3.3.2-Details of copies and screenshots of research articles

2020-2021

This is to certify that the report contains the copies of research articles showing the Titles of the article, affiliation, Name of the Journal, year, and author's name as listed in the excel sheet with a total of 35 Research Publications.

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Copies of research articles clearly showing the title of the article, affiliation, name of the journal, year and authors name

Sl. No.	Title of the paper	Name of the author/s	Name of journal	ISSN number	Page No.
1.	Micropropagation in Terminalia catappa varieties	Mrs. Farzana Tasneem M I	World Wide Journal -IJSR	2277-8179	5-10
2.	Assessment of Molecular Markers study in the Terminalia catappa varieties	Mrs. Farzana Tasneem M I	Journal of Research and Development	2230-9578	11
3.	"Impact of Heterogeneous data integration in healthcare: A questionnaire-based survey"	Bharathi Ramesh	Journal of advanced research in dynamics & control systems	1943-023X	12
4.	A Study on Impact of Global Stock Market Indices on Indian Stock Market Indices	Dr. N Venkatesh Kumar	PIMT Journal of Research	2278-7925	16-17
5.	Case Study on Key Competencies Expected Amongst Hospitality Students: Emphasized by Industry Leaders in India	Dr. R Satheesh Kumar	Juni Khyat	2278-4632	18-27
6.	A Conceptual Study on Fluctuation in Bitcoin Prices	Dr. Shreelatha H R	Juni Khyat	2278-4632	28
7.	Savings Habit Amongst Youngsters in IT Industry	Prof. Sushma Rawath	Global Scientific Journal	2320-9186	29
8.	Sprots Tourism: A Niche and Untapped Market	Prof. Savita Shastri	Juni Khyat	2278-4632	30-36
9.	An Empirical Study on Investors attitude towards Financial Derivatives Market	Prof. Lasya K R	Juni Khyat	2278-4632	37
10.	Structural Break Characterization: A Case on Key Indian Agricultural Indicators and Indian Securities Market	Dr. N Venkatesh Kumar	Pacific Business Review International	0974-438X	38-51

11.	An Assessment of Self - Esteem and Self-Confidence among the Women in Erode District of Tamil Nadu	Dr. R Satheesh Kumar	Psychology & Education	333077	52-59
12.	Artificial Intelligence Augmentation in Blood Transfusion, Biochemistry, Hematology of Digital Pathology: A Comparative Performance Evaluation on Pathology Labs and Corporate Hospitals Located in Bengaluru	Prof. Lasya K R	International Journal of Engineering trends and Technology	2231-5381	60
13.	Impact of Investors perception towards the development of Commodity Derivatives Market	Prof. Lasya K R	Pensee International Journal	0031-4773	61
14.	A Study on behavioral Influence by colleagues on the Productivity of Lectures	Jayashree KN (M.Com)	International Research Journal of Commerce, Arts & Science	2319-9202	62-72
15.	Factors influencing Consumers in Purchase of Green Products with Special Reference to Organic Trading Firm	Pooja S, Harish S & Narendra K	International Research Journal of Commerce, Arts & Science	2319-9202	73-84
16.	A Study on the Role of Artificial Intelligence and Blockchain in the Education Sector	Harish S & Narendra K	Sambodhi	2249-6661	85-89
17.	Analytical view on the investment preference in Pradhan Mantri Suraksha Bima Yojana & Pradhan Mantri Jeevan Jyoti Bima Yojana	Ragini	Wesleyan Journal of Research	0975-1386	90
18.	An Empirical study on inventory mgt. Towards super sugars limited	Prof. Mini .K. Abraham	Alochana Chakra Journal(UGC Care1)	2231-3990	91

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19.	An Empirical study on Risk and returns of HDFC and ICICI Banks.	Prof. Mini .K. Abraham	Pal arch's Journal of Archaeology, (Sco pus Indexed)	1567-214x	92
20.	An Empirical study on inventory mgt. Towards super sugars limited	Dr.B.G.Lakshmi	Alochana Chakra Journal	2231-3990	93
21.	An Empirical study on Risk and returns of HDFC and ICICI Banks.	Dr.B.G.Lakshmi	Pal arch's Journal of Archaeology	1567-214x	94
22.	An Empirical study on inventory mgt. Towards super sugars limited	Prof. MahaLakshmi A.L	Alochana Chakra Journal	2231-3990	95
23.	An Empirical study on Risk and returns of HDFC and ICICI Banks.	Prof. MahaLakshmi A.L	Pal arch's Journal of Archaeology, (Sco pus Indexed)	1567-214x	96
24.	Expanded utilization of personal electronic devices during the pandemic and its effect on overall health and wellness of people in Bangalore	Prof. Manjushree G.S.	International Journal of current science, research and review	2581-8341	97-108
25.	A study on students perception towards sway am (Online learning) in sub-urban, Mysore	Prof. K.V.Naresh	Internal Journal of business, Management and Allied sciences	2349-4638	109-118
26.	Attachment Styles of Married and Cohabited Young Adults	Bhanu BS	The International Journal of Indian Psychology	15471255 SI	119-120
27.	Shrungaaraprakaashe Kaarakavichaarah	Dr. Nagaratna Hegde (Sanskrit)	Nibandhamala	2277-2359	121-123
28.	Sajjanendraprayogakalpadrume Vyaakaranaamshaaha	Dr. Nagaratna Hegde	Samskrutaadhyayanam	2249-1104	124-128
29.	Champukaavyasya Vaishishtyam	S. Roopa	Hitaya	2581-7787	129

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30.	"The Study of South Indian Brahmin Women Writings and Socio-Political Imperatives" in ISSN:2348-2397 January TO March 2021 Vol.8,Issue 29,Page No's,132-135(PRINT)	Chaithra N S Murthy	Shodh Sarirha	2348-2397	130-134
31.	Adaptability to Virtual Learning Due To Onset of Pandemic COVID 19 – A Survey among Students	Rashmi Eshwar	Indian Journal of Natural Sciences	0976 – 0997	135
32.	Adaptability to Virtual Learning Due To Onset of Pandemic COVID 19 – A Survey among Students	Ashwini S Diwakar	Indian Journal of Natural Sciences	0976 – 0997	136-140
33.	An insight into the superior performance of zno@PEG nano catalyst for the synthesis of 1,4-dihydropyrano[2,3-c]pyrazoles under ultrasound	Sumaiya Tabassum, Sunaja Devi K R, Santhosh Govindaraju	Materials Today: Proceedings	2214-7853	141-146
34.	Stream-Based Vertex cut partitioning with Buffer support for Power-law graphs(SVBP)	N Mithili Devi	Turkish Journal of Computer and Mathematics Education	5335-5350	147-161
35.	Effect of industrial effluent on germination and seedling growth OG sinenesis and Phaseolus Mungo	Malinishetty and Somashekara	International Journal of Recent Scientific Research	0976-3031	162-165

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ANTIMICROBIAL ACTIVITY OF DIFFERENT VARIETIES OF *TERMINALIA CATAPPA* LEAVES

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ABSTRACT: *Terminalia catappa* Linn. belongs to the family Combretraceae found in tropical regions of Asia, Africa and Australia, which is commonly called as Indian almond, sea-almond, tropical almond, wild badam. The fruit is useful in bronchitis and bowels. Juice of leaves is used in the preparation of the ointment for scabies, leprosy, cutaneous diseases and also as analgesic. The root bark is used in dysentery and diarrhoea. The stem bark cures fevers. The oil yielded from kernels is used commercially as a substituted for almond oil. According to the literature the different parts of the plants is used in many therapies including, antibacterial anticlastogenic, antioxidant, antifungal, antiulcer and molluscidal activity, management of sickle cell aneamia, anticancer, anti HIV reverse transcriptase, hepato-protective, anti-inflammatory, antidiabetic. In this study the methanol extracts of two varieties of *Terminalia catappa* (yellow and red variety) leaf was screened for antifungal like *Candida albicans* and *Aspergillus niger* and antibacterial like *Eschiershea coli*, *Staphylococcus aureus, Citrobacter species, Enterococcus faecalis, Pseudomonas aerogenosa* and *Bacillus cereus* was evaluated. The variation in the intensity of inhibitory activity of this microorganism between two varieties was observed.

INTRODUCTION: Herbal medicines have been known to man for centuries, the therapeutic efficacy of many indigenous plants for several disorders discovered by well known scientist. Antimicrobial properties of medicinal plants are being increased reported from different parts of the world, the plant extract or their active constituents used as fold medicines in traditional therapies of 80% of the world's population.

The harmful microorganism can be controlled with the drugs and these results in the emergence of multiple drug resistant bacteria and it has created an alarming clinical situation in the treatment of infections, in effort to expand the spectrum of antibacterial agents from natural resources.

Medicinal plants contain active chemical constituent in various parts of plants like root, leaf and stem. Plant extract has active ingredients [1]. The combination of plant extract and antibiotics could be useful in fighting emerging drug - resistance microorganisms. *Terminalia catappa* Linn. is an ornamental tropical tree belonging to the family Combretaceae is native to Southeast Asia in the tropical regions of Asia, Africa and Australia. It is known by the common names Bengal almond,

Country almond, false kamani, Indian almond, Malabar almond, and about 35m (115 ft) tall, 9 m in width of its symmetrical canopy [2] and horizontal branches. The greenish yellow leaves are clustered in axillary spikes, small and inconspicuous. It usually commences flowering within 2 - 3 years of out planting but this may vary with site and genotype. It is a large deciduous stately tree with a characteristic pagoda shape [3]. It is cultivated in Nigeria solely as a shade tree and for its fruits and seeds as well as medicinal uses [4]. The several reports revealed the identification, characterization and standardization of *Terminalia catappa* as medicinally important plant [5, 6].

Plant with red leaves are used to expel worms applied to rheumatism where as ordinary leaves are mixed with the oil and rubbed on to the breast to relieve mammary pain, secondary metabolites which are useful for the growth and development of plant [7]. The pharmacological significance of the plant is an updated review is for the traditional medicinal uses which play a major chemical constitutes reported on this tree and plant was sensitive to pollution control in Nature [8].

Many scientists have contributed and studied phytochemicals [9] play an important role in the treatment of different types of diseases and disorders and are still used in both traditional and modern medicine. Phenolic compounds are known as powerful chain breaking antioxidants [10]. Juices from leaves were used as an ointment for scabies, leprosy and other skin infections [11]. The plant showed a rich source of bioactive compounds and justifying their traditional use to treat any disease and disorder is postulated. The leaves have antioxidant property anticancer used to cure liver diseases [12] anti HIV reverse transcriptase and management of sickle cell anemia [13], hepato-protective, anti-inflammatory [14] antidiabetic [15, 16] fish pathogen [17].

The leaves found to possess to fight against the infectious microbes which might be due to the phytochemicals identified in the leaf thus acting as a potent antimicrobial agent [18, 19, 20, 21, 22]. Methanol extract showed significant antifungal activity against most susceptible mold [23, 24]. *Terminalia catappa* as a source of naturally derived anti-microbial formulations to herbal medicines against bacterial infection [25] and in pharma industry. In present study the methanol extracts of two varieties of *Terminalia catappa* (yellow and red variety) leaf was screened for antimicrobial activities.

MATERIALS AND METHODS:

Collection of Material: The leaves of *Terminalia catappa* were collected in the reference of two varieties that is the yellow and red variety from Bangalore city. The two yellow varieties are called as T1 and T2. The two red varieties were called as T3 and T4.

Preparation of Plant Extract:

Extraction: The leaves of *Terminalia catappa* were air dried and then the sample was powdered in a homogenizer 10 g was used for methanol extraction by Soxhlet method. The solvent was then evaporated to dryness under reduced pressure in Roto evaporator and the extracted compound left was used for the antimicrobial assay.

Preliminary Phytochemical Assay: The methanolic extract of different varieties of *Terminalia catappa* leaves were subjected to preliminary phyto-chemical assay to detect the presence of different bioactive compounds like proteins, carbohydrates, glycosides, flavanoids, tannins and phenol [26, 27].

Quantitative Analysis of Phytochemicals:

Determination of Total Phenol: The total phenol concentration in methanolic leaf extracts were determined by using Folin-Ciocalteu method [28]. To 1 ml of leaf extract, 0.5 ml of 0.2N Folin- Ciocalteu reagent and 1.5 ml of 0.7 M sodium carbonate solution was added and adjusted to 10ml with distilled water. After incubation in dark at 25 ºC for 1 h, the absorbency of reaction mixture was measured at 725 nm. Catechol was used as a standard to produce the calibration curve.

Determination of Total Flavonoids: The total flavonoid content of leaf extract was measured using aluminium chloride method [29]. One ml of leaf extract was mixed with 0.5 ml of 1.2% aluminium chloride and 0.5 ml of 120 mM potassium acetate. The volume was then increased to 10 ml with distilled water. The mixture was incubated for 30 min at room temperature. The absorbance was measured at 415 nm. Rutin was used as standard for the calibration curve.

Test Microorganisms and Growth Media: The following microorganisms such as *Eschiershea coli, Pseudomonas aerogenosa*, *Bacillus cereus, Staphylococcus aureus, Staphylococcus mutans, Enterococcus* and fungal strains like *Candida albicans, A. niger, Enterococcus*, *Klebsiella, Citrobacter* were chosen based on their clinical and pharmacological importance.

The bacterial and fungal stock strains were incubated for 24 h at 37 ℃ on nutrient agar and potato dextrose agar medium (PDA), stock cultures were maintained at 4 ℃. All bacterial strains were procured in lyophilized form from the Institute of Microbial Technology (IMTECH), Chandigarh.

Antimicrobial Activity:

Determination of Zone of Inhibition: *In-vitro* antibacterial and antifungal activities were examined for methanol extract against six pathogenic bacteria (Gram positive and Gram negative) and two pathogenic fungal were investigated by well diffusion method. Each purified extracts were dissolved in methanol for the determination of zone of inhibition and standard antibiotic ampicillin (10 mg/ml) used for comparison of the results.

All the extracts (T1, T2, T3, T4) were screened with different concentration of plant extract (50, 100, 150, 200 µg/ml) against the *Eschiershea coli, Pseudomonas aerogenosa, Bacillus cereus, S. aureus, Staphylococcus mutans, Enterococcus, Klebsiella pneuomonia, Citrobacter* and fungal strains like *Candida albicans, Aspergillus niger.* The zones of growth inhibition around the discs were measured after 18 to 24 h in incubation at 37ºC and 28 ℃ for bacterial and fungal respectively. For each extract three replicate trials were conducted against each organism. The diameters of the inhibition zones were measured in mm.

RESULTS AND DISCUSSION: According to the result of qualitative analysis of chemical constitutes of different varieties in *Terminalia catappa* showed the presence of amino acid, protein, carbohydrates, glycosides, alkaloids (+) and saponin, tannin, flavanoid showed very good result (++) shown in **Table 1**.

The quantitative analysis with a focus on flavanoids, and phenol from the methanol extract of

different varieties of the sample in **Table 2**. The phenol content was determined by Folin-ciocalteau reagent. The maximum concentration of phenol was observed T3-195 µg/ml, T4-185 µg/ml, T2-180 µg/ml minimum concentration was observed in-T1-178 µg/ml. The flavanoid content was evaluated by aluminium chloride method highest amount of flavanoid content was obtained in sample T1-0.89 µg/ml, T4-0.86 µg/ml, T3-0.75 µg/ml and low in sample T2-0.72 µg/ml.

TABLE 1: QUALITATIVE ANALYSIS OF LEAF EXTRACT

Qualitative Test	Methanol			
	T1	**T2**	**T3**	**T4**
Protein	+	+	+	+
Alkaloids	+	+	+	+
Saponins	++	++	++	++
Carbohydrates	+	+	++	+
Glycosides	+	+	++	+
Tannin	++	++	++	++
Flavanoid	++	++	++	++
Amino acid	+	+	++	+

TABLE 2: QUANTITATIVE ANALYSIS OF PHENOL AND FLAVANOID

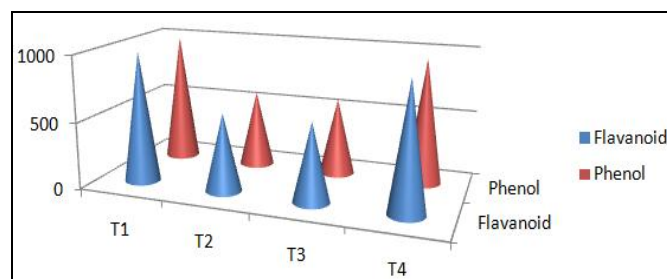| Sample	Amount of flavanoid	Amount of phenol
T1	990µg/ml	178 µg/ml
T2	585 µg/ml	180 µg/ml
T3	587 µg/ml	195 µg/ml
T4	950 µg/ml	185 µg/ml

FIG. 1: REPRESENTING THE QUANTITATIVE ESTIMATION OF PHENOL AND FLAVANOID

Antimicrobial activity of methanol extract of *Terminalia catappa* leaf variety was studied with selected G+ve and G-ve pathogens such as *Bacillus cereus, Staphylococcus aureus*, *K. pneumonea, Eschiershea coli, Citrobacter sp., Pseudomonas aerogenosa* and fungus such as *Candida albicans* and *Aspergillus niger* was performed in well diffusion method.

Result revealed that the methanol extract of *Terminalia catappa* leaves was found to be effective against standard ampicillin (40 mm), G +ve such as *Staphylococcus aureus* with the zone of inhibition is 40 mm in T1 and T2, 30 mm in T3,

20 mm in T4. The G+ve *Bacillus cereus* showed the zone of inhibition 22 mm in T2 and T3, no zone of inhibition in T1 and T4.

An antifungal activity of G+ve like *Candida albicans* showed 12 mm in T1, 26 mm in T2, 07 mm in T4, no zone of inhibition in T3. *Aspergillus niger* with the zone of inhibition as 20 mm in T2,18 mm in T3, 10 mm in T4, no zone of inhibition in T1. G–ve bacteria like *Eschiershea coli* showed 40 mm in T1, T2 and 32 mm in T3, 20 mm in T4. *Pseudomonas aeurogenosa* has 20 mm in T1 and 22mm in T2 and 19 mm in T3, 11mm in T4. *Citrobacter sp* showed 16 mm in T1, 12 mm in T2, and 08 in T3, 12 mm in T4. *Klebsiella pneumonia*

showed the zone of inhibition as 18 mm in T1, T2 and T3 is 10 mm, 12 mm in T4 respectively. The positive control, ampicillin has showed the highest level of 40 mm when compared to sample taken.

According to the **Table 3**, variety T2 showed significant antibacterial and antifungal activities in all pathogens tested in different concentrations. The G+ve bacteria *Staphylococcus aureus*, G-ve bacteria *Eschiershea coli* was significantly inhibited in methanolic extract of all varieties with the standard in accordance with earlier report [30] and its bioactive compounds can be used as chemo preventive agents to treat bacterial diseases without risk assessment [31].

TABLE 3: ANTIMICROBIAL ACTIVITY

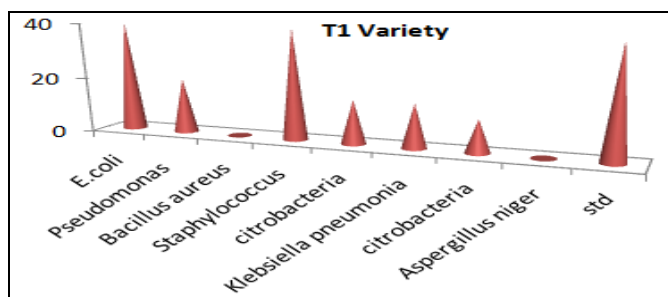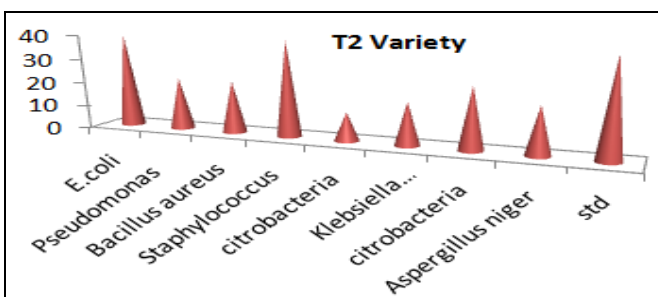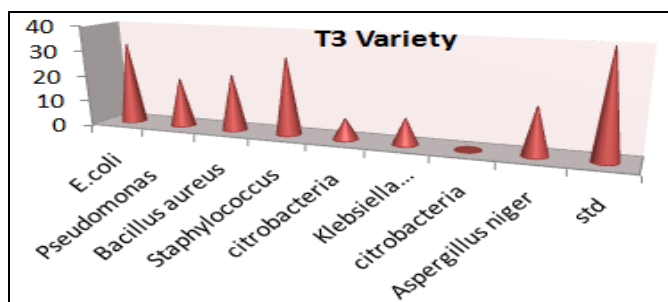| S no.	Samples (Methanol)	*Eschiershea coli*	*Pseudomonas aeurogenosa*	*Bacillus cereus*	*Staphylococcus aureus*	*Citrobacter enterococcus*	*Klebsiella pneumonia*	*Candida albicans*	*Aspergillus niger*
1	T1	40 200mg/ml	20 200mg/ml	-------	40 200mg/ml	16 200mg/ml	18 50mg/ml	12 50mg/ml	---
2	T2	40 200mg/ml	22 150mg/ml	22 150mg/ml	40 200mg/ml	12 100mg/ml	18 100mg/ml	26 100mg/ml	20 150mg/ml
3	T3	32 150mg/ml	19 150mg/ml	22 150mg/ml	30 200mg/ml	8 100mg/ml	10 150mg/ml	---	18 150mg/ml
4	T4	20 200mg/ml	11 100mg/ml	----	20 200mg/ml	12 100mg/mls	12 200mg/ml	07 100mg/ml	10 100mg/ml
5	Standard ampicillin antibacterial	40 200mg/ml	40 200mg/ml	40 200mg/ml	40 200mg/ml	40 200mg/ml	40 200mg/ml	40 200mg/ml	40 200mg/ml

FIG. 2: T1 VARIETY

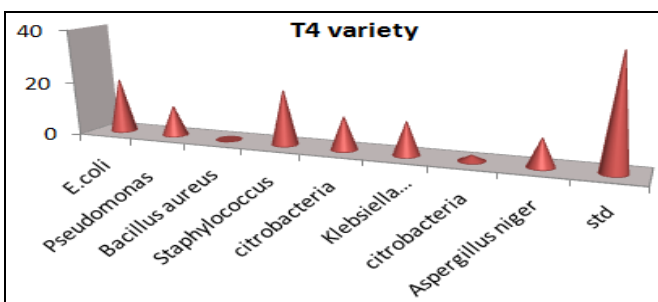FIG. 3: T2 VARIETY

FIG. 4: T3 VARIETY

FIG. 5: T4 VARIETY

CONCLUSION: In the current investigation, the methanol extracts of different varieties of *Terminalia catappa* leaves showed high antibacterial activity, exactly to standard whereas antifungal activity was

half to the standard. Therefore the antibacterial activity of four different varieties is equally important and can be used for clinically isolated microorganisms as compared with the standard.

The present study justified that the different varieties of *Terminalia catappa* leaves can be used in the traditional system to treat various infectious diseases caused by microbes especially by two microorganisms like *staphylococcus aureus* (a Gram -positive bacteria), *Eschiershea coli* (Gram - negative bacteria) were more susceptible and for the further investigations in the potential discovery of new natural bioactive compounds.

CONFLICT OF INTEREST: Nil

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Sulphuric acid supported silica gel (H$_2$SO$_4$-SiO$_2$) as an efficient catalyst for one-pot multicomponent synthesis of pyrano[2,3-c]pyrazol-amines under ultrasonication

Santhosh Govindaraju [a], Sumaiya Tabassum [b]

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An insight into the superior performance of ZnO@PEG nanocatalyst for the synthesis of 1,4-dihydropyrano[2,3-*c*]pyrazoles under ultrasound

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ABSTRACT

The investigation presents a straightforward synthesis of fifteen 1,4-dihydropyrano[2,3-*c*]pyrazoles using ZnO@PEG nanocatalyst in ethanol *via* Multicomponent approach under the influence of ultrasound. The present methodology successively tolerates a variety of functional groups and offers several advantages such as excellent yields without chromatographic purification, milder reaction conditions, shorter reaction times, and the use of an environmentally benign reusable catalyst. Ecstatically, the reaction was successfully scaled to gram level ascertaining the wider applicability of ZnO@PEG nanoparticles in multicomponent reactions.

