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Mount Carmel College, Autonomous
No.58, Palace Road, Bengaluru 560 052.

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Editor's Note

It is very interesting to note that the present issue starts with Languages, which links all the emotions and receptiveness. The paper in Sanskrit explains how sense organs are important to get adjusted to environment. There is a dire need to accept the individuals as they are and all have the liberty to lead life of their choice.

In the Humanities section, economic policies like GDP growth that shows the differences, which is evident between the developing and the developed world and lays focus on the fact that growth is not possible without development and development in turn is a holistic phenomenon and accomplishment. This can be extrapolated from the survey report pertaining to Nigerian sugarcane growers. The productivity in sugarcane farms is affected by the incompetency in terms of allocation of working capital and also due to health related problems. This can be taken as one of the negative growth factor in the primary sector. The problems of the sugarcane growers in the country are a persistent one that calls for attention. While there is decline in GDP growth and inequity with regard to sources of income, other big blow on the economy was from fall in rupee value. Whatever may be the reason for the decline, it reflects on the nation's and personal financial well-being. These factors are well presented using appropriate data analyses in the published papers. The reflexive essay throws light on available pension systems that makes life easy for everyone after the superannuation with good financial support.

There is an attempt made in the form of a research paper on the assessment of behavioural patterns pertaining to ADHD children and how their problems can be brought under control with appropriate support system, which falls under the category of both Humanities and Sciences. The awareness among people to go for herbal preparations are increasing and the paper explains the importance of some herbs in the management of dandruff problem and the method for preparation of herbal oil. Another important finding is about the analyses of edible oils in the market and how the health factors of individuals can be restored along with the information on the constituents of these oils.

In the progressive era of networking, the review article on the subject provides detailed information on wireless sensor networks and cloud computing.

It is clear that there is scope for all those who are working in different areas to share their knowledge through our publications. Now Carmelight is an open access journal which provides readership to one and all.

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भाषायाः प्रवर्तनम् - अर्थमीमांसासिद्धान्ताः

Indian Semantic Theories on the *functioning of Language*

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Abstract: *The paper highlights a few Sanskrit theories on the* ***functioning of language****. There are many unresolved issues discussed in the field of modern linguistics such as -what is language, what is the role of language in human life, how does language become the connecting link between the speaker and the listener, how does language get the power to represent the world, how does cognition happen or how meaning is understood, Is there any innate language faculty present etc. Noam Chomsky has suggested ideas like 'Innate Language Faculty', 'Transformational Generative Grammar' etc. to solve some of these linguistic problems. The theories discussed in ancient Sanskrit texts highlighted in this paper have universal application, especially in the field of Semantics. This paper suggests scope for further exploring into ancient Sanskrit texts to see the origin and development of Semantics* - 'अर्थमीमांसा'.

Keywords*: - Arthamimamsa, Semantics in Sanskrit, Bhasha-tritaya-sidhanta, Sabda-jyoti-sidhanta, Vag-utpatti sidhanta, Sphota Sidhanta, Pratibhasidhanta, Sabda-anuvidhasamjana*

अर्थविषये मीमांसा इति अर्थमीमांसा – Semantics इति भाषाशास्त्रज्ञैः अधुना व्यवहृतं पदम्। अस्मिन् विषये भाषायाः प्रवृत्तिः कथं, भाषा अर्थव्यवहारसमर्था कथं भवति? श्रोतुः भाषा वक्तुः भाषा च कथं संबद्धा भवति? भाषा कथं लोकं प्रकाशयति? भासते इति भाषाप्रतिभासः -तस्य प्रतिभानं -प्रवर्तनं कथमिति विशदीकरणाय उपकारकाः केचन सिद्धान्ताः अत्र निरूपितास्सन्ति।

१. भाषात्रितयसिद्धान्तः

भाषा कथं नरस्य आशयविनिमयोपाधिः जायते इति भाषात्रितयसिद्धान्तः सूचयति, तदित्थम्-

शब्दः, वाक्, भाषा -पदत्रयमपि समानार्थकत्वेन व्यवह्रियन्ते चेदपि भाषाशास्त्रचर्चासु विशिष्टार्थयुतं भवत्येकैकम् पदम्। श्रूयते इति शब्दः(heard-sound) अथवा ज्ञानेन्द्रियस्य विषयत्वेन 'शब्दः' इति पदं परिगणनीयम्। उच्यते इति वाक्, वाक् तु कर्मेन्द्रियेण उत्पन्नम् (speech produced)। वाक्-शब्दयोः समवर्तित्वेन आशयविनिमयशक्ता भवति भाषा।

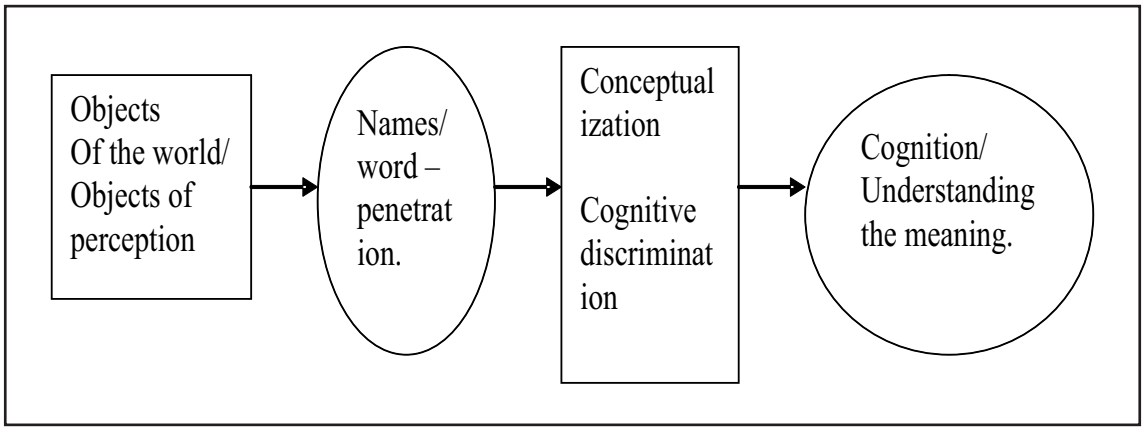
जायमानः मनुष्यशिशुः तदारभ्यैव शब्दान् श्रुत्वा श्रुत्वा कतिपयमासानन्तरं वाचां उच्चारणाय प्रयतते, क्रमेण च भाषाप्रयोगसमर्थः च भवति। या कापि वा भाषा भवतु नाम, एषः भाषात्रितयसिद्धान्तः भाषार्जनव्यवस्थां सम्यङ्निरूपयति।

२. शब्दज्योतिस्सिद्धान्तः – शब्द एव ज्योतिः इति सिद्धान्तत्वेन कल्पयामः। आचार्येण दण्डिना विरचिते

'इदमन्धं तमः कृत्स्नं जायेत भुवनत्रयम्।

यदि शब्दाह्वयं ज्योतिरासंसारं न दीप्यते' इत्यस्मिन् श्लोके आशयस्यास्य प्रस्तावः दृष्टः। दृश्यप्रपञ्चस्यैव अपरं नाम लोक इति- लोक्यते -आलोक्यते इति लोकः। दृश्यप्रपञ्चस्य संज्ञानं (cognition) पञ्चेन्द्रियाणां द्वारा सम्भवति। यदा मस्तिष्के संज्ञानं भवति तत्तु शब्दानुविद्धमेव इति भर्तृहरिणा 'न सोऽस्ति प्रत्ययो लोके यः शब्दानुगमादृते' इति निरूपितं वर्तते।शब्दानुविद्धसंज्ञानसिद्धान्तस्य प्रस्तावः इत्थम्।

३. शब्दानुविद्धसंज्ञानसिद्धान्तः रेखाचित्रे दर्शितोऽस्ति-



४. प्रतिभासिद्धान्तः

प्रतिभा भाषार्थः इति प्रतिभासिद्धान्तः भाषायाः श्रवणेन कथम् अर्थस्य अवगमनं साधयति इति विशदयति। शब्दश्रवणानन्तरं पूर्णस्याशयस्य शब्दस्फोटः स्मृतिमण्डले पूर्वार्जितस्मृतिमनुसृत्य तरसा अर्थस्य भानं -प्रतिभानं (sudden flash of understanding) संभवतीति।'अभ्यासात् प्रतिभाहेतुः इति निदर्शनेन पूर्वार्जित ज्ञानस्य संबद्धः एव नूतनज्ञानं सम्भवतीति, अर्थस्य अवगमनं भवतीति च सिद्ध्यति।

स्फोटसिद्धान्तमधिकृत्य चर्चाः सुलभाः किन्तु प्रतिभा भाषार्थः इत्यस्याशयस्य आधुनिकभाषाशास्त्रमण्डले गौरवेण श्रद्धया च चर्चिताः प्रबन्धाः न सुलभाः। स्फोटस्तु भाषायाः एककम्- प्रकृतिः, प्रत्ययः, पदं, वाक्यं, प्रबन्धः, परिच्छेदः, प्रभाषणम् -यद्वा भवतु पूर्णस्य तस्य भाषैककस्य श्रवणे (स्फोटश्रवणे) स्फुटति प्रतिभा भाषायाः अर्थः।

प्रतिभासिद्धान्तः निर्मितबुद्धिविषयेऽपि – Artificial intelligence, search engines इत्यादिषु प्रसङ्गेषु अपि विशदीकरणाय समर्थः वर्तते।

५. वागुत्पत्तिसिद्धान्तः– वाचां चतुरवस्थामधिकृत्य महाभाष्यकारेण उद्धृतमस्ति 'चत्वारिवाक्परिमिता त्रीणि गुहायां नेङ्गयन्ति.." इत्यादि।

परावाक् मूलचक्रस्था पश्यन्ती नाभिदेशगा
हृदिस्था मध्यमा ज्ञेया वैखरी कण्ठदेशगा'

इति स्फुटं प्रतिपादयति वाचां उत्पत्तिः एकस्यां व्यक्तौ यथा संभवतीति। वक्तुः विवक्षया प्राणवायुः मूलाधारादुत्थिता (परावाक्) उपरि गच्छन्ती नाभीदेशे स्वाधिष्ठान इति ऊर्जस्थानं प्राप्य (पश्यन्ती वाक्) पुनः उपरि गच्छन्ती हृद्देशस्य ऊर्जस्थानं प्राप्य (मध्यमा वाक्) कण्ठद्वारा वायुना सह कत्वगत्वविशिष्टा वैखरीवाक् निर्गच्छति। एषः वागुत्पत्तिसिद्धान्तः।

आत्मा बुद्ध्या समेत्यार्थान् मनो युङ्क्ते विवक्षया

मनः कायाग्निमाहन्ति स प्रेरयति मारुतम्

मारुतस्तूरसि चरन् मन्दं जनयते स्वरम्" इति पाणिनीयशिक्षायां वागुत्पत्तिवर्णना विद्यते।

वाक् आत्मनिष्ठा भवति, कर्मेन्द्रियःभवति न तु ज्ञानेन्द्रियस्य विषयः। वैखर्या यदा परश्रवणगोचरा बहिर्गच्छति, तदा अन्येषां तच्छब्दःभवति खलु, तत्र तेषां श्रवणगोचरः शब्दः सः। समानभाषाभाषितसमाजे एकस्य आत्मनिष्ठा वाक् अन्येषां श्रवणगोचरःशब्दःभूत्वा समानार्थबोधकःभवति, भाषा आशयविनिमयसाधिका च भवति। एवं भाषा लोकव्यवहारसाधिका लोकव्यवहारसंबन्धिका च भवति।

६. भाषासरस्वतीसिद्धान्तः – सरस्वतीनाम्ना भाषाव्यवहारः तस्याः भाषायाः प्रवाहशीलस्य (fluidity of language) च सूचकसिद्धान्तत्वेन प्रदर्शयानि।

भाषासरस्वतीसिद्धान्तः भाषा वाणी, सरस्वती इत्यादि नामभ्यामपि निर्दिष्टा, अत्र भाषायाः सरणसामर्थ्यं -सरति सरतीति सरस्वती- अर्थद्योतनस्य विविधाः स्तराः भवितुमर्हतीति प्रस्तौति। अभिधार्थः, लक्षणार्थः, व्यञ्जनार्थः पुनः प्रत्येकस्यापि पदस्य सामर्थ्यं वस्तुनः एकदेशस्य, भूरिदेशस्य वा अर्थद्योतनसामर्थ्यं एतत् सर्वं वाक्यपदीयस्य द्वितीयकाण्डे

घटादीनां न चाकारान् प्रत्याययति वाचकः।

वस्तुमात्रनिवेशित्वात् तद्गतिर्नान्तरीयकी (२-१२३) श्लोकेस्मिन् तथा

एकस्मिन्नपि दृश्येऽर्थे दर्शनं भिद्यते पृथक्

कालान्तरेण चैकोऽपि त्वं पश्यत्यन्यथा पुनः" (वाक्यपदीयम् २-१३६) इत्यादिषु श्लोकेषु प्रतिपादिताः सन्ति।

बालोप्येकः प्रथमदिने विद्यालयम् इति पदस्य अर्थं यथा अवगच्छति तथा न भवति दशवर्षाणामनन्तरं तस्य मनसि अर्थः। एवम् 'रघुः महाराजः' , हिमवान् महापर्वतः , कुमारसम्भवं महाकाव्यम् इत्येतेषु वाक्येषु महान् इति पदस्य किञ्चिदिव भिन्नार्थः प्रतिभाति खलु! राज्ञः महत्वं, पर्वतस्य महत्वं, काव्यस्य महत्वं च भिन्नार्थान् द्योतयति इव। एवं न केवलमत्र, भाषाप्रयोगे आस्वादने च सर्वत्र विस्मयावहः भाषायाः प्रतिभासाः। वयं तेषाम् आधिक्येन सौलभ्येन च तद् द्रष्टुम् आस्वादयितुं च दत्तश्रद्धाःभूयास्म।

Conclusion: संस्कृतभाषायां पाणिनीये बहवः भाषाशास्त्रसङ्केताः (linguistic concepts) विद्यन्ते इति आधुनिकाः अङ्गीकुर्वन्ति, पिपठिषन्ति च। परन्तु अर्थजिज्ञासायां (Semantic enquiry) तावन्तो विषयाः न उपलभ्यन्तेति चेत् तन्न सत्यम्। संस्कृतवाङ्मये पारावारे सिद्धान्तत्वेन कल्पयितुम् अर्हाणि रत्नानि बहूनि विद्यन्ते।

सुलभतया लब्धानि कानिचन सङ्केतरत्नानि सिद्धान्तत्वेन प्रकटीकृतानि अस्मिन् लेखने। एकैकोपि सिद्धान्तः न केवलं संस्कृतस्य अपि तु भाषासामान्यस्य (Language Universal) प्रवर्तनं कथमिति विशदयितुं समर्थः विद्यते। 'अर्थमीमांसा' इति शास्त्रशाखायाः उत्पत्तिः विकासश्च इतोपि द्रष्टव्यः आधुनिकैः भाषाशास्त्रज्ञैः। चिन्तोद्दीपकैः सिद्धान्तशतैः उत्तरोत्तरं विकसितेयम् अर्थमीमांसा शिक्षाव्याकरणनिरुक्तादिषु ग्रन्थेषु च अभिव्याप्य वर्तते इति सूचनायैवायमारम्भः।

In order to register the cognition, it has to be coded in language- this idea is presented in 'Sabda-anuviddha-samjjnana' theory. अनुविद्धमिव सर्वं ज्ञानं शब्देन भासते (वाक्यपदीयम्- प्रथमकाण्डः श्लोकः 123)

पूर्णस्यश्रुतशब्दस्य स्फोटः स्मृतिमण्डले यदा भवति तदा भाषार्थः पूर्वार्जितज्ञानानुसारी अर्थः प्रतिभाति इति प्रतिभा वाक्यार्थः इति वाक्यस्य भाषायाः एककत्वं कल्पयित्वा वदति। वस्तुतः प्रतिभा भाषार्थः इति वक्तव्या।This pratibhaa theory is successful in explaining all kinds of meaning inclusive of word meaning, meaning of demonstrative pronouns, meaning of discourse markers, sentential meaning, discourse meaning etc.

The underlying mental involvement is an important factor in the process of language performance-New horizons in the study of Language and Mind, Noam Chomsky, 2008, preface pg.2

Any knowledge we acquire based on the already existing knowledge.

Indian theories of meaning by Dr. K. Kunjunni Raja

वाक्पाणिपादोपस्थपायु – इति वाक् पञ्चसु कर्मेन्द्रियेषु एकः, आत्मनिष्ठा च। वाक् इति पदं शब्द इति पदेन न मिश्रितं भवतु। शब्दस्तु श्रवणगोचरः विषयः। तस्मिन् विषये श्रद्दधानाः भवेम इति 'वागुत्पत्तिसिद्धान्तत्वेन प्रस्तुता अत्र।

पाणिनीयशिक्षा

Fluidity of language- language has the ability to expand, to contract, to give additional meaning to give limited meaning etc.

Knowing themagical feature of language, to expand, to lengthen, to broaden, to deepen, we must give special attention to the 'elasticity' / 'fluidity' of language. Due to the extreme acquaintance,

we just miss to 'wonder' at it. In Sanskrit, in the Vedas, 'Language' and also 'Knowledge' are worshiped as 'Saraswati'. सरतिसरतिइतिसरस्वती, that which flows, that which is not stagnant, that which is pure and energetic due to the ever flowing nature. Language flows from the speaker to the hearer, through the four stages, parā, pasyanti, madhyama,vaikhari. -Thought/idea of the speaker flows to the hearer, through speech and speech enlighten the idea/thought in the hearer's mind.Pg 281, Indian Theories of Meaning with special stress on Bhartrhari& Chomsky.

भारतीय-पश्चात्यमनोविज्ञानक्षेत्रे संज्ञानात्मकज्ञाननिर्मितिवादस्य तौलनिकम् अध्ययनम्

A COMPARATIVE STUDY OF COGNITIVE CONSTRUCTIVISM BASED ON INDIAN AND WESTERN PSYCHOLOGY

Maneesha .L
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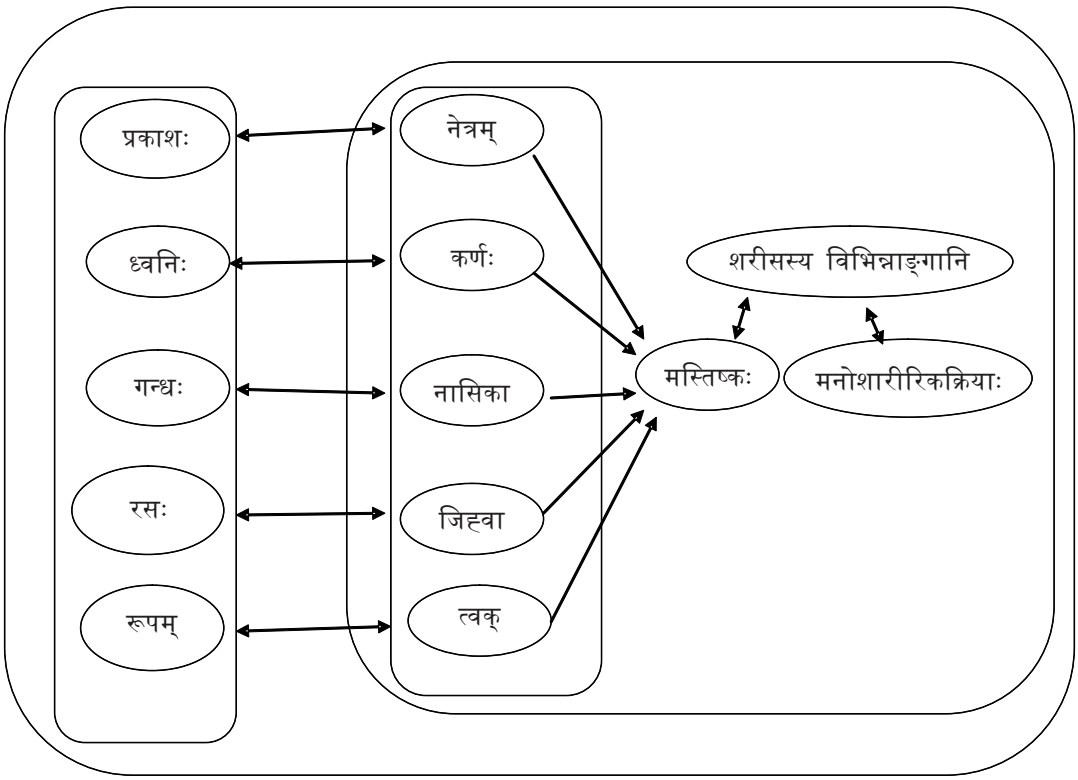
वातावरणात् उद्दीपकसंकेतं मानवः स्वीयैः पञ्चेन्द्रियैः गृह्णाति। संकेतानां सूचनानां वा संसाधनप्रक्रिया निम्नप्रदर्शितरेखाचित्रेण ज्ञातुं शक्यते।



प्रदर्शितचित्रेण स्पष्टरूपेण परिलक्षितं भवति यत्- मानवः स्वीयं वातावरणं प्रति संवेदनशीलोऽस्ति, तं प्रति अनुक्रियाञ्च करोति। यदा इन्द्रियाणां माध्यमेन मानवः बाह्यवातावरणात् उद्दीपकानां पूर्वानुभवाधारेण तेषां रूप- गुण- नाम संवेदनादिसन्दर्भे किमपि ज्ञानं प्राप्यते तदा ज्ञानग्रहणस्य प्रक्रिया- प्रत्यक्षीकरणम्(Peceptualization) इति कथ्यते। प्रत्यक्षीकरणे संवेदनायै अर्थः प्रदीयते। इयं प्रक्रिया तदैव घटिता भवति यदा तस्याः संवेदनायाः किञ्चित् पूर्वज्ञानं जनेषु स्यात्। परं यदा वातावरणस्य संकेतचिह्नानि प्रत्यक्षीकृतोद्दीपकानां विशेषता सम्वादी न भविष्यन्ति तदा जनेषु प्रत्यक्षीकरणं कठिनं भविष्यति एवञ्च तात्कालिकज्ञानस्यापि प्राप्तिः न भविष्यति। यदा कोपि उद्दीपकः ज्ञानेन्द्रियाणां सम्पर्के समागच्छति तदा तत्सम्बन्धितज्ञानेन्द्रियं प्रभावितं भवति तथा च उद्दीपकानां सूचना कस्यापि ऊर्जारूपेण तं निकषा गच्छति। तदनन्तरं ज्ञानेन्द्रियाणां स्नायुतन्त्रेषु रसायनसम्बद्धानि परिवर्तनानि भवन्ति। इमानि स्नायोः आवेगरूपेण मस्तिष्कं प्रति गच्छति। मस्तिष्के स्नायोः आवेगानां प्राप्त्यनन्तरं पूर्वानुभवैः जनेषु संज्ञानं भवति इति भारतीयमनोवैज्ञानिकानाम् अभिप्रायः।

संज्ञानात्मकज्ञाननिर्मितिवादस्य तात्पर्यम् अनया प्रक्रियया भवति यस्यां संवेदन- प्रत्यक्षीकरण- प्रतिमा- धारण- प्रत्यस्मारण- चिन्तन- तर्क- समस्यासमाधान सदृशाः मानसिकप्रक्रियाः सम्मिलिताः भवन्ति। अतः संज्ञानशब्दस्य तात्पर्यम् अधोदत्तरीत्या – Neisser (1967) महोदयेन भणितम्[1]