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1. Introduction

The synthesis of heterocyclic compounds possessing 4-*H* pyran ring has attracted synthetic organic chemists in recent years as they are imperative in the field of medicinal chemistry. Pyrano [2,3-*c*]pyrazoles are one among such heterocycles that have known to display a wide range of biological activities such as anticancer [1], antimicrobial [2], anti-inflammatory [3], analgesics [4]. They also act as a versatile reaction intermediate [5] and as biodegradable agrochemicals [6].

Multicomponent reactions (MCRs) [7] are one-pot reactions that offer operational simplicity and diversity as they can successfully amalgamate most of the atoms in the reactants into products. MCRs are attractive and environmentally benign [8] as they are highly atom efficient [9], use less hazardous chemicals, produce minimum side products, generate higher yields in shorter reaction time thereby saving energy, time, raw materials, and solvents required for the reaction.

The acceleration of the reaction rates was reported by Richards and Loomis in the year 1927 set forth a new channel by providing an alternate methodology in conventional organic synthesis. Ultrasonication creates a remarkable change in a chemical reaction due

to the phenomenon of cavitation which results in creating immense temperature, pressure variations. The sudden gush of the reaction media on the surface of the catalyst increases the mass transfer [10] resulting in the upsurge of the chemical reactivities by nearly a million-folds [11].

Heterogeneous/Homogeneous catalysts supported on inert substrates such as polyethylene glycol (PEG) [12] have garnered much attention in recent years and are widely used in the field of synthetic organic chemistry for the development of clean and greener protocols [13]. PEGs are commercially available, non-toxic and show unique properties (negligible vapor pressure, thermally stable) which makes them environmentally-friendly [14]. Recently, polymer-supported catalysts [15] have emerged as viable alternatives to homogeneouss catalysts as they are inert, inexpensive, easy to prepare, and most importantly they are recyclable. The PEG capped nanocatalysts are a valuable addition to sustainable methodologies as the demand for benign nanocatalysts in organic synthesis is on the rise.

Recently, pyrano[2,3-*c*]pyrazoles have been synthesized by the use of catalysts [16–19] under varied reaction conditions. However, the reported protocols suffer from drawbacks such as harsher reaction conditions, less yield, use of toxic solvents, and prolonged reaction times. Thus, in this regard, the development of a new eco-friendly protocol for the synthesis of pyrano[2,3-*c*]pyrazoles which

are more effective and rapid is of significant interest to chemists all over the world.

A rigorous literature survey reveals that 1,4-dihydropyrano[2,3-c]pyrazoles skeleton has not been prepared using nanocatalysts. Moreover, our research team has recently prepared, characterized (XRD, FTIR, UV-DRS, SEM, EDAX) and successfully used ZnO@PEG [20] in photocatalytic degradation of malachite green dye. Additionally, Lewis acid catalysts such as ZnO [21], Al_2O_3 [22] and CuO [23] are widely used in MCRs. These observations initiated us to explore the applicability of ZnO@PEG in the synthesis of pyrano[2,3-c]pyrazole *via* MCR approach and we have successfully reported its synthesis under sonication as shown in Scheme 1.

2. Materials and methodology

2.1. Experimental section

Reagents and solvents were purchased from Sigma Aldrich. All materials were of commercial reagent grade. Melting points were determined using Thiele's apparatus (con. H_2SO_4) with a calibrated thermometer. The progress of the reaction and the purity of the compounds was monitored by TLC [analytical silica gel plates (Merck60 F_{254})]. Infrared (IR) spectra were recorded using an Agilent Cary 630 FT-IR spectrophotometer. ^1H NMR spectra were recorded using an Avance Bruker instrument operating at 400 MHz and ^{13}C NMR spectra were recorded at 100 MHz in DMSO d_6. Chemical shifts are reported in ppm. Mass spectra were recorded using a Q-TOF or Waters micro mass LCT Premier mass spectrometer using an electrospray ionization technique. Sonication was performed using a SIDILU Indian make sonic bath operated at 35 kHz (constant frequency, 80 W) maintained at 25 °C by circulating water.

2.2. General procedure for the synthesis of 1,4-dihydropyrano[2,3-c] pyrazoles using ZnO@PEG nanoparticles

A 50 mL flask was charged with a substituted aldehyde (1, 1 mmol), 4-nitro phenylacetonitrile (2, 1 mmol), ethyl acetoacetate (3, 1 mmol), hydrazine hydrate (4, 1 mmol) and 0.1 g of ZnO@PEG in ethanol (3 mL). The mixture was sonicated (35 kHz, constant frequency) at 25 °C for 15 min. After completion of the reaction [monitored by TLC, using EtOAc: Hexane (9:1) as the eluent], the reaction mixture was treated with EtOAc (5 mL) to dissolve the product formed, and filtered through a pre-weighed sintered glass crucible. The solid (ZnO@PEG nanoparticles) present in the sintered glass crucible was repeatedly washed with water and dried in a hot air oven, the crucible was weighed, the solid was collected and kept aside for reuse. The filtrate was then taken into a separating funnel, the organic layer was separated, and dried over anhydrous Na_2SO_4 to get the crude compound which was then recrystallized from ethanol to get the pure product. The structures of all the products were confirmed by IR, ^1H NMR, ^{13}C NMR, HRMS analyses.

2.3. Spectral data

3-methyl-5-(4-nitrophenyl)-4-phenyl-1,4-dihydropyrano[2,3-c]pyrazol-6-amine (5a):

Pale yellow powder; Yield 97%; mp 212–213 °C; IR (ATR cm^{-1}): ν 3315, 3244, 2960, 1543, 1506, 1315, 920, 610; ^1H NMR (400 MHz, DMSO d_6): δ 1.92 (s, 3H, –CH$_3$), 4.54 (1H, s, –CH), 6.94 (s, 2H, –NH$_2$), 7.24–8.28 (m, 9H, Ar-H), 12.47 (s, 1H, –NH) ppm; ^{13}C NMR (100 MHz, DMSO d_6): δ 12.5, 31.6, 88.8, 103.7, 122.4, 123.9, 127.4, 128.6, 129.8, 134.8, 138.5, 144.3, 146.4, 150.6, 162.3 ppm; HRMS (ESI): m/z [M + H]$^+$ calcd for $C_{19}H_{16}N_4O_3$ 349.1301, found 349.1305.

4-(4-chlorophenyl)-3-methyl-5-(4-nitrophenyl)-1,4-dihydro pyrano[2,3-c]pyrazol-6-amine (5b):

Buff powder, Yield 95%; mp 200–201 °C; IR (ATR cm^{-1}): ν 3345, 3256, 2968, 1512, 1332, 920; ^1H NMR (400 MHz, DMSO d_6) δ (ppm): 1.99 (s, 3H, –CH$_3$), 4.53 (s, 1H, –CH), 6.95 (s, 2H, –NH$_2$), 7.14–8.33 (m, 8H, Ar-H), 12.24 (s, 1H, –NH); ^{13}C NMR (100 MHz, DMSO d_6) δ (ppm): 13.76, 32.84, 89.01, 110.83, 122.32, 125.09, 129.53, 129.81, 131.14, 133.01, 139.26, 145.16, 147.43, 150.72, 161.88; HRMS (ESI): m/z [M + H]$^+$ calcd for $C_{19}H_{16}ClN_4O_2$ 383.0911, found 383.0907.

4-(4-bromophenyl)-3-methyl-5-(4-nitrophenyl)-1,4-dihydro pyrano[2,3-c]pyrazol-6-amine (5c):

Pale yellow solid, Yield 92%; m.p 226–227 °C; IR (ATR cm^{-1}): ν 3321, 3240, 2960, 1501, 1372, 913; ^1H NMR (400 MHz, DMSO d_6): δ 2.10 (s, 3H, –CH$_3$), 4.79 (s, 1H, –CH), 6.87 (s, 2H, –NH$_2$), 7.22–8.33 (m, 8H, Ar-H), 12.67 (s, 1H, –NH) ppm; ^{13}C NMR (100 MHz, DMSO d_6): δ 13.7, 32.8, 88.9, 111.7, 120.7, 122.4, 125.2, 125.9, 128.8, 129.5, 129.9, 132.7, 139.4, 144.5, 147.3, 151.9, 161.7 ppm; HRMS (ESI): m/z [M + Na]$^+$ calcd for $C_{19}H_{15}BrN_4O_3$ 449.0225, found 449.0221.
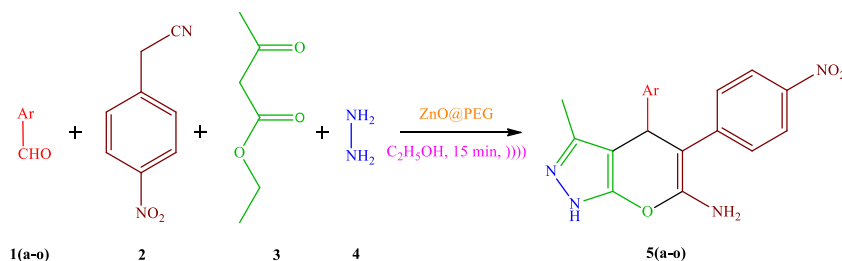
3-methyl-4,5-bis(4-nitrophenyl)-1,4-dihydropyrano[2,3-c]pyrazol-6-amine (5d):

Yellow powder, Yield 94%; mp 230–231 °C; IR (ATR cm^{-1}): ν 3334, 3213, 2963, 1565, 1315, 956; ^1H NMR (400 MHz, DMSO d_6) δ (ppm): 1.97 (s, 3H, –CH$_3$), 4.69 (s, 1H, –CH), 6.80 (s, 2H, –NH$_2$), 7.45–8.29 (s, 8H, Ar-H), 12.40 (s, 1H, –NH); ^{13}C NMR (100 MHz, DMSO d_6) δ (ppm): 13.10, 32.14, 89.09, 112.26, 122.52, 122.79, 129.57, 129.95, 138.84, 140.62, 143.41, 144.16, 147.53, 150.29, 162.48; HRMS (ESI): m/z [M + H]$^+$ calcd for $C_{19}H_{16}N_5O_5$ 394.1151, found 394.1148.

4-(6-amino-3-methyl-5-(4-nitrophenyl)-1,4-dihydropyrano[2,3-c]pyrazol-4-yl)phenol (5e):

Yellow powder, Yield 91%; mp 245–246 °C; IR (ATR cm^{-1}): ν 3321, 3346, 3136, 2954, 1561, 1314, 966; ^1H NMR (400 MHz, DMSO d_6) δ (ppm): 2.03 (s, 3H, –CH$_3$), 4.69 (s, 1H, –CH), 6.86 (s, 2H, –NH$_2$), 6.99–8.29 (m, 8H, Ar-H), 11.60 (s, 1H, –OH), 12.52 (s, 1H, –NH);

^{13}C NMR (100 MHz, DMSO d_6) δ (ppm): 12.50, 32.31, 89.63, 102.86, 105.69, 113.24, 122.86, 124.35, 126.81, 129.16, 129.41, 139.79, 144.50, 145.62, 156.21, 163.59; HRMS (ESI): m/z [M + H]$^+$ calcd for $C_{19}H_{17}N_4O_4$ 365.1250, found 366.1248.

Scheme 1. Synthesis of 1,4-dihydropyrano[2,3-c]pyrazoles.

3-methyl-5-(4-nitrophenyl)-4-p-tolyl-1,4-dihydropyrano[2,3-*c*]pyrazol-6-amine (5f):

Yellow solid, Yield 87%; mp 236–237 °C; IR (ATR cm^{-1}): ν 3339, 3217, 2931, 1548, 1526, 1301, 936, 610; ^{1}H NMR (400 MHz, DMSO d_6): δ 2.04 (s, 3H, –CH$_3$), 2.34 (s, 3H, –CH$_3$), 4.92 (s, 1H, –CH), 6.62 (s, 2H, –NH$_2$), 7.15–8.32 (m, 8H, Ar-H), 12.66 (s, 1H, –NH) ppm;

^{13}C NMR (100 MHz, DMSO d_6): δ 13.5, 21.7, 32.4, 89.5, 112.7, 122.7, 124.0, 129.2, 130.5, 131.1, 133.8, 138.8, 145.4, 147.1, 150.9, 162.4 ppm; HRMS (ESI): *m/z* [M + K]$^+$ calcd for C$_{20}$H$_{18}$N$_4$O$_3$ 401.1016, found 401.1012.

4-(6-amino-3-methyl-5-(4-nitrophenyl)-1,4-dihydropyrano[2,3-*c*]pyrazol-4-yl)-2-methoxyphenol (5 g):

Yellow powder, Yield 91%; mp 208–209 °C; IR (ATR cm^{-1}): ν 3321, 3346, 3150, 2943, 1544, 1375, 909; ^{1}H NMR (400 MHz, DMSO d_6) δ (ppm): 2.09 (s, 3H, –CH$_3$), 3.64 (s, 3H, –OCH$_3$), 4.87 (s, 1H, –CH), 6.80 (s, 2H, –NH$_2$), 6.66–8.36 (m, 7H, Ar-H), 11.23 (s, 1H, –OH), 12.55 (s, 1H, –NH); ^{13}C NMR (100 MHz, DMSO d_6) δ (ppm): 12.74, 32.42, 56.51, 89.19, 112.33, 112.61, 114.98, 122.36, 123.71, 125.18, 130.05, 138.84, 145.16, 146.12, 147.39, 148.21, 148.95, 162.58; HRMS (ESI): *m/z* [M + H]$^+$ calcd for C$_{20}$H$_{19}$N$_4$O$_5$ 395.1355, found 395.1351.

4-(3,4-dimethoxyphenyl)-3-methyl-5-(4-nitrophenyl)-1,4-dihydropyrano[2,3-*c*]pyrazol-6-amine (5 h):

Pale yellow powder, Yield 95% mp 220–221 °C; IR (ATR cm^{-1}): ν 3362, 3254, 2956, 1555, 1321, 933; ^{1}H NMR (400 MHz, DMSO d_6) δ (ppm): 2.05 (s, 3H, –CH$_3$), 3.73 (s, 3H, –OCH$_3$), 3.87 (s, 3H, –OCH$_3$), 4.69 (s, 1H, –CH), 6.61 (s, 2H, –NH$_2$), 6.59–8.35 (m, 7H, Ar-H), 12.23 (s, 1H, –NH); ^{13}C NMR (100 MHz, DMSO d_6) δ (ppm): 12.47, 31.99, 55.62, 89.42, 112.38, 112.57, 113.49, 123.34, 124.10, 129.14, 131.96, 139.00, 144.69, 145.47, 146.53, 148.62, 150.56, 162.09; HRMS (ESI): *m/z* [M + H]$^+$ calcd for C$_{21}$H$_{21}$N$_4$O$_5$ 409.1512, found 409.1510.

3-methyl-5-(4-nitrophenyl)-4-(3,4,5-trimethoxyphenyl)-1,4-dihydropyrano[2,3-*c*]pyrazol-6-amine (5i):

Pale Yellow powder, Yield 95%; mp 238–240 °C; IR (ATR cm^{-1}): ν 3327, 3219, 2947, 1568, 1339, 910; ^{1}H NMR (400 MHz, DMSO d_6) δ (ppm): 1.97 (s, 3H, –CH$_3$), 3.60 (s, 6H, –OCH$_3$), 3.68 (s, 3H, –OCH$_3$), 4.67 (s, 1H, –CH), 6.85 (s, 2H, –NH$_2$), 6.59–8.30 (m, 6H, Ar-H), 12.28 (s, 1H, –NH); ^{13}C NMR (100 MHz, DMSO d_6) δ (ppm): 12.32, 31.85, 57.05, 60.35, 89.36, 104.53, 112.34, 123.55, 128.67, 129.79, 137.41, 139.56, 144.27, 146.39, 149.60, 152.01, 162.23; HRMS (ESI): *m/z* [M + H]$^+$ calcd for C$_{22}$H$_{23}$N$_4$O$_6$ 439.1618, found 439.1614.

3,4-dimethyl-5-(4-nitrophenyl)-1,4-dihydropyrano[2,3-*c*]pyrazol-6-amine (5j):

Yellow solid, Yield 93%; mp 242–243 °C; IR (ATR cm^{-1}): ν 3350, 3263, 2924, 1569, 1367, 914; ^{1}H NMR (400 MHz, DMSO d_6): δ 1.69 (s, 3H, –CH$_3$), 1.99 (s, 3H, –CH$_3$), 4.54 (s, 1H, –CH), 6.93 (s, 2H, –NH$_2$), 7.66–8.33 (m, 4H, Ar-H), 12.23 (s, 1H, –NH) ppm; ^{13}C NMR (100 MHz, DMSO d_6): δ 12.5, 18.6, 28.5, 89.5, 113.4, 123.5, 129.1, 139.9, 144.4, 145.7, 149.1, 163.6 ppm. HRMS (ESI): *m/z* [M + Na]$^+$ calcd for C$_{14}$H$_{14}$N$_4$O$_3$ 309.0964, found 309.0960.

3-methyl-5-(4-nitrophenyl)-4-(pyridin-4-yl)-1,4-dihydropyrano[2,3-*c*]pyrazol-6-amine (5 k):

Yellow solid, Yield 90%; mp 248–249 °C; IR (ATR cm^{-1}): ν 3354, 3210, 2921, 1526, 1350, 934; ^{1}H NMR (400 MHz, DMSO d_6): δ 2.03 (s, 3H, –CH$_3$), 4.69 (s, 1H, –CH), 6.86 (s, 2H, –NH$_2$), 7.19–8.61 (s, 8H, Ar-H), 12.52 (s, 1H, –NH) ppm; ^{13}C NMR (100 MHz, DMSO d_6): δ 13.1, 32.1, 89.1, 112.3, 122.5, 122.8, 129.6, 138.8, 140.6, 143.4, 147.5, 148.5, 150.3, 162.5 ppm; HRMS (ESI): *m/z* [M + H]$^+$ calcd for C$_{18}$H$_{15}$N$_5$O$_3$ 350.1253, found 350.1250.

3-methyl-5-(4-nitrophenyl)-4-(thiophen-2-yl)-1,4-dihydropyrano[2,3-*c*]pyrazol-6-amine (5 l):

Yellow solid, Yield 95%; mp 246–247 °C; IR (ATR cm^{-1}): ν 3361, 3264, 2908, 1587, 1331, 929; ^{1}H NMR (400 MHz, DMSO d_6): δ 1.97 (s, 3H, –CH$_3$), 4.69 (s, 1H, –CH), 6.80 (s, 2H, –NH$_2$), 6.90–8.28 (m, 7H, Ar-H), 12.40 (s, 1H, –NH) ppm; ^{13}C NMR (100 MHz, DMSO d_6): δ 12.3, 31.9, 55.1, 60.4, 89.4, 112.3, 123.6, 125.6, 127.3, 128.7, 129.8, 137.4, 139.6, 146.4, 149.6, 152.0, 162.2 ppm; HRMS (ESI): *m/z* [M + Na]$^+$ calcd for C$_{17}$H$_{14}$N$_4$O$_3$S 377.0684, found 377.0681.

3-methyl-4-(2-methylpyridin-4-yl)-5-(4-nitrophenyl)-1,4-dihydropyrano[2,3-*c*]pyrazol-6-amine (5 m):

Pale Yellow powder, Yield 90%; mp 218–219 °C; IR (ATR cm^{-1}): ν 3345, 3276, 2900, 1567, 1330, 945; ^{1}H NMR (400 MHz, DMSO d_6): δ 2.01 (s, 3H, –CH$_3$), 2.23 (s, 3H, –CH$_3$), 4.68 (s, 1H, –CH), 6.80 (s, 2H, –NH$_2$), 7.18–8.58 (s, 7H, Ar-H), 12.47 (s, 1H, –NH) ppm; ^{13}C NMR (100 MHz, DMSO d_6): δ 13.54, 28.41, 32.27, 88.50, 112.38, 122.67, 123.84, 132.43, 138.19, 140.74, 143.99, 147.70, 151.33, 157.12, 161.25 ppm; HRMS (ESI): *m/z* [M + H]$^+$ calcd for C$_{19}$H$_{18}$N$_5$O$_3$ 364.1410, found 364.1409.

3-methyl-4-(3-methylthiophen-2-yl)-5-(4-nitrophenyl)-1,4-dihydropyrano[2,3-*c*]pyrazol-6-amine (5n):

Yellow powder, Yield 91%; mp 230–231 °C; IR (ATR cm^{-1}): ν 3356, 3260, 2954, 1579, 1367, 956; ^{1}H NMR (400 MHz, DMSO d_6): δ 1.98 (s, 3H, –CH$_3$), 2.12 (s, 3H, –CH$_3$), 4.69 (s, 1H, –CH), 6.82 (s, 2H, –NH$_2$), 6.53–8.29 (m, 6H, Ar-H), 12.38 (s, 1H, –NH) ppm; ^{13}C NMR (100 MHz, DMSO d_6): δ 12.34, 13.47, 30.43, 88.79, 113.69, 123.58, 125.70, 127.35, 130.57, 133.42, 136.61, 138.64, 146.13, 150.21, 152.77, 161.48 ppm; HRMS (ESI): *m/z* [M + H]$^+$ calcd for C$_{18}$H$_{17}$N$_4$O$_3$S 369.1020, found 369.1021.

2-(6-amino-3-methyl-5-(4-nitrophenyl)-1,4-dihydropyrano[2,3-*c*]pyrazol-4-yl)-5-nitrophenol (5o):

Yellow powder, Yield 90%; mp 227–229 °C; IR (ATR cm^{-1}): ν 3335, 3245, 2932, 1534, 1345, 932; ^{1}H NMR (400 MHz, DMSO d_6): δ 2.04 (s, 3H, –CH$_3$), 4.69 (s, 1H, –CH), 6.83 (s, 2H, –NH$_2$), 7.13–8.36 (m, 7H, Ar-H), 11.61 (s, 1H, –OH), 12.23 (s, 1H, –NH) ppm; ^{13}C NMR (100 MHz, DMSO d_6): δ 12.49, 31.86, 89.42, 111.21, 112.45, 114.30, 122.03, 124.11, 129.14, 131.91, 139.08, 143.43, 145.47, 145.79, 148.67, 156.38, 161.25 ppm; HRMS (ESI): *m/z* [M + H]$^+$ calcd for C$_{19}$H$_{16}$N$_5$O$_6$ 410.1101, found 410.1009.

3. Results and discussion

To explore the feasibility and generality of ZnO@PEG nanoparticles catalyzed sonicated MCR, the reaction variables such as the energy efficiency, catalyst, solvent, and feed ratio of catalyst were optimized to observe their roles in enhancing the rates and yield of the products. Benzaldehyde, 4-nitro phenylacetonitrile, ethyl acetoacetate and hydrazine hydrate were chosen as model substrates.

A variety of catalysts were explored under different reaction conditions (reflux temperature, microwave, and ultrasonic irradiation) and the results are presented in Table 1. To rationalize the influence of the catalyst, a control reaction was first carried out in the absence of catalyst wherein a maximum yield of only 25% was obtained and most of the starting materials were recovered (Table 1, Entry 1). Later, a cluster of catalysts (Lewis acids, *N*-containing bases, metal oxides) (Table 1, Entries 2–9) under various reaction conditions were examined and a maximum yield of 55% was obtained. Switching the reaction only with PEG afforded only 70% of the maximum yield (Table 1, entry 10). However, after incorporating PEG to ZnO and when ZnO@PEG nanocatalyst is used as a catalyst, to our delight, the yield of the reaction increased to 95% (Table 1, Entry 11). Hence, ZnO@PEG nanoparticles under ultrasonic irradiation were preferred for our further studies.

We then began to assess the effect of various solvents (nonpolar, polar aprotic, and polar protic solvents) on the model reaction to substantiate the best choice and the results of the findings are listed in Table 2. We initially probed this experiment under the solvent-free condition on sonication gave the maximum yield

Table 1
Optimization of the catalyst for the synthesis of **5a**[a].