"संवेदितसूचनानां (sensory information) ग्रहणं कृत्वा विस्तरेण (elaboration) संग्रहणेन (collection) पुनः प्रापणेन (recovery) एवञ्च समुचितप्रयोगेण संज्ञानं भवति" । अतः बालकेषु संज्ञानात्मकविकासः कासाञ्चनसूचनानां ग्रहणेन, चिन्तनेन क्रमशः योग्यतोत्पादनेन भवति। अस्य प्रयोगं विविधपरिस्थितिषु संपाद्य ते विविधसमस्यानां समाधानं सारल्येन कर्तुं शक्नुवन्ति। संज्ञानात्मकज्ञाननिर्मितिवादस्य विकासाध्ययने महत्त्वपूर्णकार्याणि कृतवन्तः पियाजे, ब्रूनर्, औसुबेल् इत्यादयः पाश्चात्यमनोवैज्ञानिकाः। ते निम्नलिखितान् पञ्चोपागमलोकप्रियदृष्टिकोणान् प्रदर्शितवन्तः।

1. सूचनासंसाधनरूपे संज्ञानम् (Cognition as Information Processing)-

   मनोवैज्ञानिकपण्डिताः , संज्ञानं पूर्णरूपेण सूचनासंसाधनस्य प्रक्रिया वर्तते इति मन्यन्ते। एतेषां मतिनुसारेण संज्ञानं इति समावेशी शब्दोस्ति। शब्दोयं ताः प्रक्रियाः प्रतिसंकेतयति याभिः

सांवेदिकनिवेशस्य रूपान्तरणं (transformation), न्यूनीकरणं (reduction), विस्तरणं (elaboration), संग्रहणं (collection), पुनः प्राप्तिः(recovery), अनुप्रयोगश्च (application) भवति। एते संज्ञानात्मकमनोवैज्ञानिकाः चिन्तनस्य सूचनासंसाधनस्य कार्यं वर्तते इति वदन्ति।[2]

2. मानसिकप्रतीकानां प्रहस्तलनरुपेण संज्ञानम्(Cognition as manipulation of mental symbols)-

केचन मनोवैज्ञानिकाः संज्ञानात्मकप्रक्रियाः मानसिकप्रतीकानां प्रहस्तलरूपेण स्वीकुर्वन्ति, यतो हि प्रतीकेषु प्रतिनिधित्वकरणं समुपलब्धं भवति। अतः यदा वयं कस्यापि वस्तुनः कृते प्रतीकात्मकशब्दस्य प्रयोगं कुर्मः तदा तस्य वस्तुनः उपस्थित्यभावेपि पूर्वानुभवस्याधारेण प्रतीकानाम् अर्थः अवगम्यते।

3. समस्या-समाधानरूपेण संज्ञानम् (Cognition as Problem Solving Process)-

केचन कथयन्ति यत् संज्ञानं ताः प्रणालीः संकेतयति यासां समस्यानां समाधानाय सूचनानां संकलनाय च उपयोगः भवति। एतेषां मतानुसारं समस्या-समाधानम् एका संज्ञानात्मिका प्रक्रिया।

4. चिन्तनरूपेण संज्ञानम् (Cognition as thinking)-

चिन्तमपि एका संज्ञानात्मकप्रक्रिया वर्तते इति केचन वदन्ति। चिन्तने विविधानां मानसिकक्रियाणां समावेशोस्ति।

5. ज्ञानप्राप्तिः, स्मरणं, प्रत्यक्षीकरणं, चिन्तनं, निर्णयः, तर्कः, अधिगमः, कल्पना, सम्प्रत्ययीकरणम् इत्यादिषु संज्ञानम्।

संज्ञानात्मकप्रक्रिया(Cognitive process)-

अधिगमप्रक्रियायां छात्राणां साज्ञानात्मकप्रणाली कक्ष्यायाः वातावरणे तथा छात्राणां

मानासिकक्षमतानाञ्चोपरि आधारिता भवति। छात्राः स्वक्षमतानुगुणं वातावरणात् सूचनाः गृहीत्वा संसाध्य ज्ञानं प्राप्नुवन्ति। सूचनाः गृहीताः समसाधिताश्च भवन्ति, सैव प्रकारः संज्ञानात्मकशैली इति उच्यते। संज्ञानात्मकशैली इति विदुषां मते एकः स्थिरगुणः, यस्याः संबन्धः व्यक्तेः व्यक्तित्वेन, योग्यतया, भावात्मकपक्षैश्च भवति। विंशतितमशताब्द्यां संज्ञानात्मकविकासेन बुद्ध्या च संबद्धानां विविधानां सिद्धान्तानां प्रतिपादनान्तरं संज्ञानात्मकक्षेत्रस्य विवधेषु आयामेषु कार्याणि अभवन्, येषु संज्ञानात्मकशैली अपि प्रमुखरूपेण सम्मिलिता आसीत्।

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2. www. Researchgate.net

   What is Cognition? A functional Cognitive Perspective. Jan De Houwer Ghent University, Belgium pg3

उत्तम शिक्षण में शिक्षक की भूमिका

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भूमिका:

ज्ञान, आत्मा को परितृप्त करने का एकमात्र साधन हैं और शिक्षा वह सूक्ष्म माध्यम है जो आत्मा को ज्ञान से जोड़ती हैं। शिक्षा का मानव जीवन में अत्यंत महत्वपूर्ण स्थान है । विद्यार्थी के संस्कारगत, नीतिगत एवं चरित्रगत विकास में सही समय पर दी हुई शिक्षा कालांतर में यह निर्णय करती हैं कि उसका जीवन कैसा होगा। समग्र शिक्षा में उस शिक्षा के उपयोग का भी प्रशिक्षण होना आवश्यक है जो विद्यार्थी को इस सत्य से परिचित कराए कि ज्ञान का उपयोग स्थान,काल एवं पात्र के अनुरूप होना चाहिए।

शिक्षा को प्रत्यक्ष रूप देने वाले कलात्मक कारीगर शिक्षक होते हैं। ज्ञान से भी अधिक वह अपने व्यक्तित्व से विद्यार्थियों के कोमल मानसपटल पर सदा अपना छाप छोड़ जाते है। एक शिक्षक के जीवन में विद्यार्थियों की संख्या अपरिमित होती हैं जिनमें से अधिक उनके स्मृतिपटल से विलुप्त हो जाते हैं। परंतु एक विद्यार्थी के जीवन में शिक्षकों की संख्या सीमित रहती हैं एवं उनमें से अधिकतर विद्यार्थी की स्मृति से कभी विलुप्त नहीं होते। किस शिक्षक ने कितना ज्ञान दिया ,यह विद्यार्थी के लिए इतना महत्वपूर्ण नहीं है जितना कि एक शिक्षक ने किस प्रकार अपने दुर्बल से अतिदुर्बल विद्यार्थी के मन में आशा का बीज बोकर उसमें संसार से सम्मुखीन होने का आत्मबल प्रदान किया है।

कई बुद्धिजीवी शिक्षण–पद्धति में हमेशा कमी देखते हैं। समय समय पर शिक्षण–पद्धति को त्रुटिपूर्ण घोषित करते हैं। यदि इतिहास के पृष्ठों को पलटकर देखा जाए तो वेद कालीन शिक्षण पद्धति अत्यंत कठिन था। विद्यार्थी के पास साधनों का भी अभाव था। तो प्रश्न यह है कि उस काल में इतनी त्रुटियों के होते हुए भी महान पंडितों की संख्या में कभी अभाव के लक्षण क्यों दिखाई नहीं दिये? गुरु मुखी विद्या से विज्ञान,योग, शल्य चिकित्सा, नृत्य,संगीत, अर्थशास्त्र, नीतिशास्त्र, आयुर्वेद, दर्शनशास्त्र आदि सभी विधाओं में प्रकाण्ड पंडित समाज को प्राप्त हुआ। तत्कालीन शिक्षक केवल शिक्षक नहीं थे ,वे समाज सुधारक भी थे। इसका तत्पर्य यही है कि त्रुटि कहीं और हैं।

शिक्षक में जब नैतिक क्षमता का ह्रास होता है, मूल्यों का आसन डगमगाने लगता है। जो स्वयं अपने मूल्यों पर अटल रहते हैं केवल वे ही उनका हस्तान्तरण कर सकता हैं।

शिक्षा में नैतिक मूल्य की परम आवश्यकता है तथा शिक्षक में दो गुणों का होना भी अत्यावश्यक है– यथा बुद्धि एवं विवेक। विद्या ग्रहण के ये तत्व भी कहे जा सकते हैं।

अ. शिक्षा–ग्रहण में बुद्धि का स्थान

शिक्षा ग्रहण में सबसे प्रमुख और आवश्यक तत्व बुद्धि है। अर्थशास्त्र के निर्माता आचार्य चाणक्य का उदाहरण इस तथ्य के समर्थन के लिए उपयुक्त हैं।

संपूर्ण अर्थशास्त्र के अध्ययन से पता चलता है कि कितनी सूक्ष्मता से नियमों को श्रृंखलाबद्ध किया गया है। इस ग्रंथ में कुल दस अधिकरण हैं।

प्रथम अधिकरण	राज्य में अनुशासन की स्थापना
द्वितीय अधिकरण	राज्य में अध्यक्षों की नियुक्ति
तृतीय अधिकरण	राज्य में कानून व्यवस्था
चतुर्थ अधिकरण	प्रजापीड़कों से प्रजा की रक्षा
पंचम अधिकरण	राज्य–कर्मचारियों पर नियंत्रण
षष्ठ अधिकरण	राज्य–सत्ता के सात अंग
सप्तम अधिकरण	राज्य में षडगुणों की व्यवस्था
अष्टम अधिकरण	विजय–यात्रा तथा सेना–व्यवस्था
नवम अधिकरण	कूट युद्ध की रचना
दशम अधिकरण	शत्रुनाश के अद्भुत औपनिषदिक उपाय

कौटिल्य अर्थशास्त्र के प्रथम अधिकरण में चार प्रमुख विद्याएँ तथा उनके उद्देश्य का उद्घाटन हुआ है। आचार्य कौटिल्य के कथन के अनुसार–

" विद्याविनीतो राजा हि प्रजानां विनये रतः।
अनन्यां पृथ्वीं भुङ्क्ते सर्वभूतहिते रतः॥"

अर्थात विद्या द्वारा विनय को धारण करने वाला राजा ही प्रजाओं में विनय अथवा अनुशासन की स्थापना कर सकता है। वह सर्व–लोक–हित में तत्पर रहता हुआ, शत्रुरहित होकर,पृथ्वी का भोग करता है। [१]

इस ज्ञान को शिक्षा एवं शिक्षक से जोड़ा जाए तो भाव यही है कि विद्या प्रदान करने वाले शिक्षक यदि विनय को धारण करें तभी वे सफलतापूर्वक अपने विद्यार्थियों में विनय का बीज बो पायेंगे। विद्यार्थी के लिए शिक्षक दर्पण के समान होते हैं। यथा गुरु,तथा शिष्य का अत्युत्तम उदाहरण इससे बढ़कर और क्या हो सकता हैं?

कौटिल्य ने बुद्धि–बल को राज्य संचालना में सबसे अधिक महत्वपूर्ण माना हैं। समय की सदुपयोगिता पर भी अर्थशास्त्र बल देता है। विद्याभ्यास का समय और आयु पर ध्यान देते हुए चाणक्य का मत है कि मुंडन के पश्चात १६ वर्ष विद्याभ्यास का होना चाहिए। बुद्धि विकास का यह स्वर्ण काल है। सही

अनुशासन से इंद्रियों का वशीकरण और प्रलोभनों का दमन इस आयु में शिक्षक अपने विद्यार्थियों को सिखा सकते हैं।

शिक्षण पद्धति एक वैयक्तिक कला है जिसे न कभी सिखाया जा सकता है और न ही अनुकरण किया जा सकता है। पारंपरिक रूप से यह संपूर्ण गुरु–शिष्य के संबंध पर निर्भर करता है।

एक स्पष्टवादी, सरल एवं सद्गुणों से परिपूर्ण शिक्षक ही एक स्वस्थ समाज का निर्माण कर सकता है।

आ. शिक्षा–ग्रहण में विवेक का स्थान

शिक्षा में विवेक का स्थान अनिवार्य हैं। स्वामी विवेकानंद जी एक ऐसे शिक्षक थे जिनके शब्द कालजयी है और युग युगांतर तक शिक्षकों के लिए गीता की वाणी के समान प्रेरणादायक बने रहेंगें। फ्रेंच साहित्यकार रोमां रोला स्वामी विवेकानंद से अनुप्राणित थे। १९१४ के आसपास वे भारत आये और तीन महान गुरुओं की जीवनी लिखने का कार्य प्रारंभ किया। उन्होंने महात्मा गांधी, श्री रामकृष्ण परमहंस और विवेकानंद की जीवनी लिखी जो १९२९–३१ में प्रकाशित हुई।

रोलां द्वारा रचित " विवेकानंद" नोबेल पुरस्कार द्वारा सम्मानित हुआ था।

विद्या के प्रार्थी, विद्यार्थी, असीम शक्ति, क्षमता और उत्सुकता से शिक्षक के पास आते हैं परन्तु ऐसा नहीं हैं कि हमेशा विद्या का आदान– प्रदान मनोनीत हो। कभी कभी गुरु की आँखे शिष्य में वह प्रतिभा को पहचान लेती हैं जिससे शिष्य स्वयं अन्जान है।

एक बार रामकृष्ण परमहंस ने अपने शिष्य विवेकानंद के बारे में कहा था– "जिस दिन नरेन दुःख और क्लेश के सम्पर्क में आयेगा, उसके चरित्र का अभिमान पिघलकर असीम करुणा के भाव में बदल जाएगा। तब उसका प्रबल आत्म–विश्वास हारी हुई आत्माओं में विश्वास और श्रद्धा जगाएगा और प्रबल आत्मसंयम पर आधारित उसका उन्मुक्त आचरण दूसरों की आँखों में अहंकार से सच्ची मुक्ति के प्रकाश को चमका देगा।"[2]

स्वामी विवेकानंद ने संपूर्ण जगत को यही विवेक प्रदान किया। शिक्षक में यदि विवेक हो तो शिक्षा के प्रवाह में न तो कोई बाधा उत्पन्न होगी और न ही विद्यार्थी के मन में कोई संशय रहेगा। ज्ञान प्राप्ति का यही सरल उपाय है।

स्वामीजी की शिक्षा प्रणाली में आध्यात्मिकता और योग का प्रमुख स्थान है। उनके चार सिद्धांत – कर्मयोग,भक्तियोग,राज–योग और ज्ञान–योग चिंतन मनन के बिन्दु हैं। विद्या ग्रहण में मन का शान्त एवं नियंत्रित होना प्राथमिक आवश्यकता हैं। शिक्षक का भी शान्त एवं निरहंकार रहना इस मत का समर्थन करता है। विवेकानंद का यह कथन कितना सत्य हैं– शांत रहो, स्वतंत्र रहो और कर्म करो।

क्या शिक्षा–प्रणाली इन मतों से कभी भिन्न था?

निष्कर्ष:

शिक्षक का समाज में महत्वपूर्ण भूमिका इसलिए नहीं कि वे शिक्षा के माध्यम हैं बल्कि इसलिए कि वे चरित्र निर्माण का साँचा हैं। ज्ञान का आधार अपरिमेय है। आज के युग में ज्ञान बटोरना असाध्य नहीं हैं लेकिन उच्च श्रेणी का मानव बनना असंभव अवश्य है। जिस भारत में कभी मनीषियों की कमी नहीं हुई ,दुर्भाग्यवश क्यों आज इसकी कमी आ गयी है?

शिक्षा का अर्थ बदल रहा है, विद्यार्थियों के विचार बदलने के लिए शिक्षकों को भी परिवर्तन का हाथ थामना होगा।

संदर्भ– सूची

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२. रोमां रोला, विवेकानंद, अनुवादक– राजकुमार शर्मा, पृ.सं–६, मनीष प्रकाशन, दिल्ली



याद आते हो.....

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याद आते हो,
हर पल मुझे तुम याद आते हो
कुछ अनकही बातों में,
कुछ उभरते जज़बातों में।

तुम्हारे और मेरे बीच जो एहसास की डोर है,
उसके दोनों छोर पर हमारा दिल है।
अपने दिल की राह से जब तुम तक जाती हुँ
तब तुम याद आते हो।

जब दिसम्बर की सिकुड़ती रातों में
रज़ाई के नीचे मेरा मन सोता था
तब तुम याद आते थे।
जब उन दिनों चाँद भी बादलों की चादर ओढ़कर
अपनी रोशनी से जाहां को रोशन कर रहा था,
तब उस रोशनी में नहाया हुआ हर एक पल
तुम्हारी याद दिलाता था।

जब बारिश होती है
और मेरा जी प्यासा हो जाता है
तब तुम याद आते हो।

ये अजीब सी बात है कि
तुम्हारे और मेरे बीच कोई कड़ी छूटती नहीं है।
क्या हम एक हो चुके है साथी।

फूलों के रंगों में
मिट्टी की खूशबु में
पानी पर पड़ती परछाई में
तुम ही तो हो जो नज़र आते हो।
इन आँखों ने जो देखा है उन सबमे तुम्हें ही देखा है।
और जब आईने में मैं एक नज़र खुद से मिलाती हुँ
तो लगता है कि तुमसे नज़र मिला रही हुँ।

किताबों में न जाने कितने अनगिनत शब्द
हर शब्द का कुछ-कुछ अर्थ।
जब उन्हें पढ़ती हुँ
तो लगता है कि तुम्हारा नाम लेती हुँ।
क्योंकि तुम हर पन्ने में बसे हो।
जब पुराने पलटे पन्ने इक नज़र देखती हुँ
तब तुम याद आते हो।

और इस तरहा हर लम्हा गुज़र जाता है।
तुममे हम खोये रहते हैं,
पर बीता हर एक-एक पल
तुम्हारी याद दिलाता है।
क्योंकि उन बीतें लम्हों में तुम ही तो बीते थे
जो गज़ारे थे साथ हमने।

किन्नर ! मानवजाति की नयी आवाज़।

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koyalbiswas@gmail.com

नर हो, न नारी हो,
असीम क्षमता के अधिकारी, तुम किन्नर हो।
ईश्वरीय संरचना में अनन्य,
धैर्यशाली, कर्तव्यपरायण, मानवश्रेष्ठ तुम किन्नर हो।
पौरुष में सुडौल, शक्ति तुम में अपार,
बुद्धिबल एवं विवेक में अतुलनीय निरंतर ।
नारीत्व की गरिमा, सौन्दर्य की उपमा,
ममता, स्नेहानुभूति एवं दया तुममें अपारावार।

समाज के कठोर शब्दबाण से सदा व्यथित हुए
सभी लैंगिक मतभेद में तुम निरुत्तर रहे।
पुरुष जाति से विलग, चाहो तो नारी जाति में सम्मिलित हो जाओ,
नारी तुमसे गौरान्वित हो, तुम अपने अस्तित्व पर अभिमान करो।
केवल समानता के अधिकार से नहीं, मनुष्यत्व के मापदण्ड पर
तुम सभी को सीना तानकर जीना सिखाओ।
अश्रुपात से नहीं, अभिव्यक्ति में आत्मसंतुष्टि हो
सदियों से मौन रहनेवाले किन्नर, अब तो तुम जागो।

जब जब सत्ता छीन ली गई तुमसे,
दूसरी नीड़ तलाशे तुमने,
अपनी अस्मिता को दुनिया के सम्मुख लाने का
क्यों कभी ज़िद नहीं किया तुमने?

कभी शिखण्डी बनकर तुम किसी की ढाल बने
तो कभी सम्राटों के अंदरमहल की सेविका बने
हर स्थान में केवल उपयोग की वस्तु बनकर
तुमने कैसे सदियाँ काटे?

आज तुम धीरे धीरे उन्नति की राह पर चल रहे हो,
शिक्षा एवं उद्योग क्षेत्र में प्रशंसा के पात्र भी बने हो।
वह दिन दूर नहीं जब तुम स्वयं अपनी पहचान बनोगे,
न नर ,न नारी केवल किन्नर शिरोमणि बनकर दुनिया को दिखाओगे।
समाज को तुमपर होगा नाज़,
तुम किन्नर हो, मानवजाति की नयी आवाज़।

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DETERMINANTS OF TOTAL FACTOR PRODUCTIVITY (TFP) OF SUGARCANE FARMERS IN KWARA STATE OF NIGERIA

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Abstract: *The present research empirically determined the factors influencing Total factor productivity (TFP) of sugarcane producers in Kwara State of Nigeria using 2017/2018 sugarcane cropping season field survey data obtained through administration of structured questionnaire complemented with interview schedule on 105 sugarcane farmers selected via multi-stage sampling technique. The collected data were analyzed using conventional TFP index and censored regression model. From the empirical findings, it was observed that inefficiency in the allocation of working capitals; capital consumption and health-related challenges decrease TFP of sugarcane farmers in the studied area. However, the study advised the extension agents to educate farmers to be rational in resource allocation in order to optimize their productivity in sugarcane production. In addition, the study advised farmers to adopt health precautious measures in order not to predispose their family members to tropical diseases and should imbibe savings and investment cultures.*

Keywords: *TFP, sugarcane, farmers, Kwara state, Nigeria*

INTRODUCTION

The empirical literature has widely recognized the importance of productivity, and its importance will further increase due to the limited possibility in further expansion of cultivated area, pressure on limited land resources for agricultural activities as evidenced by farmers/herders clashes, population explosion, urbanization growth and expected

increase in income. Therefore, to evaluate the sources of growth and to recognize the impact of changing government policies, productivity analysis is very essential.

Productivity can be measured by partial and total factor productivity (TFP). Partial measures of productivity can be misleading, as there is no clear indicator of why they change[1]. For example, land and labour productivity may rise due to increased use of agrochemical or output mix. To account for at least some of these problems a total measure of productivity, the total factor productivity (TFP), was devised.[2]

In the study area, the land resource for agriculture is shrinking owing to competing demand for its use which is visible by the escalating rift between farmers and herders on a continuous basis, thus leading to unnecessary loss of lives and properties. Therefore, a further increase in agricultural production has to be achieved by enhancing the productivity of the land.

Productivity can be increased *via* one or combination of its determinants-the technology, the quantities and types of resources used and the efficiency with which the resources are used. Therefore, embarking on new technologies is meaningless unless the full potential of the existing technologies is explored.[3]

An estimate on the extent of TFP can help to decide whether to improve productivity efficiency or to develop new technologies to raise sugarcane production in the studied area. Also, inefficiencies in TFP of sugarcane may also arise due to socio-economic factors which have a correlation, thus the need to explore this possibility.[4] It is in view of the foregoing that the present research was conceptualization with the aim of identifying the factors that determine the TFP of sugarcane farmers in Kwara State of Nigeria.

RESEARCH METHODOLOGY

The Kwara State of Nigeria lies between longitudes 4^0 $20^{'}$ and 4^0 $25^{'}$ East of the Greenwich meridian and latitudes 8^0 $30^{'}$ and 8^0 $50^{'}$ North of the equator. The population of

the state is approximately 2.3 million and has a landmass of approximately 36,825 square kilometres with varying physical features like hills, lowland, rivers etc. Its vegetation is derived savannah with two distinct wet and dry seasons, with mean annual precipitation and monthly temperature of 1000-1500mm and 25^0C-34^0C, respectively.[5] The major occupation of the inhabitants is agricultural activities complemented by trade, artisanal, *Ayurvedic* medicine etc. The present research used undated data elicited through structured questionnaire complemented with interview schedule from 105 active sugarcane farmers during the 2017 production selected *via* multi-stage sampling design. In the first stage, one agricultural zone, namely zone B was purposively selected due to its comparative advantage in the production of sugarcane. In the second stage, two LGAs *viz.* Edu and Patigi which made-up the selected agricultural zone were automatically selected as both have the potentials in the production of sugarcane in the studied areas. Because of the limited number of villages producing sugarcane in the selected LGAs all the villages were considered. Therefore, a total of seven villages: five (5) villages from Edu LGA and two (2) from Patigi LGA were the areas of coverage. In the last stage, fifteen sugarcane farmers from each of the selected villages were randomly selected: seventy-five (75) and Thirty (30) active farmers from Edu and Patigi LGAs respectively. Thus, a total of 105 active farmers were chosen for the study.