Entry	Catalyst	Reflux (80 °C)		MW (250 W)		US	
		Time (min)	Yield (%) [b]	Time (min)	Yield (%) [b]	Time (min)	Yield (%) [b]
1	No Catalyst	600	15	30	10	15	25
2	CuSO$_4$·5H$_2$O	600	35	30	15	15	35
3	Ln(OTf)$_3$	600	25	30	20	15	40
4	Pyridine	600	80	30	45	15	60
5	Piperidine	600	86	30	50	15	50
6	Fe$_2$O$_3$	600	30	30	30	15	40
7	CuO	600	30	30	35	15	50
8	Al$_2$O$_3$	600	35	30	40	15	50
9	ZnO	600	62	30	45	15	75
10	PEG	600	50	30	65	15	70
11	ZnO@PEG	600	75	30	60	15	95

[a] Reaction conditions: benzaldehyde (1 mmol), 4-nitro phenylacetonitrile (1 mmol), ethyl acetoacetate (1 mmol), hydrazine hydrate (1 mmol) and 0.1 g of ZnO@PEG in ethanol (3 mL).
[b] Isolated yields.

Table 2
Optimization of the solvent for the synthesis of **5a**[a].

Entry	Catalyst	Reflux (80 °C)		MW (250 W)		US	
		Time (min)	Yield (%) [b]	Time (min)	Yield (%) [b]	Time (min)	Yield (%) [b]
1	No Solvent	600	17	30	15	15	15
2	Toluene	600	15	30	25	15	25
3	*n*-Hexane	600	20	30	25	15	30
4	DCM	600	30	30	25	15	30
5	THF	600	35	30	30	15	40
6	DMSO	600	35	30	30	15	30
7	CH$_3$CN	600	40	30	50	15	55
8	DMF	600	50	30	50	15	70
9	H$_2$O	600	60	30	60	15	60
10	H$_2$O	1200	65	60	60	45	70
11	Ethanol	600	65	30	70	15	95

[a] Reaction conditions: benzaldehyde (1 mmol), 4-nitro phenylacetonitrile (1 mmol), ethyl acetoacetate (1 mmol), hydrazine hydrate (1 mmol) and 0.1 g of ZnO@PEG in solvent (3 mL).
[b] Isolated yields.

(15%) of **5a** whereas unsatisfactory yields were obtained under other conditions even after the prolonged time (Table 2, Entries 2–9). The yield of the product increased incrementally when water is used as a solvent for an extended time (Table 2, Entry 10).

Furthermore, when the reaction was performed in the presence of ethanol within a short period (Table 2, Entry 10) yield of 95% was obtained. Hence, it is clear that the best solvent is ethanol and for further studies, ethanol was chosen as the reaction solvent.

With the prospect to reduce the reaction time and to maximize the product yield, the amount of catalyst required to promote this successful transformation under ultrasonication was ascertained and the results are summarized in Table 3. Consequently, the best result was obtained by using the 0.1 g of catalyst (Table 3, Entry 2). When the reaction was carried out using 0.05 g of the catalyst, the

reaction progressed steadily to give moderate yield (Table 3, Entry 1). Consequently, the best result was obtained by using the 0.1 g of catalyst (Table 3, Entry 2). Further increment in the quantity of the catalyst did not show any significant enhancement in the yield of the desired product (Table 3, Entries 3,4). Later, a scale-up of the model reaction to 10 mmol scales was performed and as anticipated, the desired product was obtained in 95% yield (15 min, Table 3, Entry 5).

Later, the possibility of recycling the catalyst was investigated by performing model reaction and it was observed that the ZnO@-PEG nanoparticles could be reused for five consecutive cycles with almost the same catalytic activity giving 95%, 92%, 90%, 87%, and 85% yields (Fig. 1).

To demonstrate the reliability and practicability of our new protocol the substituted aldehydes, 4-nitro phenylacetonitrile, ethyl acetoacetate, hydrazine hydrate was subjected to the optimized

Table 3
Optimization of the amount of ZnO@PEG for the synthesis of **5a**[a].

Entry	Amount of ZnO@PEG (g)	Time (min)	Yield[b] (%)
1	0.05	15	40
2	0.1	15	95
3	0.15	15	95
4	0.2	15	95
5[c]	1	15	95

[a] Reaction conditions: benzaldehyde (1 mmol), 4-nitro phenylacetonitrile (1 mmol), ethyl acetoacetate (1 mmol), hydrazine hydrate (1 mmol) and ZnO@PEG in ethanol (3 mL).
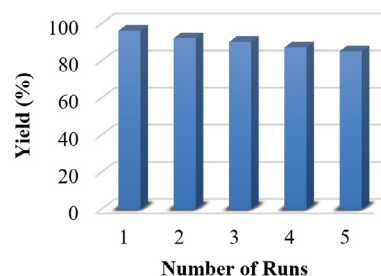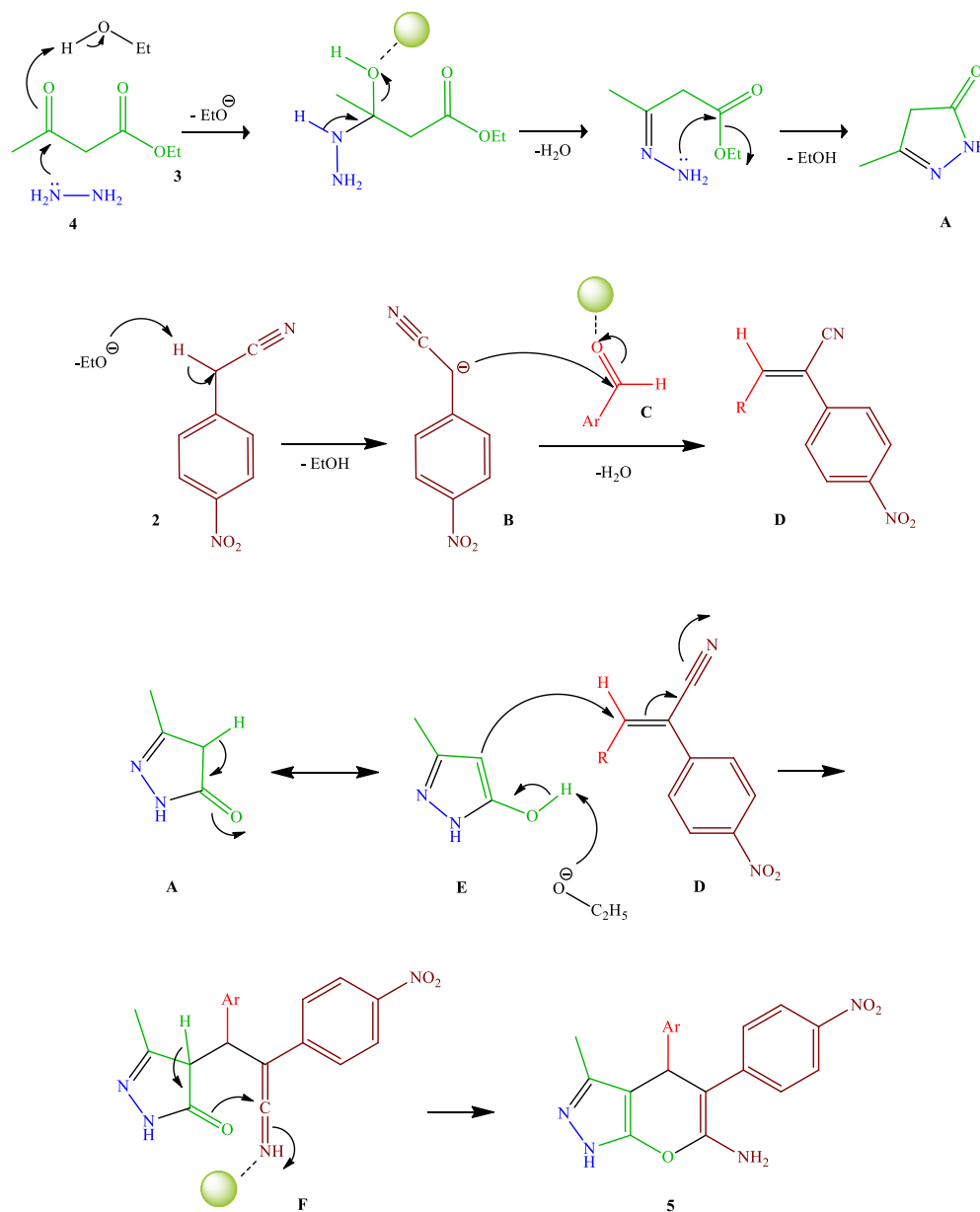[b] Isolated yield.
[c] The reaction was carried out in 10 mmol scale.

Fig. 1. Reusability of ZnO@PEG in the synthesis of **5(a–o)**.

Scheme 2. A plausible mechanism for the synthesis of 1,4-dihydropyrano[2,3-*c*]pyrazoles.

Table 4
Synthesis of 1,4-dihydropyrano[2,3-*c*]pyrazoles.

Entry	R	Product	Time (min)	Yield (%)[a]	m.p. (°C)
1	4-Phenyl	5a	15	97	212–213
2	4-Chlorophenyl	5b	15	95[†]	200–201
3	4-Bromophenyl	5c	15	92	226–227
4	4-Nitrophenyl	5d	15	94[†]	230–231
5	4-Hydroxyphenyl	5e	15	91[†]	245–246
6	4-Tolyl	5f	15	87	236–237
7	3-Methoxy 4-hydroxyphenyl	5 g	15	91[†]	208–209
8	3,4-Dimethoxyphenyl	5 h	15	95[†]	220–221
9	3,4,5-Trimethoxyphenyl	5i	15	95[†]	238–240
10	Methyl	5j	15	93	242–243
11	Pyridin-4-yl	5k	15	90	248–249
12	Thiophen-2-yl	5l	15	95	246–247
13	3-Methylpyridin-4-yl	5m	15	90[†]	218–219
14	3-Methylthiophen-2-yl	5n	15	91[†]	230–231
15	2-Hydroxy 4-nitrophenyl	5o	15	90[†]	227–229

[a] Isolated yield.
[†] Novel compound.

condition and successfully synthesized fifteen 1,4-dihydropyrano[2,3-c]pyrazoles **5(a – o)** in excellent yields under sonication. The results of this study are presented in Table 4.

It was also observed that in all cases the four substrates congregated successfully to afford the desired product in good to excellent yields in short reaction times (Table 4, Entries 1–15). It is seen that the presence of electron-donating and withdrawing groups tethered on the aromatic ring, did not have any substantial effect on the efficacy of the reaction and product yield.

A plausible mechanism for the formation of the substituted 1,4-dihydropyrano[2,3-c]pyrazoles catalyzed by ZnO@PEG is envisaged. The initial step may involve the intermolecular cyclization between ethyl acetoacetate (**3**) and hydrazine hydrate (**4**) catalyzed by ZnO@PEG to give the cyclized product (**A**). Also, the hydroxyl groups present on PEG may play a vital role in enhancing the electrophilicity of aldehyde by activating the carbonyl group of the aldehyde (**C**) through hydrogen bonds. This may further lead to a decrease in the energy of transition state which enables the nucleophilic attack of the activated phenyl acetonitrile (**B**) (stabilized by the nitro group of the aryl ring) to give a Knoevenagal adduct (**D**). The enol form (**E**) of the ketone (**A**) may react by a Michael type addition reaction with **D** to give a highly unstable intermediate **F** which on intermolecular cyclization results in the formation of substituted 1,4-dihydropyrano[2,3-c]pyrazoles (**5**) as depicted in the Scheme 2.

4. Conclusions

We have described a facile, versatile, environmentally benign, rapid and economical protocol for the synthesis of 1,4-dihydropyrano[2,3-c]pyrazoles under ultrasonic irradiation. The effect of ZnO@PEG nanoparticles as a catalyst along with the use of benevolent processes like ultrasound is significant for the preparation of 1,4-dihydropyrano[2,3-c]pyrazoles in excellent yield. Cost-effective recovery, reusability of the catalyst without appreciable loss of activity, avoidance of laborious column purification steps, straightforwardness, reliability, broad substrate scope, absence of hazardous organic solvents, and rapid reaction rate are the additional advantages of the current method.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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ANTIOXIDANT ACTIVITY OF DIFFERENT VARIETIES OF *TERMINALIA CATAPPA*

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ABSTRACT

Terminalia catappa, an ornamental tropical tree belonging from the family Combretaceae which is native to Southeast Asia, commonly known as Tropical almond**.** The bark of the tree is used to cure fever and has diaphoretic, anti-indigestion, hepatoprotective, antiperoxidation, antisickling, anti-dysentery, antibacterial, antifungal, analgesic, anticolic, antihyperanalgesic and anti-inflammatory properties. The leaves are used in the preparation of ointments to cure for scabies, leprosy and cutaneous diseases. The two varieties of plants were collected from Bangalore. The methanol extract of leaf was evaluated for qualitative phytochemical analysis, which showed the presence of phenol, flavonoid, tannin, steroid and alkaloid.The secondary metabolites such as phenol and flavonoids were analyzed quantitatively. The radical scavenging potential of methanol leaf extract of 2 different varieties *Terminalia catappa* of showing remarkable effect with the IC_{50} value ranged from 3.54-5.52μg/ml which was comparable with standard. The result suggest that the tree has potential for the excellent source to formulate the herbal medicine.

KEYWORDS: Antioxidant, *Terminalia catappa,* DPPH, Phenol, Flavonoid.

1. INTRODUCTION

Nature has provided a source of medicinal agents for thousands of years and modern drugs are isolated from natural resources they are traditional medicines use of medicinal herbs has become an important part of daily life despite the progress in modern medical and pharmaceutical research Use of medicinal herbs has become an important part of daily life despite the progress in modern medical and pharmaceutical research.[1] Phytochemistry play important role in treatment of different diseases and disorders are still used in both traditional and modern medicine.[2] An Antioxidant are natural substances that prevent or delay damage, they protect the body from damage caused by harmful molecules called free radical ,oxidative stress can damage carbohydrates ,protein, lipids and DNA in cells and tissue which consequently leads to several degenerative diseases and plays important role in the development of chronic and degenerative ailments such as cancer ,arthritis ,aging, autoimmune disorders ,cardiovascular and neurodegenerative diseases, exogenous and endogenous antioxidants act as a free radical scavengers by preventing and repairing damages.[3,4,5] Recent developments have shown that antioxidants from natural phytochemical products have ability to scavenge free radical or active oxygen.[6,7] The increasing in the search for natural alternative of synthetic antioxidants has led to the evaluation of antioxidants in a number of plant sources.[8]

Terminalia catappa is an ornamental tropical tree belonging to the family Combretaceae is native to Southeast Asia in the tropical regions of Asia, Africa, and Australia .It is known by the common names *Bengal almond, country almond, false kamani, Indian almond, Malabar almond, sea almond, and tropical almond*. It is a perennial tree reaching a height of between 15-25 m and about 9 m in width of its symmetrical canopy).[9] It is large deciduous stately tree with a characteristic pagoda shape.[10] It is cultivated as a shade tree and for its fruits and seeds which are eaten as a fruit as well as for medicinal uses.[11] Two common varieties of *Terminalia catappa* (Indian almond)like yellow variety and red variety.[12] The fruits which consist of the epicarp, fleshy mesocarp, stony mesocarp and kernel are ovoid in shape, laterally compressed with various sizes and colours at maturity.[13] The fruit of *Terminalia catappa* is a rich source of allegicacid, gallicacid and many more unidentified flavonoid compound Juices from the leaves were used as an ointment for scabies ,leprosy and other skin diseases.[14] The bark is excellent source of tannins.[15] With the study conducted by various scientists have worked on the antioxidant properties of aqueous extracts from three different leaves of *Terminalia catappa* might be potential antioxidant supplement for application in food product or as a drink.[16] An invitro Antioxidant activity of ethanol extract from *Terminalia catappa* leaves and fruit effect of fruit ripening showed that leaf extract showed highest

level of total phenol and flavonoid content ,DPPH free radical scavenging activity and Reducing power potential compared to unripe fruit this may be related to that increased vitamin C through Ripening process.[17] Phytochemical analysis and invitro antioxidant activity of *Terminalia catappa* had strong potential attempt at the extract to isolate and bioactive phytoconstituents observed activities as mechanisms is highly active,[18] Study recommended that the three varieties are good for human consumption like other fruit,[19] nutritious nut containing secondary metabolites used as herbal drug preparation after clinical.[20] Methanol extract of *Terminalia catappa* was selected for further study of synergistic activity with standard antibiotics.[21] Medicinal uses of *Terminalia catappa* reported from various countries.[22]

Therefore, the present study was undertaken to evaluate phenol and flavonoid content in the methanol extract of leaves and their correlation with antioxidant activity and their enriching bioactive compound as well as fruit .

2. MATERIALS AND METHOD
2.1Plant material collection and Extract Preparation
The leaves of different varieties like yellow (T1, T2) and red (T3 ,T4) of *Terminalia catappa* were collected from Bangalore. The leaves were dried at room temperature crushed into fine powdered by mixer grinder and stored in polythene bag until use.

Solvent extraction: Twenty five grams of powdered sample were filled in the thimble and extracted successfully with methanol solvent in a Soxhlet extractor for 48h. The solvent extracts were concentrated under reduced pressure and preserved at 5° C in airtight bottle until further use. The crude extract of methanol leaf extracts of *Terminalia catappa* varieties was subjected to phytochemical screening tests(Qualitative analysis) for the detection of major secondary metabolites by using standard procedure, the qualitative results as expressed as (+) and (-) for the absence of phytochemical. The presence of alkaloids, tannins, flavonoids and proteins, carbohydrates, and phenols were performed according to the method described by.[23,24]

Table 1: Qualitative analysis of leaf extract.

Qualitative Test	Methanol			
	T1	T2	T3	T4
Protein	+	+	+	+
Alkaloids	+	+	+	+
Saponins	++	++	++	++
Carbohydrates	+	+	++	+
Glycosides	+	+	++	+
Tannin	++	++	++	++
Flavonoid	++	++	++	++
Amino acid	+	+	++	+
Phenol	++	++	++	++

Note: T1-yellow variety 1,T2-yellow variety 2,T3-Red variety 1,T4-Red variety 2

2.2 Quantification of Total phenols and Total Flavonoid
The total phenol content in methanol extracts of leaves of *Terminalia catappa* variety were determined according to the method employed by using Catechol as standard.[25] one milliliter of plant extracts was measured with 1ml of FC reagent and 3ml of 20 % of Na_2CO_3 solution .the mixture was incubated for 40min at room temperature and absorbance was measured at 760nm .An allumunium chloride colorimetric method was used to determine the flavonoid content.

The plant extracts was mixed with 0.5ml of alumunium chloride (1.2%) and 0.5 ml of 120mM potassium acetate. The mixture was allowed to stand for 30 min at room temperature. The absorbance was measured at 415nm flavonoid content was expressed in terms of Rutin equivalent.
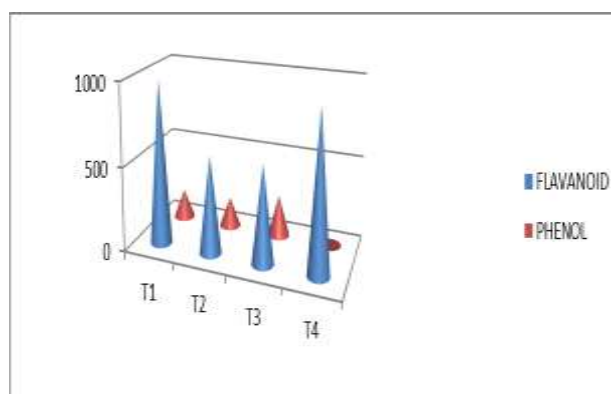

Figure 2: Quantification of Total phenols and Total Flavonoid.

3.Antioxidant Assay
3.1. DPPH radical scavenging assay
The free radical scavenging activity was measured by using DPPH radical (1,1 Diphenyl 1-2-picryl – Hydrazyl).[26,27] The scavenging activity of the methanol leaf extracts of *Terminalia catappa* variety was estimated using a 2ml of DPPH solution in ethanol and acetone was mixed with increasing phenol concentration of extract. The ascorbic acid is a standard reference to antioxidant. The reaction mixture was incubated for 15 min and thereafter the optical density of 517nm against blank using UV-VIS spectrophotometer. For The control DPPH solution in ethanol or acetone was taken without plant extracts and optical density was recorded after 15min. The assay was carried out in triplicate. The decreasing optical density of DPPH on addition to test samples in relation to the control was used to calculate the antioxidant activity as percentage inhibition of DPPH radical scavenging calculated using the following equation.

3.2 The Percentage of scavenging activity was calculated by using the following formula
Effect of scavenging O/D= {1 − A sample (517nm)/A control (517nm} x 100.

Table 2: Representing quantitative estimation of *Terminalia catappa* leaves.

Sample	Amount of flavanoid	Amount of phenol
T1	990µg/ml	178 µg/ml
T2	585 µg/ml	180 µg/ml
T3	587 µg/ml	195 µg/ml
T4	950 µg/ml	185 µg/ml

Table 3: Representing IC50 VALUE.

Sl. No.	Conc	T1	%	T2	%	T3	%	T4	Std	%
1	50 µl	15	5	33.9	11	16.2	8	79.3	07	6
2	100 µl	50	17	46.6	16	16.9	8.25	79.4	15	8
3	150 µl	66	23	60.1	21	43.3	21	82.3	18	11
4	200 µl	74.5	26	74.6	26	60.3	30	84.5	30	29
5	250 µl	81.7	28	80.1	28	68.2	33	87.5	38	37
	IC Value	IC50=5.52		IC50=5.24		IC50=6.38		IC50=3.54	IC50=9.68	
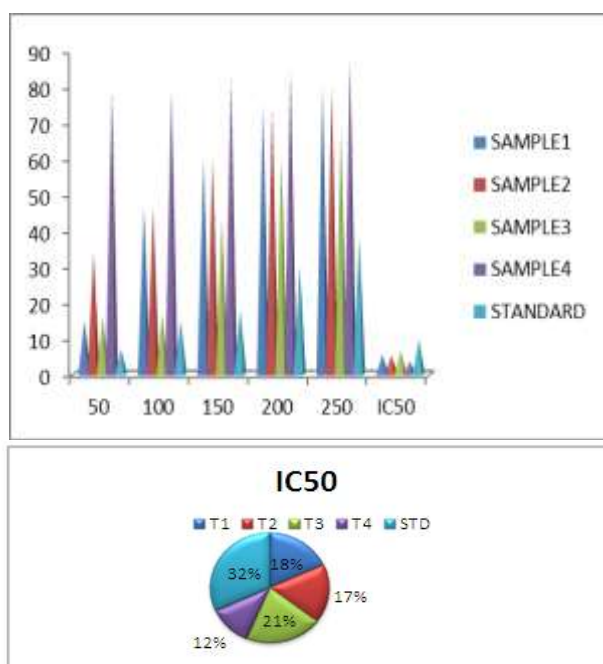
Fig. 2: Representing the difference of IC50 value with reference to the *Terminalia catappa* varieties

RESULT AND DISCUSSION

The Summarised result of the qualitative , qauntitative analysis of chemical constitutes of *Terminalia catappa* with a focus on flavanoids and phenol from methanol extract of different varieties of *Terminalia catappa* in Table 1and Table 2 .The phenol content was determined by folinciocalteau reagent. The maximum concentration of phenol was observed T3- 195 µg/ml ,T4-185 µg/ml T2- 180 µg/ml minimum concentration was observed in T1-178 µg/ml The flavonoid content was evaluated by alumunium chloride method highest amount of flavonoid content was obtained in sample T1-0.89 µg/ml T4-0.86 µg/ml T3-0.75 µg/ml and low in sampleT2-0.72 µg/ml shown in figure3 The free radical scavenging of methanol leaf extract was measured by DPPH radical which is stable organic free radical with absorption maxima at 517nm it loses the optimal absorption when accepting an electron resulting in colour variation from purple to yellow this discoloration indicates the scavenging potential of antioxidant activity of methanol extract of different varieties of *Terminalia catappa* compared to standard .The standard sample should be dependent activity and the concentration used was 50,100,150,200,250m g/ml, shown in figure1 the percentage of free radical scavenging capacity of the sample T1,T2 were ranged from T1-15 to 81.7, T2- 33.9 to 80.1 ,T3-16.2 to 60.2 ,T4-82.7 to 87.5 respectively shown in Table 3,the methanol extract of sample exhibited strong antioxidant activity followed by the sample showed considerably low in which was reported as T1-15to T3-16.2 with the different concentration the radical scavenging activity in likely to be related to the value of phytochemical and their hydrogen donating ability to reach from radical converting the in to more stable non reacting species of previously reported.[28] Phytochemical are widely distributed in plant and have gained much ability due to their role in the ability to scavenge the free radical and have beneficial effects on human health the present study clearly indicates that methanol extract of different variety of *Terminalia catappa* leaves possess significant antioxidant activity which may be developed as a functional ingredients in pharmaceutical product.