For reliability test of the questionnaire, the questionnaire was pre-tested in a pilot survey made up of 15 farmers from the sampling population and the estimated Cronbach Alpha value was 0.86, indicating high reliability and consistency of the questionnaire. With the aid of trained enumerators, ex-post data of 2017 sugarcane cropping season were collected in the year 2018. The collected data were analyzed using conventional Total factor productivity (TFP) index and a censored regression model.

Model Specification

Total factor productivity (TFP)

Following Key and Macbride (2003), the TFP approach adopted is presented below:

$$TFP == \frac{Y \quad Y}{TVC TVC} \quad \text{..... (1)}$$

$$TFP == \frac{Y}{\sum P_i X_i} \quad \frac{Y}{\sum P_i X_i} \quad \text{..... (2)}$$

Where, Y is output quantity (kg), TVC is a total variable cost, $P_i P_i$ is the unit price of ith variable input and $X_i X_i$ is the quantity of ith variable input. This methodology neglect the TFC as it does not affect both the profit maximization and the resource use efficiency conditions since the study focused on small-scale farmers. Total fixed cost is constant as it is sunk.

From cost theory:

$$AVC == {}^{TVC}/_{Y} \, {}^{TVC}/_{Y} \quad \text{..... (3)}$$

Where, AVC is an average variable cost in Naira (₦). Therefore, the transpose of AVC will be TFP:

$$TFP == \frac{Y \quad Y}{TVC TVC} = \frac{1 \quad 1}{AVC AVC} \quad \text{..... (4)}$$

As such, TFP is the inverse of the AVC. The partial productivity estimate is the marginal product given as MP = $\Delta TFP/\Delta X \Delta TFP/\Delta X$ …….....…..(5)

Censored model[6]: The original Tobit model developed by James Tobin a Nobel laureate economist[7] is given below:

$$Y_i^* Y_i^* = \alpha + X\beta\alpha + X\beta + \varepsilon + \varepsilon_i \quad \text{..... (6)}$$

Where Y_i* is censored variable.

Now, $Y_i = 0$ *if* $Y_i^* Y_i^* \square\ 0$

$= Y_i^* Y_i^*$ *if* $Y_i^* Y_i^* > 0$

$$Y_i^* = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \cdots \ldots + \beta_n X_n + \varepsilon_i$$
$$Y_i^* = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \cdots \ldots + \beta_n X_n + \varepsilon_i$$
..... (7)

Where:
Y_i* = TFP index of ith farmer
X_1 = Sucker (kg)
X_2 = NPK (kg) Marital status
X_3 = Urea (kg)
X_4 = Herbicide (litre)
X_5 = Family labour (man day)
X_6 = Hired labour (man day)
X_7 = Farm size (hectare)
X_8 = Depreciation on capital items (₦)
X_9 = Unit price of output (₦)
X_{10} = Yield (kg)
X_{11} = Age (Year)
X_{12} = Marital status (Married =1, Otherwise = 0)
X_{13} = Educational level (Formal = 1, Otherwise = 0)
X_{14} = Household size (Number)
X_{15} = Farming Experience (Year)
X_{16} = Land ownership (Yes =1, Otherwise = 0)
X_{17} = Non-farm income (Yes =1, No = 0)
X_{18} = Extension contact (Yes = 1, No = 0)
X_{19} = Co-operative membership (Yes =1, No = 0)
X_{20} = Access to credit (Yes =1, No = 0)
X_{21} = Sickness (Number)
X_{22} = Security threat (Yes = 1, Otherwise = 0)
X_{23} = Income (₦)
$\alpha\alpha$ = Intercept
$\beta_{1-n}\beta_{1-n}$ = Estimated coefficients
$\varepsilon_i\varepsilon_i$ = Error term

RESULTS AND DISCUSSION

Measuring Total Factor Productivity (TFP) of Sugarcane Famers in the Studied Area

The results showed that almost half of the sampled farming population had their productivity to be below the optimal point i.e less than unity which owed to inefficiencies in the rationalization of their farm resources, while 50.5% were productive in the use of their resources as indicated by their TFP indices which were greater than unity (Table 1). However, 46.7% of the sugarcane farmers were found to be at the marginal surface of the TFP index, indicating that their output-input index ratio was almost equal. Therefore, the farmers with marginal TFP need to enhance their allocation efficiency in order to maximize their output in sugarcane production in the studied area.

Table 1: Distribution of Total factor productivity indices of farmers in the studied area

TFP indices	**Frequency**	**Percentage**
<1.00	52	49.5
< 2.00	49	46.7
< 3.00	4	3.8
Total	**105**	**100**
Mean	**1.0815**	
Minimum	**0.3913**	
Maximum	**2.5105**	
Standard deviation	**0.4186**	
Variance	**0.1752**	
CV	**0.3871**	

Source: Field survey, 2018

Determinants of TFP of Sugarcane Farmers in the Studied Area

The significance of the Chi^2 at 10% degree of freedom means that the Tobit regression model is the best fit for the specified equation and the variable parameter estimates encapsulated are different from zero, thus have the significant influence on the explained variable (Table 2). In addition, the diagnostic test of the model showed the absence of collinear relationship among the predictor variables as indicated by their respect variance inflation factors (VIF) which were less than the VIF benchmark value of 10.00. However, the stochastic term was not normally distributed as evidenced by the significance of the Chi^2 test statistic which is within the radius of 10% degree of freedom. Though, non-normality of the disturbance term is not seen as a serious problem as data in their natural form are not normally distributed. Furthermore, the empirical evidence showed TFP of sugarcane farmers to be influenced by some working capital: sucker, NPK, human labour and land; yield and idiosyncratic variables: education, non-farm activities, extension contact, sickness of farm family and income as indicated by the significance of their respective estimated coefficients which were within the radius of 10% probability level. The negative effects of both sucker and NPK coefficients ($p<10\%$) indicate the excess utilization of the foregoing inputs due to the availability of stock and subsidy for the former and latter, thus decreasing the TFP of sugarcane farmers in the studied area. The negative significance of labour coefficient means that both the free labour and the complemented labour (hired) were in excess, thus decreasing TFP of sugarcane producers in the studied area. However, the reasons for excess labour used may be attributed to the availability of family labour which is at free cost and cheap cost of hired labour whose reward is mostly in kind. The marginal and elasticity implications of a unit increase in the sucker, NPK, family labour and hired labour will decrease TFP of sugar cane by 3.13E-5 and 0.137%; 8.28E-5 and 0.121%; 0.00049 and 0.272%; and, 0.00053 and 0.413% respectively.

The positive significance of the land coefficient implies that large-scale farmers have high TFP due to economies of scale i.e pecuniary advantages. In addition, the positive significance of the unit price of the output indicates the positive effect of remunerative

price in increasing TFP of sugarcane farmers in the studied area. If price received by the farmers is remunerative or farmers' term of trade is favourable, they will be encouraged to invest appropriately in the production of sugarcane, thus an increase in the TFP of the sugarcane in the study jurisdiction. Furthermore, the positive significance of the yield shows how high productivity due to efficient management of farm resources increased TFP of sugarcane farmers in the studied area. Therefore, the marginal and elasticity implications of a unit increase in farm size, a unit price of output and yield will increase TFP of sugarcane farmers by 0.025 and 0.968%; 9.93E-5 and 0.624%; and, 1.28E-5 and 0.956% respectively.

The results showed that educated farmers had high TFP in sugarcane production due to their ability to be efficient in the management of their farm resources and their receptive attitude towards innovation and adoption. The marginal and elasticity implication of being educated will increase TFP of sugarcane production by 0.0029 and 0.026% respectively. The positive effect of non-farm income on TFP implies that farmers with diversified income had high TFP in sugarcane production due to the tendency of supplementing their farm capital investment from the extra income earned from non-farm activities. Thus, the marginal and elasticity implications of farmers with non-farm income will increase their sugarcane TFP by 0.0062 and 0.009% respectively. The findings revealed that sugarcane farmers with access to extension services *viz.* innovation and counseling had high TFP in sugarcane production as indicated by the positive significance of extension contact estimated parameter. Therefore, the marginal and elasticity implications of TFP of sugarcane farmers with access to extension service will increase by 0.0081 and 0.016% respectively. The results showed that household with health challenges would have decline TFP as medical consumption will affect the income stream or capital base of the farm investment. Also, the labour pool of the farm family will be affected both in quality as there will be distraction and quantity that will be available for farm activities. In addition, the cost of hiring of extra labour for strenuous/tedious farm operation will further deplete the capital investment of the farm, thus affecting the sugarcane farmers' TFP. Infact, the dearth consequences of ill health of farm family member are enormous,

thus cannot be over-emphasized. The marginal and elasticity of TFP of sugarcane farmer with sick family member will decrease by 0.0014 and 0.054% respectively.

However, for those non-significant idiosyncratic variables, there is a need to draw little empirical inference with respect to their signs. The negative sign of age coefficient showed that the decline in labour efficiency of old farmers tends to decrease TFP of sugarcane. The negative coefficient of experience indicates conservative attitudes of experienced farmers towards innovations, thus decline in their TFP. The negativity of farm ownership status showed how the effect of fragmentation on inherited farmland, the communal disposition to commercial production decreases TFP of sugarcane production in the studied area. The inverse coefficient of credit implies that farmers with no access to credit have decline TFP due to inadequate farm productive resources and constrain to adopt sugarcane production innovations. Also, the inverse relationship of security threat coefficient means that farmers who faced security challenges *viz.* communal conflict and herders attack had declined TFP in sugarcane production.

On the other hand, the effect of social and economic power inherent in marriage exerts a positive effect on the TFP of married sugarcane farmers in the studied area. Also, farmers with large farm household composed of able-bodied people had high TFP in sugarcane production which is attributed to decrease in the cost of labour and increase in the farm capital investment which owed to the generation of non-farm income. Farmers who belong to the social organization had high TFP in sugarcane production due to pecuniary advantages *viz.* bulk discount in input purchase, access to required and timely credit delivery either in cash or kind, efficient diffusion of innovation and bargaining power in the marketing of their outputs.

Table 2: Determinants of sugarcane farmers' TFP in the studied area

Variable	**Coefficient**	**t-stat**	**Elasticity**	**VIF**
Constant	−0.04955(0.01435)	3.453***	-	
Sucker	−3.133E-5(9.75E-6)	3.212***	-0.1369411	3.087

NPK	−8.284E-5(2.04E-5)	4.058***	-0.1211215	2.182
Urea	−3.276E-5(4.04E-5)	0.810^{NS}	-0.0340584	1.984
Herbicide	−1.073E-4(4.29E-4)	0.249^{NS}	-0.0046013	2.197
Family labour	−0.000497(0.00010)	4.892***	-0.2721591	4.451
Hired labour	−0.00053(5.49E-5)	9.540***	-0.4129293	2.319
Farm size	0.0246019(0.00092)	26.68***	0.9683564	4.147
Capital item Dep.	−6.826E-9(9.32E-8)	0.073^{NS}	-0.0012776	3.507
Unit price of output	9.931E-5(2.85E-5)	3.487***	0.6238543	1.273
Yield	1.275E-5(1.21E-6)	10.57***	0.9556377	1.304
Age	−0.000116(0.00013)	0.878^{NS}	-0.0672339	2.055
Marital status	0.00391(0.00444)	0.879^{NS}	0.0477135	1.445
Education	0.00289(0.00168)	1.721*	0.0260312	1.443
Household size	0.000176(0.000256)	0.685^{NS}	0.0284074	2.174
Farming Experience	−3.802E-5(0.00022)	0.171^{NS}	-0.0039653	1.998
Land ownership	−0.001799(0.00174)	1.037^{NS}	-0.0148589	1.304
Non-farm income	0.006239(0.003618)	1.724*	0.0096144	3.423
Extension contact	0.008046(0.002927)	2.749***	0.0160019	2.540
Co-operative mem.	0.000331(0.006529)	0.051^{NS}	0.0003844	8.521
Access to credit	−0.005978(0.00709)	0.842^{NS}	-0.0052458	8.025
Sickness	-0.001439(0.000813)	1.768*	0.0536665	1.440
Security threat	−0.000537(0.00265)	0.202^{NS}	-0.0004684	1.922
Income	−7.017E-10(1.91E-10)	3.683***	-0.0144162	1.236
Chi^2 (χ^2)	**2802.06*** **			
Normality test (χ^2)	**7.729[0.0209]** **			

Source: Field survey, 2018
*, **, *** and ^{NS} means significance at 10%, 5%, 1% and non-significant respectively
Note: ( ): values in parenthesis are standard error; [ ] values in square brackets are probability levels

CONCLUSION AND RECOMMENDATION

Based on the findings it can infer that farmers' TFP is affected by working capital which is due to excess supply, sickness and income in the studied area. Therefore, the study recommends that farmers should create alternative opportunities in which excess of the human labour could be channeled into, thus enhancing its efficiency. In addition, the change agents should teach and encourage farmers to be efficient in the allocation of their productive resources in order to maximize TFP in sugarcane production. The farmers should be encouraged to be rational in their consumption needs so that the going concerns of their businesses would be efficient. Health is wealth, and for the direct correlation of health with productivity to be efficient, there is need to strengthen the health institutions in the studied area by the government, non-governmental organization and the farmers, as provision of good health is a joint responsibility. The farmers should be given proper sensitization by the health, educational and social institutions on the imperative of maintaining precautions that will guarantee good health. Furthermore, the study recommends the need to explore the neoclassical TFP index and decomposition productivity index of sugarcane farmers using time series data in order to strengthen the government policy on sugarcane productivity in the studied area. Incorporation of these recommendations will help to reduce importation of sugarcane, revitalization of sugarcane industrialization and revitalization of the rural economy in the studied area in particular and the country in general.

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EMPIRICAL ANALYSIS OF CAUSES AND EFFECT OF DEPRECIATION IN INDIAN ECONOMY

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Abstract: *For three years, the rupee defied conventional wisdom to grow steadily, until the big fall this year of the rupee hitting an all-time low of 72.98 against the US dollar on September 18, 2018 with a 15 per cent drop in calendar year 2018. This fall in the value of rupee can be primarily attributed to the rise in the prices of crude oil, interest rate hikes by the US Federal Reserve, US-China trade war and increase in the demand for dollar. While the effect can be seen in the exports becoming cheaper, imports becoming costlier, rising current account deficit (CAD), inflation, increased external funding cost and rising prices of IT stocks computed in dollar. This paper tends to examine what a weak currency means for the national economy and personal finance. This paper will empirically test the causes and effects of depreciation in the economy and suggest policy measures to reduce the effect of depreciation in the lives of commons.*

Keywords:*depreciation; inflation, CAD (current account deficit).*

INTRODUCTION

In 1947, the value of one rupee was said to be equivalent to one dollar. There's another theory, though — that one dollar was, in fact, equivalent to INR 4 since the Indian currency then was pegged to the British pound sterling. Over the decades, the rupee has been on a roller coaster ride until last week, when it plunged to an all-time low of 72.97 against the US dollar.

The rupee has weakened despite the RBI pumping in $25 billion into the market in 2018. The fall in the rupee can be primarily attributed to global factor INR. One, rising

crude oil prices, primarily because of US sanctions on Iranian exports and a drop in Venezuela's production. India, which imports over 70 per cent of its oil needs, spent USD 87.7 billion or INR 5.65 lakh crores on importing 220.43 million tonnes (MT) of crude oil in 2017-18. A costlier import oil bill meant the currency taking a further hit.

Over the years with the fall in the value of rupee the import of crude oil calculated in dollar has become costlier. Even after that the import dependency on crude oil has increased to 82.8% in April in FY 18. This shows that crude oil is an essential import item which is independent of the changes in the exchange rate.

The double whammy of a weak rupee and higher crude oil prices has led to a sustained rise in fuel prices in India, with petrol prices crossing INR 90 per litre in several cities.

Despite the fall in the prices of crude oil from 2013 due to new reserves, there is a continuous rise in the prices of petrol in India. Another way India's current account deficit (the country runs a higher import bill than what it earns through exports) could have been bridged was through portfolio inflows to Indian capital markets — or money which foreign funds deploy to buy stocks or debt of Indian firms.

So what does a weak rupee mean for the country and the economy, and are demands for a muscular currency mere political expediency or the need of the hour? And what causes a rupee to weaken or strengthen?

With India's manufacturing sector becoming increasingly integrated with the rest of the world and using more of imported inputs, it has become more difficult for India today to reap the benefits of a cheaper currency than it was earlier. As the domestic value added of India's manufacturing sector declines and it becomes more reliant on foreign inputs, currency depreciation will lead to higher costs of production. This will eventually lead to higher inflation in prices of domestically produced goods and will prevent them from

becoming more competitive in the world market. Thus, higher inflation—due to imported prices—might offset any gains from depreciation in terms of export competitiveness.

Since around 45% of the Nifty's earnings per share (EPS) are linked to the global economy through exports, a falling rupee has been a tailwind for the key benchmark index in the past. Typically, a 10% fall in rupee vs dollar should boost Nifty EPS by 4% and vice versa, other things remaining the same.

Companies in the information technology (IT) and pharmaceuticals are, of course poised to benefit. However, the full gains of the rupee's depreciation may not accrue to them this time. A depreciating euro against the dollar and headwinds in emerging market currencies could potentially negate some of the forex gains for IT and pharma companies, respectively. Meanwhile, the Nifty's long-term performance doesn't get impacted much by the rupee's decline on an absolute basis, but does on a relative basis to emerging market. There is a positive correlation between the depreciation and IT stocks. As the rupee depreciates, the value of IT stocks goes up. The assumption is that rupee proceeds from projects billed in dollars will be far greater than earlier anticipated. Besides, the fact that a large chunk of these companies' expenses are in the local currency means that margins can get a sizeable boost. Despite a weaker rupee, margins have been declining for Indian IT in the past few years.

Reserve Bank of India has the capacity to stop the further fall but it believes that if oil prices rise and other currencies depreciate, the rupee depreciating has to be part of the adjusting mechanism. This fall in the value should not worry the people as India has enough Foreign Exchange reserve to cover the 10 months of import which is a positive sign. But in the short run with the fall in the value of rupee come the rising volatility in the market. Inflation in the domestic market is likely to be experienced. Value of money goes down. Purchasing power goes down. Imports become costlier. Export becomes cheaper. Petrol prices rises. External borrowing cost rises. And in all this it is the lives of common man that gets affected.

SCOPE OF THE STUDY

This study will analyse the issue of depreciation with the help of real time data. It will focus on the relationship between crude oil prices and exchange rate; sensex and exchange rate; exchange rate and CAD; exchange rate and foreign reserve and finally exchange rate, gdp and foreign reserve. Their relations will be empirically tested and based on study results policies will be recommended.

LITERATURE REVIEW

There are certain doubts on the effectiveness of the current policy of devaluation and depreciation under the LERM in solving India's trade and payment deficits. Simple regression analysis confirms that during the period 1971-90 the depreciation of the rupee had no favourable effect on the dollar value and volume of exports and no contractionary effect on the value and volume of imports. Hence it had no influence on the balance of trade.[1] In the later period, aggregative data was used to estimate the equilibrium exchange rates for the Indian economy for the period 1960-1993 and a producer theory approach was used to estimate export supply and import demand functions. Through the producer theory modeling of imports, the effect on employment of devaluation and changes in prices of trade and non-traded goods was calculated. While devaluation has a positive impact on employment, the magnitude is limited. Further, while an export oriented strategy (which would increase the price of export goods) would increase employment the magnitude of this impact is small and even lower than a strategy which induces substitution of labour for imported goods in production. Most implant, employment responds much more significantly to changes in the price of non-traded goods and the real wage. It suggests the classic tradeoff between inflation and unemployment. The low importance of the traded goods sector of course reflects the low share of this sector in the overall GDP.[2] Indian economy has more to lose and less to gain with depreciation of rupee in long run. [3] The fall in the value of currency not only hurts the national pride, but also carries other risks as well. Depreciation of rupee dampens the inflow of foreign capital, rise in the external debt burdens, and also mount India's oil and fertilizer subsidy bills. The

most positive impact of depreciation of rupee is the stimulation of merchandise exports and discouraging merchandise imports and thus improving the terms of trade. But, even after significant increase in the exports and sales in the sample year, Indian companies are reporting huge foreign exchange losses due to the depreciation of Indian rupee. This declines the overall profitability of these companies. As far as imports are concerned, for a country such as India, imports are necessary. India imports many essential goods like crude oil, fertilize INR, pharmaceuticals and many capital goods. Thus, the argument that depreciation is good as it discourage India's import does not make any sense. According to one school of thought, exports are mainly supply-driven and are not very sensitive to price. The policy option for export-growth then lies in improving the supply conditions. The opposite view is that demand plays a crucial role, exports are highly sensitive to price and the price-competitiveness of exports can be influenced through the instrument of exchange rate. The (maruta) in this context is policy intervention. Strategic policy has had a role in providing the enabling conditions for export expansion.[4] It is observed that three variables Balance of Payment–Current account, Foreign exchange reserves and GDP at factor cost are the most significant variables affecting the exchange rate of Indian rupee against US dollar.[5] Also, the lagged value of the dependent variable (USD/INR), current account balance, relative money supply, index of industrial production and interest rate differential are the most significant variables in determining the USD/INR exchange rate. It is also observed that forward premia, capital account and RBI's net intervention do affect exchange rates (significant at 10% level), but their impact is found to be marginal.[6]

Different researches have been done using different methodology to study the impact, causes and effect of depreciation from the time of 1960s to 2011.

OBJECTIVES OF THE STUDY

To empirically analyse the causes and effects of depreciation of rupee on Indian economy.

Following relations would be checked:

- Crude oil Prices and Exchange Rate
- Sensex and Exchange Rate
- Exchange rate and Current Account Deficit
- Exchange Rate and Foreign Reserve
- Exchange Rate and GDP at market price; Foreign Reserve
- To suggest policy measure to reduce the negative impact of depreciation on the economy.

METHODOLOGY

This paper is a quantitative secondary data-based research. Data related to exchange rate, crude oil price and sensex is taken from different websites. Variable used in the research are Foreign Exchange rate (US/ INR), Crude Oil Prices, Sensex which are taken on daily basis from FY 2014 to FY 2018. Variables like GDP at market price, Export, Import and foreign reserve are taken on yearly basis covering data from FY 1992 to FY 2013. GDP at market prices, export import and foreign reserve is taken from government website of ministry of statistics and programme implementation. Relation between different variable explaining depreciation is considered and using Augmented Dickey fuller test the stationarity of variables is checked. To check the significance of variable variance, auto regression is tested. Impulse response function is generated to know the impact on dependent due to change in the independent variable.

RESULTS

Crude Oil Prices and Exchange Rate of Rupee

Theoretical Statement: There is a positive relation between the crude oil prices and the fall in the value of rupee. As India imports crude oil priced in dollar from the world paid from the foreign reserves and this constitute the highest percentage of import, thus when crude oil prices rises the value of rupee falls.

Empirical Testing of the Statement

For which relation of crude oil and exchange rate on the basis of daily data collected and analysed from FY 2014-2018. Total observations are 971. The variables considered are INR and Crude oil prices and as these variables are not stationary on level, the 1st difference of INR and Crude oil prices is taken. Natural log models gave smaller Akaike Information Criteria, hence natural log transformation of variable at first difference is used. Variable dlninr is natural log transformation of first difference of exchange rate (INR) and variable dlncrp is natural log transformation of first difference of Crude oil prices.

Var Results:

Ho: dlninr does not affect dlncrp

H1: dlninr does effect dlncrp.

Here, as our p- value of co-efficient is less than 5% (0.05) that means our co-efficient are significantly different from zero. Thus, Ho is rejected and with 95% of confidence one can say that crude oil prices are affecting value of Rupee (INR) i.e. exchange rate.

Equation will estimate Vector auto regression of 2nd order lag.

Equation:

dln_inr = -0.0000873 - 0.08232 dln_inr(t-2) + 0.0098942 dln_crp (t-2)

It can be interpreted that one unit positive change in first difference of crude oil prices it leads to -0.0823282 unit change in first difference of Exchange Rate (INR). Thus when there is increase in prices of crude oil there is a fall in the value of rupee in the form of depreciation.

Post estimation tests

1) Test of Granger Causality

Here,

Ho : Crude oil price does not granger cause INR.

As the p-value is less than 5% (0.05) Ho is rejected and it can be concluded that Crude oil prices does granger causes INR.

2) Test of Auto-correlation

Ho : No auto-correlation

As the p value is greater than the 0.05 we cannot reject the null hypothesis of no Auto correlation

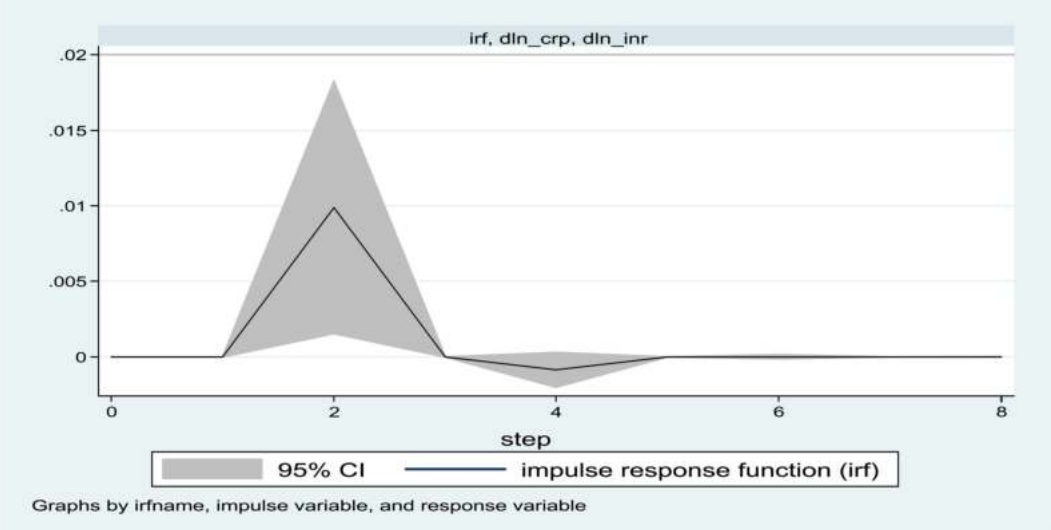

Fig.1: Impulse Response Function

When there is 1 unit shock on crude oil prices at time period 0 there is a positive impact on the INR i.e. depreciation at time period 2.

Hence, it is proved that there is a positive relation between crude oil prices and depreciation of rupee. Thus the theoretical claim is accepted. Crude oil Prices causes the fall in the value of rupee.

Sensex and Exchange Rate of Rupee

Theoretical Statement: There is a negative relation between the sensex and exchange rate of rupee as it can be attributed to the increased flow of FII in sensex because of which there is an increased demand of money increases which leads to appreciation of rupee.

Empirical Testing

For which we are going to analyse relation of sensex and exchange rate on the basis of daily data collected from FY 2014-2018. Our total observations are 971. Our variables are INR and Crude oil prices as our Variables are not stationary on level, we took the 1st difference of sensex and exchange rate of rupee is considered in the following analysis.

Var Results:

H0: snx does not affect the inr

H1: snx does affect the inr

Here, as the p-value of co-efficient is less than 5% (0.05) that means our co-efficient are significantly different from zero. Thus, Ho is rejected and with 95% of confidence one can say that sensex affects the rate of rupee (INR) i.e. exchange rate.

Equation will estimate Vector auto regression of 3rd order lag.

Equation

dinr = -0.005611 -0.00067 dsnx (t-3)+ 0.0047274dinr (t-3)

It can be interpreted that one unit positive change in first difference of sensex leads to 0.0047274 unit change in first difference of Exchange Rate (INR). Thus when there is

increase in sensex there is an increase in the value of rupee in the form of appreciation.

Post estimation Tests

1) Granger Causality Test

H0: Snx does not ganger cause the inr

As the p-value is less than 5% (0.05) Ho is rejected and can be concluded that sensex does granger causes INR.

2) Autocorrelation test

H0: No autocorrelation in error terms

As the p value is greater than the 0.05 one cannot reject the null hypothesis of no Auto correlation.

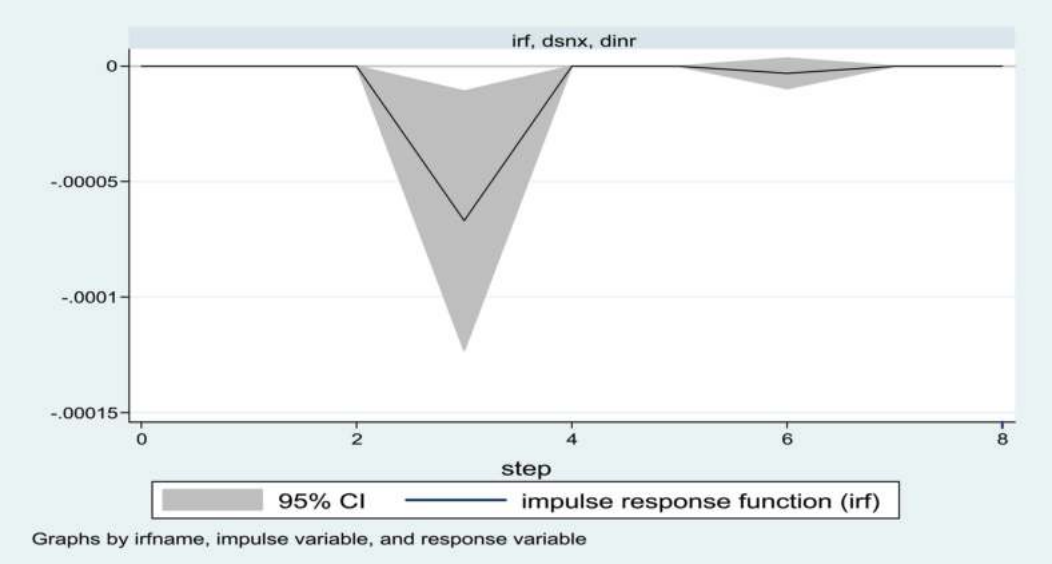

Fig. 2: Impulse response Function

When there is 1 unit shock on sensex at time period 0 there is a positive impact on the INR i.e. depreciation at time period 3.

Hence it is proved that there is a negative relation between sensex and depreciation of rupee. Thus the theoretical claim is accepted. Rise in Sensex causes rise in the value of rupee.

Exchange Rate and Current Account Deficit

Theoretical Statement: When there is a depreciation of rupee, the current account deficit falls. And when the currency depreciates the value of money falls and thus exports become cheaper and import becomes costlier. When export rises the import falls and the difference i. e. CAD falls.

Empirical Testing of the Statement

For which relation of exchange rate and current account deficit is analysed on the basis of yearly data collected from FY1992 – 2013 at current prices. Total observations are 22 and variables considered are INR and CAD - as the variables are not stationary on level, 1st difference of INR and Crude oil prices are accounted for the study.

Var Results:

Ho: dinr does not affect the dcad

H1: dinr does effect dcad.

Here, the p- value of co-efficient is less than 5% (0.05) that means the co-efficient is significantly different from zero. Thus, Ho is rejected and with 95% of confidence one can say that the value of rupee affects the current account deficit.

Equation will estimate Vector auto regression of 2nd order lag.

Equation:

dcad = -35388.23 – 0.7928782dcad (t-2)+14185.4dinr(t-2)

This can be interpreted as when there is one unit positive change in first difference of exchange rate of rupee it leads to 14185.4 unit change in first difference of current

account deficit. Thus when there is fall in the value of rupee there is a fall in the current account deficit.

Post estimation tests

1) Test of Granger Causality

Here,

Ho: inr does not granger cause cad.

As the p-value is less than 5% (0.05) Ho is rejected and concluded that inr does granger causes cad.

2) Test of Auto-correlation

Ho: No auto-correlation

As the p value is greater than the 0.05 one cannot reject the null hypothesis of no Auto correlation.

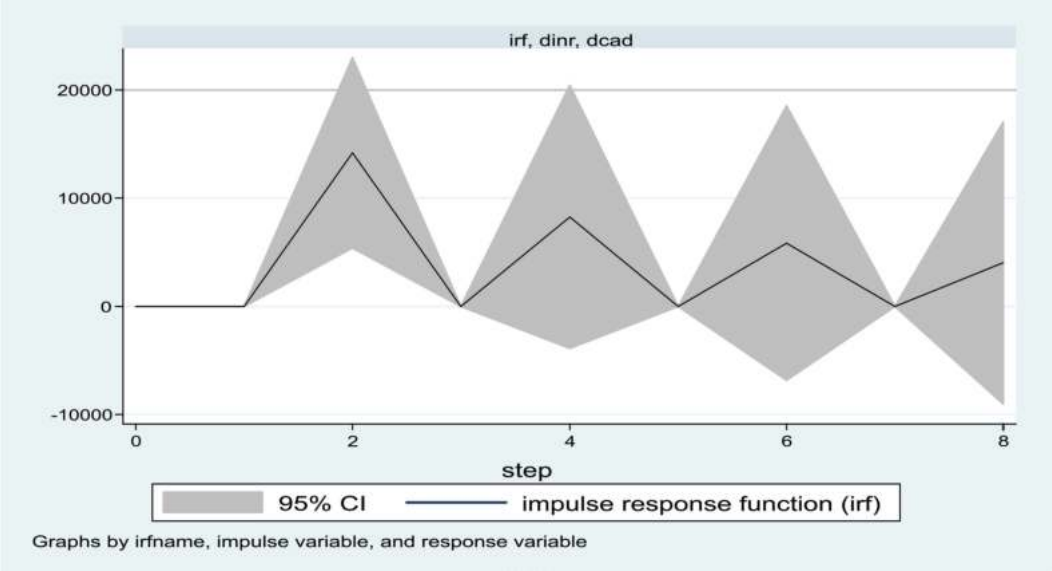

Fig. 3: Impulse Response Function

When there is 1 unit shock on inr at time period 0 there is a positive impact on the cad at time period 2 which means that when rupee depreciated the cad falls considering the negative sign of cad.

Hence it is proved that there is a negative relation between the inr and cad. When the depreciation happens then the current account deficit falls. Thus the theoretical claim is accepted that depreciation of rupee affects current account deficit. Therefore, changes in INR causes changes in CAD.

Exchange Rate and Foreign Exchange Reserves

Theoretical Statement: When the value of rupee falls there is a fall the foreign reserve as the payment in the international market is calculated in dollars. As the imports become costlier so now more of the foreign reserve is used in payment of imports and debt repayment.

Empirical Testing of the Statement

For which we are going to analyse relation of crude oil and exchange rate on the basis of yearly data collected from FY 1992-2013. Our total observations are 22. Our variables are inr and fr. As our variables are not stationary on level, we took the 1st difference of inr and fr.

Var Results:

Ho: dinr does not affect dfr

H1: dinr does effect dfr

Here, as the p- value of co-efficient is less than 5% (0.05) that means the co-efficient is significantly different from zero. Thus, Ho is rejected and with 95% of confidence one can say that inr is affecting the fr.

Equation will estimate Vector auto regression of 1st order lag.

Equation:

dfr = 76243.58 -19162.04dinr(t-1)-0.3314547 dfr(t-1)

This can be interpreted as when there is one unit positive change in first difference of inr it leads to - 19162.04 unit change in first difference of Exchange Rate (INR). Thus when there is fall in the value of rupee there is a fall in the foreign reserve.

Post estimation tests

1) Test of Granger Causality

Here,

Ho :inr does not granger cause fr.

As the p-value is less than 5% (0.05) Ho is rejected and concluded that inr does granger causes fr.

2) Test of Auto-correlation

Ho : No auto-correlation

As the p value is greater than the 0.05 one cannot reject the null hypothesis of no Auto correlation.

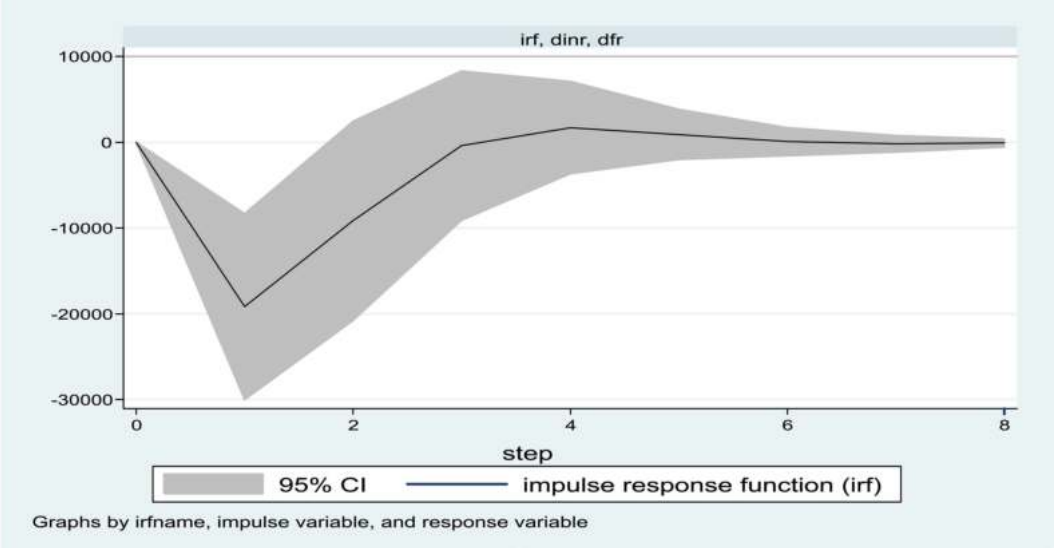

Fig. 4: Impulse Response Function

When there is 1 unit shock on inr at time period 0 there is negative impact on the fr at time period 1.

Hence it is proved that there is a negative relation of depreciation of rupee and foreign reserves. Thus the theoretical claim is accepted. Depreciation causes decline in foreign reserves.

Exchange rate, GDP and Foreign Exchange Reserves

Theoretical Statement: There is positive relation between the Gross Domestic Product and the value of currency as the country develops their currency becomes powerful. While at the same time with the rise in the foreign reserves there is an appreciation of rupee as it now has higher backing to support the value of money against the downfall.

Empirical Testing of the Statement

For which effect of exchange rate on foreign reserve and GDP at market prices on the basis of yearly data collected from FY1992 – 2013 would be analysed at current

prices. Total observations are 22 and the variables are inr, fr and cad and as these variables are not stationary on level, 1st difference of INR and Crude oil prices are considered.

Var Results:

Ho: dgdp and dfr does not affect dinr

H1: dgdp and dfr does effect dinr .

Here, the p- value of co-efficient is less than 5% (0.05) that means the co-efficients are significantly different from zero. Thus, Ho is rejected and with 95% of confidence one can say that gdp and fr are affecting Rate of Rupee (INR) i.e. Exchange rate.

Equation will estimate Vector auto regression of 2nd order lag.

Equation:

dinr = 1.305112-0.2370092dinr(t-2)+4.05e-06dgdp(t-2)-0.00002dfr(t-2)

This can be interpreted as when there is one unit positive change in first difference of gdp it leads to +4.56e-06 unit change in first difference of Exchange Rate (INR). Thus when there is increase in the gdp there is a fall in the value of rupee in the form of appreciation keeping other variables constant.

Also when there is one unit positive change in first difference of fr it leads to -0.00002 unit change in first difference of Exchange Rate (INR). Thus when there is increase in the fr there is a rise in the value of rupee in the form of appreciation keeping other variables constant.

Post estimation tests

1) Test of Granger Causality

Here,

Ho: gdp and fr does not granger cause INR.

As the p-value is less than 5% (0.05) Ho is rejected and can be concluded that gdp and fr does granger causes INR.

2) Test of Auto-correlation

Ho: No auto-correlation

As the p value is greater than the 0.05 one cannot reject the null hypothesis of no Auto correlation.

Hence, it can be concluded that when the GDP rises, the value of rupee falls as being a developing economy the country has to import essential items for development and infrastructural needs. Thus the positive relation between the GDP and INR value can be rejected. Thus changes in GDP causes changes in INR value.

While, rise in the Foreign Reserves causes rise in the value of INR as the central bank has enough reserves to protect the value of rupee.

POLICY RECOMMENDATIONS AND SUGGESTIONS

1) As the changes in the value of rupee are highly sensitive to the sensex with FII flows are the major reason behind this relation which is highly volatile. According to this we should welcome FII in the stock market which will lead to appreciation of rupee against dollar also at the same time some steps should be taken for the sustained increase in the FIIs in India then only the benefits can be reaped in the long run.

2) When the currency depreciates, domestic good gets competitive edge in the international market as a result export rises and import falls. Consequently the CAD falls. Thus a depreciated currency can directly help in reducing the problem of rising CAD. Benefit of this increased income could be taken to improve the quality of export for the long term dependency of the international market for the Indian good otherwise

the benefit from the exchange rate will soon vanish in the short run if no productive investment in taken correspondingly.

3) Import substitution strategy should be followed to control the falling of foreign reserve due to the depreciation of rupee in the international market.

4) As with the growth of GDP the rupee depreciation which means that capital goods necessary for development of economy is imported. These capital goods should be produced domestically so that the import of these items can be reduced as a result of which the rupee will appreciate with the growth in GDP.

LIMITATIONS OF THE STUDY

There exist a relation between the exchange rate depreciation and inflation, as the theory suggests. But as the base year is taken as 2012 because of which there were only few data points available. Due to which a significant results cannot be derived with the above methodology. Further study can be undertaken to give a significant relationship between inflation and exchange rate.

CONCLUSION

Depreciation has become the economy's reality in recent years. It has both positive and negative impact on the economy. One set of people will defend depreciation while the other will stand against it. On macro level depreciation can be justified on the basis of falling CAD, rising export, falling import. At the same time its sustainability is under question. This growth can only be 1sustained in the long run with the strong policy interventions. This study is beneficial in understanding the theoretical applicability on the real data in the case of India. At the same time the impact on the lives of common cannot be captured in these figures which further demands for a micro level study.

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GROWTH FROM THE INCOME PERSPECTIVE: DEVELOPED AND UNDERDEVELOPED COUNTRIES

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Abstract: *Economic growth is possible without development and growth can occur in many aspects. This paper makes an attempt to study how the GDP growth rates are related to income inequalities in the developed and underdeveloped countries. The study considered three economies representing the developing world (India, Brazil and Bangladesh) and three economies depicting the developed world (US, Canada and UK) to observe the contrast in terms of relationship between income and equity / inequity status. Previous studies have shown a positive correlation with respect to income inequality and GDP. The study aims to explain reasonable causes with appropriate statistical methods.*

Keywords: *economic growth, equity, inequity, developed, developing, economies***.**

INTRODUCTION

Arguments on the connection between economic growth and income inequality were much prevalent. In the year 1955, Kuznets ascertained a theory and stated that economic development procedure must result in early period of income concentration as people and resources transfer from agriculture to urban and industrialised areas. However, this trend must be reversed as the migration procedure is weakened. Economic growth is regarded as a strong instrument for increasing affluence. High and continued economic progress enhances the employee demand and pays, which in turn increases the income level[1]. In a similar context, high income as a consequence of minimisation of poverty results in increased labour efficiency and growth. However, the level of poverty

minimisation as a consequence of economic development is subject to the way dispersal of income variations with economic growth and on preliminary differences in income. If the income disparity enhances, then economic growth does not result in substantial poverty minimisation[2]. Various developing nations accomplished high economic progress rates in diverse eras, but poverty does not minimise considerably in these periods owing to growth in income inequalities. The paper analyzes the connection between income disparity and economic progress in developed and underdeveloped nations.

LITERATURE REVIEW

Disparity results in weak economic progress owing to financial market inadequacies. It was stated that in the short run, there can be progressive connection between income disparity and economic progress; however, in the long run high income disparity can result in low economic development.[3] In the condition of financial market inadequacies, the poor individuals unable to borrow, owing to low level of sufficient security. Hence, poor people do not possess similar likelihoods in life as affluent individuals and also contribute less in the economic development of the nation[4]. Nations with low income rate or with inadequate income distribution hence underutilise the industrious and development possibility to higher level in comparison with nations having less amount of poor people or with more impartial income dispersal.

Theoretical evaluation of macroeconomic connection between income disparity and economic progress and the contention is that financial market inadequacy can be the likely cause of optimistic connection between disparity and economic progress in short run period. The financial market inadequacies naturally imitated unequal facts and restrictions of legal establishments.[5] The data for about 108 nations through the period of 1960 to 1974 observed no methodical connection between economic development and variations in collective disparity. On the basis of the examination, times of collective development were related with augmented disparity in 43 circumstances and with the reduction in disparity in 45 cases. The simple connection between existing and covered income progress and changes in Gini coefficient is inconsequential for the entire sample

described with respect to nation features for example, rich or poor, equivalent or unequal, developing or underdeveloped economies, recommending no robust connection between development and variations in collective disparity.[6]

It was found that there exists positive connection between income disparity and economic development. The writer contended that the most probable consequences for the inconsistency of outcomes are nation oriented, misplaced variable favouritism, information quality aspects and span of period under concern.[7] It was shown that the discrepancy in the outcome was essentially owing to the reason that income disparity information can be weak substitution for wealth disparity. They stated that information on land holding is attractive for variety of causes. First is that ownership of land can be key factor of creative capability of an individual and the skill to capitalise, particularly in agricultural segment where land is a key resource. Second is that in contradiction of income, the dimension of which is frequently related with huge mistakes, is comparatively established simply and does not necessitate expectations about plotting from income movements into inventory of resources.[8]

SCOPE OF THE STUDY

This study focuses on the relationship between growth in terms of GDP and income inequality which is measured by the Gini Coefficient, a statistical tool for measuring economic inequality. In the process of growth which in literal sense is the increase in the national income of the country does not always signify that income distribution within the nation is equal. It has been very evident from the past studies that countries with higher GDP do not always have lower Gini coefficient.

METHODOLOGY

The information in income inequality might not be comparable throughout nations owing to the differences in descriptions and methodologies. Therefore, the Gini coefficient is used in order to assess the income inequality. Gini coefficient is subject to Lorenz curve, which highlights share of population in contradiction of the portion of

earning obtained and has minimum worth of about 0 and maximum value of about 1. 0 signifies perfect equality of income and 1 signifies perfect inequality of income. This Gini coefficient has been compared with GDP growth of the nations. In order to evaluate if there is any relationship between GPD growth and income inequality between developed and underdeveloped nations, three nations from each categories are considered. The underdeveloped nations considered in the paper are Brazil, Bangladesh and India and developed nations considered in the paper are the US, the UK and Canada. Spearman's correlation has been used.

ANALYSIS AND DISCUSSION

Income Inequality in Underdeveloped Nations

Table 1:Demonstration of Gini coefficient index of three developing nations.

Gini Coefficient (In %)				
Nations	**1970**	**1980**	**1990**	**2000**
India	30	32	31	33
Bangladesh	26	27	28	32
Brazil	58	58	63	59

From the above table, it can be observed that Gini coefficient in Brazil was much higher than other two developing nations. From 1970 to 2000, the average rate of Gini coefficient in Brazil was 59.5%. In contrast, in India, the average Gini coefficient from 1970 to 2000 was 31.5% (CIA, 2012). Furthermore, in Bangladesh, the average Gini coefficient from 1970 to 2000 was observed as 28.25%.