CONCLUSION

The present study evaluated the significant antioxidant activity in DPPH assay, leaf of T3 variety showed highest antioxidant activity compare to variety of T1,T2,T4.An Antioxidant activity is due to the highest phenol compounds in T2 variety than variety T1 showed less activity .This finding of this study suggest that the plant is a potential source of natural antioxidant that could have therapeutical agent in preventing or slowing progress of oxidative stress related to degenerative diseases .Further investigation of the isolation and characterization of the antioxidant constituent ,so *Terminalia catappa* varieties are wonder drug as the species have cure for many diseases and leaves of *Terminalia catappa* as a good source of natural antioxidants.[29]

ACKNOWLEDGMENT

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A STUDY ON RISK AND RETURNS OF HDFC Mutual fund and ICICI prudential mutual fund

ABSTRACT

 Many times the investors go on acquiring assets in an adhoc CURITI& unplanned manner & the result is high risk, low return profile that they may face. All such assets of financial nature such as gold, silver, realestate, building, insurance policies, post office certificate. NSC or NSS would constitute his portfolio & the wise investor not only plans his portfolio as per risk return profile or preferences but manages his portfolio efficiently so as to secure the highest return for the lowest risk possible at that level of investment. This is in short the portfolio management. The basic principle is that the higher the risk, the higher is the return &investor should have clear perception of elements of risk & return when he makes investments. Risk return analysis is essential for the investment & portfolio management. An investor considering investment is securities is faced with the problem of choosing from among a large no. of securities. His choice depends upon the risk return characteristics of individual securities. He would attempt to choose the most desirable securities & like to allocate his funds over group of securities. As the economic and financial environment keep changing the risk return characteristics of individual securities as well as portfolios also change.

A portfolio is a collection of assets. The assets may be physical or financial like Shares, Bonds, Debentures, Preference Shares, etc. The individual investor or a fund manager would not like to put all his money in the shares of one company, that would amount to great risk. He would therefore, follow the age old maximum that one should not put all the eggs into one basket. By doing so, he can achieve objective to maximize portfolio return and at the same time minimizing the portfolio risk by diversification.

NEED FOR THE STUDY

 In the finance field, it is a common knowledge that money or finance is scarce and that investors try to maximize their returns. But when the return is higher, the risk is also higher. Return and risk go together and they have a tradeoff. The art of investment is to see that return is maximized with minimum risk. In the above discussion we concentrated on the word "investment" and to invest we need analyze securities. Combination of securities with different risk-return characteristics will constitute the portfolio of the investor.

SCOPE OF THE STUDY

 The study covers all the information related to the investor risk-return relationship of securities. It is confined to five years data of ICICI and HDFC securities. It also includes the calculation of individual standard deviations which helps in allocating the funds available for investment based on risky portfolios

OBJECTIVES OF THE STUDY

 1. To make comparative study of risk and return of ICICI& HDFC.

 2 To study the systematic risk involved in the selected companies equities.

3. To offer some suggestions to the investors.

METHODOLOGY OF THE STUDY

The data used in this project is of secondary nature. The data is collected from secondary sources such as various websites, journals, newspapers, books, etc., the analysis used in this project has been done using selective technical tools. In Equity market, risk is analyzed and trading decisions are taken on basis of technical analysis. It is collection of share prices of selected companies for a period of five years. This is the study of Risk-Return analysis for a period of five years

LIMITATIONS

 The study is restricted to only two selected companies.

 Very few and randomly selected scripts/companies are analyzed from BSElistings

Risk and return trade off:

 Investors make investment with the objective of earning some tangible benefit. This benefit in financial terminology is termed as return and is a reward for taking a specified amount of risk.

 Risk is defined as the possibility of the actual return being different from the expected return on an investment over the period of investment. Low risk leads to low returns. For instance, incase of government securities, while the rate of return is low, the risk of defaulting is also low. High risks lead to higher potential returns, but may also lead to higher losses. Long-term returns on stocks are much higher than the returns on Government securities, but the risk of losing money is also higher.

 Rate of return on an investment cal be calculated using the following formula-

 Return = (Amount received - Amount invested) / Amount invested

 He risk and return trade off says that the potential rises with an increase in risk. An investor must decide a balance between the desire for the lowest possible risk and highest possible retun.The study is limited to banking companies only.

Risk-Return Relationship

By now you should understand that even with the most conservative investments you face some element of risk. However, not investing your money is also risky. For example, putting your money under the mattress invites the risk of theft and the loss in purchasing power if prices of goods and services rise in the economy. When you recognize the different levels of risk for each type of investment asset, you can better manage the total risk in your investment portfolio.
A direct correlation exists between risk and return and is illustrated in Figure. The greater the risk, the greater is the potential return. However, investing in securities with

the greatest return and, therefore, the greatest risk can lead to financial ruin if everything does not go according to plan.

Risk and Returns
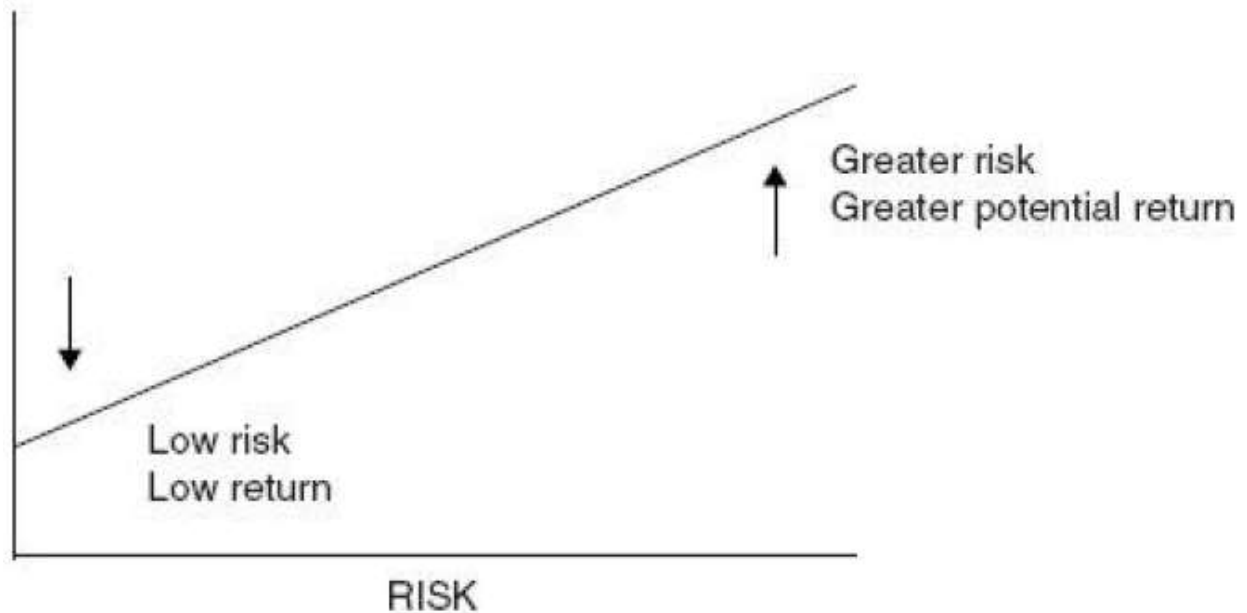
RISK

Understanding the risks pertaining to the different investments is of little consequence unless you're aware of your attitude toward risk. How much risk you can tolerate depends on many factors, such as the type of person you are, your investment objectives, the dollar amount of your total assets, the size of your portfolio, and the time horizon for your investments

HDFC:

Rate of Return = Share price in the closing – Share price at the opening
Share price in the opening

| Year	Opening value	Closing value (P1)	(P1-P0)	(P1-P0)/P0*10
2012-13	186	286.99	100.99	54.30
2013-14	264	189	-75	-28.41
2014-15	202.4	381.28	178.88	88.38
2015-16	387.8	467.57	79.77	20.57
2016-17	469.22	510.7	41.48	8.84
Total return				143.68

Average return =143.68/5

=28.74
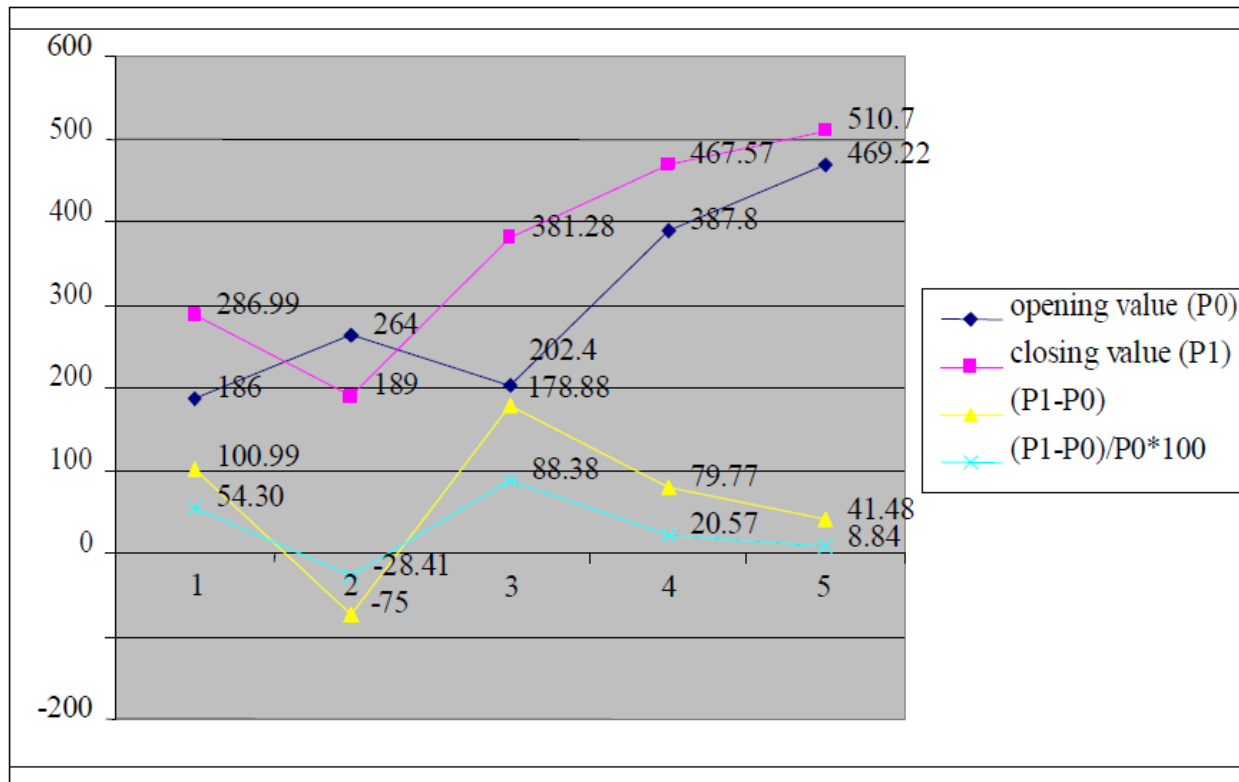
Interpretation: The average returns of HDFC are 28.74 wherein the maximum returns are inthe third year i.e. 2013-14.

ICICI:
Analysis of Return

Year	Opening value (P0)	Closing value (P1)	(P1-P0)	(P1-P0)/P0*10
2012-13	823	835.2	12.2	1.48
2013-14	799.95	337.85	-462.1	-57.77
2014-15	360	960.05	600.05	166.68
2015-16	952	1107.25	155.25	16.31
2016-17	1110	856.05	-253.95	-22.88
Total return				103.83

Average return =103.83/5
= **20.77**
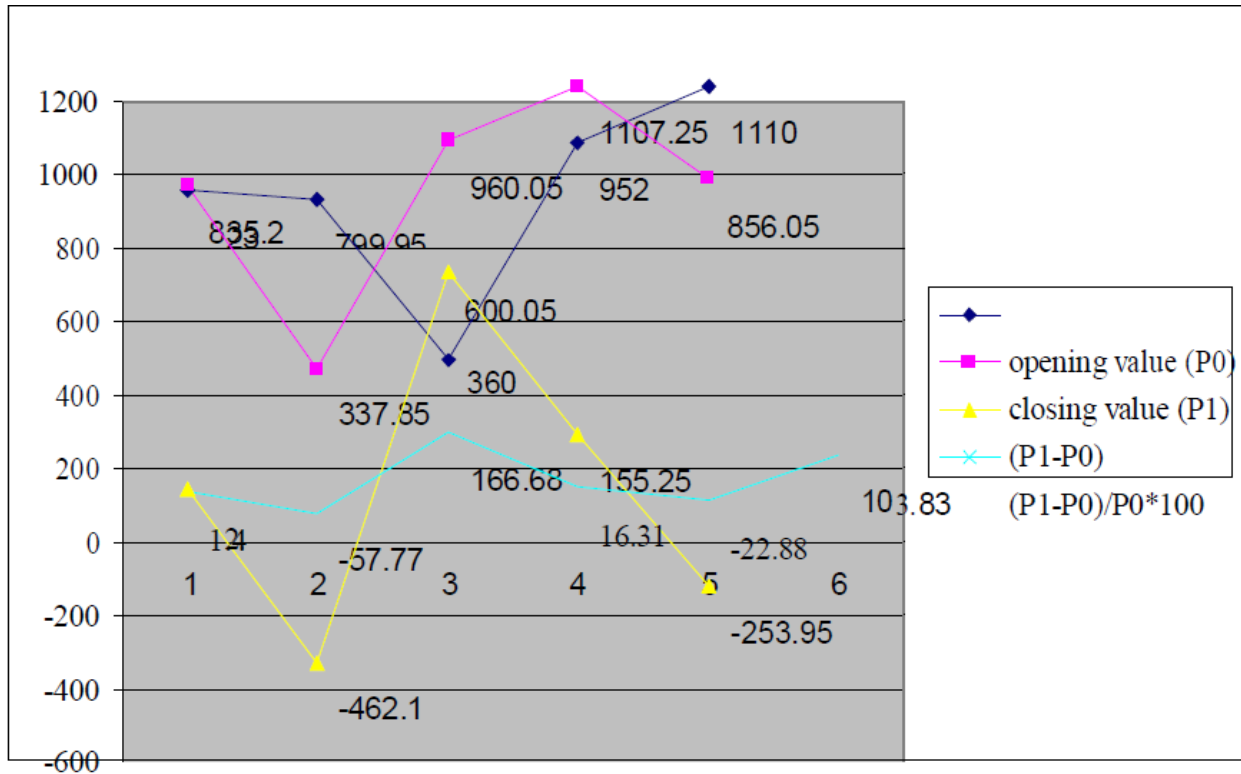
Interpretation: The average returns of ICICI are 20.77 wherein the maximum returns are in the third year i.e. 2014-15.Investment in HDFC is more profitable to the investor as the average returns are comparatively more than the average returns of ICICI. Thus, an investor who is only concerned about the returns in long run should invest in HDFC equities.

RISK ANALYSIS

Standard Deviation

This is the most commonly used measure of risk in fiancé. Its square also is widely used to find out the risk associated with a security.

Computation of Variance

Year	Return (R)	Avg return (R)	Deviations(R-R)	Square deviations(R-R) d^2
2012-13	54.3	28.74	25.564	653.52
2013-14	-28.41	28.74	-57.146	3265.67
2014-15	88.38	28.74	59.644	3557.41
2015-16	20.57	28.74	-8.166	66.68
2016-17	8.84	28.74	-19.896	395.85
Total	143.68			7939.12

Variance = 1/n-1 (Σ d2) = 1/5-1 (7939.12)
= 1984.78
Standard deviation=√ variance
=√ 1984.78
= **44.55**
ICICI: Analysis of Risk:

Year	Return (R)	Avg Return (R)	Deviations(R-R)	Square deviations(R-R) d^2
2012-13	1.48	20.77	-19.286	371.95
2013-14	-57.77	20.77	-78.536	6167.90
2014-15	166.68	20.77	145.914	21290.90
2015-16	16.31	20.77	-4.456	19.86
2016-17	-22.88	20.77	-43.646	1904.97
Total	103.83			29755.58

Variance = 1/n-1 (Σ d2) = 1/5-1 (29755.58)
= 7438.89
Risk=Standard deviation=√ variance
=√ 7438.89
=**86.25**
Interpretation: Risk associated with the investment in long run is less for the HDFC securities when compared to ICICI. Thus, when an investor is only considering risk factor, it is advisable to invest in HDFC securities.

AVERAGE RETURN OF BOTH COMPANIES:

S.No	COMPANY	AVERAGE RETURN	STANDARD DEVIATION
1	HDFC	28.74	44.55
2	ICICI	20.77	86.25
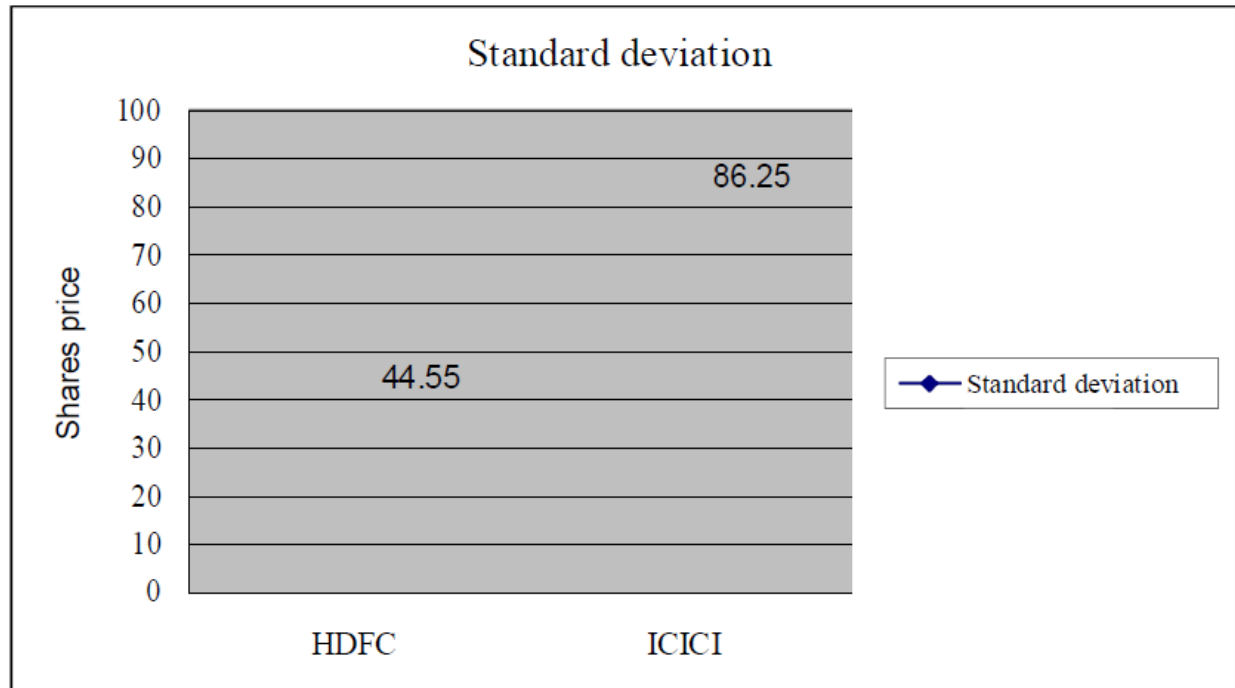
Interpretation: From the above table and graph it can be understood by considering both risk and return factors that the returns are more and risk is less for HDFC equities.

**COVARIANCE = COV. AB = (Σ[RA-RA] [RB-RB])
/ N WHERE:
RA = Return on
A RB = Return
on B
RA = Expected return on
A RB = Expected return
on B N = Number of
equities**

**COVARIANCE OF BANK EQUITIES
PORTFOLIO: $Cov_{A,B} = \Sigma(r_{iA}-r_A)(r_{iB}-r_B) / n-1$**

HDFC & ICICI

| Years	DEVIATIONS OF HDFC (RA-	DEVIATIONS OF ICICI (RB-	COMBINED DEVIATION
2012-13	25.564	-19.286	-493.027
2013-14	-57.146	-78.536	4488.018
2014-15	59.644	145.914	8702.895
2015-16	-8.166	-4.456	36.3877
2016-17	-19.896	-43.646	868.3808
		TOTAL	13602.65

COVARIANCE (COV_{AB}) = 13602.65/5

= **2720.531**
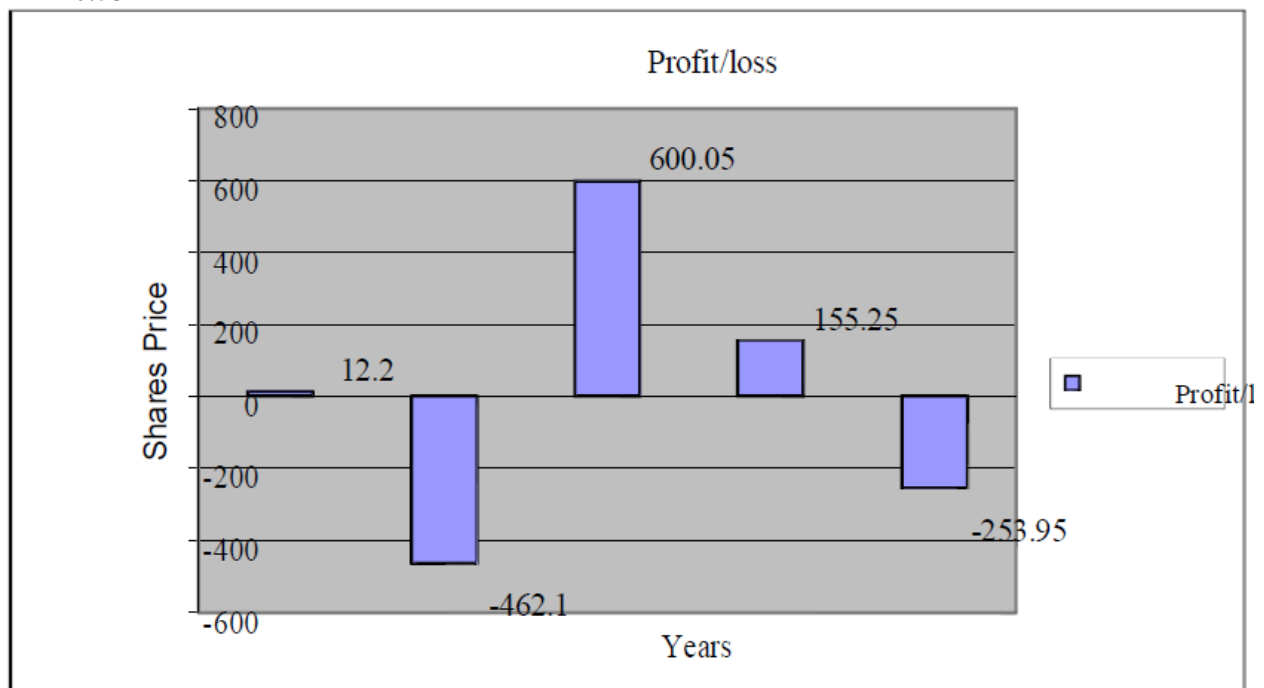
Interpretation:

From the above table it can be clearly stated that investor can enjoy more profits in 2013-14 and bear high loss in 2012-13 as the opening and closing share values fluctuate.

Maximum Profit

Maximum profit

Shares price

642
608.5
325
160.95
27.9
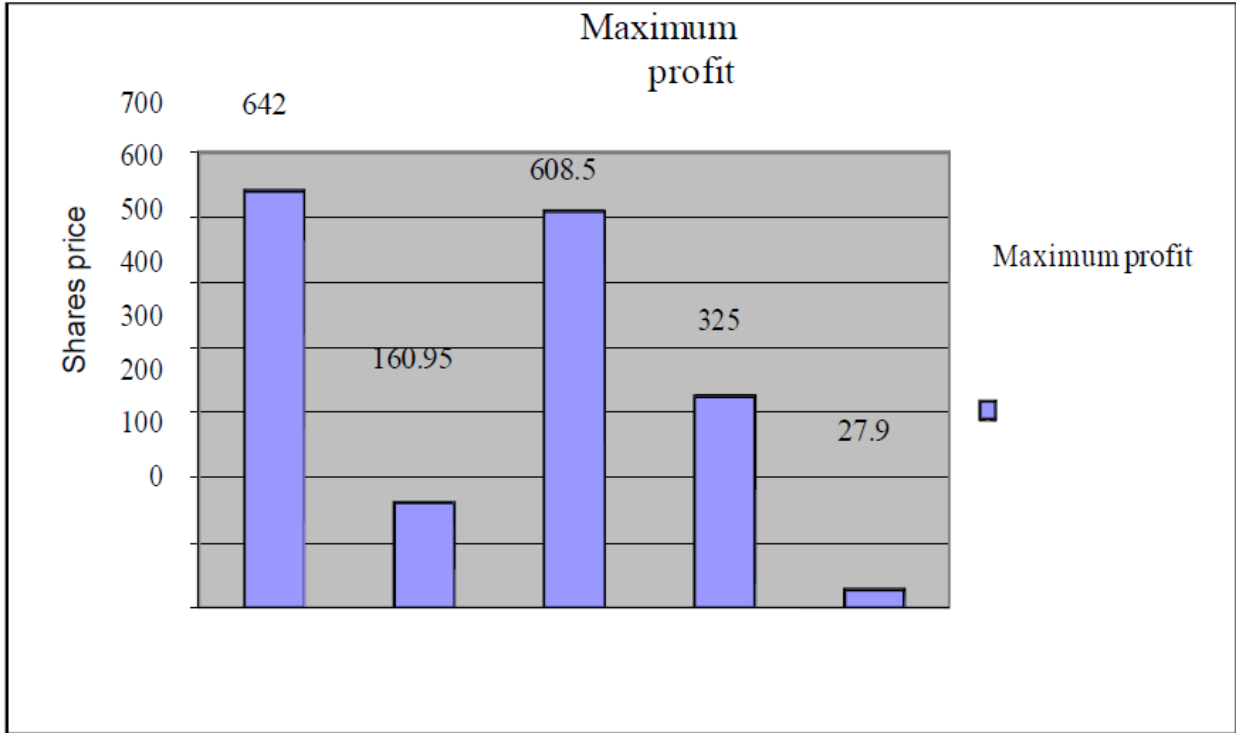
Maximum profit

Interpretation:
From the above table it can be stated that with the fluctuations in the opening
value and highest share price, 2007-08 is the most profitable year for the investor

Maximum Loss

Maximum loss

Shares price

30.6
-103
-143.9
-547.2

Maximum loss
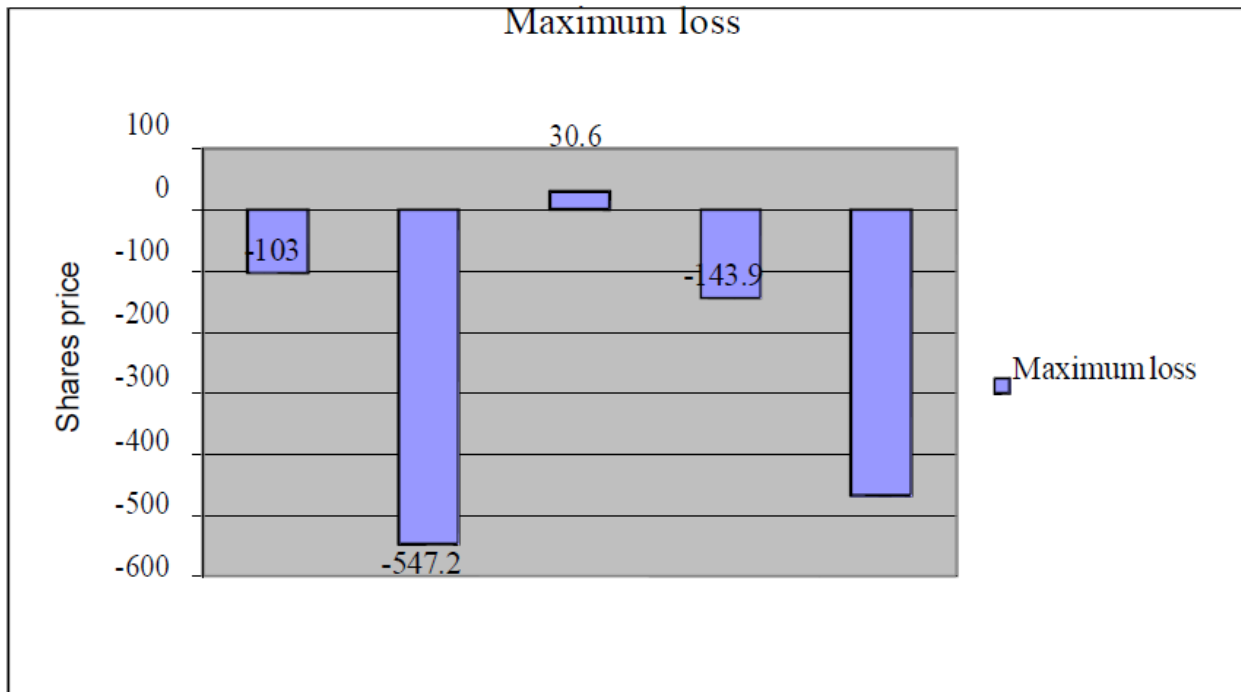
Interpretation:
From the above table by considering the difference between opening value and lowest share price, it can be stated that 2012-13 is most unfavorable year for the investor with huge loss.

FINDINGS

As far as the returns of the selected companies is concerned, HDFC is comparatively performing well compare to ICICI Bank. As far as the Standard deviation of the selected companies is concerned, ICICI is very high where as HDFC is giving less risk. This means that higher the risk, the higher the returns. As far as the Correlation co-efficient of ICICI and HDFC is concerned, it is 0.007 The covariance of the ICICI and HDFC is 2720.531. The systematic risk (Beta) of HDFC is 0.907. The systematic risk (Beta) of ICICI is 1.838.

SUGGESTIONS

The investor should consider the equities with maximum returns and minimum risk.

Thus, it is advisable to invest in HDFC equities. Investors should hold equities which give high returns with less risk. Do not relay completely on technical analysis. Investors should give importance to fundamental analysis of equities Industrial policy also has a major role in facilitating the growth of the economy. Holding two or more securities reduce the unsystematic risk.

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Certificate of Publication

This is to Certify that the Paper Entitled

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From

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A EMPIRICAL STUDY ON RISK AND RETURNS OF HDFC AND ICICI BANKS

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ABSTRACT

Many times the investors go on acquiring assets in an adhoc and unplanned manner . The result is at high risk, low return profile that they may face. All such assets of financial nature such as gold, silver, realestate, building, insurance policies, post office certificate, NSC or NSS would constitute his portfolio & the wise investor not only plans his portfolio as per risk return profile or preferences but manages his portfolio efficiently so as to secure the highest return for the lowest risk possible at that level of investment. This is in short the portfolio management. The basic principle is that the higher the risk, the higher is the return &investor should have clear perception of elements of risk & return when he makes investments. Risk return analysis is essential for the investment & portfolio management. An investor considering investment is securities is faced with the problem of choosing from among a large no. of securities. His choice depends upon the risk return characteristics of individual securities. He would attempt to choose the most desirable securities & like to allocate his funds over group of securities. As the economic and financial environment keep changing the risk return characteristics of individual securities as well as portfolios also change.

A portfolio is a collection of assets. The assets may be physical or financial like Shares, Bonds, Debentures, Preference Shares, etc. The individual investor or a fund manager would not like to put all his money in the shares of one company, that would amount to great risk. He would therefore, follow the age old maximum that one should not put all the eggs into one basket. By doing so, he can achieve objective to maximize portfolio return and at the same time minimizing the portfolio risk by diversification.

13214

1. NEED FOR THE STUDY

In the finance field, it is a common knowledge that money or finance is scarce and that investors try to maximize their returns. But when the return is higher, the risk is also higher. Return and risk go together and they have a tradeoff. The art of investing see that return is maximized with minimum risk. In the above discussion we co on the word "investment" and to invest we need analyze securities. Com securities with different risk-return characteristics will constitute the port investor.

2. SCOPE OF THE STUDY

The study covers all the information related to the investor risk-return relationship of securities. It is confined to five years data of ICICI and HDFC securities. It also includes

Certificate Of Publication

This is hereby awarding the Certificate to **Manjushree GS** In recognition of the publication of the paper entitled

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A STUDY ON STUDENT PERCEPTION TOWARDS SWAYAM (ONLINE LEARNING) IN SUB-URBAN MYSORE

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निबन्धमाला
परिसरीयशोधपत्रिका

(Campus Research Journal)

मुख्यसम्पादकः निदेशकश्च

आचार्यः चल्ला. लक्ष्मीनारायणशर्मा

सम्पादिका

आचार्या सि.एल्. सिसिली

नवमं पुष्पम्

निबन्धमाला (2019-20)

विषयानुक्रमणिका

शृङ्गारप्रकाशे कारकविचारः – भोजस्य सूक्ष्मचिन्तनम्

Dr. Nagaratna Hegde[1]

संस्कृतवाङ्मये भोजराजस्य योगदानं महदस्ति । सः प्रसिद्धः राजा यथा, तथैव महाशास्त्रवित् अपि । शास्त्रविदः प्रायः एकस्मिन् शास्त्रे कृतपरिश्रमाः, प्राप्तपरिणतयः च भवन्ति । किन्तु बहुशास्त्रवित् भोजः अनेकेषु शास्त्रेषु परिणतमतिः आसीत् । व्याकरणं, साहित्यं, ज्योतिषं, शिल्पशास्त्रम् इत्यादिषु अपूर्वान् ग्रन्थान् रचयता तेन स्वशास्त्रप्रौढिमा प्रमाणीकृता ।

काव्ये चम्पूरामायणं, अलङ्कारशास्त्रे शृङ्गारप्रकाशः, सरस्वतीकण्ठाभरणं च, व्याकरणे सरस्वतीकण्ठाभरणं, शैवदर्शने तत्त्वप्रकाशः, योगदर्शने राजमार्तण्डः, शिल्पशास्त्रे समराङ्गणसूत्रधारः, राजनीतौ युक्तिकल्पतरुः, ज्योतिषे राजमृगाङ्कः, पशुवैद्ये शालिहोत्रं च तदीयाः प्रसिद्धाः ग्रन्थाः ।

शृङ्गारप्रकाशः कथन साहित्यशास्त्रीयः ग्रन्थः । तत्र साहित्यशास्त्रसम्बद्धाः बहवः अंशाः निरूप्यन्ते । शृङ्गाररसस्य विचारः आधिक्येन प्रस्तुतः इत्यतः अस्य ग्रन्थस्य शृङ्गारप्रकाशः इति नाम । उपलभ्यमानेषु तदीयेषु ग्रन्थेषु अयं महान् ग्रन्थः । अस्मिन् ग्रन्थे ३६ विभागाः वर्तन्ते । १-८ पर्यन्तं व्याकरणविचारः, ९-१० भागयोः दोषविचारः, १०-१२ पर्यन्तं महाकाव्यलक्षणविचारः रूपकविचारश्च, अवशिष्टेषु २४ भागेषु रसविषयाश्च प्रतिपादिताः । अस्य ग्रन्थस्य अपरं वैशिष्ट्यं नाम व्याकरणसम्बद्धाः अंशाः अपि बहु रमणीयतया निरूपिताः ।

प्रायः पञ्चाङ्गं व्याकरणम् । सूत्रपाठः, धातुपाठः, गणपाठः, उणादिपाठः, लिङ्गानुशासनपाठः चेति पञ्च पाठाः । एतेषु पञ्च, चत्वारः त्रयः वा यस्य स्यात् तादृशं पृथग्व्याकरणत्वेन परिगण्यते । पाणिन्युत्तरकाले बहूनि व्याकरणानि रचितानि विविधैः विद्वद्भिः । तेषु भोजः अपि अन्यतमः । "सरस्वतीकण्ठाभरणम्" इति नाम्ना प्रसिद्धः अस्ति तस्य सूत्रपाठात्मकः व्याकरणग्रन्थः । पाणिनेः व्याकरणपरम्परामेव अनुसरन् अपि भोजः भाष्यादिषु उक्तान् विचारान् निर्मथ्य परिष्कृतान् आशयान् आविष्करोति स्वीयेषु सूत्रेषु । एतस्य अनितरसाधारणं वैशिष्ट्यं विज्ञाय एव भट्टोजिदीक्षितसमकालीनः "प्रक्रियासर्वस्वस्य" रचयिता नारायणभट्टत्तिरिः लिखति –

"पाणिन्युक्तं प्रमाणं, न तु पुनरपरं, चन्द्रभोजादिशास्त्रं
केऽप्याहुस्तल्लघिष्ठं न खलु बहुविदामस्ति निर्मूलवाक्यम् ।
बहूङ्कीकारभेदो भवति गुणवशात्, पाणिनेः प्राक् कथं वा ?
पूर्वोक्तिं पाणिनिश्चाप्यनुवदति, विरोधेऽपि कल्प्यो विकल्पः[2] ॥ इति ।

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चम्पूकाव्यस्य वैशिष्ट्यम्

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संस्कृतसाहित्ये चम्पूकाव्यम् अत्यन्तं रमणीयं स्थानम् आवहति । सुमधुरपदैः भावस्फुटतया रसपरिपाकात्

चम्पूकाव्यानि सहृदयान् आकर्षन्ति । कविः दण्डी स्वस्य काव्यादर्शग्रन्थे "गद्यपद्यमयी कापि चम्पूरित्यभिधीयते"

इति चम्पूकाव्यप्रकारस्य लक्षणं प्रतिपादितवान् अस्ति।

चम्पूशब्दः "चपि" गत्याम् इति धातोः निष्पन्नः । गद्यपद्यरसमिश्रितरचनाशैली ब्राह्मणेषु अपि दृश्यते ।

एतरेयब्राह्मणस्य हरिश्चन्द्र – उपाख्याने इदं वयं पश्यामः । कठोपनिषत्सु अपि गद्यपद्ययोः मिश्रणम् अस्ति एव ।

गद्यपद्यमिश्रितचम्पूः सर्वान् सहृदयान् रञ्जयति इत्यत्र न कोऽपि सन्देहः । संस्कृतसाहित्यं चम्पूकाव्यैः सुसमृद्धम्

A STUDY ON THE ROLE OF ARTIFICIAL INTELLIGENCE AND BLOCKCHAIN IN THE EDUCATION SECTOR

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Abstract

The Internet and digital innovation have disrupted the worldwide educational system in the past decade. The Indian system of education has undergone a sea change as well. Online education in India is likely to be a $2 trillion industry by 2021, according to a KPMG and Google report. This is evident from the country's exponentially increasing penetration of the Internet and smartphones, which drives digital content and schools, online evaluations, and cloud-based platforms. New ideas such as interactive and experiential learning are now being promoted by innovations such as artificial intelligence (AI), e-learning platforms, and virtual reality. The new learning credential scheme is subject to different challenges due to academic fraud and deceit. Blockchain technology protects colleges and students to set up a clear and shared database based on confidence. Here, blockchain technology can efficiently prevent and preserve protection against academic and learning fraud, such that the credential is recognized universally by universities and employers in different regions. This paper gives an overview of Artificial Intelligence and Blockchain and its application in the education sector.

Keyword: Digital, Internet, Artificial Intelligence, Blockchain, Virtual Reality

Introduction

Stakeholders in decisions on the implementation of online learning are deeply aware of the social impacts of new technology and real people's role in shaping online learning. However, individuals are no longer the only ones to communicate online using computers, phones, tablets, and smartphones. Our vehicles, thermostats, refrigerators, and a host of others increasingly form a real, networked universe. Artificial Intelligence (AI) today provides algorithms to process vast quantities of data and draw conclusions about experiences. Inferential machine learning is getting smarter as we read, study, search, and navigate the environment by discovering, observing, and capturing hidden models that describe our behavioral patterns. Moreover, in cyber-physical structures around us, this knowledge can alter parameters and positively impact education.

AI has appeared from a futuristic perspective as a central element of what seems to be a science fiction future in which users connect with hard and soft technology and learn. When attempting to gain insight into the value of technology, it is clear that many AI-based applications have become part of our routines. As Housman (2018) emphasizes, "AI is capable of two things: (1) automating repetitive tasks by forecasting outcomes on human-labeled data and (2) enhancing human decision-making by feeding problems to human-developed algorithms." In other words, by performing the tasks repeatedly, AI learns the given commands and generates a decision path for humans somehow.

The Blockchain is an immutable ledger that enables transactions to take place in a decentralized environment. Blockchain-based apps are developing, covering different areas, including financial services, credibility, reputation, and the Internet of Things. Many sectors, such as banking, medicine, manufacturing, and training, use blockchain apps to benefit from this technology's unique bundle of features. In terms of trustworthiness, cooperation, organization, authentication, reputation, and accountability, Blockchain technology (BT) offers benefits. The present study focuses on the application of AI and Blockchain in the Education sector.

Literature Review

(Borge, 2016) addressed that new education technologies can help meet and maintain educational goals. By using AI, we can better evaluate each student in a slow or lazy class to understand the subjects explained by the teacher. Analysis can give a clear picture of the comprehension of every matter by

the student. If a student is lagging in certain areas or if he/she can not understand a few subjects, then AI analysis will display this report to students, teachers, or parents to take the required steps. AI research should also advise students to use simple examples or in easy ways to develop their skills in a particular field where they are uncomfortable.

(Zheng, Xie, & Dai, 2017) in the paper presents a comprehensive overview of blockchain technology. The researcher provides an overview of blockchain architecture and compares some typical consensus algorithms used in different blockchains. Furthermore, technical challenges and recent advances are also addressed in work.

(Ka_ska Porayska 2017) in his paper focuses on the usefulness and importance of AI knowledge generation and knowledge representation approaches to promote education practice through action research. AI provides methods whose operation extends beyond ILEs and into real-world teaching activities, through which teachers can learn and use computer design ideas required to produce proof of interest. This opens up a new dimension for AIEd as an environment, i.e., explicitly demonstrating the continued importance and maturing mutuality of the AI-Education relationship.

(Chen, Xu1, Lu, & Chen, 2018) Blockchain is the central infrastructure for developing cryptocurrencies such as bitcoin. Blockchain technology has been implemented in many fields, such as banking, the judiciary, and industry, as part of the fourth industrial revolution after the invention of the steam engine, electricity, and information technology. The paper focused on its future educational applications and discussed how blockchain technology could address some education problems. This article first presented the characteristics and advantages of blockchain technology by looking at some of the latest blockchain education applications. Some groundbreaking applications for blockchain technology have been suggested, and the benefits and challenges of blockchain technology have also been addressed for education.

(Alammary, Alhazmi, Almasri, & Gillani, 2019) did a comprehensive analysis of research into educational applications focused on blockchain. It focuses on three key topics: (1) educational applications of blockchain technology, (2) advantages that blockchain technology can bring to education, and (3) challenges of blockchain technology training. A thorough review of each theme's effects and an intensive discussion based on the findings have been conducted. This analysis also provides insights into other fields of education that could benefit from blockchain technology.

(Mendez & Bayyou, 2019) revealed that the invention of new technology and the availability of high-speed connections play a vital role in every aspect of our daily lives. This advancement also brings many challenges, especially security-related challenges. Blockchain technology, one of the most influential inventions in the last decade, attracts attention for its potential to provide security from supply chain management to shipping and other areas. The education sector also needs to utilize the benefits that blockchain technology offers. Educational institutions, especially tertiary institutions, are now eyeing to employ this application to improve teaching and learning activities and promote collaboration among the stakeholders such as students, teachers, and parents. It will also be used in e- transcripts, digital degrees, certification, cloud storage, and identity management. This progress study discusses the blockchain technology applications that can be maximized by the education sector.

(CHEN & CHEN, 2020) evaluated the educational impact of Artificial Intelligence (AI). The research focuses on the implementation and effects of AI in administration, education, and learning through a narrative and context for evaluating AI defined by a preliminary review. A qualitative approach to analysis was employed and effectively promoted the study goal's realization using a literature review as a research design and strategy. Intelligence artificial is an area of research and the subsequent inventions and advances culminating in computers, machinery, and other objects with humane intelligence with cognitive skills, learning, adaptability, and decision-making. The study found that AI was commonly used and adopted in education, particularly by educational institutions.

At first, AI took the form of computer-related technology, moving to web-based and on-line intelligent education, and then using embedded computer systems, along with other innovations, using humanoid robots and Web-based chatbots to carry out the tasks and functions of instructors individually or with instructors. Using these channels, teachers have been able to conduct various administrative tasks, such as updating and graduating from appointments and achieving higher teaching quality. Since the systems use machine learning and adaptability, curriculum and content were tailored to their needs. They fostered their acceptance and retention, enhancing learner experiences, and overall learning quality.

AI in Education

The mention of artificial intelligence brings to mind a supercomputer, a computer with immense processing capabilities, including adaptive behavior, such as the inclusion of sensors, and other capabilities, that enable it to have human-like cognition and functional abilities, and indeed, which improve the supercomputers interaction with human beings. Indeed, different motion pictures have been made to showcase the abilities of AI, such as in smart buildings, such as the ability to manage air quality in a building, temperatures, and or playing music depending on the sensed mood of the occupants of the space. There has been increased application of artificial intelligence within the education sector, going over and above the conventional understanding of AI as a supercomputer to include embedded computer systems.

For example, embedded into robots, AI, or computers and supporting equipment enable robots that improve the student's learning experience, from the most basic unit of education, early childhood education. The application of robots, working together with teachers or colleague robots (cobots), is being applied to teach children routine tasks, including spelling and pronunciation, and adjusting to them. Similarly, the web-based and online education, as enumerated in different studies, has transitioned from merely availing materials online or on the web for students to download, study, and do assignments to just pass, to include intelligent and adaptive web-based systems that learn instructor and learner behavior to adjust accordingly, to enrich the educational experience.

The excitement that Artificial Intelligence has largely untaken the potential to play an essential role in education is very much in line with the era we live in. The busy world we live in and teachers teach, with 24-hour communication, constant news, and measured demands, need some relief. For others, this could be in Artificial Intelligence. All we do now is extended, under-resourced, and this sense of overwhelming can be suffocating. Some people may inevitably want us to turn to technology with its rapid and seemingly endless advances to find a response to how we can penetrate our daily lives even harder.

Intelligent learning, creative interactive learning, data processing, and prediction are part of AI-aided education. Significant educational AI scenarios and leading supporting technologies are listed in Table 1. Note that AI-enabled education plays a more critical role in supporting learning needs.

Smart education programs offer timely, tailored preparation and input for teachers and learners alike. They aim to improve learning value and efficiency using multiple computer technologies, particularly technology related to machine learning, closely connected with the statistical model and cognitive learning theory

Table 1: Techiques of AI in Education

Scenario of AI in Education	AI-related techniques
Assessment of Students and Schools	Adaptive and Personalised Learning
Grading and Evaluation of paper and exams	Image recognition, Computer Vision
Personalized intelligent teaching	Data mining, Intelligent teaching systems
Smart School	Face and Speech recognition
Online and mobile remote education	Edge Computing, Real-time analysis

Blockchain Application in Education

Online Education: Often referred to as distance learning or electronic learning, it uses data and online innovation to deliver information and fast learning. It is recognized as a web educational technique. Blockchain engineering offers an ideal solution to the validity and security problems of online instruction. The blockchain may also create unmodifiable learning

Online instruction records without the intervention of third parties to track them and ensure appropriate acknowledgment of credits, of course.