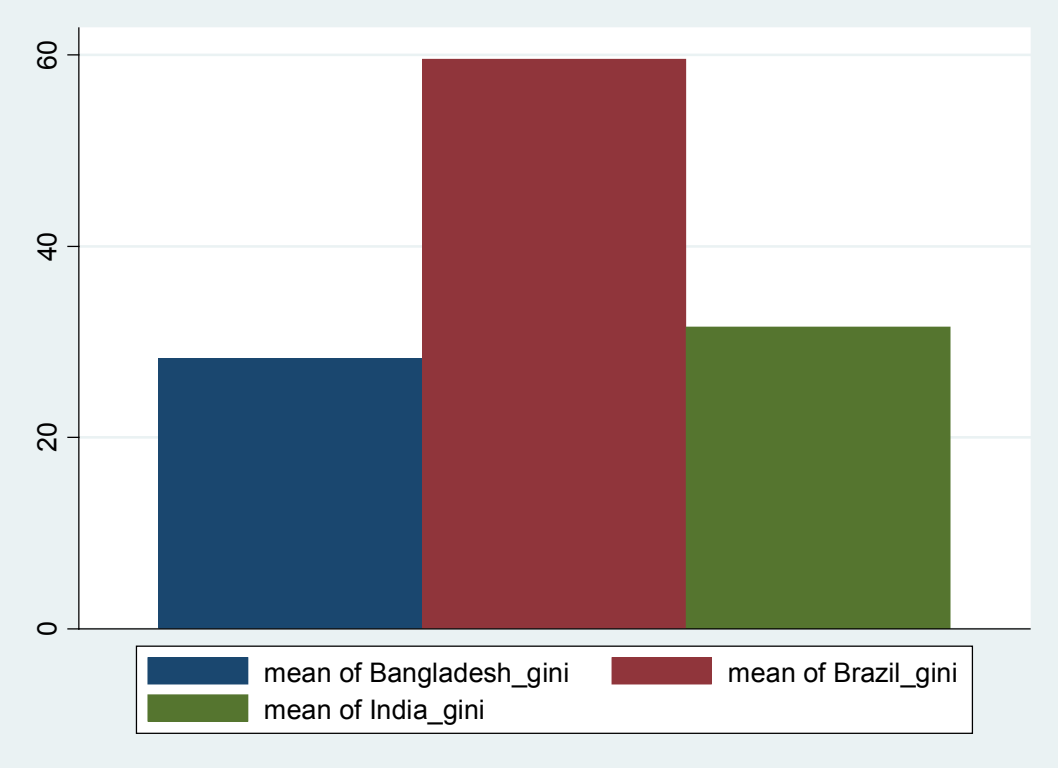

Fig. 1 : Mean Gini Coefficients of select countries (developing world)

GDP Growth Rate in Underdeveloped Nations

The GDP growth in developing nations from the period of 1970 to 2000 is demonstrated in Table 2.

GDP per capita (in %)			
Nations	**1970-1979**	**1980-1989**	**1990-2000**
India	1.6	3.6	4.1
Bangladesh	1.8	2.3	3.8
Brazil	6.2	0.9	1.5

From the above table it can be observed that the GDP per capita growth in India was 1.6% from 1970 to 1979 which has become 4.1% in 1990 to 2000. In Bangladesh, the GDP per capita growth was 1.8% in 1970 to 1979 which has become 3.8% in 1990 to 2000. In Brazil, the GDP per capita growth as 6.2% in 1970 to 1979 which has reduced to 1.5% in 1990 to 2000.

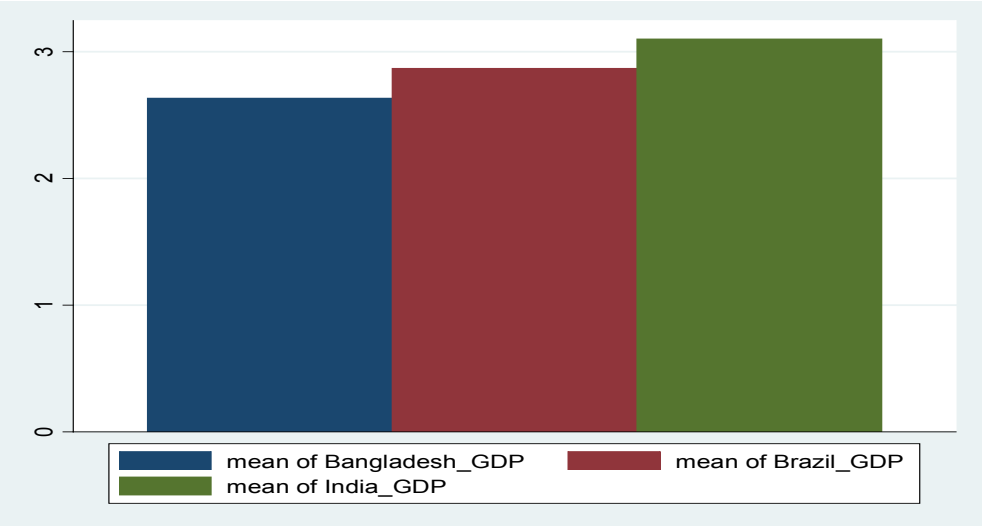

Fig. 2 : Mean GDP values of select countries (developing world)

Relationship between GDP Growth and Income Inequality in Underdeveloped Nations

In order to understand if there is any relationship between GDP growth and income inequality in developing nations, correlation analysis is undertaken. From the examination of correlation, it was observed that the value of correlation coefficient between Gini coefficient and GDP growth in Bangladesh was 0.99, which is positive and very closer to 1. Thus, it signifies that strong positive relationship exists between these two variables. On the other hand, the value of correlation coefficient between Gini coefficient and GDP growth in Brazil is -0.729, which is negative and very close to -1. Therefore, it can be stated that string negative relationship exist between these two variables. Finally, with respect to India, the correlation coefficient between Gini coefficient and GDP growth rate

is 0.189 which is positive but far from 1. Therefore, it can be stated that weak positive relationship exists between the variables.

In order to better understand the relationship, linear regression analysis has been undertaken.

Table 3: Output summary – linear regression

Source	SS	df	MS	Number of obs =	3
				F(1, 1) =	363.00
Model	13.9615385	1	13.9615385	Prob > F =	0.0334
Residual	.038461538	1	.038461538	R-squared =	0.9973
				Adj R-squared =	0.9945
Total	14	2	7	Root MSE =	.19612

Bangladesh_g~i	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Bangladesh_GDP	2.538462	.1332347	19.05	0.033	.8455544	4.231369
_cons	22.31538	.3686694	60.53	0.011	17.631	26.99977

Source	SS	df	MS	Number of obs =	3
				F(1, 1) =	0.04
Model	.071428579	1	.071428579	Prob > F =	0.8790
Residual	1.92857142	1	1.92857142	R-squared =	0.0357
				Adj R-squared =	-0.9286
Total	2	2	1	Root MSE =	1.3887

India_gini	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
India_GDP	.1428572	.7423075	0.19	0.879	-9.289054	9.574769
_cons	31.55714	2.436835	12.95	0.049	.5942216	62.52006

From the above analysis, it can be observed that the value of R^2 between the Gini coefficient and GDP growth of Bangladesh, Brazil and India are 0.99, 0.53 and 0.03. This

signify that any changes in GDP will have 99% changes in income in Bangladesh, 53% changes in Brazil and only 3% in India. Thus, it can be stated that strong relationship exists between income inequality and GDP growth in Bangladesh, while moderate relationship exist between these two variables in Brazil. On the other hand, specific relationship has been found between income inequality and GDP growth in India.

Income Inequality in Developed Nations

Table 4: Demonstration of Gini coefficient index of developed nations

Gini Coefficient (In %)					
Nations	**Mid 70**	**Mid 80**	**Mid 90**	**Mid 2000**	**Late 2000**
United States	0.406	0.436	0.477	0.486	0.486
United Kingdom	0.338	0.419	0.453	0.445	0.456
Canada	0.385	0.395	0.43	0.436	0.441

From the above table it can be observed that in the US, the average gini coefficient index was about 0.45% from mid 1970 to late 2000. The UK has maintained gini coefficient index of about 0.42%from mid 1970 to late 2000. On the other hand, the average Gini coefficient index in Canada was 0.41% within similar time period.

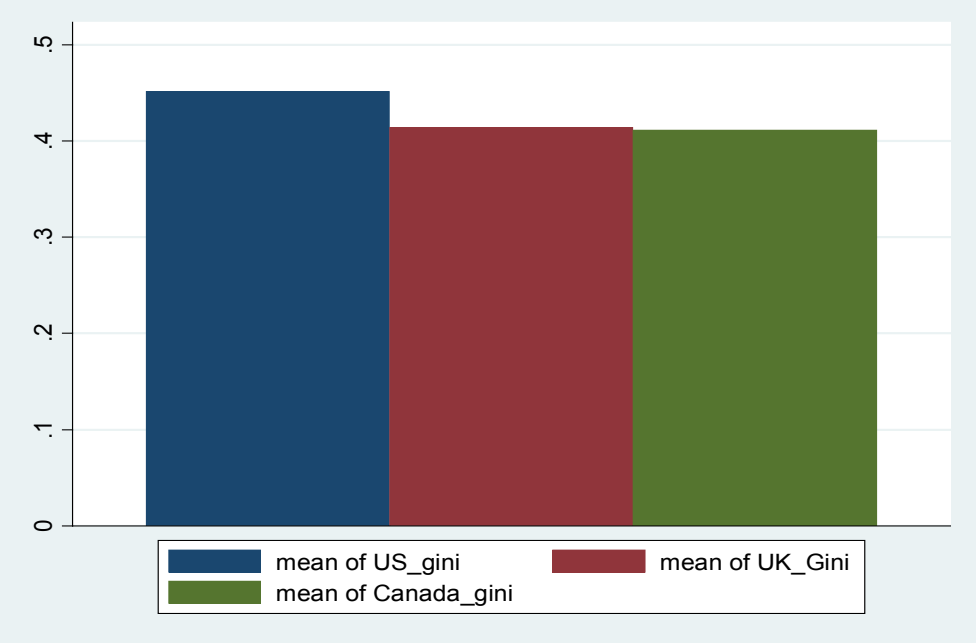

Fig. 3 : Mean Gini coefficients of select countries (developed world)

GDP Growth Rate in Developed Nations

The GDP growth rate in the three developed nations is demonstrated in Table 5.

Table 5: GDP growth (in %)

Nations	1970	1980	1990	2000
United States	3.2	-0.2	1.9	4.1
United Kingdom	6	-2	0.7	3.7
Canada	3.3	2.2	0.2	5.2

From the above table, it can be observed that the average GDP growth rate in the US was about 2.25% from 1970 to 2000. In contrast, the average GDP growth rate in the UK was about 2.1% within similar period (OECD, 2015). In Canada, the average GDP growth rate is observed as 2.72% from 1970 to 2000.

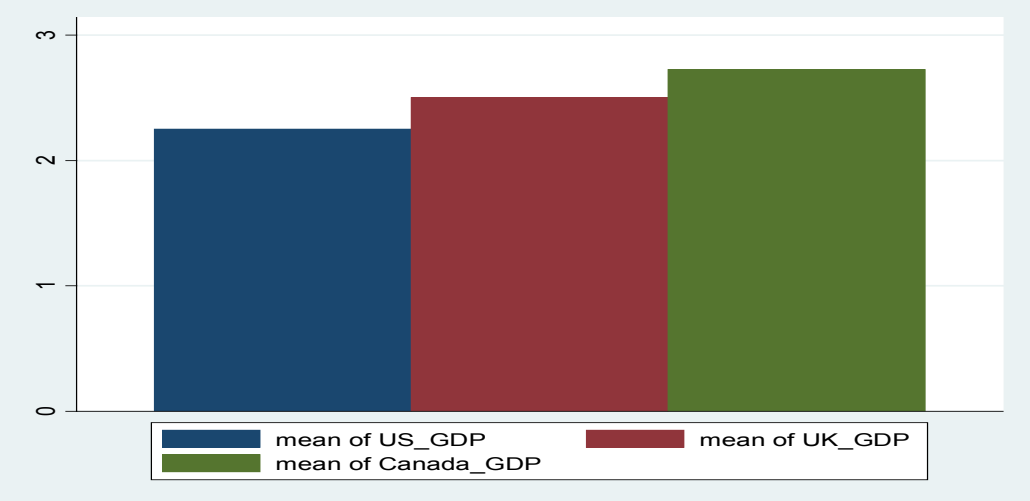

Fig. 4 : GDP Mean Values of Select countries (Developed world)

Relationship between GDP Growth and Income Inequality in Developed Nations

The Pearson correlation analysis was followed in order to evaluate the relationship between GDP growth rate and income inequality in developed nations. From the above analysis, it can be observed that the value of correlation coefficient between Gini coefficient and GDP growth in the US is 0.238 which is positive but much far from 1. Thus, it can be stated that weak positive relationship exists between the variables. In case of the UK, the value of correlation coefficient between gini coefficient and GDP growth is -0.484, which is negative. This indicates that negative relationship exists between the two variables. Finally, with respect to Canada, the value of correlation coefficient between the variables is 0.046 which is positive but much far from 1. Hence, it can be stated that very weak positive relationship exists between the variables.

For better comprehension of relationship, regression analysis has been undertaken.

Table 6 – Output summary – linear regression analysis

Source	SS	df	MS	Number of obs =	4
				F(1, 2) =	0.12
Model	.000235897	1	.000235897	Prob > F =	0.7616
Residual	.003914854	2	.001957427	R-squared =	0.0568
				Adj R-squared =	-0.4148
Total	.004150751	3	.001383584	Root MSE =	.04424

US_gini	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
US_GDP	.0047512	.0136863	0.35	0.762	-.054136	.0636384
_cons	.4405598	.0379161	11.62	0.007	.2774199	.6036997

From the regression analysis, it can be observed that value of R^2 between Gini coefficient and GDP rate of the US, the UK and Canada was 0.05, 0.23 and 0.95. This indicates that any changes in GDP t has about 5% changes in income in the US, 23% in the UK and 95% in Canada. Therefore, it can be stated that there is no connection between income disparity and GDP growth in the US, while the connection is weak in the UK. However, there is robust connection between income inequality and GDP growth rate in Canada.

CONCLUSION

From the analysis, it can be observed that for some nations such as Bangladesh and the UK, there is string positive connection between income disparity and GDP increase. On the other hand, some nations such as India, the US and Canada has demonstrated weak positive connection between income disparity and GDP increase. Thus, the relationship between these two variables is still ambiguous. Empirical evaluation recommends that the influence of income disparity on economic progress during 1990s is positive which support the supposition that income inequality can simplify quicker economic growth in short run. However, it can be argued that high economic growth might not indicate

the income is distributed evenly it is often witnessed that income distribution is always in favour of the higher income group. Many economies of the world have tackled this issue in the form of progressive taxation to transfer income from the rich to the poor or increased public expenditure for the weaker sections. Monetary policies have also been strengthened. However poverty arising out of income inequalities have never ceased to exist. There is a recessionary trend in the world due to political factors, international capital and labour movements have been decelerating, therefore many countries have witnessed slower and lesser growth rates causing income levels to be far more volatile. Thus, it will unable to minimise the poverty rate. Hence, it is important for the government in both developed and developing nations to consider both economic growth and income distributions concurrently.

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BEHAVIOURAL ADJUSTMENT AMONG CHILDREN WITH ADHD AND CHILDREN WITHOUT ADHD: A COMPARATIVE STUDY

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Abstract: *Attention Deficit Hyperactivity Disorder (ADHD) is a neurobehavioural disorder affecting more boys than girls during the developmental years. Inattention, impulsivity and hyperactivity are the cardinal features of children with ADHD. The present study aims at finding a significant difference between ADHD children and Non ADHD children on their Behavioural adjustment. A total of 100 children were included in the study, 50 children with ADHD and 50 children without ADHD. The children were 9 years and 10 years of age and studying in regular schools in Bangalore city. In each group there were 40 boys and 10 girls. The children were screened for ADHD using the Conner's Rating scale and then their behavioural adjustment was assessed using Teacher-Child rating scale. The difference in Behavioural adjustment among the two groups is compared and discussed in the paper.*

Key words: ADHD, Behavioural adjustment, Teacher ratings.

INTRODUCTION

Most individuals are able to focus and concentrate on situation or stimuli in the environment around them. However, some individuals, especially, children show problems in paying attention to a given task, selecting particular information as well as sustaining their attention on the task. Shifting focus from one activity to another is another challenge related to attention. Older children and adolescents are better than younger children at making appropriate shifts of attention. By middle school, children are better at focusing their attention on the relevant dimensions and show less impulsiveness.

In about 3% to 5% of children in schools, the degree of attention problems can be so high that they can be classified as suffering from Attention Deficit Disorder (ADD) or Attention Deficit Hyperactivity Disorder (ADHD). Attention Deficit Hyperactivity Disorder (ADHD) is the medical term used to describe a neurobiological condition in an individual and a diagnosis is based on developmentally inappropriate behavioural symptoms that begin in pre-school years and tend to persist through childhood, adolescence, and adulthood. These symptoms include inattention, hyperactivity, and/or impulsivity. Children with ADHD usually have functional impairment in multiple settings including home, school and peer relationships. (NIH Consensus Development Conference Statement, 2000). The prevalence in India is 10% to 20%.[1] A meta-analysis of 175 studies worldwide on ADHD prevalence in children has an overall estimate of 7.2%.[2]

All parents aspire to raise happy, well behaved and well adjusted children. With children with ADHD, this is far from reality. Behaviours that usually indicate that a child is "growing up" are not easy for kids who might naturally be inattentive or overly impulsive to learn. Missing subtle social cues, over focusing on minor details, having difficulty transitioning—all these hamper the child's interactions with others. The child's behavioural adjustment can best be assessed by teachers, who are familiar with the child's relations with others and their ability to perform tasks.

Behavioural Adjustment: Behavioural adjustment is defined as relations with people (e.g. his/her degree of competence); performance of tasks (e.g. child's schoolwork or play mastery or underachievement); self-relations (e.g. whether a child is self-assured or troubled with problems in self-esteem, self-care, and self regulation); general contentment (a sense of well-being or disturbed feelings anxiety, depression; thinking - phobias, obsessions; or physiological dysfunction - sleep disorder); adaptive or coping style such as handling life's problems.[3]

Managing children with ADHD can be challenging for parents as well as teachers. Their uninhibited and disruptive behaviour is a cause of worry for parents and can be

exasperating for both parents and teachers. Their emotional immaturity leads to poor adjustment with peers, and siblings and they often get into trouble with their caregivers. Several research studies document the adjustment problems shown by children with ADHD. A study conducted on 84 adolescents (aged 12-17 years) with ADHD and 77 adolescents without ADHD showed greater impairment in social competence, behaviour and emotional adjustment of ADHD children.[4]

A review study, identified the cognitive and emotional characteristics associated with ADHD as risk factors for the development of diverse adjustment problems in school context.[5] Research in non clinical population can additionally help in understanding ADHD deficits, since children with specific problems for attention focusing, inhibitory control, or impulsivity, allow isolating the effects of these variables on their adjustment into school. The review studies also examined the children diagnosed with ADHD and in typical development population with and without specific difficulties, with the purpose of obtaining a better understanding of the mechanisms that can lead ADHD children to develop a poor adjustment into school. Finally, in the intervention field, the reviewed programs offered promising results for the improvement of ADHD adjustment of children into school. Thus a review of research on ADHD and behavioural adjustment revealed that children with ADHD show poor adjustment at home and in school situation and do require psychological intervention.

Present Study

The present study aims to find a significant difference between children with ADHD and Non ADHD children on their Behavioural adjustment. The domains of *Behavioural adjustment*, namely, Acting out behaviour, Shy-anxious behaviour, Learning skills, Frustration tolerance, Assertive social skills and Task orientation are compared between ADHD and Non ADHD children.

HYPOTHESIS

There will be a significant difference in Behavioural adjustment between children with ADHD and Non ADHD children, namely in Acting out Behaviour; Shy-anxious behaviour; Learning skills; Frustration Tolerance; Assertive social skills and Task orientation.

MATERIALS AND METHODS

A total of 100 children were included in the study, 50 ADHD and 50 Non ADHD children. The children were 9 years and 10 years of age and studying in regular schools in Bangalore city. In each group there were 40 boys and 10 girls.

Tests Administered

I Conners[6] Abbreviated Rating Scale (to screen children with ADHD).This scale consists of 10 overlapping parent and teacher items from the 39 item Conners Teacher Rating Scale. The items are rated on a four-point scale with the following categories: Not at all, Just a little, Pretty much, and very much, with a score of 0,1,2,3, respectively. This test has been reliable in identifying hyperactive children.

II Teacher-child Rating Scale - This scale measures the Behavioural adjustment of children and the same is rated by the class teacher. It measures six areas of Behavioural adjustment, namely Acting out Behaviour; Shy-anxious behaviour; Learning skills; Frustration Tolerance; Assertive social skills and Task orientation.[7]

Assessment Method

Children in regular schools were screened for ADHD symptoms, using Conners Abbreviated Rating Scale, which was given to the class teachers. 50 children with ADHD were thus chosen and teachers were requested to rate these children on the Teacher-Child rating scale (T-CRS). 50 Non ADHD children were chosen by matching for age, gender,

and socio-economic status and then the teachers rated them on T-CRS. The sample included 40 boys and 10 girls in both the groups.

RESULTS AND DISCUSSION

The data obtained was subjected to descriptive statistics and t tests.

Table 1: Behavioural adjustment of ADHD and Non ADHD children

Behavioural adjustment	ADHD Group	Non-ADHD Group	t value	P value
Acting out	21.86±4.14	7.78±3.14	19.16	<0.001**
Shy-Anxious	12.08±4.14	8.52±2.43	5.24	<0.001**
Learning skills	19.38±5.39	7.66±3.48	12.91	<0.001**
Frustration-Tolerance	24.30±6.59	42.06±6.95	13.11	<0.001**
Assertive Social Skills	16.02±4.30	24.34±4.96	8.96	<0.001**
Task Orientation	18.88±5.67	32.82±5.78	12.17	<0.001**

**** t significant at 0.01 level.**

The results on Table 1, indicate that there is statistically significant difference between ADHD and Non ADHD children in all the domains of Behavioural Adjustment.

In Acting out behaviour, the ADHD children show significantly higher level of aggressiveness, disruptiveness and impulsivity when compared to Non ADHD children. Thus showing that they are more expressive in their demands, have poor self control, are impulsive, are highly distracted and show high attention seeking behavior. The ADHD children also show a significantly higher anxiety behaviour as measured in the Shy-anxious area, than the Non ADHD children. The higher score probably shows that they are more expressive of their negative emotions. In the Learning skills area, which measures the typical skills needed to succeed in the school, the ADHD children show poorer learning

skills than the Non ADHD children. Their scores on Learning skills shows that they have problems coping with academics, and have poor study skills. The Frustration –Tolerance area assesses the child's skills in tolerating and adapting to limits imposed by the school environment or the child's own limitations. In this area, the ADHD children show poor frustration tolerance when compared to Non ADHD children. Their low score in the area of Frustration-Tolerance shows poor emotional lability and poor control over their emotions. The ADHD children also show a significantly poorer interpersonal functioning as measured in the Assertive Social Skills area. Their poor scores on Assertive Social skills, shows that they have problems in interpersonal relationships, poor communication skills, problems in establishing and maintaining positive relations with others.Task Orientation assesses the child's functional effectiveness within the educational setting and the ADHD children show a poorer ability when compared to the Non ADHD children. Their low scores on Task-orientation, indicates their poor reasoning capacities, problem-solving abilities, poor planning and organization abilities.