The implementation of blockchain innovation can be within the following areas of internet-based education.

i.   **Student's learning progress record**: The blockchain can store data in a database in different areas and sequence blocks and record timestamps. The new blocks of data can not be changed or removed.

ii. **Authenticated certification of learning results:** Currently, online training certification is problematic because of inefficient third-party organizations. The solution is that blockchain technology, such as academic certification, offers comfortable, valid certification of learning outcomes. The certificates of students can be easily checked even if they are lost. The blockchain uses a cryptographic asymmetric encryption algorithm to ensure data protection and legitimacy.

iii. **Decentralized sharing of contents and other resources:** The blockchain framework often immediately executes and does not require third parties to check. In this regard, this framework can simplify the transaction process, carry out intelligent, automatic, and decentralized transactions, and boost overall transaction security.

Student data privacy and consent: Educational institutions mostly require student guardians to sign various types of forms to allow schools to use student data, but they may not effectively distinguish between the forms they have signed for consent, and they are no information about where and when these forms will be used. This problem can be overcome by blockchain creation by using hyper ledger fabric and composer. This structure is a digital agreement to be Executed without relying on a legal document from a third party. The proposed framework consists of repeated authorization blocks that will allow the educational institution to grant access to data for any legal purpose after obtaining the student's guardian's consent employing a smart contract for data access privilege.

Creation (and maintenance) of a student academic CV: a digital paper to be shared with employers, With some restricted nodes such as universities, safeguarding the documents and be able to access the fields to update, for example, universities

Student and Professor identity: which can be unique across all institutions, sharing the same base platform.

Online Quiz Scheme Based on Double-layer, student's online quiz is one of the advantages that technology offers to the educational institution. In the traditional system, the scoring system maybe not be as transparent as expected. A web test based on Doublelayer Consortium Blockchain was proposed to provide a solution for the transparency issue. The proposed solution provides open confirmation of students' answers and the reply records that cannot be altered by any party.

Conclusion:
Initially, AI in education took the form of computers and Computer-related systems, and later the web-based type of systems, and the Web-based Online Education. Using Embedded systems Robots, in cobots or humanoids, may be used as colleagues of teachers or individual instructors, such as chatbots. The use of these tools and platforms has allowed the effectiveness and performance of teachers, resulting in richer or enhanced consistency of teaching. Likewise, AI-enhanced learning opportunities to students have allowed customization of learning materials to students' needs. Overall, AI has had an enormous influence on education, particularly in administration, training, and learning.

Blockchain application offers a secure distributed ledger technology. The study shows that blockchain can be in educational fields in various areas such as online education, privacy and learning consent

Outcome, Meta-Diploma, Organizational Rivalry, University, cooperative education-industry, Educational record, credibility and reward Certificate, Student Assessment Scheme, Online Quiz Scheme Double-layer-based. This study will help educational institutions to evaluate and use blockchain applications in their organisation.

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THIS CERTIFIES THAT

JAYASHREE K N

HAS/HAVE WRITTEN AN ARTICLE / RESEARCH PAPER ON

A STUDY ON BEHAVIORAL INFLUENCE BY COLLEAGUES ON THE PRODUCTIVITY OF LECTURES

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"A study on behavioral influence by colleagues on the productivity of lectures"

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Abstract

Employees are the assets of the organization. The attitude of the employees is one of the important components in the workplace for any organization. Such attitude affects the employee's productivity as well. There are number of factors which affects the attitude of an employee like salary, work environment, peer groups, etc. Peer group is an important element in any organization wherein it can act as both motivating factor or as a demotivating factor. Hence this study aims at discovering whether there is any impact of such peer groups on the employee's productivity in the field of teaching. Teaching is one such field wherein the impact of peers affects the organization as a whole. This research aims at examining the impact by collecting the primary data from lecturers through structured questionnaire and to conclude on that there is any relationship between the impact of peers and the employee's productivity.

Keywords: Influence of colleagues, lecturer's productivity, and attitude of lectures.

Introduction

In today's work environment in every company, fresher plays a crucial role wherein whatever they learn; they will apply it to their entire life. During this phase of learning, colleagues play a very important role wherein some employees get influenced very easily. Peer groups will be sometimes boon wherein they will motivate and sometime play a misleading way.

Especially in the field of teaching, as a lecturer (a fresher) employee will learn many things from the peer group how to teach, handle class, how to take up subjects, how to prepare for class, etc. When they observe that their peer group is dedicated, well prepared and sincere, even they will try to be like them wherein the final result for the organization will be a great success. This research potrays the manner in which peer groups are impacting on the lecturer's work productivity towards their class by undertaking a hypothesis study with the statitical tools to justify the given hypothesis.

Problem Statement

"Are colleagues influencing the employee's productivity with perspective to the field of teaching".

Literature review

1. **Thomas Cornelissen, Christian Dustmann and Uta Schonberg (2016)** have studied on the peer effects in the workplace where they found that there were small peer effects in wages, and larger peer effects the productivity.
2. **Michael Muller, Sadat Shami, Shion Guha and Mikhil Masli (2016)** have undertaken a research on the employee engagement wherein they concluded that employee engagement is a reflection of an employee's experience of work. Employee's engagement is associated with the involvement of their peers; friends contribute to the social factors at work.
3. **Seok-Hwi Song (2014)** has published his work on workplace freindship and employee's Productivity where he has concluded that the workplace friendship can lead employees to have positive work attitudes and performance of employees. Even the organization will benefit from encouraging friendships among employees.

Research gap

From the above survey of the literature, it is found that there is no factual evident on taking up research towards the impact of peers on the lecturer's productivity. As lecturers face the younger generation in the classrooms, the attitude of lecturer is very important in guiding and building the attitude of students which is very essential for their holistic development. Hence this research examines about the influence of colleagues on the productivity of the lecturers.

Objective of the study

1. To examine the influence of colleagues on lecturer's productivity.
2. To determine the factors affecting the lecturer's productivity.
3. To study the impact of peers on overall development of the lecturer.

Research Methodology

Type of research: This study is based on exploratory and descriptive method.

Period of study

This research is undertaken for a period of January to June 2020.

Justification for study period

It is the human tendency that one's attitude changes according to the circumstances. Hence six months was selected for the study.

Sampling

Sample size: Sample size of 300 Under Graduate lecturers was selected for the study.

Sampling method: For conducting this study, convenient and stratified Random sampling is adopted.

Sampling description: 300 lecturers from Bangluru South colleges are considered.

Data collection

Primary data: A structured Questionnaire was framed with 10 questions.

Secondary data: Secondary data was collected through various psychological books, websites, magazines and online resources.

Research Hypothesis:

In this study 4 hypothesis were framed and examined to assess which hypothesis should be accepted or rejected.

H1: Peer relationship is required in lecturer's work environment

H2: The attitude of lecturer in the workplace changed with the influence of peers.

H3: Colleagues affect the motivation level of the lecturer.

H4: The peer groups are contributing to the overall development of the lecturer

Tools and techniques

Data collected from the Questionnaire was analyzed and interpreted with the help of charts and hypothesis application.

Operational Definition:

Colleagues: A colleague is a person who is working at the same level, it can also be termed as peers.

Lecturer's productivity: It can be defined as the assessment of the efficiency of the lecturers with regard to this paper.

Concept of lecturer's productivity

The work of the lecturers is initially independent of any influence or views. But when they start their carreer in any organization, the impact of the peer groups on the lecturer's attitude affects to a considerable extent.

Usually lecturers take up the job of teaching mainly because of their passion. The other main factor can be the knowledge and creativity which they possess will be utilized for the purpose of student's enrichment of knowledge. It is said that teaching is a noble profession wherein the success of a teacher lies in the student's success. There are many factors that need to be considered by the lecturer for the purpose of taking the class. It could be the attitude of lecturer towards student, subject knowledge, mood, confidence, communication skills, class control, etc.

Forms of teaching

Teacher centered teaching

> In this style of teaching, the emphasis is given for the teachers. There are further forms under teacher-based:

- **Direct instruction**

In this style of teaching, teacher relies on the explicit reaching wherein lecturers conduct class by giving instructions.

- **Kinesthetic learning**

  This style of teaching relies on student by asking them to perform activities than listening to the instructions given by the lecturers. Ex: role playing, drawing, use of scripts etc.

- **Flipped classroom**

  This concept evolved in the year 2007 where two lecturers recorded their lectures video thereby students listen to the lecture at home and conduct assignments during the class hours(opposite to the normal classroom style)

Student centered teaching

- **Differentiated Instruction**

  Here as the word insists, the teaching is based on differential learning wherein the individual student's need is met with the help of technology.

- **Expeditionary learning**

  This form of teaching is based on the technology wherein students are encouraged project based learning and thereby helping students to shape their future.

- **Inquiry based learning**

  In this form of teaching, lecturers allow students to raise questions and by answering to their questions they will help them to gain knowledge. Here lecturer acts as a facilitator.

- **Game based learning**

  This form of teaching insists to engage the students to be more active in the classroom. This requires a lot of effort and time by the lecturers to get prepared and frame learning oriented game and thereby teaching student's knowledge crreativly.

The concept of peer relationship at workplace

Having a peer relationship at the work environment is one of the most valuable things. The importance can be as follows:

- It increases the employee's loyalty.

  Collegues play a very important role in helping the lecturer's to explore about the college, students and the working environment, upon which employee's loyalty can be built initially.

- Freindship with peers increase the job satisfaction.

  Good friendship with colleagues helps the lecturer's to have a comfortable work environment which indirectly contirbutes to job satisfaction to a greater extent.

- Built-in support network gained by the friends.

Through colleagues employees will have a good network, wherein in this competitive world network is net worth of an individual.

- It acts as a motivating factor.

  If lecturer's faces that their colleagues are making use of creative methods of teaching, learning and working with dedication, lecturer's also feel that as a motivating factor to work even more better.

Data analysis:

Chart 1.1 showing the age of respondents for the survey

Blue: 21-30

Red: 31-40

Yellow: 41-50

Green: Above 50
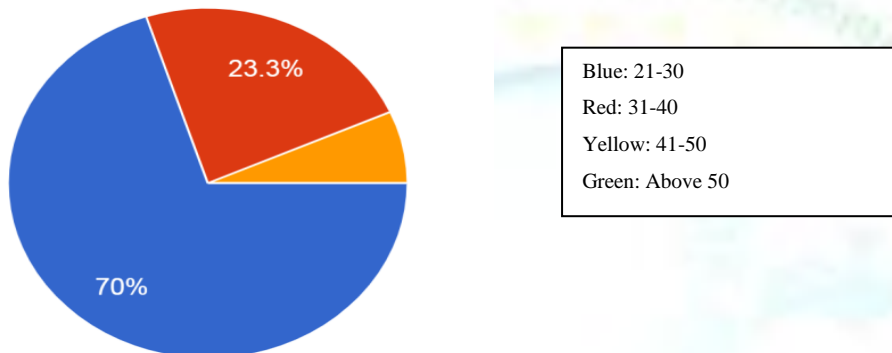
Among the respondents for the survey considered majority of them were youngsters who took up the lecturer's job as a career recently who are of the age of 23-30 years of age.

Chart 1.2 showing the opinion of the repondents towards the peer relationship.


Blue: Yes

Red: No

Yellow: May be
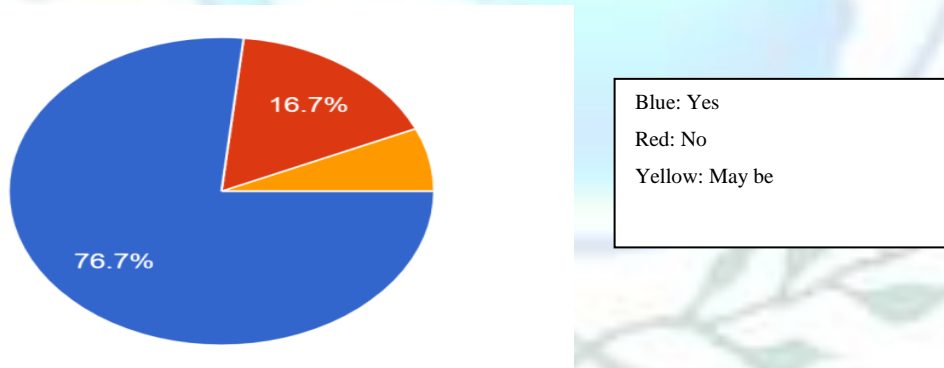
Among the respondents, majority of them prefer to have a healthy, good peer relationship at their working place, wherein 6.6% of the respondent were not sure whether a peer relationship with colleagues is required or not.
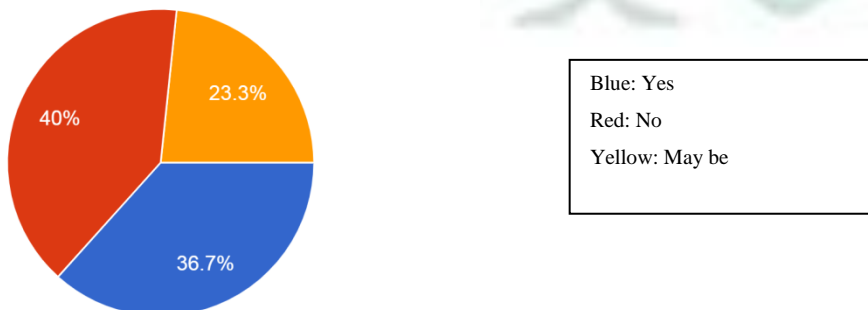
Chart 1.3 representing the attitude of lecturers in the workplace with the influence of peers

| Blue: Yes |
| Red: No |
| Yellow: May be |
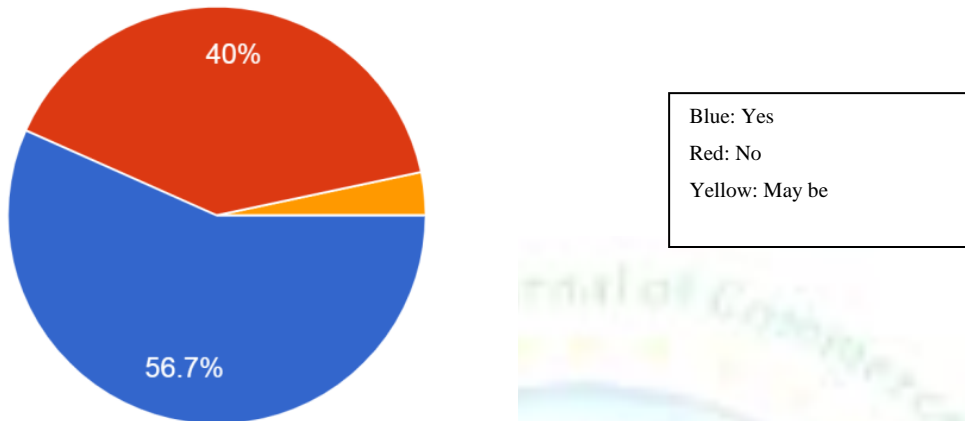
From the above chart, it is evident that 56.7% of the respondents expressed that they have been inflenced by the peers wherein their attitude has changed to the view of workplace.

Chart showing the impact of peers on the lecturer's attitude towards job at the beginning of their career.

Chart 1.4 representing the opinion on peers

| Blue: Yes |
| Red: No |
| Yellow: May be |
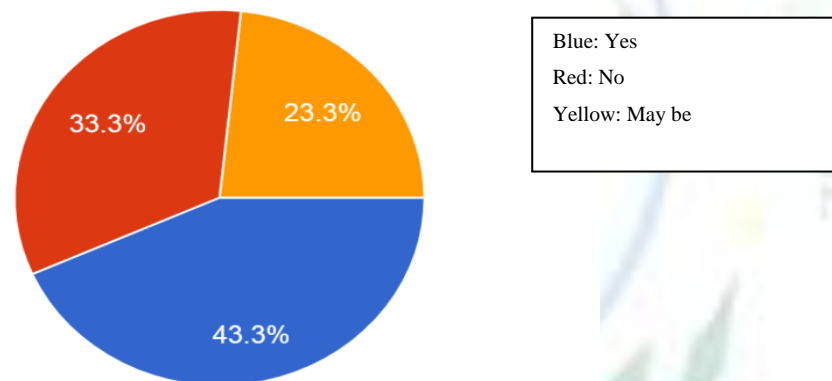
The majority of repondents initially when they had started their carrer were affected by their peers.

Chart 1.5 showing the opinion of lecturers on peers after they gain their experience

| Blue: Yes |
| Red: No |
| Yellow: May be |

There is no much difference in the respondent's opinion after they gained experience, they opinion is somewhat similar.

Chart representing factors that are influencing the attitude of the lecturers by their peers
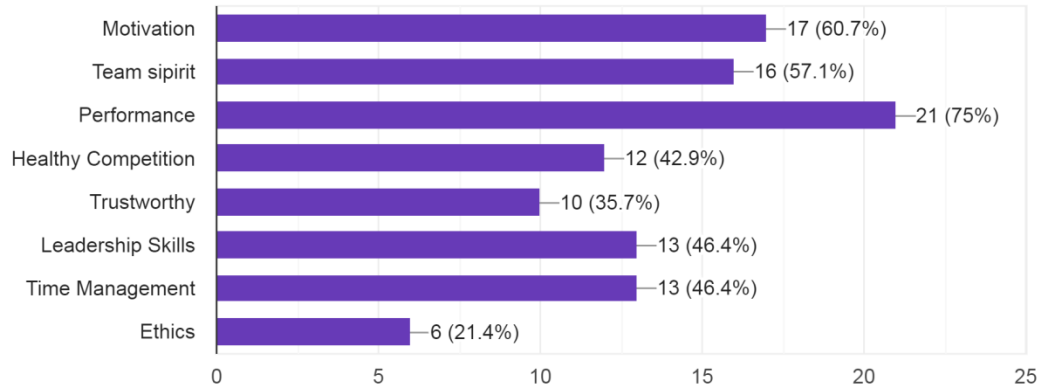
From the above graph, performance is the major element which is affecting for lecturers, wherein they feel that due to peers, their performance is increasing. Motivation and team spirit are the other major element.

Result of Analysis

Hypothesis

To evaluate the above hypothesis, p-value has been used. P-value is nothing but a probability statement which gives answer for: If Null hypothesis is true and then what will be the probability of becoming aware of the test statistics. A p-value which shows 0.05 or less rejects null hypothesis 'at 5% level', 5% and 10% are common significance level used to which p-values are compared.

While testing the H1, the requirement of peer relationship was considered, the result was statistically significant (p value $0.003 < 0.5$). Hence it can be concluded that there is a significant relationship between peer relationship and the lecturer's work environment.

The H2 is about the influence of attitude of lecturers by peers, the result was again statistically significant wherein the null hypothesis is rejected (p value $0.007 < 0.5$). Hence it can be concluded that the attitude of lecturer towards their workplace is influenced by peers.

H3 is all about the impact of motivation level of lecturers is affected by peers is statistically significant (p value ($0.006 < 0.5$) which implies that the peers influencing the level of motivation towards lecturer's job.

H4 speaks about the overall development of leturers wherein ($0.005 < 0.5$) the null hypothesis is rejected and it can be concluded that the hypothesis can be accepted.

Findings

- It is found that the requirement of good peer relationship during the initial stage of a lecturer's carrer helps for the individual development

- Respondents feel that there are a lot of things (other than mentioned above) which affects their learning process as a lecturer.
- 10% of the respondents feel that the peer relationship will not influence the lecturer's productivity.
- Respondents feel that a number of factors like motivation, imporved performance, team spirit, ethics, time management and leadership skills are gained from their colleagues.
- Majority of the respondents were between the age of 23-30 which is an advantage wherein the impact of peers at beginning of the career will be more as compared to the later years.
- Majority of the respondents feel that they should have a good, healthy and professional relationship with their colleagues.
- Improvement in the performance is the major element which influence the lecturer.
- Even though lecturer's peers have negative vibes, respondents feel that it will not affect their attitude towards their workplace.

Limitation of study

- The sample size selected is small when compared to the total number of lecturers.
- The respondents selected are chosen from south Bangalore; hence the opinion cannot be generalized.
- Many respondents were reluctant to present their response.

Conclusion

Peer relationship is very much essential for any workplace concerned. Hence with the above study, it is evident that there is a need for healthy peer relationship in the lecturer's workplace. If they have a good working environment without having peer relationship, it will not contribute to the overall development and growth. Higher performance, motivation and team spirit are the major elements which are influencing the attituded of the lecturers which is a good sign of development. If lecturers are developing individually, then the advantage is not only for the lecturer but for the entire student faternity is concerned. Ultimately the goal of the lecturer's influence should benefit students along with the lecturers.

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विषयसूची

सज्जनेन्द्रप्रयोगकल्पपद्रुमे व्याकरणांशाः

नागरत्ना हेगडे

संस्कृतवाङ्मये व्याकरणं महत्त्वभूतं स्थानम् आसादयति । संस्कृते शास्त्रग्रन्थाः स्युः, काव्यादिकानि स्यान्नाम, किन्तु विना व्याकरणं कोऽपि ग्रन्थः न सिद्ध्यति इति विदितमेव सर्वैः । व्याकरणप्रधानानि काव्यानि अपि बहुभिः शास्त्रकारैः कविभिः व्यरच्यन्त इत्यपि वयं जानीमः । आदौ तावत् "व्याकरणप्रधानानि काव्यानि" इति विषये किञ्चित् प्रस्तोतुमिष्यते ।

व्याकरणप्रधानानि काव्यानि कानिचन

भट्टिकाव्यम्

अयं ग्रन्थः शास्त्रकाव्यपरम्परायां सर्वापेक्षया महत् स्थानम् आवहति । सर्वविदितत्वात् अत्र विस्तारः न क्रियते ।

कविरहस्यम्

इदं किञ्चन काव्यम् । अस्मिन् ग्रन्थे दक्षिणभारतीयस्य राष्ट्रकूटस्य नरेशस्य कृष्णराजस्य गौरववर्णनेन सह व्याकरणनियमानां यथासम्भवं समावेशः कृतः । अस्मिन् काव्ये शब्दशास्त्रस्य शिक्षा महत्त्वं आवहति, कृष्णराजस्य वैशिष्ट्यवर्णनं गौणतां याति । अत्र कविना आत्मनः परिचयः न कृतः, किन्तु काव्यस्य अन्तिमश्लोके "सदभिधाननिधानहलायुधद्विजवरस्य कृतिसुकृतात्मनः[1]" इति

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[1] कविरहस्यम् - अन्तिमवाक्यम्

Measuring the Performance of a Model Semantic Knowledge-Base for Automation of Commonsense Reasoning

Chandan Hegde and **K. Ashwini**

Abstract Commonsense Reasoning is a subfield of artificial intelligence that deals with ability of a computer to imitate mundane decision making. Though the field existed from decades, there has been very little contribution made to the development of commonsense reasoning. Lack of a well-defined methodology as well as computing facilities for implementing commonsense reasoning have always been obstacles in the development process. Semantic networks can be used to conceptualize and implement a part of commonsense reasoning. This paper presents a study on performance measurement and analysis of one such model semantic network used to build commonsense knowledge-base. Various categories of performance measures have been presented to analyze the practicality of such models for automation of commonsense reasoning. Overall, the analysis is intended to present a practical feasibility study of a model semantic network by considering characteristics of a commonsense knowledge-base.

Keywords Commonsense reasoning · Artificial intelligence · Knowledge-base · Semantic networks · Inference

1 Introduction

Commonsense Reasoning (CR) is one among many subfields of Artificial Intelligence (AI) that deals with the simulation of human actions and decision making using commonsense knowledge [1]. After its introduction, the field has barely made progress due to the complexity involved in computational implementation as well

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as the methodology. However, there is a plenty of scope for improvement provided the modern computing is enriched by the touch of artificial intelligence and other computing prowess. There have been very little contribution towards development of such type of reasoning because of knowledge-base related issues. Provided substantial growth in artificial intelligence and understanding knowledge-base development, the complete automation of commonsense reasoning remains a mere theory due to many reasons. One reason is the inability of computers to implement automated reasoning to the full extent. Another reason being absence of knowledge-base dedicated to commonsense knowledge. Humans have been gifted with ability to make assumptions about matters around us. For instance, a free falling object or an impact caused by a heavy metal object after a collision are always subjected to assumptions. A computing machine cannot derive assumptions given such scenarios. That way computing agents are far away from having materialistic knowledge.