The results thus prove the hypothesis that there will be a significant difference in all domains of Behavioural adjustment between children with ADHD and Non ADHD children namely in Acting out Behaviour; Shy-anxious behaviour; Learning skills; Frustration Tolerance; Assertive social skills and Task orientation. The study reiterates the fact that children with ADHD not only have problems with focussed and sustained attention but also have problems in their expressed behaviour and emotions which need to be dealt with for all round development of the children. Although it was initially thought that Attention Deficit–Hyperactivity Disorder (ADHD) remits in all children, ADHD may persist into adulthood 10% to 66% of the time. Surveys of adults aged 18 to 44 years showed that 4.4% of adults meet the criteria to be diagnosed with ADHD, and 3% to 6% of adults have ADHD-like symptoms that interfere with daily life.

IMPLICATIONS

The present study recognizes the importance of early identification of ADHD children and the importance of reducing their behavioural problems. If left untreated,

these children may show other behavioural and psychiatric disorders such as Oppositional Defiant Disorder (ODD), Conduct Disorder (CD) and during adolescence Anti Social Personality Disorder.

CONCLUSION

There is a significant difference between children with ADHD and Non ADHD children on all the areas of behavioural adjustment, namely, Acting out behaviour, Shy anxious behaviour, learning skills, Frustration Tolerance, Assertive social skills and Task orientation. Early identification of children with ADHD and placing them on an intervention programme will enable them to make better behavioural adjustment.

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A DESCRIPTION OF NATIONAL PENSION SYSTEM IN INDIA

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Abstract: *This description study identified the opportunities available in the society which helps government employees as well as non government employees. Therefore, it is the right time for the policy maker and government to reform NPS for the development of the employees in the society.*

INTRODUCTION

National Pension System (earlier called New Pension Scheme) is Government of India initiative to provide pension opportunity to every Indian citizen. It was introduced from 1st January 2004 for newly recruited government employees (both State and Central) and it is opened to all from 1st January 2009. The basic objective of NPS is to inculcate the habit of savings among employees exclusively for retirement benefits. Any resident Indian between the age of 18 to 60 years can open an NPS account and it is not compulsory for only government employees joined on or after 1/1/2004, it is also open even to government employees who joined before 1/1/2004 (if they are willing to invest in NPS).

The entities under NPS are - Pension Fund Regulatory and Development Authority (PFRDA), National Pension System Trust (NPST), Trustee Bank, Pension Fund Managers (PFMs), Points of Presence / POP Service Providers (POP / POP-SP), Central Record keeping Agency – Facilitating Centre (CRA – FC) and Annuity Service Providers (ASPs).

Pension Fund Regulatory & Development Authority (PFRDA)

The Pension Fund Regulatory and Development Authority Act was passed on 19th September, 2013 and the same was notified on 1st February, 2014. PFRDA is regulating NPS, subscribed by employees of Government of India, State Governments and by employees of private institutions/organizations and unorganized sectors. The PFRDA is ensuring the orderly growth and development of pension market. Based on the recommendations of the OASIS report, Government of India introduced a new Defined Contribution Pension System for the new entrants to Central/State Government service, except to Armed Forces, replacing the existing system of Defined Benefit Pension System. On 23rd August, 2003, Interim Pension Fund Regulatory and Development Authority (PFRDA) was established through a resolution by the Government of India to promote, develop and regulate pension sector in India.

National Pension Scheme Trust (NPST)

NPS Trust is the registered owner of all assets under the NPS architecture which is held for the benefit of the subscribers under NPS. The securities are purchased by Pension Funds on behalf of, and in the name of the Trustees, however individual NPS subscriber remain beneficial owner of the securities, assets and funds. NPS Trust, under the NPS Trust regulations, is responsible for monitoring the operational and functional activities of NPS intermediaries' viz. custodian, Pension Funds, Trustee Bank, Central Recordkeeping Agency, Point of Presence, Aggregators and that of IRDAI registered Annuity Service Providers (empanelled with PFRDA) and also for providing directions/ advisory to PF(s) for protecting the interest of subscribers, ensuring compliance through audit by Independent Auditors, and Performance review of Pension Funds.

The Trustee Bank

Axis Bank Ltd has been appointed by PFRDA as the Trustee Bank for National Pension System (NPS) effective from 1st July, 2013.

Trustee Bank as an intermediary is responsible for the day-to-day flow of funds and banking facilities in accordance with the guidelines/ directions issued by the Authority under NPS.

The NPS Trustee Bank accounts are maintained on behalf of the NPS subscribers and in the name of the NPS Trust. NPS Trust is the registered owner of NPS funds. However, individual NPS subscribers remain beneficial owners of these funds.

Pension Fund Managers (PFM's)

The following are the seven choices of pension fund managers - UTI Retirement Solution, SBI Pension Fund, LIC Pension Fund, ICICI Prudential Life Insurance Company, Reliance Capital Asset Management Company, Kotak Mahindra Asset Management Company and HDFC Pension Management Company.

Points of Presence / POP Service Providers (POP / POP-SP)

The Government of India has decided to roll out the NPS for all citizens of India from 1st May, 2009. Hence, various facilities like opending Permanent Retirement Account, contributing to NPS etc will be required to be provided to all the citizens (known as 'Subscribers' in the NPS architecture) at various locations across India. These processes shall be carried out through the entities known as Points of Presence (POPs) appointed by the PFRDA POPs shall provide the services under NPS through their network of branches called POP Service Providers (POP-SP).

Central Record Keeping Agency – Facilitation Centre (CRA – FC)

CRA-FC is the entity appointed by NSDL to extend various services under NPS, to its users across the country. The entities who have been appointed as CRA-FC shall establish multiple branches across the country to provide services to the nodal offices such as Pay and Accounts Office (PAO) or equivalent office under Central and State Government.

The main functions and responsibilities of the CRA include:

- Recordkeeping, administration and customer service functions for all the subscribers of the NPS.
- Issue of unique Permanent Retirement Account Number (PRAN) to each subscriber, maintaining a database of all PRANs issued and recording transactions relating to each subscriber's PRAN.
- Acting as an operational interface between Provident Fund Regulatory Development Authority (PFRDA) and other NPS intermediaries such as Pension Fund Managers (PFMs), Annuity Service Providers (ASPs), Trustee Bank etc..

Annuity Service Providers (ASPs)

Annuity Service Providers (ASPs) are appointed by PFRDA to maintain the annuity contribution of subscribers through their various schemes. Subscribers will have the option to invest their amount into one annuity scheme upon retirement/resignation. ASPs would be responsible for delivering a regular monthly pension (annuity) to the subscribers for the rest of his/her life.

NPS subscriber can choose/select any one of following as ASP for getting monthly pension - SBI Life Insurance, LIC, ICICI Prudential Life Insurance, HDFC Life or Star Union dai-ichi life insurance.

TYPES OF NPS ACCOUNTS

NPS offers two types of accounts to its subscribers - Tier I Account or Tier II Account.

- *Tier I Account* is a basic pension account which is mandatory account where government employees should have to contribute 10% of Basic salary plus DA and government also makes an equal contribution whereas other NPS subscriber will

contribute a minimum of 500 per month which is equal to 6000 for a year. Other private employees will be given to either NPS or EPF option. If the employees choose NPS, then 10% of Basic salary plus DA and employer makes an equal contribution.

- *Tier II Account* is a saving / investment account which is voluntary account which can be withdrawable at any time without paying any exit penalty but no contribution is made by the government/employer. A minimum of Rs. 1000 has to be contributed to open tier II account and thereafter Rs. 250 per month should be contributed. Minimum balance of Rs. 2000 should be maintained at the end of each year.

INVESTMENT OPTIONS UNDER NPS

NPS offers you with the flexibility to design your own portfolio based on your preference. The NPS investment has 3 options-

Active choice - Individual Funds

One will have the option to actively decide as to how one's NPS pension wealth is to be invested in the following three categories

- Asset Class "E" - investments in equities
- Asset Class "C"- investments in Corporate debts
- Asset Class "G" - investments in Government securities.
- Asset Class "A" - Alternative Investment which allows up to 5% (Newly added asset class only for private sector subscriber with active choice)

Auto Choice

If one opts for 'Auto Choice', the fund will be invested as per the Life cycle fund matrix designed by experts. In addition to the 'Moderate Life Cycle Fund', there lies the option for two more Life Cycle Funds - "Aggressive Life Cycle Fund" and "Conservative

Life Cycle Fund". The 'Moderate Life Cycle Fund' option provides with the option of a Life Cycle fund with a reasonable risk profile where the maximum equity allocation is kept at 50% upto the age of 35 years. For 'Aggressive Life Cycle Fund' maximum equity allocation is kept at 75% upto the age of 35 years while for "Conservative Life Cycle Fund" maximum equity allocation is kept at 25% upto the age of 35 years.

Default Choice

Alternatively, the subscriber can opt for the default scheme, where as per the time left to retirement his portfolio is rebalanced each year for the proportion of equity, corporate bonds, and government bonds.

CONCLUSION

NPS is a great product, low on charges and an extremely high lock in period (till retirement) that is best suited for long term savings for retirement purpose. However, as an "investor", when one plans for retirement, the most important thing to look for in available product option is whether it is possible to have full control over the money. NPS, though being a product meant for retirement planning, suffers from certain limitations, lack of clarity on certain aspects and benefits, as per present income tax regulations, "maturity proceeds" of NPS are taxable. It is hoped that the Government will bring NPS in line with avenues like Public Provident Fund (PPF) in the Exempt-Exempt- Exempt (EEE) structure that will mean maturity proceeds are not made taxable or as per the Proposed Direct Tax Code (DTC), NPS will have Exempt-Exempt-Exempt (EEE) status.

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LITERATURE SURVEY ON WIRELESS SENSOR NETWORKS AND CLOUD COMPUTING

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Abstract: *A recent trend in engineering is the merging of Wireless Sensor Networks with Cloud Computing. The Internet of Things is an example of this. For example, smart homes which have sensors attached to various devices within the home and which can be controlled through the Cloud are attracting a lot of interest in the engineering community. There are many other intriguing applications that come from the combination of WSNs and Cloud Computing. In this review an introduction is provided to Cloud Computing and to WSNs. It also includes information on applications of WSN and the Cloud.*

INTRODUCTION TO CLOUD COMPUTING

Cloud Computing is a technology by which under-utilized resources of a large company can be used by other smaller companies over the Internet. The fact that the actual resource is not physically collocated in the small company is not visible to the end user. The end user will be oblivious to the fact that the actual resource is located miles away from him/her. The seamless way in which the resources are accessed, thanks to the Internet, makes this possible. Resources can be anything from networks, servers, storage, applications and services. Thus the services are provided to the end-user by virtual hardware, simulated by software running on one or more real machines. Hence through virtualization, a single large server may act as multiple virtual servers in order to harness the under-utilized resources. According to the US National Institute of Standards and Technology (NIST), Cloud computing is defined as a model for enabling

ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction[1]. For example, a cloud computer facility that serves European users during European business hours with a specific application (e.g., email) may reallocate the same resources to serve North American users during North America's business hours with a different application (e.g., a web server)[2].

The three types of Clouds are public, private and hybrid. A cloud that is owned by a private company, but whose services are available for use to the general public, is called the public cloud. A private cloud is one that is owned by a private company, but whose services are available to a limited number of people within the company. A hybrid cloud is one that has features of both public and private clouds.

The three different service models of Cloud Computing are IaaS, PaaS and SaaS depending on what resource is offered to the end-user. IaaS is Infrastructure as a Service, wherein infrastructure resources such as hardware, storage, servers and networking components are offered to the end-user as a service. IaaS is sometimes known as Hardware as a Service (HaaS).

PaaS (Platform as a Service) provides the computing platform such as operating system, programming language execution environment, database and web servers. End users can develop their software solutions on such a platform without investing into buying and managing the actual operating system.

SaaS (Software as a Service) provides access to application software and databases. The provider can either, host the commercially available software and deliver it to the customer over the Internet, or, it can give the customer network-based access to a single copy of the application software.

INTRODUCTION TO WIRELESS SENSOR NETWORKS (WSNs)

A Wireless Sensor Network (WSN) is a network consisting of multiple sensor nodes, often distributed spatially, and which send data to a central location that collects the data and does some information processing. The data picked up and sent by a sensor node can be anything from temperature, sound, pressure, humidity, light, inclination, acceleration, chemical substance, etc.

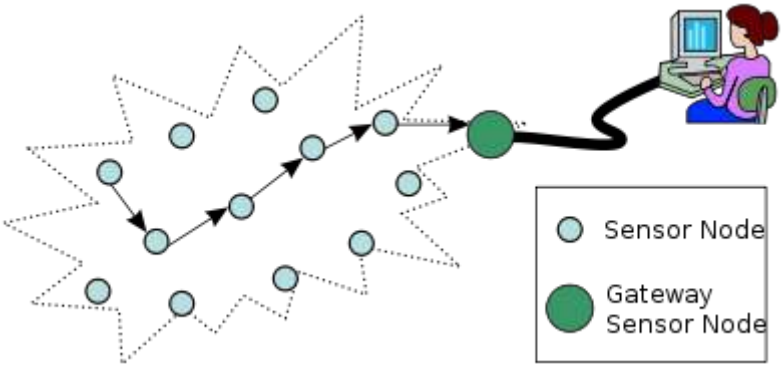

Figure 1: Typical sensor network[3]

Various applications of WSNs include area monitoring, health care monitoring, air pollution monitoring, forest fire detection, landslide detection, water quality monitoring, and natural disaster prevention. Military applications include monitoring friendly forces, equipment and ammunition; battlefield surveillance; critical observation of opposing forces and terrain; targeting; battle damage assessment; nuclear, biological and chemical attack detection. Environmental applications include forest fire detection; biocomplexity mapping of the environment i.e. study of the complex interactions of living organisms with their environment; flood detection; and precision agriculture. Health applications include telemonitoring of human physiological data; tracking and monitoring doctors and patients inside a hospital; and drug administration in hospitals. Home applications include home automation and smart environment. Other commercial applications include environmental control in office buildings; interactive museums; detecting and monitoring car thefts; managing inventory control; and vehicle tracking and detection.

Features of sensor nodes

Sensor nodes are small in size; they are also cheap and use very less energy; they can communicate easily over short distances. The sensor network is usually placed either inside the phenomenon or very close to it. The positions of the sensor nodes within the phenomenon are usually not pre-determined. Thus, random placement in difficult-to-access places is made possible. Also, sensor nodes have an on-board processor. This enables sensor nodes to perform simple computations and transmit only the required data. Since sensor nodes are very close to each other, multihop communication consumes less power compared to the traditional single hop communication. Further, multihop communication overcomes the signal propagation effects in traditional long-distance wireless communication.

Sensor networks must focus on power conservation because of the low power consumption requirement. Thus, prolonging network lifetime is given more importance than lower throughput or higher transmission delay. Many WSN companies use the 32-bit ARM® Cortex™-M3 processor due to its low-power, energy efficient features such as deep sleep mode and wake-up interrupt controller[4].

Sensor networks communication architecture

The typical diagram of a sensor field is shown in Figure 2:

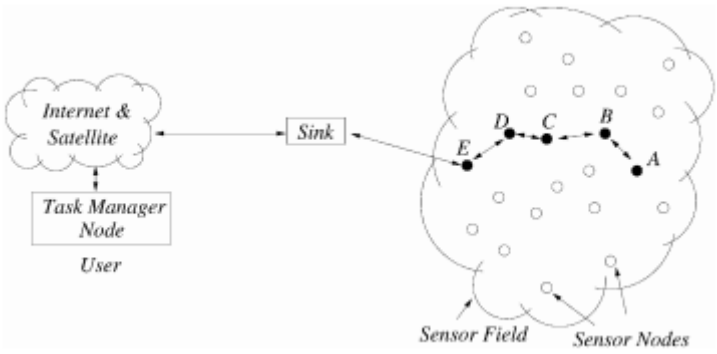

Figure 2: Sensor nodes scattered in a sensor field[5]

Sensor nodes such as A, B, C, D and E collect the required data and send it to the sink and the end users. Data reaches the end user via the sink through a multihop infrastructureless architecture.

The protocol stack used by all the sensor nodes is shown in Figure 3.

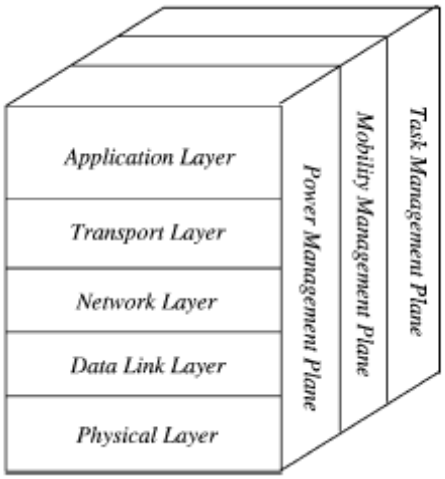

Figure 3: Sensor networks protocol stack[5]

As seen in Fig 3, the protocol stack is similar to the OSI protocol stack omitting only the presentation layer and session layer. In addition, the sensor networks protocol stack has the following planes: power management plane, mobility management plane and task management plane.

The three different planes are explained first, followed by the five layers.

The power management plane manages how a node effectively manages and conserves its energy. An example to conserve energy is that a sensor node may switch off its receiver after receiving a message from one of its neighbours, so that it does not waste energy in receiving the same message from its other neighbours. Another example is that when the sensor node is running low on power, it sends a broadcast message to

all its neighbours indicating that its energy level is low and that it will not participate in routing messages.

As the title suggests, the mobility management plane records the movement of sensor nodes so that the recently moved node can find out its neighbours and also for maintaining a route back to the user.

The task management plane manages which all nodes are required to perform the sensing task at a particular time. The sensor nodes will be chosen for the sensing task based on their power level.

These three planes are required so that each sensor node works in collaboration with other sensor nodes, thus prolonging the lifetime of the sensor network.

Application Layer

A few of the application layer protocols are sensor management protocol (SMP), task assignment and data advertisement protocol (TADAP) and sensor query and data dissemination protocol (SQDDP). As the name suggests, the SMP manages the sensor nodes. The nodes do not have global IDs. Instead, they are accessed using attribute-based naming or location-based addressing. An example of attribute based naming is a query such as "the areas where the temperature is more than 70 F" which queries an attribute rather than querying a particular node. In TADAP, the concept of interest dissemination is introduced. Here, users send their interest about an attribute to a set of sensor nodes. The other approach is the reverse where the nodes advertise their data to the users. SQDDP provides the interfaces for issuing queries, responding to queries and collecting the replies.

Transport Layer

Since sensor networks are different from the traditional networks, different transport protocols are used for communication between sink node and sensor node, and between the user and the sink node. Usually, UDP or TCP will be used between the user and the

sink node, and UDP type protocols between the sink and sensor nodes because of the constraint of limited memory for the sensor nodes. As mentioned in the above paragraph, global addressing is not used for the sensor nodes, instead attribute-based naming is used.

Network Layer

Due to the dense population of sensor nodes within a sensor field, special multihop wireless routing protocols are required between the sensor nodes and the sink node. Networking layer protocols of wireless sensor networks are usually designed on the principles of power efficiency, data centricity, data aggregation and attribute-based and location-based addressing.

For power efficiency, a number of approaches are possible such as maximum available power route, minimum energy route, minimum hop route and maximum minimum available power node route. Here, the energy mentioned is the energy needed to transmit a packet through a link. The maximum minimum available power (PA) node route is the route along which minimum PA is greater than minimum Pas of other routes.

In data centric routing, interest dissemination mentioned in the application layer protocol TADAP, is used. Attribute-based naming is used for addressing the sensor nodes.

An example of data aggregation is shown in Fig. 4.

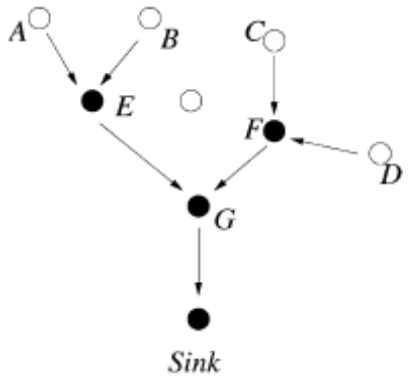

Figure 4: Example of data aggregation

Here, the network is seen as a reverse multicast tree. Sensor node E aggregates the data from sensor node A and B, and sensor node F aggregates the data from sensor node C and D. However, during data aggregation, specifics such as location of reporting sensor nodes should not be omitted.

Characteristics of WSN

The hardware of a WSN is typically of the following configuration: CPU from 10 MHz to 190MHz, RAM from 10KB to 512 KB, Flash from 48KB to 4MB, and Networking from 250kbps 802.15.4 up[6]. Also, some of the Operating Systems typically deployed in a WSN are:

1. *TinyOS: a static component based Operating System built using the NesC language*
2. *Contiki: a modular operating system built using standard C*
3. *Squawk: a Java-based operating system that supports the Java ME MIDP 1.0 specification*

LINK BETWEEN WSN AND CLOUD COMPUTING

Cloud Computing resources can be utilised well in few WSN applications such as environmental applications[6]. For example, consider a flood-monitoring application. Under normal conditions, the timeliness of flood predictions is not critical. But, during flood conditions, prediction of a new flood is very critical. However, the resources manually provisioned using traditional methods, may not be able to respond fast enough. By integrating Cloud Computing in such a situation, resources can be provisioned quickly. An experiment has been conducted by extending sensor networks into the cloud using Amazon web services, specifically Amazon EC2 and it has been shown that the load-balancing service of EC2 can gracefully increase the number of instances required to support the increased load[6]. Thus, they conclude that Cloud computing, specifically Amazon EC2, can support dynamic load requirements of applications.

Integration of Cloud Computing with WSN is helpful in another area[4]. The provision of large amount of storage capacity through Cloud Computing helps to store the exponentially large amount of data generated from WSNs. Also, traditional networks such as WLAN, MAN and Internet network, are not equipped to transfer such a large volume of data. Also, the fact that Cloud Computing resources are publicly available when compared to proprietary nature of traditional networks, makes Cloud Computing preferable to the others.

When data collected by a WSN is no longer needed, such data can be stored on a Cloud for future research and historical reasons[7]. Also, when compared to integrating WSN with grid computing, Cloud computing usually concentrates on general purpose applications, whereas grid computing is for high performance computing and hence Cloud Computing is preferred. Hence, a WSN and Cloud Computing integration framework is explained[7].

A concept called 'Tangible Cloud' argues that the level of investment into WSNs is too high for just a single application and one has to strive towards a shared infrastructure, multi-application paradigm, and these happen to be the concepts of Cloud Computing[8].

An alternative approach to the traditional sensors considers smartphone-class devices as sensors[9]. Compared to the traditional sensors, these are not low-power, but high throughput and have reliable cellular network connectivity with hundreds of Kbps and require frequent recharging. But, they support more computationally intensive applications than motes. Smartphones have standard sensors such as eGPS, Bluetooth v2, orientation, acceleration, audio microphone and camera. The different security issues involved with the components of their networked system such as the sensors, i.e. smartphones, the brokering network and the final Cloud Computing network is explored[9].

The opportunity that allows users not only to monitor the data sent by sensors but also explores to analyse future status of such data[10]. An example given is that farmers not only need to monitor real-time temperatures of the crops, but also need the forecast of the

overnight temperature by applying sensor data to temperature-prediction models. Sensor data analysis can be of three types – data retrieval, data storage and channel recovery and redirection. (1) Data retrieval can be either of push-based model or pull-based model. In a push-based model, the sensor node pushes the data via a UDP or SNMP packet through the network to the user. Whereas, in a pull-based model, the user is the one who initiates the data retrieval query. (2) In data storage, past sensor data is stored for historic and future uses, in cloud storage such as Tripod FTP, Amazon S3 and Hadoop. (3) In data channel recovery and redirection, existing data channels are recovered and redirected for reasons of job migration and user mobility. The Connector data-channel software toolkit that provides data-transfer channels from sensors to the cloud and from the cloud to the end user is come up with[10].