Among several challenges involved in automating commonsense reasoning, drawing inferences from a given well-defined knowledge repository stands out. A knowledge-base ought to represent commonsense knowledge is different from a regular corpora in two ways. One, CR doesn't make use of deductive reasoning while most of the reasoning methods are dependent on it. Evidences play a very little role when it comes to commonsense reasoning. CR makes use of observations instead. What makes CR more complex is the fact that the observations are subjected to periodic changes. Due to such dynamic characteristic, CR requires a constant update throughout its existence. Two, to be able to draw inferences a computer must work with critical elements of commonsense knowledge like time, objects, physics and rules of interaction, etc. The first challenge looks attainable due to the advancement in computational sciences. However, it is the second challenge where there is a need for a novel method to interpret the physical aspects in terms of computational linguistics.

And in the process of conceptualizing a commonsense reasoning the first quest will always be addressing a knowledge-base build which can aid reasoning. Several efforts have been made in the past to support commonsense reasoning. A very few have proposed a dedicated knowledge-base to enhance a system's ability to do reasoning. An effort was already made in the past for such a network through perception [2, 3]. Once the knowledge representation is implemented the inference engine can be systematized.

Among all the available tools to build a knowledge-base semantic networks stand out due to their simplicity and effectivity. Semantic networks are being used in many reasoning models proving their efficiency as knowledge repositories [4]. A semantic network that has an ability to store knowledge about how objects look and feel like can benefit knowledge building for commonsense reasoning. The subsequent sections of this paper discuss these matters in detail and analyze the performance characteristics of semantic networks in conceptualizing commonsense reasoning. Four important measures namely sparsity, cluster size, power-law degree distribution and connectivity in semantic networks have been discussed in this paper. Following section describes few properties with respect to that.

2   Basic Concepts: Constitution of a Knowledge-Base

A network designed to hold the commonsense knowledge in the form of a semantic network must store several type of information. Information about mundane activities, elementary knowledge of objects, and the basic rules of interaction between human and objects are few to mention. To implement a complete automation of CR on such repositories, the process expects the information to be stored in object-level [5]. Advanced data structures, graphical representations and frames are few other options to store knowledge in the similar manner to a semantic network [6]. The following section lists few of the properties of semantic networks with respect to representing commonsense knowledge.

2.1   Atomicity

Representation of data can be brought down to the root level when the information is constituted in object form. Atomicity is the property when the data has indivisible form of representation. Representation of commonsense knowledge can benefit hugely due to atomicity. Due to the inductive reasoning nature of CR, information in atomic form can aid reasoning to its full extent. Further, the derived data from object notation is tend to have better clarity. Sparsity is the practical measure to identify atomicity among nodes of a semantic network.

2.2   Inheritance

Semantic networks by default implement inheritance between object notations because of taxonomic structure. Inductive reasoning always gets benefited from taxonomic nature of information representation. It makes derivation of conclusion much more easier. The influence of inherited structure can induce better conclusions in CR.

2.3   Classification

Objects with similar properties can be grouped together to form a class. Classification of objects reduces the effort required to associate one object with another to derive a conclusion. Complexity of predicted outcome can also be minimized due to the classification of information into clusters. Clustering is the practical notion of classification in semantic networks.

2.4 Association

Semantic network can yield a better result when relation among nodes or objects are well-defined. The inferencing can be benefited largely due to association of nodes with each other. However, complexity of the network can increase due to larger associativity. As mentioned before the objects in a semantic network ought to represent commonsense knowledge are expected to change their state due to the dynamic nature of the information itself. It changes the association between the nodes often.

To prove the exhibition of the above mentioned properties by the proposed semantic network, a network built from one of the existing python libraries called ConceptNet has been formulated [7]. The details of the same is described in following section.

3 Performance Measures for a Model Semantic Network

The experimental phase of this study is made up of a semantic network built with the help of ConceptNet. The details on the network built is described in Table 1. Explanation on the variables used to build the network is covered in the subsequent paragraphs.

The four performance measures experimented on the above mentioned network are defined in the following section. In a realistic condition a knowledge-base in the form of a semantic network is bound to addition of nodes dynamically. The network defined for this study is capable of having such dynamic nodes with minimal effect on its performance.

Table 1 Summary statistics of model semantic network

Variables	Statistics (types)
Number of nodes	108,256 (words)
–	48,787 (classes)
Average number of edges	4.0 (words)
–	1.6 (classes)
Average shortest path length	8.56
Diameter of the network	24

3.1 Sparsity

In this model of ConceptNet the total number of nodes are categorized into words and classes. Sparsity in a semantic network is the percentage of actual connections between nodes out of total number of possible connections. Table 1 lists a variable by the name average number of connections which is a measure of average numbers of edges per node. The numbers 4.0 and 1.6 for words and classes respectively in this category indicates that the network is very much sparse.

3.2 Cluster Size

Cluster size allows us to understand the number of nodes associated with each other by any means. It is a measure which indicates the association property among the existing nodes. Cluster size is also depiction of number of class members. The number of clusters in the semantic network is directly associated with the number of classes in the vicinity.

3.3 Power-Law Degree Distribution

The power-law degree distribution $P(k)$ represents the probability that a randomly chosen word will have associating neighbors. The degree distribution follows a power law:

$$P(k) \approx k^{-\gamma} \tag{1}$$

where, γ is typically between 2 and 4 [8]. When the degree distribution is inconsistent for a chosen set of nodes, it indicates improper distribution of connectivity resulting in bigger networks. We expect the network to show consistent degree distribution for a chosen set of nodes to avoid complex network formation.

3.4 Connectivity

Connectivity defines ease of reach and traverse throughout the network. In most of the cases connectivity is indirectly proportional to sparsity. Denser the network, better the connectivity. Despite our model network being very sparse it excels in connectivity due to the presence of classes and their associations. Overall, connectivity with respect to a knowledge representing semantic network is a measure of efficiency of the network to support reasoning. The semantic network studied in this paper

bears a statistical feature which is not just constrained to a network for knowledge-representation. It is generic in the perspective of all the semantic networks supporting reasoning. There are several factors which affect the performance of a semantic knowledge representation. The factor of performance deficiency due to node addition is not covered in the experiment conducted due to uncertainty involved. A CR model can only be accepted if it is subjected to reiteration of truth value after each inference drawing [9]. Assumptions, conclusions and even updates in the knowledge-base are subjected to an evaluation process. The term uncertainty is used for such derived data that is subjected to truthiness evaluation. And when it comes to the depiction of uncertainty, probabilistic models have been proven to be effective [10]. One peculiar behavior of CR is that the conclusions derived are also subjected to a measure of belief. A well-defined knowledge-base can reduce the amount of uncertainty involved in commonsense derivation.

4 Results and Analysis

The first set of outcomes of the experiment to measure performance is with the sparsity of the network. Figure 1 represents the results of comparison between the numbers of connections in the network maintained at different n (number of nodes or words in this case) values.

The linear growth in the number of connections in the model semantic network shows that the sparsity can be maintained even in the case of exponential growth in number of nodes. Thus, giving us an edge over the problem of dynamic addition of nodes. The surety over the network maintaining its integrity even after adding the nodes can be estimated by having a look into power-law degree distribution. Figure 2 shown below is the result of the same. The plot is given only for the word nodes.

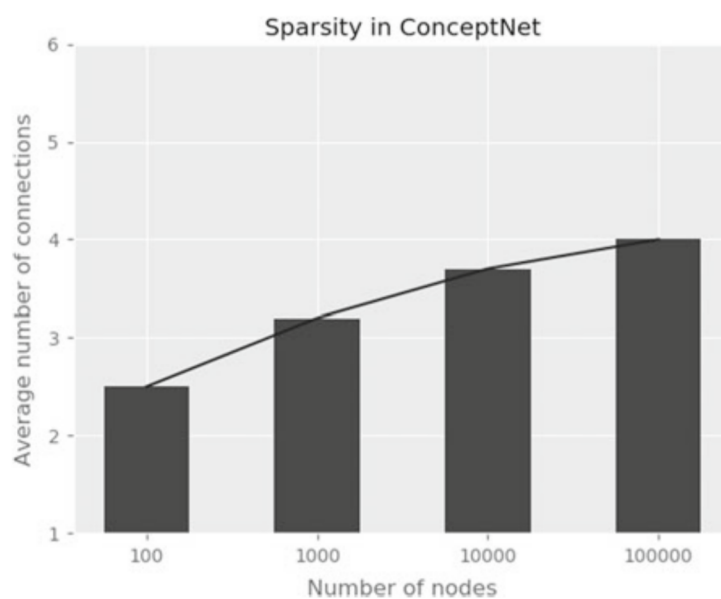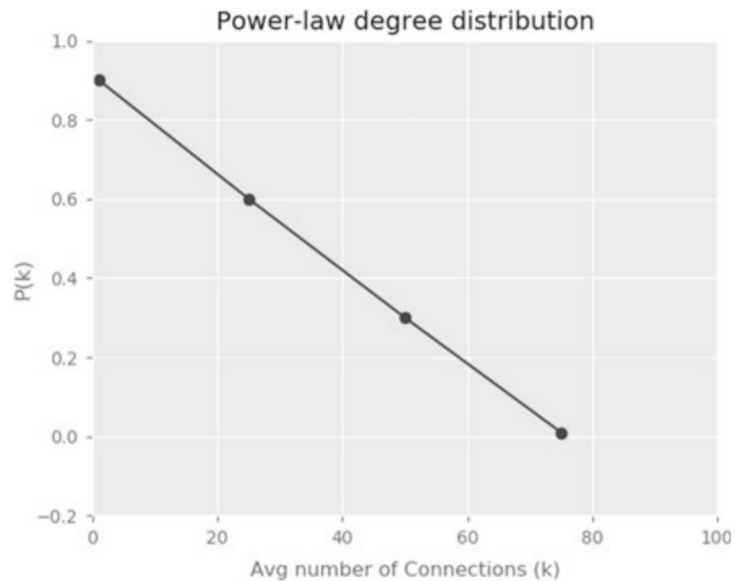**Fig. 1** The linear growth of sparsity

Fig. 2 Degree distribution
of a random node

Power-law degree distribution

P(k)

Avg number of Connections (k)

Classes have not been included since it may cause redundant calculations after word node estimation.

The degree distribution with respect to word nodes shows that the probability of a node having the number of neighbors decreases with increase in number of nodes. Though it seems like an unexpected behavior from a network, it is true to the essential that the increase in number of word nodes has no direct relation with the number of association. Existing classes may prevent the new nodes from having new associations which is from the perspective of network performance, a huge boost. One major concern over the resulting facts is the average length of shortest paths between any nodes. The model network consisting of 108,256 word nodes has an average length of 8.56 nodes. This figure is the result of Shortest Path First algorithm [11]. The reason for consideration of this algorithm is obvious, absence of negative weight on edges. Initially, the average length might seem like a small number but as the network grows, this number is also expected to increase further causing delays on inferencing. Finally, Fig. 3 gives a visualization of growing model of sematic network with the number of nodes set to 150. The distinguishing shades on the nodes represents timely addition of nodes. In the visualization depiction, $t1$ is the time interval during which initial nodes were added, $t2$ is an intermediate time during which the next set of nodes were added and finally $t3$ is the interval which saw rest of the word node additions. There is a greater analysis than what image projects. Addition of nodes comes with an overhead delay of computation of classes to which they belong to and association with all the related nodes.

Surprisingly, there is a simple yet effective solution to the problem of increasing number of associations due to additions of word nodes. The solution lies not in the design of semantic network but in an effective inference engine.

Fig. 3 Visualization of
ConceptNet undirected
graph: a total of 150 nodes
are represented at various
time intervals $t1$, $t2$ and $t3$
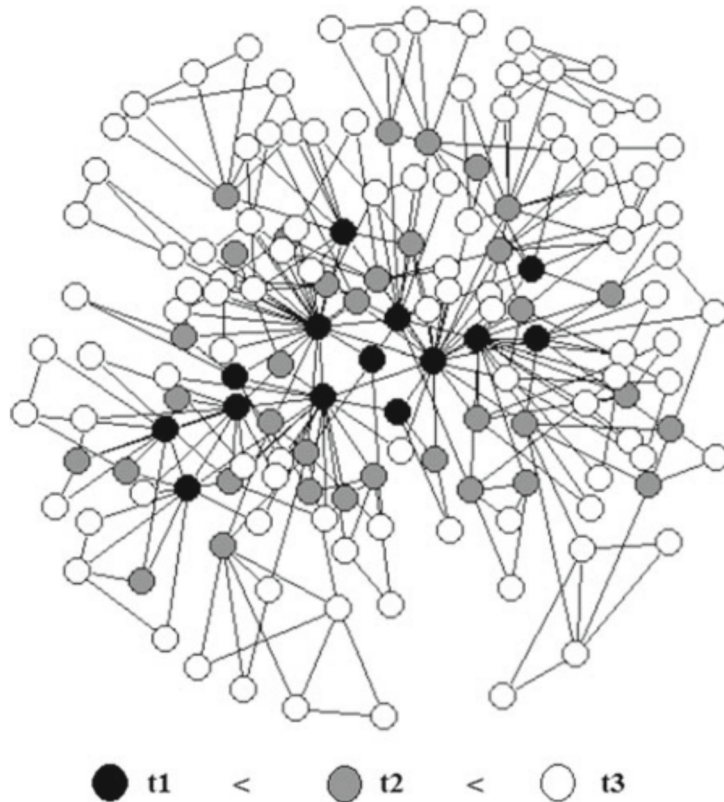
5   Revisiting the Problem of Inferencing

The introductory part of this paper mentioned the role of inferencing in automation of commonsense reasoning. Having looked into the performance aspects of knowledge representation, it is the time to revisit inferencing with asserted inputs from the previous section.

5.1   An Inference Engine

Drawing inference is different in automation of CR compared to other inferencing methods in two ways. One, in terms of a well-defined knowledge-base to support the reasoning. Two, the algorithm used to derive decisions from such knowledge-base. The former is usually a mixture of curated structured data and real-time data. Conceptualizing commonsense reasoning with an additional commonsense knowledge-base seems more adequate. The reason why a monotonic inference method would not be ideal is that the validation of drawn conclusion with commonsense knowledge base may change the original course of inference and call a secondary inference to substantiate the truthiness of earlier conclusion. The type of reasoning containing a substantiating secondary inferencing is called plausible reasoning [12]. In plausible reasoning the correctness of the outcome is uncertain. Although, many inference

methods have been used in the study of CR in the past, use of two aforementioned methods seem more suitable due to obvious reasons like existence of uncertainty. One such popular study is in the field of expert systems. However, not all of expert system study ensembles the application of commonsense reasoning. A goal driven approach or backward chaining for inference is not at all suitable in case of commonsense reasoning due to uncertain conclusions drawn. On the other hand reasoning cannot be completely data-driven. A formulated hypothesis is required to trigger backward chaining whereas in-detail dataset can elicit forward chaining [13]. The idea of inference in commonsense reasoning follows a forward chaining with the primary knowledge-base, arrives at certain conclusion, after which it reiterates the correctness using backward chaining with the secondary commonsense knowledge. Due to the absence of a well-defined association between the objects of the knowledge-base and the secondary commonsense knowledge repository.

5.2 Systematizing Commonsense Reasoning

Modern day computers are equipped with massive computing infrastructures. However, there has been no state-of-the-art framework that can exhibit a good commonsense reasoning simulation. Following are the challenges to systematize automation of commonsense reasoning:

Problem Definition The definition of commonsense reasoning itself is abstract. While implementation of automation of commonsense reasoning requires systematizing the knowledge of physical objects, their materialistic properties and basic rules of physical interaction, the definition is far from such inclusions. From an implementation perspective these properties are not readily available.

Plausible Reasoning According to one of the leading active researchers in the field of commonsense reasoning, Ernest Davis, in the study of CR the conclusions drawn are always plausible [5]. It is almost impossible to derive an acceptable conclusion even after a substantial amount of input provision. In addition to this, there exist a very few successful reasoning models that are similar in operation.

Size of Data Vast array of data is required for the inference engine to apply reasoning. Larger the data, better the results. This is backed by the fact that information need to be represented in a detailed manner which requires large repositories.

Knowledge Representation The knowledge representation part of CR has no specific format of structured data. Moreover, abstraction is difficult to attain when there are detailed description of a group of objects. The likeliness of data being unstructured is more in case of CR due to the size and dimensions of data involved. Recently, IBM Watson—a machine capable of working on unstructured data and give analytic solutions, proved that inference can be improvised [14].

6 Conclusion

This work has found that measuring and analyzing sparsity, degree distribution, cluster size and connectivity for a model semantic network derives few important observations. First, the exponential growth in number of word nodes has very small effect on sparsity of the network. Low sparsity in semantic network tends to efficient access and association, reducing the time complexity of reasoning. Second, power-law degree distribution decreases with the increasing number of connections between the word nodes. A low degree distribution for a node means low probability that a chosen word node will have a smaller number of neighbours. Every time a new node is inserted, the number of newly created association will be kept to minimal. This again reduces the amount of computation if the network is considered for scaling. Third, the term cluster in our model network is directly associated with the class node and its members. The size of such clusters is a count of members of such classes. Performance of an automated commonsense reasoning model largely depends on a knowledge-base comprising of materialistic knowledge. Computer society has proven that knowledge-corpora can be very much bound to performance because of its immense size. The above-mentioned observations allow us to reiterate the fact that semantic networks can be adequate in hosting knowledge-corpora with least performance issues. An effective inference technique can catalyst the process of reasoning. By considering all the characteristics of an effective inference engine, an effort can be put to make inferencing practical with semantic network as a knowledge-base. The future of automation of commonsense reasoning depends on an establishment of a very strong knowledge-base. A state-of-the-art commonsense knowledge-base can benefit various applications comprising of computational intelligence. It can be used to refine computational ability of a machine in the field of natural language processing, deep learning, data analytics and many other subfields of computer science. It can also be used as a tool for building complex semantic networks for storing rich information.

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An Assessment on Self-Esteem and Self-Confidence among the Women in Erode District of Tamil Nadu

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Abstract

Self-esteem does have an enormous influence on mental health. Self-esteem includes personality which affects the adjustment of people in different spheres. Self – esteem is a persistent issue which requires continuous monitoring so that the behavioral pattern could be kept in tune with the changing requirements. Self- Esteem and self- confidence is one of the critical factors which are demanded by all kind of women in the society. This chapter gives females' association between Gender, Income Level, and Family Type with Personality level. In this sense, 30 people were selected by the technique of survey method, data interpretation, and the 'self-scale' on each other. This study shows a significant and positive association between household income and personality as well as self-confidence through self- esteem in female's private lives. Also there are substantial differences among women in joint, nuclear and extended families with regard to their personality in family relations. In family relations, Womens' income has also shown the important connection to women's self-esteem create self-confidence in their life style.
"Without self-confidence we are babies in the cradle. ~Virginia Woolf"

I. INTRODUCTION

Self esteem which is based upon the self confidence, performance and the Empowerment of the women. Self-confidence is indeed a useful element for enhancing and empowering one's personality, happiness and overall fellow human. Consequently, creating an environment to create trust is becoming an important ingredient in the dignified life of the society. In Day to Day life, people are valued, reliable and create a positive picture. From infancy, its values and significance must be understood directly. It can be developed in multiple configurations, like college, family, representatives of friendship groups, acquaintances and relations.

1.1.BOOSTER OF SELF-ESTEEM

Most literally, self-confidence is receiving significant, reasonable faith in one's own decision, ability and influence. It is based on mutual respect in qualities that, while correlated to self-esteem, are

quite distinct. Personality is what one thinks with his or her particular skills.

1.2. HEALTHY SELF-ESTEEM
Whenever the viable business becomes reached here between skill of the infant and the mother's interactions, positive self esteem is achieved. The inward awareness that is prepared to handle all that life can throw us which is self-esteem. Personality is a sense of identity and an appreciation that we are powerful and intelligent human beings who've been capable of doing everything If you have no self-belief so you have doubts about the ability, you won't challenge themselves and stick to stuff which are comfortable.

1.3. SELF-ESTEEM
Self Esteem is generally considered the evaluative component of the self-concept, a broader representation of the self that includes cognitive and behavioral aspects as well as evaluative or affective ones. While the construct is most often used to refer to a global sense of self-worth, narrower concepts such as self-confidence or body-esteem are used to imply a sense of self-esteem in more specific domains. It is also widely assumed that self-esteem functions as a trait, that is, it is stable across time within individuals. Self-esteem is an extremely popular construct within psychology, and has been related to virtually every other psychological concept or domain, including personality (e.g., shyness), behavioral (e.g., task performance), cognitive (e.g., attribution bias), and clinical concepts (e.g., anxiety and depression). Environment of acceptance and success raises self-esteem, while environment of failures lower it

1.4. SELF-CONFIDENCE IS AN ASSET
The 'personality,' that old saying 'Initial experience is the greatest success' definitely remains true. Any person who steps comfortably into a space earns ratings over a person that sneaks in along with slumped shoulder and a bent head. Personality is an advantage that made people sit up and notice you, value you, and believe you are a potential self confident.

1.5. POSITIVE THINKING & SELF CONFIDENCE
The Personality and strategies that are used increase the standard of living in the society. Generally, self

confidence in one's abilities which improves motivation, making it a powerful tool against people with weak willpower. It is necessary to weigh this request for peer beliefs against the risks of hubris. We are developing a notion of self on the real economy via intrinsic memories that intertwines the motivated and rational characteristics of the human cognition. While welfare can also be enhanced by "positivity," it could also be peer.

1.6. FUNDAMENTAL HUMAN IMPULSE
As a basic human instinct, the maintenance and improvement of self-esteem is still established. The critical importance performed by personality in inspiration, impact, or human relationships has also been stressed by thinkers, writers, and teachers and, of all, clinicians.

II. SELF- ESTEEM OWN STRENGTHS
Personality stems from our ability to see strengths of our own. Let us admire them and have faith in ourselves. That inability of this to respect themselves performance with low personality. Let us realize that in fact, a few items are hard to achieve. Performance stems from putting in the effort based on faith in oneself. There is probably still nothing as complete but all trust in one. Rather, it is specific from each situation in issue. The person whose personality about his order to articulate may feel ambiguous about speaking. It varies depending on both necessary and desirable situations to build up one's own personality. What is absolutely important is to try, try, and try to do something again. Success, that will lay the proper foundation, will follow. The institution will be built with increasing success. Reassurance from others speed up the process, a desirable factor

2.1. SELF-CONFIDENCE BOOSTERS
- ➢ **Achievement:** Although failure is viewed as a step to success, success certainly increases one's personality.
- ➢ **Familiarity:** When the person has been exposed to it earlier, a given situation is less threatening and therefore adds to one's personality.
- ➢ **Amount of test results**: The more familiar a situation is due to frequent exposure, the greater one's personality would also be.
- ➢ **Group encouragement**: When a child embarks on an odd scary mission or attempts anything new, the friend groups'

approval and encouragement bring his personality fly higher.

➢ **Adulation by adult women relatives and friends**: When a particular teacher, family, etc. recognizes and understands the efforts of the infant, the student inherits renewed energy to repeat the action that has been noticed.

➢ **Agreeable atmosphere in the work and parents**: a positive, encouraging, semi and semi environment in the college is definitely essential for improving peer.

➢ **Rate of encouragement**: Higher levels of motivation will increase trust in the individual. Perseverance: One's inner strength and inner desire to excel will pep one up to increase one's confidence in self**.**

2.2. DETERMINANTS TO SELF-CONFIDENCE

➢ **Elevated Critique**: Frequent critism can decrease personality and the kid can lose all interest in extracurricular. The baby may recede and be removed into a shield.

➢ **Under Repeated Equivalences**: repeated finding of flaws can make a child wonder his someone else's abilities and abilities in comparison with other children, leading to a catastrophic loss of self-confidence.

➢ **Actually reduced blunders**: Related to bad environmental support, illness, etc., repetitive or regular mistakes may occur. This could mean the loss of self - development and self.

➢ **Disorders:** such as mental disorder, stammering, dyslexia, complexity learning. Impairments could result in a loss of confidence in themselves. The child might, but at the other hand, rise to the challenge, surmount these obstacles and surpass Socrates own aspirations.

➢ **Physical Disabilities**: The child may perceive the disability in either way here too. This same kid can look at existing talents, train and develop them, and reach unanticipated peaks in life with sufficient care.