A solution for patient's data collection in health care institutions using WSNs and Cloud Computing is proposed[11]. Here, from the patient's bedside, sensors which are attached to medical devices are connected to the institution's networking infrastructure. Through the networking infrastructure, the data reaches the cloud from where it is distributed to medical staff for analysis. This proposal makes it possible for medical staff located at a particular location to monitor patients located at a remote location. This improves the quality of medical assistance delivery.

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QUALITATIVE ANALYSIS OF EDIBLE OILS

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Abstract**:** *Essential fatty acid is required as a part of diet to maintain a good health condition like proper functioning of cardiovascular, nervous and immune systems which is provided mainly by the edible oils. But these oils are susceptible to degradation with less of nutrient content and increase in the number of free radicals that affects health. High amount of free fatty acids and their oxidation result in rancidity of oils, that lower the nutrient content. The present investigation was carried out on different varieties of oils like mustard, sunflower, groundnut, olive and sesame oils of various brands. The chemical tests were performed for parameters like acid value, peroxide value, iodine value, saponification, phytosterol content, moisture content and free fatty acid profile. The results showed that the amount of peroxide value, saponification and iodine values were found to be less for mustard oil, olive oil and sunflower oil. So, these oils can be suggested to be healthier. Edible oils differ in their fatty acid compositions. The free fatty acid profile for linoleic acid was found to be less than the standard values. People mostly depend on the edible oils of different brands without any knowledge about the amount of adulteration. So, the investigation helps to determine the nutrient rate and reduce the health risk factors.*

Key words: *Edible oils, adulteration, acid value, free fatty acid profile.*

INTRODUCTION

The oils occur naturally as esters of long straight chain carboxylic acids. They belong to the saponifiable group (contain an ester group) of lipids.[1] Lipids are relatively insoluble in polar and non-polar organic solvents. Edible oils constitute the triglycerol molecules, mainly formed by unsaturated (oleic, linoleic, linolenic acids) and saturated fatty acids (myrictic, palmitic, stearic acids etc.), esterified to glycerol units. The seeds of plants

are the main sources for the vegetable oils. Amongst many oilseeds from which edible oils are extracted includes groundnut, mustard, sesame, castor, and soyabean. The other sources include palm, cottonseed, and coconut. Fats and oils are considered as essential nutrients. They provide the most concentrated source of energy of any foodstuff supply. Essential fatty acids are precursors for important hormones like the prostaglandins which are carriers for fat soluble vitamins, and make food more palatable.[2]

Oils begin to decompose from the moment they are isolated from their natural living environment, with the production of an unpleasant taste and odor over a period of time which is referred to as rancidity. The unpleasant organoleptic characteristics of the rancid vegetable oils are caused by the presence of free fatty acids and by atmospheric oxidation. This is accelerated by the exposure of the vegetable oils to heat, light, moisture, residual natural dyes, pigments and by the presence of transition metals (e.g. copper, nickel and iron). One of the main indicators of the quality and freshness of vegetable oils is their fatty acid composition. Because long chain organic acids are not very volatile compounds, for analytical purposes they are converted into their more volatile derivatives – fatty acid esters. The esterification reaction is often used in the analysis of fats. In gas chromatography, fatty acids are generally analyzed in the form of methyl esters.[3]

In the present study, the product quality of different vegetable oils was measured using various parameters. These include peroxide value, acid value, free fatty acid profile, saponification, phytosterol, and moisture test. These are chemically investigated in the oils for fatty acid content to find out which oil is healthy for human being.

MATERIALS AND METHODS

The present study was carried out in the Research Laboratory, Botany department, Mount Carmel College. Oils available in the market in the form of various branded product which are from registered industries. A total of 5 varieties of oils and about 21 brands were selected for the study.

The saponification, iodine, peroxide value, moisture and phytosterol content was determined as per the standard procedure.[4,5] The four oil samples were selected from four different brands and the analysis was carried out by Karnataka Soaps and Detergents Ltd. The analysis of Fatty Acid Methyl Ester (FAME) was carried out using Gas Chromatography (GC) Model-14B, loaded with software Class GC-10 (version-2.00). Nitrogen was used as a carrier gas with flow rate of 20 ml/min.

RESULTS

The present study was carried out on six different parameters and comparison was made among five varieties of oil and their different brands respectively. The nine brands of sunflower oil are indicated as S1, S2, S3, S4, S5, S6, S7, S8 and S9. The only filtered oil was S9. About four brands of olive oil are indicated as 01, 02, 03 and 04. About three brands of groundnut oil are indicated as G1, G2, and G3. The three brands of sesame oil indicated as T1, T2 and T3. Lastly two brands of mustard oil are indicated as M1 and M2.

Acid value of different oil samples are given in Table 1. Among sunflower oils, S3 showed maximum and S9 showed minimum free fatty acid content. Olive oil O3 showed maximum and 02 showed minimum free fatty acid content. Among groundnut oil samples, G1 showed maximum and G2, G3 showed comparatively less free fatty acid content. Of sesame oil samples, T1 showed maximum, whereas, T2 and T3 showed minimum free fatty acid content. Out of the two brands of mustard oil, M1 showed higher whereas, M2 showed lesser acid value. On comparing all the oils, maximum free fatty acid content was in brands such as S3, O3 and G1 and the least in S9 i.e., in filtered oil.

Saponification value of Sunflower oil S3 and S4 showed maximum and of S5 was the minimum. In olive oil, O3 showed maximum and O1 showed minimum saponification value. Among the groundnut oil samples G1 showed maximum and G3 showed less saponification content. T1 sample of Sesame oil showed maximum, whereas, T2 and T3 showed minimum saponification value. In mustard oil, out of the two brands M1 showed

higher value than M2. Maximum saponification content was observed in S1, S2, S3, S4, S8, O3, G1, G2 and M1 and the least saponification value was in O1.

Sunflower oil samples S8 and S9 showed highest and S5 and S7 showed minimum unsaturated fatty acids. Unsaturated fatty acid content was more in O2 than O3. All the groundnut oil samples showed higher iodine value and the least was in G3. The level of unsaturated fatty acid was maximum in T1. It was low in sesame oil T2 and T3. The iodine value of mustard oil M2 was higher than that of M1. Maximum unsaturation of fatty acid content was in S8 followed by S9, 02, 04, T1 and the least in T2.

The Peroxide value of different oil samples are, Sunflower oil S6 showed maximum and S3 showed minimum oxidation. In olive oil O2 showed maximum oxidation as compared to other three brands. In groundnut oil G2 showed maximum and G1 and G3 showed comparatively lesser oxidation of oil. In sesame oil T2 showed maximum oxidation as compared to T1 and T3. In mustard oil, the two brands M1 and M2 showed very negligible peroxide values. The peroxide value is considered to remain less than 5 which shows less of oxidation, but, O2 showed exceptionally high peroxide value. The Moisture content in sunflower oil, S6 showed maximum water content and minimum moisture content was found in S1 and S2. Sample O1 showed the least and O4 showed the highest water content in olive oil samples. In groundnut oil, G2 showed maximum and G3 showed minimum moisture content. In sesame oil, T2 showed much higher moisture content and T1 showed the least water content. In mustard oil, M1 had more water content as compared to M2. Of all the oil samples tested T2 had maximum water content as compared to all other varieties of oil and their respective brands. S1, S2, O1 and M2 showed minimum moisture content.

The phytosterol content in sunflower oil S1, S4, S6 and S8 showed very less phytosterol content as compared to the other 5 brands. The maximum phytosterol content is seen in S5 (Table 1). All the four brands of olive oil showed considerably high phytosterol content, the highest being in 04. Sesame oil T1 showed maximum phytosterol content and

T2 showed the least phytosterol content. In M1 phytosterol content was higher than in M2. Groundnut oil - G1 and G2 had higher phytosterol content compared to G3.

The different fatty acid concentrations were obtained for the four oil samples when they were run through gas chromatographic analysis as given below (Table 2). The concentration of palmitic acid- Highest concentration was found to be in sunflower oil and least in sesame oil. Mustard oil showed absence of palmitic acid. Concentration of stearic acid- mustard oil showed 9.05 % of fatty acid and 5.48 % of fatty acid in sesame oil. Absence of stearic acid is seen in sunflower oil and groundnut oil. Concentration of oleic acid- highest concentration was seen in groundnut oil and least in mustard oil. Concentration of linoleic acid- Highest concentration was seen in mustard oil and least in sunflower oil with only 0.05% of linoleic acid. Concentration of linolenic acid- The concentration of linolenic acid was considerably less in all the varieties, however, it was absent in sunflower oil. Concentration of arachidic acid- The concentration was less than 1% for all the oils except mustard oil with 1.41% of the fatty acid. Concentration of behenic acid- sunflower oil and groundnut oil showed absence of behenic acid and mustard oil with 1.63% .

VARIETIES	ACID VALUE MEAN ± S.E	SAPONI-FICATION VALUE MEAN ± S.E	IODINE VALUE MEAN ± S.E	PEROXIDE VALUE MEAN ± SE	PHYTO-STEROL CONTENT µg/ml	MOISTURE CONTENT MEAN ± S.E
Sunflower oil						
S1	1.103 ± 0.015	53.3 ± 0.1	1.53 ± 0.01	2.32 ± 0.008	50	0.028± 0.0001
S2	1.713± 0.015	53.3 ± 0.1	0.75 ± 0.01	2.333 ± 1.247	310	0.029 ± 0.0001
S3	1.737± 0.032	56.1 ± 0.1	5.96 ± 0.01	0.32 ± 0.008	400	0.090 ± 0.001
S4	1.117± 0.015	56.133 ± 0.152	0.866 ± 0.057	2.7 ± 0.081	60	0.341 ± 0.001
S5	1.12 ± 0.01	16.833 ± 0.015	0.5 ± 0.01	4.3 ± 0.081	460	0.273 ± 0.001
S6	0.627 ± 0.025	42.07 ± 0.01	4.633± 0.152	6.33 ± 0.124	105	0.346 ± 0.001
S7	0.63 ± 0.026	39.273± 0.015	0.51 ± 0.01	2 ± 0.816	330	0.107 ± 0.001
S8	0.3 ± 0.1	47.7 ± 0.1	9.643 ± 0.015	0.657 ± 0.012	150	0.183 ±0.006
S9 (Filter Oil)	0.21 ± 0.01	30.85 ± 0.01	9.143 ± 0.015	1.33 ± 0.012	295	0.164 ± 0.0006
Olive oil						
01	1.117± 0.015	2.7 ± 0.1	5.83 ± 0.01	3.33 ± 0.01	370	0.028 ± 0.001
02	0.557 ± 0.015	14.01 ± 0.01	8.38 ± 0.01	32.327 ±0.015	275	0.067 ± 0.001
03	1.737± 0.032	47.7 ± 0.1	4.23 ± 0.01	3.2 ± 0.2	330	0.082 ± 0.002
04	1.12 ± 0.01	25.24 ± 0.01	6.22 ± 0.01	2.7 ± 0.1	385	0.21 ± 0.01

Groundnut oil						
G1	1.737 ± 0.035	44.8 ± 0.1	1.262 ± 0.006	3.167 ± 0.289	390	0.06 ± 0.01
G2	0.55 ± 0.01	36.5 ± 0.1	1.02 ± 0.02	5.343 ± 0.015	150	0.136 ± 0.001
G3	0.56 ± 0.01	22.4 ± 0.01	0.883± 0.015	1.317± 0.015	345	0.055 ± 0.001
Sesame oil						
T1	1.7 ± 0.1	22.443 ± 0.015	6.21 ± 0.01	4.433 ± 0.513	405	0.165 ± 0.005
T2	1.12 ± 0.01	16.83 ± 0.01	0.171 ± 0.076	5.666 ± 0.152	380	0.563 ± 0.001
T3	1.13 ± 0.01	16.833 ± 0.015	0.254 ± 0.001	5.133 ± 0.152	170	0.216 ± 0.001
Mustard oil						
M1	1.68 ± 0.072	36.5 ± 0.2	0.013 ± 0.015	0.33 ± 0.01	550	0.667 ± 0.001
M2	1.12 ± 0. 01	25.237 ± 0.025	1.269 ± 0.001	0.663 ± 0.015	330	0.026 ± 0.001

Table 1 Acid Value, Saponification Value, Iodine value, Peroxide Value, Phytosterol Content And Moisture Content In different Oil Samples tested

Mean of five samples ± Standard error.

Oils	Fatty acids (%)						
	$C_{16:0}$	$C_{18:0}$	$C_{18:1}$	$C_{18:2}$	$C_{18:3}$	$C_{20:0}$	$C_{22:0}$
Mustard oil	0.00	9.05	2.48	10.59	1.96	1.41	1.63
Sunflower oil	38.94	0.00	55.29	0.05	0.00	0.00	0.00
Groundnut oil	14.43	0.00	79.31	3.87	1.32	0.79	0.00
Sesame oil	7.90	5.48	5.69	5.40	0.72	0.80	0.48

Table 2: Long Chain Saturated/Unsaturated Free Fatty Acids in Test Samples.

$C_{16:0}$ - Palmitic acid, $C_{18:0}$ – Stearic acid, $C_{18:1}$ – Oleic acid, $C_{18:2}$- Linoleic acid, $C_{18:3}$– Linolenic acid, $C_{20:0}$ - Arachidic acid, $C_{22:0}$ - Behenic acid

DISCUSSION

The high Iodine value indicates the degree of unsaturation in the fatty acid of triglyceride, and it results into high concentration of polyunsaturated fatty acids (PUFAs) rendering the vegetable oil more prone to oxidation, resulting in loss of PUFA due to the formation of early and advanced volatile and non-volatile lipid oxidation products. This results into health risks as high level of PUFAs are considered to be good for health.[5, 6] All the brands showed considerably less amount of iodine absorbed (<10) and hence, less degree of unsaturation, the least was seen in one of the brands of sesame oil, a few brands of sunflower oil and all the brands of groundnut oil and mustard oil. More the absorption of iodine, more will be its reaction with unsaturated fatty acid. Unsaturated fatty acids can be converted into saturated by the process of hydrogenation. Depending upon the degree of unsaturation, the fatty acids can combine with oxygen or halogens to form saturated

fatty acids.

Peroxide value, PV, is the measure of oxidation and detects the amount of unsaturation of fatty acids. Since, peroxide value correlates with the extent to which oxidative rancidity has taken place in oils, and thus, a measure of the shelf life of oils. The maximum Codex standard peroxide value for vegetable oil deterioration is considered as 10 meq O_2/Kg. The peroxide values were in agreement with the standard value. The least was seen in all the brands of mustard oil. However, one of the brands of olive oil had higher rate of oxidation. The industrial processing of vegetable oils includes preservatives and hence reduces the high PV over time, and present results are in line with the reported literature.[7]

The saponification gives the amount of soap content in the oil. So, high amount of saponification value suggests that the oil is a good raw material for soap industries. However, higher saponification value also indicates high proportion of lower fatty acids since saponification value is inversely proportional to the average molecular weight or chain length of the fatty acids.[8] Therefore, shorter the average chain length (C4-C12) the higher is the saponification number.[9] The codex standard for permissibility level of saponification is given as 190-209 mg KOH/g and interestingly all the oils show less amount of saponification (less than 60 mg KOH/g). Least amount of saponification is seen in one of the brands of olive oil (less than 10 mg KOH/g).

The acid value is a measure of the free fatty acids in oil. The more is the acid value the more is the amount of free fatty acid content. The acid value must be less than 0.6 mg KOH/g which is the Codex Standard indicating the purity of the oils. According to the overall analysis, all the brands of sesame oil and mustard oil shows higher acid values. Even the first 5 brands of sunflower oil show higher acid value. However, a few brands of sunflower oil, groundnut oil and olive oil show acid value less than or equal to 0.6 mg KOH/g. Less acid value suggest that they have high amount of saturated fatty acids than that of the unsaturated fatty acids like linoleic acid and linolenic acid. The high degree of saturated fatty acids enables oils to be stable against oxidative rancidity and confer a longer shelf-life. The moisture content is a measure of total water content

that is held by the oil. More moisture content also shows a considerable increase in other parameters such as peroxide value. So, high moisture content reduces the overall quality and purity of oil.[10] The standard levels of moisture content acceptable is 0.01-0.04%.[11] Based on these standard levels, mustard oil and olive oil have minimum moisture content and an increasing trend is seen in the first three brands of olive oil except the last brand which shows a little rise in moisture content (0.2%). Three brands of sunflower oil, 2 brands of groundnut oil also showed below 0.1 % moisture content which is acceptable. However, one of the brand of sesame oil showed the highest moisture content (0.56%). In large scale oil mill the processing is automated and routine analyses are carried out in laboratories. But, the small scale mills generally boil the oil and heat them and then the dried oil sample is carefully skimmed off.[12] So, more skilfully the work is done, less will be the impurities and moisture content in the oils.

The phytosterol plays a vital role in the physiological regulation of membrane fluidity and proper functioning of cells. It is also a major precursor in the production of bile acids, steroid hormones as well as vitamin D. High phytosterol content indicates its association with high cholesterol content in human and increasing chances of coronary heart diseases (CHDs).[13] The results obtained in pie graphs shows a considerable difference in the phytosterol content in all the oils. So, none of the brands were completely cholesterol free.

Edible oils differ in their fatty acid compositions, which are classified according to their degree of saturation. Fatty acids are saturated or unsaturated with one double bond (monounsaturated) or more than one double bond (polyunsaturated). The major unsaturated fatty acids are oleic acid (OA), linoleic acid (LA) and alpha-linolenic acid (ALA). LA and ALA are considered essential fatty acids. EFAs, are of the omega-6 and omega-3 group, respectively. In most animals, LA can be transformed to their higher unsaturated derivatives like arachidonic acid by a series of desaturation and elongation reactions.[14] The obtained results show all the four variety of oil having linoleic acid less than the standard values. The Codex standard for sunflower oil and sesame oil are 48.3-

74% and 36.9-47.9 % respectively. On the other hand, oleic acid content as per standards for groundnut oil must be 55-83% and sesame oil must be 34.4% to 45.5 % respectively. The results show only groundnut oil within the range of standards. Highest concentration was seen of oleic acid which is an unsaturated fatty acid. Although unsaturated fats are conventionally regarded as 'healthier' than saturated fats, the United States Food and Drug Administration (FDA) recommendation stated that the amount of unsaturated fat consumed should not exceed 30% of one's daily caloric intake. Most foods contain both unsaturated and saturated fats.

CONCLUSION

The partial hydrogenation of oil in industries results in increasing shelf life of the oil and to some extent the taste. At the same time as the amount of trans fatty acid increases it affects the health. The study of parameters like acid value shows a considerable higher free fatty acid in almost all the brands except a few, whereas, peroxide value shows the amount of acidification which is seen to be within the standard values. Along with oxidation, the parameters like saponification and even iodine value was seen to be within the range of standard values. The olive oil showed exceptionally higher oxidation in one of the brands and also sesame oil showed higher moisture content, contradictory to the other brands of oil.

Thus, the qualitative analysis helps us to conclude regarding the quality of different varieties of oils and the brands available in the market. Most of the brands among these consider themselves to be cholesterol free, pure, and free from adulteration. But the above results suggest that though in lesser amount the oils had impurity and there was some amount of adulteration. Almost all the oils with phytosterol can form cholesterol in animals, except for few brands of sunflower oil. Though, even cholesterol is necessary for health, yet they did not go in accordance with almost all the brands claiming to be cholesterol free. The free fatty acid profile gave the different fatty acid compositions of oil. The parameter also helped to conclude that most of the oil samples had less amount of essential fatty acids like linolenic acid, arachidic acid. The free fatty acid profile,

hence, helps to conclude on the quality of the oils from nutritional standpoint. Out of the nine brands of sunflower oil taken, S9 indicated filter oil i.e., it is not a refined oil but surprisingly it did not show much difference with the other 8 brands of refined oil. The results show amount of peroxide value, saponification and iodine value to be less for mustard oil, olive oil and sunflower oil. So, these oils can be suggested to be healthier.

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HERBAL CONSTITUENTS AS ANTIDANDRUFF AGENT IN HERBAL HAIR OIL

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***Abstract**: Dandruff is a common disorder affecting the scalp and can be an embarrassing condition. Herbal hair oils are combination of suitable herbs which are particularly preferred in view of their medicinal and ecofriendly. The antidandruff activity of some medicinal herbs were studied in the present study. The plant parts of Punica granatum along with other herbs like Lawsonia, proved to be the best. The antifungal activity was determined in aqueous, ethanol, chloroform and petroleum ether extracts using agar disc diffusion method. In vitro antifungal activity showed that Malassezia furfur was very sensitive to all the concentrations of ethanol extracts of medicinal plants used in this study. In vitro MIC showed that the ethanol extract of Punica inhibited rapidly the dandruff causing microorganism at the highest and also in the least concentration. The oil composition with Punica was found to be most effective and citrus extract least effective.*

***Key Words**: Dandruff, Punica granatum, Malassezia furfur, hair oil*

INTRODUCTION

Hair oils are the preparations used for the prevention and treatment of baldness or other ailments, aggression of hair as hair care products. Dandruff is a condition of the scalp and other hairy areas of the body characterized by the presence of abundant flakes that break off and accumulate in the hair. Massaging the scalp and hair with warm oil, preferably infused with hair friendly herbs, is the best way to nourish the scalp and hair

topically. Shampoos are toxic and found to have side effects like dryness of the scalp and hair, irritation of the scalp and skin[1].

Herbal cosmetics have growing demand in the world market and are invaluable gift of nature. Herbal formulations have good activity and comparatively lesser or no side effects when compared with synthetic drugs. The diet and lifestyle will have its effect on the health of the hair. There are many plants in nature which are used as herbs for hair care. With this, the present study was carried out to know the antidandruff activity of some medicinal herbs against *Malassezia furufur*, dandruff causing fungus.

MATERIALS AND METHODS:

The plants like *Eclipta alba, Azadirachta indica, Hibiscus rosa sinensis, Emblica officinalis, Trigonella faenun greacum* and *Punica granatum* for the oil formulation were selected and collected from GKVK, Bangalore. The collected plants / parts were shade dried for 7 -8 days to remove any moisture content. The dried plants were ground to bring about homogenization, sieved and stored in air tight containers.

Preparation of oil sample*:* The oil samples were prepared using direct boiling method and in a sample six ingredients were present. The required quantity of oil was measured and then transferred to a steel vessel. When oil was boiling, the plant materials were added, so that the herbs get absorbed in the oil, imparting their specific properties to the oil. Then allowed to cool, stored in air tight containers.

In vitro analysis for antidandruff activity*:* The effectiveness of the prepared formulations against *Malassezia* species was observed by employing well diffusion method. Sterile agar plates were prepared by Leeman Notman agar well diffusion method. The samples were subjected to assay for its potential antimicrobial activity. Different concentrations of the oil samples ranging from 50µl, 75 µl and 100 µl were aseptically loaded in the wells using ethanol as control. The inoculated plates were incubated at 30°C for 48 hours in an incubator. Zone of inhibition was observed around the wells in each petri plate.

RESULTS AND DISCUSSION

The ethanol extract of the different parts of *Eclipta alba, Azadirachta indica, Hibiscus rosa sinensis, Emblica officinalis, Trigonella faenun greacum* and *Punica granatum* were tested for their efficacy against dandruff causing microorganisms. The concentrations of the extract used were 50 µl, 75 µl and 100 µl and that of standard ZPTO of 50 µl was used (Fig.1).



Fig. 1 : Herbal oils showing anti fungal activity with *Punica, Ocimum* and *Citrus*

The zone of inhibition against the fungus ethanolic extract of *Punica* was 15.33±0.57mm, 18±0.99mm and 23.33±0.57mm in 50, 75 and 100 µl concentrations respectively. The same kind of response was seen in the *Ocimum* extract when used in place of *Punica* like 11.06 ±0.71, 12.2 ±0.81mm and 15.36±0.80mm when used in 50, 75 and 100 µl concentrations respectively. But the least effective was with the *Citrus* extract and the zone of inhibition was 9.26 ±0.43mm, 11.20 ±0.55mm and 13.33±0.57mm at 50, 75 and 100 µl concentrations respectively (Fig.2).

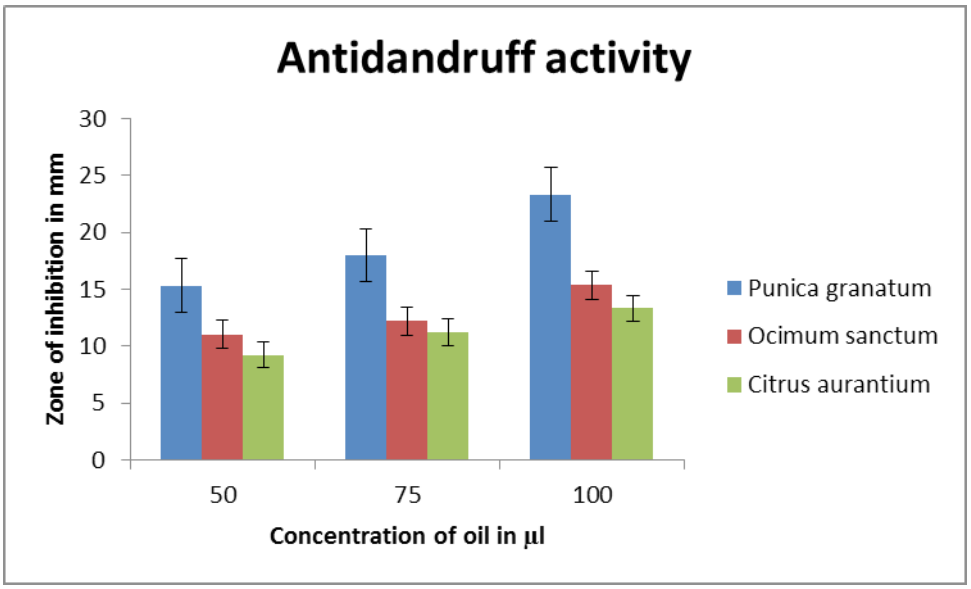

Fig. 2 : Herbal oils showing the zone of inhibition towards the *Malassezia furfur*

Hair is the most important ornament of beauty. Oiling is essential to cope with the problems like hair fall and dandruff. The core purpose of the present work was centered around finding an effective combination of herbs that is potent in its hair growth activity as well as its ability to prevent the occurrence of dandruff.

It has been observed that when in a combination it is seen that the effect of the herbs is different than if they are used singly in an oil formulation. This is due to the suppression of the activity of one herb on another in the combination. This may be because the active principle in one herb could act as a suppressor or enhancer of the active principles in another.

In the present work, all the hair oils that were formulated comprised of 5 identical ingredients, namely , *Eclipta alba*, *Azadirachta indica*, *Hibiscus rosa sinensis*, *Emblica officinalis, Trigonella faenun greacum*. Methanolic extract of *Eclipta* has been suggested that it acts as a hair growth promoter [2]. *Hibiscus* leaf extract exhibits greater potency rather than flower extract [3]. Neem is having antifungal property [4].

The sixth herb in each oil was varied. The purpose of using only one different ingredient in each sample was to see the unique effect of that variant along with the other ingredients. Accordingly, *Ocimum, Citrus* and *Punica* were used as the variant ingredient. Regarding the hair care properties not much work has been done on *Punica* plant.

Ocimum oil is capable of enhanced normal hair growth and promoting follicular proliferation in cyclophosphamide induced hair loss [5, 6].

All the formulations showed a zone of inhibition in one or the other assays and the MIC on an average was found to be 6.6% of oil. On the contrary the hair oils that had been formulated having similar herb composition showed MIC of 8% [7].

From this study it can be concluded that the very significant antidandruff activity was shown in the oil with *Punica granatum* and the least with *Citrus aurantium*. The formulation of herbal hair oil was found to be very effective against *M. furfur in vitro*. Antidandruff hair oil has potent antioxidant activity. *Emblica officinalis* has potent antioxidant efficacy attributable to the presence of flavonoids.

CONCLUSION

It can be concluded from the study that the very significant antidandruff activity of *Punica granatum* present as natural precious antidandruff agent against controlling the growth of *Malassezia furfur*. It was also observed that with the variation of one herb in the formulation showed better antidandruff activity, the formulation of herbal hair oil with *Punica* as one of the ingredient was found to be effective against the fungus in both *in vitro* and *in vivo*. The synergistic outcome of medicinal plants providing an attractive surveillance can well be applied as a development strategy in hair care products, targeting the control of dandruff.

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TRUCKS AND DOLLS

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"The two sexes are not inferior or superior to one another, they are simply different"

Gender equality is not a topic, which is of today; it has been into study as early as 1930. Have we ever wondered that materials such as toys for children could be gendered? According to various studies done on gender equality toys it was noted that children

as young as eight months may already show a preference for 'boys' or 'girls' toys. Sex differences in toy preferences were noted in research as early as the 1930s. We see that children as young as eight months have begun to identify with their gender's preferences. Parents too prefer toys based on gender roles. These innate preferences for certain features of toys, coupled with social influences may explain why toy preferences are among the earliest expressions of sex-linked social behaviour. [1] A study was carried out in Cambridge University to find out the sex-typed preferences of children to colour or shape of toys. Children looked at combinations of paired images of cars and dolls in different colours. Girls looked at dolls significantly more than boys did and boys looked at cars significantly more than girls did, irrespective of colour, particularly when brightness was controlled. These outcomes did not vary with age. There were no significant sex differences in preferences of infants for different colours or shapes. Instead, both girls and boys preferred reddish colours over blue and rounded over angular shapes. There were no sex differences in preferences for pink or reddish colors over blue, also, in preferences for angular versus rounded shapes.[2]

Aptitudes which may have an impact on toy choice of boys include their typical advantage over girls in gross motor skills and propulsive movement their higher activity levels and lower impulse control.[3] Toys affording construction and mechanical movement may appeal more to boys because of their early advantage in mental rotation of figures and event-mapping.[4] In contrast, greater attraction to social stimuli of girls may account for their preference for toys which afford nurturance; girls engage more than boys in mutual gaze and have a small advantage in processing facial expressions . Typical advantage for girls in fine motor finger control may also drive toy selection. Some recent studies show that infants engage more in 'gender-typed' play when alone than with a parent as do typically-developing girls, but not boys. The effect of socialization may depend on parent and child sex, and vary as parents redefine their roles in interaction with the knowledge and perceived needs of younger and older children.

Why do children have gender preferences? The reasons are innumerable. Primarily, it could be that the parents act as role models for children and they often see their parents in the most stereotypical roles with which they relate themselves. For example, the adult male of the family is usually seen driving a car or doing things that are more likely to be building, repairing and construction, whereas the adult female indulges in cooking, nurturing and nourishing which the child understands as the role that he or she has to play being a human of that particular sex. The other reasons could be the influence of media for the child and hence the child shows a particular gender preference. Whatever could be the reason the preference of toy according to the gender is usually seen in both parents and children.

From the research on the toys mentioned above, each one, big or small has learnt to identify with their gender and relevant preferences. Definitely toys are just materials, it is also the nature versus nurture which comes into the big picture, also the biggest part of the picture. Playing with what they want relative to their gender, is acceptable but limiting only to them, is the stereotype.

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VERMICOMPOST

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Invertebrates have evolved for hundreds of millions of years, often surviving in highly hostile environments. Vermicompost the castings of earthworms is reported to be highly nutritive organicmanure and known plant growth promoter. It aids in increasing the physical, chemical and biological properties of soil by restoring and improving its natural fertility and is regarded as protective farm input. It retains nutrients for long time and contributes to slow release of nutrients to plants.

Vermicompost produced by the activity of epigeic earthworms *Eudrilus eugeniae* on organic waste mix of plant litter, vegetable waste and cow dung slurry at the PES University campus was used for testing its ability to serve as nutrient medium in micro propagation of some selected explants.

Aqueous extract from fresh vermicompost (30 per cent) comprising humic and fulvic acids was used to prepare the formulated organic plant tissue culture medium by supplementing with 20ml/L of coelomic fluid (Body fluid of earthworms) + 9 grams/L plant agar.

Several economically important plants which includes medicinal, fruits, vegetable crop plants and ornamental plants were experimented by growing the different explants on vermicompost extract medium along with coelomic fluid and the results obtained are shown below in the documented photographs.



Fig 1: Micropropagated ten weeks old plantlets of *Musa paradisica*



Fig 2: Rrhizomal bud explants of C. *longaon*



Fig 3: Nodal explants of *Aloe barbendises*on



Fig 4: Microshoots from callus of leaf explants of T. c*ordifolia.*



Fig 5: Micropropagation from the seeds of *Capsicum annum*



Fig 6: Tomato plantletas (Three weeks old)



Fig 7: Lychee plant from the seeds (Three weeks old).



Fig 8: Papaya plantlets from the seeds (Three weeks old)



Fig 9: *Penteria sapota,* Sapota plantlets from the seeds (Three weeks old)

Abstracts of Post Graduate Students' Research

Department of Psychology
M.Sc. Psychology
Project Guide: Bhargavi R

THE EFFECT OF GLASS CEILING ON WOMEN'S CAREER DEVELOPMENT AND WORK ENGAGEMENT BETWEEN PRIVATE AND PUBLIC SECTOR INDUSTRIES

Arushi J Makhija

This study examines the relationship between Glass ceiling and Career Development and also between Glass ceiling and Work Engagement and also to see the Effect of Glass Ceiling between Private and Public Sector. This study involved a total of 78 employees that is 39 women employees are from private sector and 39 women employees are from public sector, Glass Ceiling Scale, Utrecht Work Engagement and Career Development Scale was used to measure glass ceiling, work engagement and career development between private and public sector. Then the data was scored and statistically analyzed by using a t-test and Pearson product movement correlation coefficient. The result of the study revealed that is no difference between glass ceiling and career development, and also that there is a difference between glass ceiling and work engagement. There is also a difference between private and public sector in terms of the effect of glass ceiling.

Abstracts of Post Graduate Students' Research

Department of Psychology
M. Sc. Psychology
Project Guide: AlkaRanjan

THE EFFECTS OF ROUTINE PHYSICAL ACTIVITY ON THE LEVELS OF DEPRESSION AND OPTIMISM IN YOUNG ADULTS

Jhanavi Y

The aim of the study was to assess the effect of routine physical activity on the levels of Depression and Optimism in young adults of males and females belonging to the student and employee populations. Survey research was used for the study. The Life Orientation Test Revised (LOT-R) and the Beck's Depression Inventory- II (BDI-II) were administered to collect the data from 240 young adults between the ages of 20-29 years in the city of Bangalore using the convenient sampling method. 120 of them engaged in routine physical activity and 120 subjects did not pursue any routine physical activity. Between groups design was used. To analyse the data statistical tests such as independent samples t-test, Pearson's correlation and regression analysis were used. Results revealed that routine physical activity had a negative effect on the levels of depression and positive effects on the levels of optimism in the participants. There were significant differences in depression and optimism between groups that pursued routine physical activity and the groups that did not pursue routine physical activity. There were no significant differences within the groups that pursued routine physical activity and within the groups that did not pursue physical activity. There was a significant negative correlation between depression and optimism in all the groups except in males who pursued a routine physical activity. The duration of physical activity had positive effects on the levels of optimism and negative effects on the levels of depression.

Abstracts of Post Graduate Students' Research

Department of Nano Science
M. Sc. Nano Science
Project Guides: Pradeep.N, Chaitra.V, Uma.V

SYNTHESIS OF GRAPHENE OXIDE, REDUCED GRAPHENE OXIDE AND ITS APPLICATION IN THE REMOVAL OF DYE WATER

Mrinasha Pradhan

Graphene oxide was prepared by using modified Hummers method. The Graphene oxide that was prepared was reduced to Reduced graphene oxide using green synthesis. The synthesized Graphene oxide and Reduced graphene oxide was characterized by using various instruments like UV-Vis spectroscopy, X-Ray Diffraction, Scanning Electron Microscope, Energy Dispersive X-Ray Spectroscopy and optical microscopy. The removal of dye from the dye water of Congo red and fluorescence is done by using both graphene oxide and reduced graphene oxide. The comparison of the photocatlytic study before and after the ultraviolet exposure is done using UV vis spectroscopy.

Abstracts of Post Graduate Students' Research

Department of Nano Science
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ECO-FRIENDLY SYNTHESIS OF ACTIVATED CARBON FROM DEAD MANGO LEAVES FOR ENERGY STORAGE APPLICATIONS

Rakshitha C N

Supercapacitors or electrochemical double-layer capacitors (EDLCs) have capacitance value up to thousands of Farads at the same size as compared to conventional capacitors. Research has been done to increase specific capacitance of supercapacitor electrodes based on activated porous carbon material. An activated carbon (AC) material with a high surface area is prepared from the dead mango leaves by an eco-friendly method for energy storage applications. The carbonization temperature has a marked effect on both the pore structure and the electrochemical performances of the activated carbons. The structural and morphological characteristics of activated carbon was determined by X-ray diffraction (XRD) and Scanning electron microscopy (SEM). The Electrochemical performance of activated carbon was examined by Cyclic Voltammetry (CV) in 1M H_2SO_4.

Abstracts of Post Graduate Students' Research

Department of Nano Science
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SYNTHESIS, CHARACTERIZATION OF CELLULOSE NANOCRYSTALS-SILVER NANOPARTICLE'S NANOCOMPOSITE AND ITS APPLICATION AS COAT MATERIAL ON FOOD PACKING PAPER

Beula Felix

A nanocomposite of cellulose nanocrystal (CNC)-silver nanoparticles was prepared by synthesizing CNC from coconut husk using acid hydrolysis and Ag NP's using biological method. CNC and Silver nanoparticles were characterized by techniques such as XRD, SEM, optical microscopy, UV-Vis Spectroscopy and FTIR. Antibacterial study of nanocomposite and silver nanoparticles was studied. An antibacterial food packaging paper is prepared by coating the usual kraft paper with nanocomposite. In addition to antimicrobial activity, and barrier properties with respect to water, oil, honey and ink was assessed which shows that good absorption ability of CNC and the pore blocking of Ag NP's. Optical microscopy and SEM showed deposition of Ag nanoparticles on the surface of CNC. The results demonstrated that the CNF/Ag coating exhibited good antibacterial activity against Staphylococcus aureus (Gram-positive) bacteria. The enhancement in properties of coated paper in influenced by coat weight and the concentration of the nanocomposite.

Abstracts of Post Graduate Students' Research

Department of Economics
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EVALUATION OF PERFORMANCE AND EFFICIENCY OF NEELACHALISPAT NIGAM LIMITED (Study Period – 2004 To 2016)

Ankeeta Mohanty

The per capita production and consumption of steel is an indicator of economic infrastructure and thus economic growth. Increased use of iron and steel leads to rapid industrialization and infrastructural development of the country. India is the world's third-largest producer of crude steel. The growth in the Indian iron and steel sector is attributed to domestic availability of raw materials and cost effective labour. It has always strived for continuous modernization of older plants and high energy efficiency levels. The present study focuses on efficiency and operation of Neelachal Ispat Nigam Limited (NINL), mainly focusing on economic parameters of the company. Given that iron and steel is a prime driver of economic development, this study will highlight its importance through an extensive analysis on NINL. Study is based on secondary and primary data. With respect to the secondary data variables covered under study are - value of production, sales, financial ratios, income, expenditure, taxes, depreciation etc. for the time period 2004-05 to 2015-16. An in-depth analysis of the work satisfaction in terms of non- monetary benefits, leave and on-duty facilities received by employees has been examined from the sample study pertaining to two categories of employees – Senior Technicians and Senior Operative Technicians. Findings of the study revealed that production values showed decline in the case of pig iron and sales reflected consistent increase. In the case of primary data - majority of employees i.e. around 85 to 90% are satisfied with regard the above stated parameters such as non monetary benefits, leave and on-duty facilities provided by NINL. With regard to expenditure pattern between the two cadres of employees – senior technicians are economically better-off than operative technicians.

Keywords: *NINL, efficiency, performance, profitability, production, financial ratios, satisfaction, employees*

Abstracts of Post Graduate Students' Research

Department of Economics
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AN ECONOMIC ANALYSIS OF FOREIGN DIRECT INVESTMENT 2000-01 to 2015-16

Samridhi Singh

Foreign Direct Investment (FDI) plays an integral role in India's efforts to sustain its economic growth and development. It results in job creation, expansion of existing manufacturing industries and development of the new ones such as - healthcare, education, R&D, infrastructure, retailing etc. FDI is indeed a strategic component of investment, which propels an economy towards further socio-economic advancement. Since the early 1990s to this date, the Government has been tirelessly striving to attract more FDI into the country by easing its foreign capital policies and norms. The study indicates an increase in the amount of FDI in the last decade and a half, exhibiting an upward trend. The study is based on FDI trends in India for the time period 2000-01 to 2015-16 and to analyse the relationship between FDI Inflows and India's GDP, share of country-wise FDI Inflows into the domestic economy, share of various sectors in FDI Inflows, State coverage with regard to RBI's region-wise cumulative FDI Inflows. Cause and effect relationship was drawn between FDI Inflows with Trade GDP, Inflation rate, extent of External Debt, Foreign Exchange Reserves (as % of GDP) and Labour Force. Among the variables associated, foreign exchange reserves had the maximum positive impact followed by labour force and external debt. The study also considered the impact of structural parameter namely, economic crisis of 2008-09 on India's FDI Inflows. It was observed that, there was a significant impact of crisis on the domestic economy in terms of FDI as the economy witnessed outflow of foreign investment from equity market since investors had to retrench their assets to compensate for the losses in their respective domestic domains. The study suggested that, the proposals needs to be implemented effectively and sector-wise targets needs to be accomplished with the healthy intervention of the respective Ministries.

Keywords: FDI Inflows, Foreign Exchange Reserves, GDP, Economic Crisis, country-wise, sector-wise, route-wise.

Abstracts of Post Graduate Students' Research

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SULPHUR ESTIMATION IN SOME MEDICINAL PLANTS FOR HERBAL HAIR OIL

Priya Dagar, Harshitha Rao and Manisha Singh

Hair plays a vital role in the personality of human which are the eruptions from the skin. Fading, dandruff, alopecia (loss of hair) are the major problems, faced commonly due to the exposure of the hair to the harmful chemicals. Natural herbal hair oils are gaining importance as they maintain moisture and improve the overall conditioning of the hair. Human hair is made up of protein called keratin, which has high sulphur content. Sulphur presence in hair gives strength and elasticity. The present work was aimed at estimating the sulphur content in some of the selected medicinal plants as it plays an important role in building many amino acids. Ten different medicinal plants with different parts like rhizome and leaves were screened for sulphur content. The sulphur content was estimated using EDTA method. The selected plants were investigated for phytochemicals using water, methanol, petroleum ether solvents. The highest percentage of sulphur was observed in Murrayakoenigiiand lowest was in Punicagranatum. The selected plants which had high sulphur content were selected for the herbal hair oil. Further, the oil was formulated and evaluated for various physico-chemical parameters like organoleptic characters, pH, acid value, peroxide value, saponification value and iodine value. From the result of our study we found that Murrayakoenigiileaf hair oil was better in all the parameters in comparison to the Punicagranatum leaf hair oil.

Abstracts of Post Graduate Students' Research

Department of Botany
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PHYTOCHEMICAL ANALYSIS AND ANTI-MICROBIAL ACTIVITY OF *Balanitesaegyptiaca* (L.) Del. Fruit

Prachi Kumari

Phytochemicals are naturally present in the plants and show biological significance by playing an essential role in the plants to defend themselves against various pathogenic microbes by showing the antimicrobial activity by inhibition. The Balanitesaegyptiaca belongs to family Balanitaceae. The plant has high medicinal value like anthelmintic, anti-fertility, purgative, antidysentric, and anticancer properties. The fruit was shade dried pericarp and mesocarp were separated and powdered. The extraction was carried out by soxhlet method using solvents like methanol, ethanol and water. The fluorescence analysis at 365 nm ultraviolet light revealed that the powder extract of pericarp with ethanol, methanol, benzene, chloroform, 0.1 N Sodium hydroxide, dilute HCl, concentrated sulphuric acid, acetic acid, petroleum ether, acetone showed white, yellow, greenish blue, green, and white coloured fluorescence respectively. The powdered form of mesocarp of Balanitesaegyptiaca(fruit) fluoresced under ultraviolet light at 345 nm revealed that the Powder extracted with methanol, concentrated HCl, acetic acid, ammonia, petroleum ether, benzene, chloroform, acetone, ethanol, conc. Sulphuric acid showed yellow, brown, orange, white, and green coloured fluorescence respectively. The results of the phytochemical analyses of pericarp of fruit in aqueous extract, ethanol, and methanol showed the presence of saponin, quinone, flavonoids, phenols, protein and tannin except alkaloids. The phytochemical component in mesocarp of fruit in aqueous, ethanol, and methanol extract showed the presences of saponin, quinone, flavonoids, protein, phenols and tannin but with methanol alkaloids are also present.
Anti-bacterial screening in Balanitesaegyptiacausing mesocarp and pericarp of fruit revealed that the ethanolic extract of mesocarp showed the maximum zone of inhibition against gram-positive bacteria (Staphylococcus aureus) and ethanolic extract of pericarp showed maximum zone of inhibition against gram-negative bacteria (E. coli).

Abstracts of Post Graduate Students' Research

Department of Biotechnology
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EXTRACTION OF ESSENTIAL OILS AND EVALUATION OF ANTIMICROBIAL ACTIVITY USING CUMIN, FENNEL AND CORIANDER SEEDS

Nishitha Sanjana Palanna

Plants and the different parts of plant be it roots, seeds, leaves or stem are believed to contain certain important properties in them which could be widely used for medicinal healing purposes and therefore popularly used in Ayurveda. Ayurveda offers treatment for almost all possible clinical diseases like diabetes, gout, common cold. In this study three seeds were used, including cumin, fennel and coriander. These seeds are not only known for their medicinal use but also have other important applications as spices. This study was done to evaluate the antimicrobial properties of essential oils obtained from the above mentioned seeds, on two micro organismsBacillus subtilus and Escherichia coli, through analyzing zones of inhibition in an agar plate. Distinct zones of inhibition was observed in the cumin and fennel samples. However coriander did not have very significant zones of clearance, indicating possible antibacterial effect of cumin and fennel seed essential oils.

Abstracts of Post Graduate Students' Research

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THE EFFECTS OF ROUTINE PHYSICAL ACTIVITY ON THE LEVELS OF DEPRESSION AND OPTIMISM IN YOUNG ADULTS

Jhanavi Y

The aim of the study was to assess the effect of routine physical activity on the levels of Depression and Optimism in young adults of males and females belonging to the student and employee populations. Survey research was used for the study. The Life Orientation Test Revised (LOT-R) and the Beck's Depression Inventory- II (BDI-II) were administered to collect the data from 240 young adults between the ages of 20-29 years in the city of Bangalore using the convenient sampling method. 120 of them engaged in routine physical activity and 120 subjects did not pursue any routine physical activity. Between groups design was used. To analyse the data statistical tests such as independent samples t-test, Pearson's correlation and regression analysis were used. Results revealed that routine physical activity had a negative effect on the levels of depression and positive effects on the levels of optimism in the participants. There were significant differences in depression and optimism between groups that pursued routine physical activity and the groups that did not pursue routine physical activity. There were no significant differences within the groups that pursued routine physical activity and within the groups that did not pursue physical activity. There was a significant negative correlation between depression and optimism in all the groups except in males who pursued a routine physical activity. The duration of physical activity had positive effects on the levels of optimism and negative effects on the levels of depression.