2.3. LACK OF SELF-CONFIDENCE

➢ **Frequent failures:** The certain kid riddled by a loss of self can face numerous failures.

➢ Low self-esteem: Poor self esteem results in poor personality and serious implications for the college readiness of the child, peer relations, extracurricular, and thus his/her mental well-being.

➢ **Depression:** Kids who are suffering from lack of personality can progressively slip into mental illness due to the poor personality and also evolve schizophrenic qualities later on.

➢ **Self-harm tendencies**: If one's self-esteem suffers a blow, through the dangerous behaviour like personality and psychotic efforts, this same baby will try to get attention from significant others.

III. EFFECTS OF SELF-ESTEEM IN LIFE SATISFACTION

The features of person with high self esteem are those who like to meet new people; they convey oneself courageously; they are nicer to be about; they don't worry about how others will judge them; ones concepts were also met to benefit even though some people like to hear what they have to say; they generate strong options and meet new encounters. The positive personality of employees with lower personality is focused around in the society. The Most of the Women can get more achievement in their life through Self Confidence and Self Esteem.

3.1. DEVELOPING SELF-CONFIDENCE

➢ Demonstrate your abilities various aspects and greatly admire your own measures.

➢ Take risks or never believe scared of losing.

➢ Use self inspiring talk: Attempting your better is totally alright, but just don't shoot one down if the outcome is not flawless.

➢ Personality is useful to ask for others 'view but learn to independently analyze yourself. Witness out for excessive condemnation, their own in specific! When you feel dulled either by current reality, relive traditions.

3.2. STEPS TO HIGH SELF-ESTEEM

➢ Excuse oneself for past mistakes.
➢ Focus on good qualities.
➢ Follow talented people.
➢ Represent a great attitude.
➢ Getting plenty of rest.
➢ Learn skills for work.
➢ Trying to practice one's skills.

- ➢ Trying to learn original things.
- ➢ Improve daily conversations.
- ➢ Wear well.
- ➢ Women self motivation
- ➢ Women self confidence themselves

3.3. Self-Perception and Low Self-Assurance

The ill effects of poor self-perception and poor self assurance are experienced by numerous Indian ladies. Wearing cosmetics is something they can do to alter their appearance rapidly and momentarily, seeking certainty in this way. Both female's studies and the confidence were truly identified with how they feel regarding the body size and shape. In any case, an unique population has been provided very little thought, but movie girls can make the use beauty care products to improve the boldness. Ladies can use cosmetics to examine and depict their very own uniqueness utilizing distinctive items and hues.

In specific appearance training, teenage ladies recognize day evening looks, basic looks, and search for distinctive events. As an answer for improving ladylike elegance beliefs, they are regularly observed and aim to protect ladies adhere to the magnificence desires of our dense population. Shift with respect to body measurement, composition of the skin, width and coloring of a hair including the use of ornamentation. Individuals frequently can wear cosmetics with the conviction that the external interacting powerful performance will be decidedly influenced.

IV. HYPOTHESIS OF THE STUDY

H1: There is Significant Association between Income Level and Self Confidence Level.
H2: There is Significant Relationship between Age and Self Esteem Level.
H3: There is Significant Association between Age and Self- Confidence of the Women.

V. REVIEW OF LITERATURE

Bruno & Njoku, 2014, Generally, the concept of self-esteem anchor by various researchers in the realm of emotions as a socially built emotion representing perceptions and feelings about individuals' various self-images and self concepts which are based upon the psychosomatic need for the aspiration of authentic and efficacious functioning, belonging and acceptance within one's

social group, achievement and competence in contrast to other members of individuals' group.

Esmaeil et al., 2014, The researchers distinguished the self-esteem dimensions as personal, social and general self-esteem for Womens. When combined, these three subcomponents equal to overall self-esteem. The low self-esteem signs include: feeling incompetent, worthless, exaggerated perfectionism and unrealistic about our abilities, being overwhelmed with fear and negative thoughts, feeling unloved, fear of change, being unrealistic about goals, constant need for validation and recognition and distorted view of self and others.

Laschinger, Finegan, Shamian, & Wilk, 2004 Empowerment rooted in motivational desires of people. Any strategy which increases the employees' determination right and their self-sufficiency will lead to their empowerment. In fact, empowerment is the making of situations for improving the individuals' motivation in fulfilling their responsibilities through improving their self- esteem.

Ingersoll, 2007, In society need women self confident and self esteem who are empowered to be able to meet them win the competition. The rapid growth of technology has affected all aspects of the women progress. The self confidences are needed who have the necessary skills to deal with these changes.

VI. OBJECTIVES OF STUDY

- ➢ To feel Self Esteem and personality among women as per their typical family Life.
- ➢ To Analyzing the impact of Female earnings on their self esteem Level.
- ➢ To study the effect of age between women on personality and Self Confidence.

6.1. STATEMENT OF THE PROBLEM

A review of individual's self and peer by their family income and life satisfaction. Personality and Self Confidence between working women and non-working women get a high degree of quality with life. The research reveals that job satisfaction between Working and Non- Working Women Improve the personality. If you feel satisfied and forecast the sense of success based on confidence in self.

6.2. RESEARCH METHODOLOGY

This study was carried out in Erode District. Based on Non- Probability sampling technique & Convenience sampling technique. The primary data & secondary data are used in this study. A Well Structured questionnaire with 5 point scale is used to collect the responses using questionnaire method. The secondary data is generated out of journals, Books and magazines and the report of Erode District. SPSS version is used in this study to analyze the data is presented in the form of tables.

6.3. AIM OF THE STUDY
To study the self esteem and self confidence among the women in life satisfaction.

6.4. SIZE OF THE SAMPLE
For the study sample of thirty women participants was chosen for the analysis it through application of convenience sampling techniques.

6.5.SAMPLING DESIGN
The sample design used for the study is convenience sampling. The Convenience sampling was used as the desired population for the study in the given time was very difficult to get access with responses. The respondents who met the inclusion criteria were selected for the study.

The technique of choosing a sample as well as what is commonly referred to as the test type should be decided by the scientist. Sometimes chance samples or samples with non-probability can be samples. We used non-probability comparisons in this survey.

6.6. SAMPLING TECHNIQUES
In our analysis, the convenient technique of sampling is used. If the convenience of access is assisted by the population area unit selected for inclusion within the survey, convenient sampling may be regarded.

6.7. RESEARCH DESIGN
It is an effective design to understand the income level and self esteem level details, self-esteem and self confidence level in a specific population. Hence it helps to get the statistical result without really affecting the respondent's day to day activity. The results gathered would be accurate as the respondents answers the questions. Also descriptive research design helps the researcher gain lot of insight on the subject thus forming a "base" for further research. . Here the results can predict certain facts on the women education and level of self confidence, family size and self esteem.

6.8. PERIOD OF THE STUDY
The study was performed from Sep- 2020 to Nov-2020 for a period of three Months.

6.9. AREA OF THE STUDY
The analysis was only carried out in the Erode District.

6.10. SOURCE OF DATA COLLECTION
   (i)   Primary data
The key method for primary data collection is the questionnaire. The questionnaire was systematically structured to answer appropriate and specific questions covering all area research. In various investment and monetary evaluations, it is the main technique used widely.
   (ii)   Secondary data
The history of the present analysis has been gathered from books, journals, websites and others.

6.11TOOLS USED FOR ANALYSIS
   ➢ Percentage analysis methods
   ➢ Analysis of variance (ANOVA) – One way
   ➢ Spearman' Correlation Test

VII. RESULT AND DISCUSSION
Spearman' Correlation Test

H1: There is significant Association between Income Level and present Self- Confidence Level.

H3: There is significant Association between Age and Self- Confidence.

Particulars			Income of the respondents	Present Age level of the respondents	Self-Confidence level of the respondents
Spearman's Correlation	Income of the respondent	Correlation	1000	.383	-155
		Sig (2- tailed)		.037	.413
		N	30	30	30
	Present Self – Esteem level of the respondents	Correlation	.383	1.000	.266
		Sig (2- tailed)	0.37	.	.155
		N	30	30	30
	Self-Confident level of the respondents	Correlation	-155	.266	1.000
		Sig (2- tailed)	.413	.155	.
		N	30	30	30

Correlation is significant at the 0.05 level (2 – tailed).

7.1. INFERENCES
If there is a meaning mean differential between the importance's of values greater than 0.05, there is really no significant difference if the respectable position is less than 0.05. Consequently, the Age level significant value is 0.37, the Self confidence Level is .413, which would be greater than 0.05 and it is concluded that both factors get a negative correlation. The income level and Age level of participants and the degree of Self Confidence of respondent really aren't substantially distinct.

PAIRED T- TEST
H2: There is Significant Relationship between Age level and Self Esteem Level.

Paired Samples statistics

	Mean	N	Std. Deviation	Std. Error Mean
Age level of the respondents	1.2667	30	.44978	0.8212
Self Esteem level of the respondents	2.1333	30	.81931	.14958

Paired Samples Correlations

		N	Correlation	Sig
Pair 1	Age level of the respondents & Self Esteem level of the respondents	30	.100	.600

Paired Samples Test

	Paired Sample Test							
	Mean	Std. Deviation	Std. Error Mean	95% confidence interval of the Difference		T	df	Sig.(2-tailed)
				Low	Upper			
Pair -1 Age level of the respondents & Self Esteem level of the respondents	-86667	.97320	17768	-1.23007	-50327	-4.878	29	.000

Inference: The Age level of the responders' fully engage is 1.2667 and the participants' self esteem personality level rate is 2.1333 and their overall mean is -.86667. The critical self esteem level is .000 based on the outcome provided by SPSS, and it is or less 0.05, so we are rejected the null hypothesis accepts the alternative hypothesis. There is also a major distinction here between respondent' Age level and the self esteem personality rate.

7.2. LIMITATION OF THE STUDY
- The Sample Size Restricted to 30 Women Respondents Only
- The study is restricted to Erode District only.
- The study only covered Self esteem and Self confidence among the women not covers other areas. Eg: Education, family size, profession.

7.3. FINDINGS OF THE STUDY
- There is also no important distinction between Earnings and the level of self-confidence.
- There is an important distinction between the rate of age and personality level.
- There really is no important difference among Age and self Esteem Level.

7.4 SUGGESTIONS

- It is suggested to give meaning to their activities linked to personality and health.
- It is suggested to build awareness for everyone on how people who have experience on empowering oneself and appreciating oneself.
- It is suggested that create positive and personality thoughts among the women
- It is suggested that we are valuable person.
- It is suggested that women are always great person.
- It is suggested to help the process of facilitating changes in body and enhancing women's mental health.

VIII. CONCLUSION
People have higher level of global personality in family units. Whereas, women have a moderate level of complete self confidence in family units. In private lives, women in nuclear families also have a moderate degree of self confidence. The findings of the study indicate that people who are employed people and – anti women create high-level self-confidence and self-esteem themselves. Have a decent degree of satisfaction in life level is increased.

Self-confident Women inspire in their audience, peers, team leaders, customers, and friends. Gaining the confidence of others is one of the key ways in which a self-confident person easily gets self esteem from society. The good news is that self-confidence

really can be learned and built on. Whether you're working on your own self-confidence or building the confidence of people around you, it's well-worth the effort.

Most mentally challenged Women lack self-confidence with the exception of those with their life. It is heartening to note how her self-confidence returns gradually as the individual recovers with support from the family members and society. It may be success in very small activities – dressing, combing hair or taking part in activities which give pleasure and gradually help the individual to emerge from the illness. This gives an idea of how important it is that self-confidence as an asset should be improve the women life style and get more self esteem from the society.

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Prof. Lasya.KR

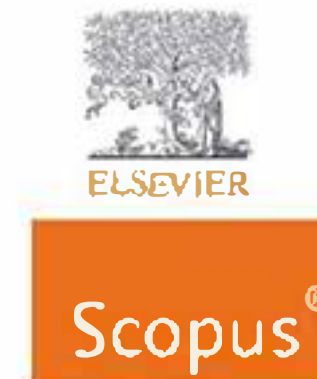From

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Structural Break Characterisation: A Case on Key Indian Agricultural Indicators and Indian Securities Market

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Abstract

This study focuses to examine the i) dependence structure pertaining to a) Per Capital GDP on selected agricultural indictors such as Agricultural Production (Food Grains), Agricultural Yield (Food Grains) and Area under Cultivation (Food Grains) b) Agricultural Production (Food Grains) on Food Credit c) Agricultural Yield (Food Grains) on Food Credit and d) Market Capitalisation of BSE Limited on Per Capital GDP ii) parameter stability due to financial crisis on the aforementioned notions from 1992-93 to 2018-19. The study showed that the relationship between Per Capita GDP and selected agricultural indicators as well as the relationship between food grains' agricultural yield and food credit undergone structural change during the study period. However, no statistically significant relationship between food grains' agricultural production and food credit as well as relationship between market capitalisation of BSE Limited and Per Capita GDP for structural change attributing to global financial crisis.

Keywords: Structural Break, Agricultural Production, Agricultural Yield, Per Capital GDP, Market Capitalisation, Food Credit

Introduction

After the 1929 Great Depression, the financial markets around the world had trembled during the financial years 2007-08 and 2008-09, which profoundly affected the economic activity around the globe. In consequence of the financial crisis, the market capitalisation of the BSE Limited, formerly known as Bombay Stock Exchange Limited had slipped to Rs. 30,86,076 crores in the financial year 2008-09 as it was Rs. 51,38,015.26 crores in 2007-08 (Source: BSE Limited), which had had cascading effect in all industry verticals in India. From the pragmatic perspective, during the financial year 2008-09, on account of various pressure from the external sector such as commodity prices around the world with inflationary trend, capital inflows, financial meltdown baffled the Indian economy. As iterated in the Economic survey 2007-08, the Indian economy, on its growth trajectory, it had reached increased level of growth with Gross Domestic Product (GDP) at market prices exceeding 8 per cent every financial year since 2003-04. Apparently, in consequence of higher growth, the confrontations with the challenges have become more critical due to globalisation. Surprisingly, until the middle of financial year 2008-09, it was believed and firmly felt that the financial crisis coupled only with the developed economies, but the illusion fled sooner. Eventually, its

reflection, the 2008-09 third quarter GDP growth fell to 6.2 per cent and again dipped to 5.8 per cent during fourth quarter. The financial crisis effect strongly laid its footprint in Indian agricultural sector as well exhibiting -1.4 per cent growth rate (Source: Reserve Bank of India) during third quarter of 2008-09 pertaining to agriculture and allied activities. Hence it is pertinent to examine relationship amongst key economic indicators and structural change attributing to financial crisis.

Literature Review

Cornia (1985) examined the relationship between labour productivity, land yields and factor inputs for farms of different sizes amongst 15 developing countries. The study found that small farms rendered higher yields as compared to large farms due to more intense use of land and negative correlation had been observed between farm size and yield per hectare and factor inputs.

Sriram (2007) advocated that the Indian agriculture has been undergoing fundamental change due to the very fact that the inputs and technology have been leaving the hands of farmers to the external resources. The study exhibited that there is a need to perceive the rural financial markets through the existence of demand pattern and also described that the rural markets should be focused holistically rather than concentrating only on agriculture.

Anjani et al.(2010) expressed that due to financial crisis uncertainty in Indian Agricultural sector perhaps be evident. On account of high economic recession at USA, UK, Japan and Saudi Arabia, the Indian agricultural exports had slowed down. The study exhibited that the institutional credit towards agriculture had remained stable and attributing to reduced level of Private and Public investments, it may considerably take few more years to see the better prospects in Indian agricultural sector.

Shah (2010) delineated that due to financial crisis, farmers of cash crops were witnessed lower prices for their crops despite there were rise in food prices. Albeit, that the Government of India has brought various regulatory measures to curb price fluctuations on the commodity prices, furthermore adequate control need to be exercised especially domestic prices pertaining to essential commodities.

Jarko & Likka (2010) analysed the business cycles in India and China as an effect of transmission of the financial crisis that affected the global economy. They found that the global financial crisis had significantly impacted the economic activities of Asian economies. The study also showed that in OCED countries and emerging Asian countries, there were significant association between trade ties and dynamic correlations of the GDP growth rates.

Ali & Afzal (2012) chose KSE 100 and BSE 100 stock indices from Pakistan and India for the period between 1st January 2003 and 31st August 2010 to examine the impact of global financial crisis. The study revealed that the negative shocks had deeper impact on the indices volatility than the positive shocks. As compared to Pakistan, Indian stock markets had intense impact due to global financial crisis.

Das et al. (2012) narrated that the Indian economy had feeble impact during and after the financial crisis due to people's perception towards savings, fundamental attributes of the organisations, intense regulatory and protective measures.

Naidu et al. (2013) analysed the effect of agricultural credit on agricultural productivity and production during the period between 1985-86 and 2011-12 in India and concluded that agricultural credit plays a pivotal role to enhance the agricultural productivity along with technological advancements in agriculture.

Mensi et al. (2014) examined how the global factors influence the BRICS countries stock markets and analysed the dependence structure between BRICS countries for the period from 1997 to 2013. Their study showed that BRICS countries' stock markets had statistically significant dependence structure with developed countries' global indices such as S&P Index and commodities index pertaining to oil and gold. It was also observed that the dependence structure often skewed due to the global financial crisis, however, the uncertain US economic policy had no influence on the BRICS stock markets.

Shalini and Prasanna (2016) studied the presence of regime shift or structural break in volatility during the financial crisis by selecting the spot prices of eighteen distinct commodities. They found that during the global financial crisis, there was a shift from low volatility to high volatility in commodities market. The selected agricultural commodities had showed faster convergence to long run equilibrium. The study also showed that the systematic risk exposure from exogenous factors pertaining to Indian commodities market had caused more volatility during and after the financial crisis.

Objectives, Data and Methodological Framework

Objectives of the Study

To examine the impact of key Indian agricultural indicators on Per Capita GDP and its parameter stability (Constant term and Exposure from Agricultural indicators) before and after the financial crisis.

To examine the impact of Indian Agricultural Production & Yield on Food Credit rendered by Scheduled Commercial Banks in India and its parameter stability (Constant term and Exposure from Agricultural Production and Yield) before and after financial crisis.

To study the impact of Per Capital GDP on Market Capitalisation of BSE Limited and its parameter stability (Constant term and Exposure from Per Capita GDP) before and after financial crisis.

Data and Methodological Framework

In order to study the aforementioned objectives, following key variables are considered for the period between 1992 and 2019 (27 Financial Years).

1. Per Capita Gross Domestic Product (GDP) at Current Prices (PCGDP)

2. Agricultural Production (Food Grains) (AP)

3. Area Under Cultivation (Food Grains) (AUC)

4. Agricultural Yield (Food Grains) (AY)

5. Food Credit given by Scheduled Commercial Banks (FC)

6. Market Capitalisation of BSE Limited (MC)

The values pertaining to the iterated study variables are collected from the Reserve Bank of India (https://www.rbi.org.in) and BSE Limited (https://www.bseindia.com).

The study is broadly categorized in three distinct stages to validate the parameter stability of derived regression models.

Stage 1: Examining the parameter stability pertaining to Per Capital GDP on Agricultural indicators of Indian economy as specified in the following regression models.

Before financial crisis (1992-93 to 2006-07): $P\widehat{CGD}P_t = \gamma_1 + \gamma_2 AP_t + \gamma_3 AUC_t + \gamma_4 AY_t + \varepsilon_{1t}$

After financial crisis (2007-08 to 2018-19): $P\widehat{CGD}P_t = \beta_1 + \beta_2 AP_t + \beta_3 AUC_t + \beta_4 AY_t + \varepsilon_{2t}$

Pooled regression (1992-93 to 2018-19): $P\widehat{CGD}P_t = \alpha_1 + \alpha_2 AP_t + \alpha_3 AUC_t + \alpha_4 AY_t + \varepsilon_t$

H_0: There is no structural change in the entire period i.e. $\alpha_1 = \beta_1 = \gamma_1, \alpha_2 = \beta_2 = \gamma_2, \alpha_3 = \beta_3 = \gamma_3, \alpha_4 = \beta_4 = \gamma_4$

H_1: There is a statistically significant structural change in the entire period i.e. $\alpha_1 \neq \beta_1 \neq \gamma_1, \alpha_2 \neq \beta_2 \neq \gamma_2, \alpha_3 \neq \beta_3 \neq \gamma_3, \alpha_4 \neq \beta_4 \neq \gamma_4$

Stage 2: Examining the parameter stability pertaining to Agricultural Production and Yield on Food credit as mentioned in the following regression models.

Before financial crisis (1992-93 to 2006-07): $\widehat{AY}_t = \gamma_1 + \gamma_2 FC_t + \varepsilon_{1t}$

After financial crisis (2007-08 to 2018-19): $\widehat{AY_t} = \beta_1 + \beta_2 FC_t + \varepsilon_{2t}$

Pooled regression (1992-93 to 2018-19): $\widehat{AY_t} = \alpha_1 + \alpha_2 FC_t + \varepsilon_t$

H_0: There is no structural change in the entire period i.e. $\alpha_1 = \beta_1 = \gamma_1, \alpha_2 = \beta_2 = \gamma_2$

H_1: There is a statistically significant structural change in the entire period i.e. $\alpha_1 \neq \beta_1 \neq \gamma_1, \alpha_2 \neq \beta_2 \neq \gamma_2$

Before financial crisis (1992-93 to 2006-07): $\widehat{AP_t} = \gamma_1 + \gamma_2 FC_t + \varepsilon_{1t}$

After financial crisis (2007-08 to 2018-19): $\widehat{AP_t} = \beta_1 + \beta_2 FC_t + \varepsilon_{2t}$

Pooled regression (1992-93 to 2018-19): $\widehat{AP_t} = \alpha_1 + \alpha_2 FC_t + \varepsilon_t$

H_0: There is no structural change in the entire period i.e. $\alpha_1 = \beta_1 = \gamma_1, \alpha_2 = \beta_2 = \gamma_2$

H_1: There is a statistically significant structural change in the entire period i.e. $\alpha_1 \neq \beta_1 \neq \gamma_1, \alpha_2 \neq \beta_2 \neq \gamma_2$

Stage 3: Examining the parameter stability pertaining to Market Capitalisation of BSE Limited on Per Capital GDP as iterated the following regression models.

Before financial crisis (2001-02 to 2006-07): $\widehat{MC_t} = \gamma_1 + \gamma_2 PCGDP_t + \varepsilon_{1t}$

After financial crisis (2007-08 to 2018-19): $\widehat{MC_t} = \beta_1 + \beta_2 PCGDP_t + \varepsilon_{2t}$

Pooled regression (2001-02 to 2018-19): $\widehat{MC_t} = \alpha_1 + \alpha_2 PCGDP_t + \varepsilon_t$

H_0: There is no structural change in the entire period i.e. $\alpha_1 = \beta_1 = \gamma_1, \alpha_2 = \beta_2 = \gamma_2$

H_1: There is a statistically significant structural change in the entire period i.e. $\alpha_1 \neq \beta_1 \neq \gamma_1, \alpha_2 \neq \beta_2 \neq \gamma_2$

In order to test the null hypothesis, Chow test is used. As iterated by Chow test, if there are no structural changes before and after the financial crisis, then, essentially the unexplained variance of pooled regression (RSS_R) and unexplained variance of before & after regression model (RSS_{UR}) shall not be statistically different. Thus, the model is iterated below.

$$F = \frac{(RSS_R - RSS_{UR})/k}{RSS_{UR}/(n_1 + n_2 - 2k)} \sim F_{[k, n1+n2-2k]}$$

Where, 'k' is the number of parameters estimated. If the calculated F-ratio is greater than the F-critical value at 0.01, 0.05, 0.1 for ascertained degrees of freedom, reject the null hypothesis, otherwise retain the null hypothesis.

Results and Discussion

Descriptive Statistics pertaining to selected study variables:

Per Capita GDP: The average pre and post financial crisis Per capita GDP are found to be Rs. 20,189.9 and Rs. 87,761.3 respectively. Diagram 4.1 depicts the Per Capita Gross Domestic Product between the financial years 1992-93 and 2018-19. The observed coefficient of variation of Per Capita GDP stood 41.84 per cent before the financial crisis and exhibited 35.26 per cent after the financial crisis. Indeed, after the financial crisis the Per Capita GDP has become less variable due to strong fundamentals of Indian industry verticals.
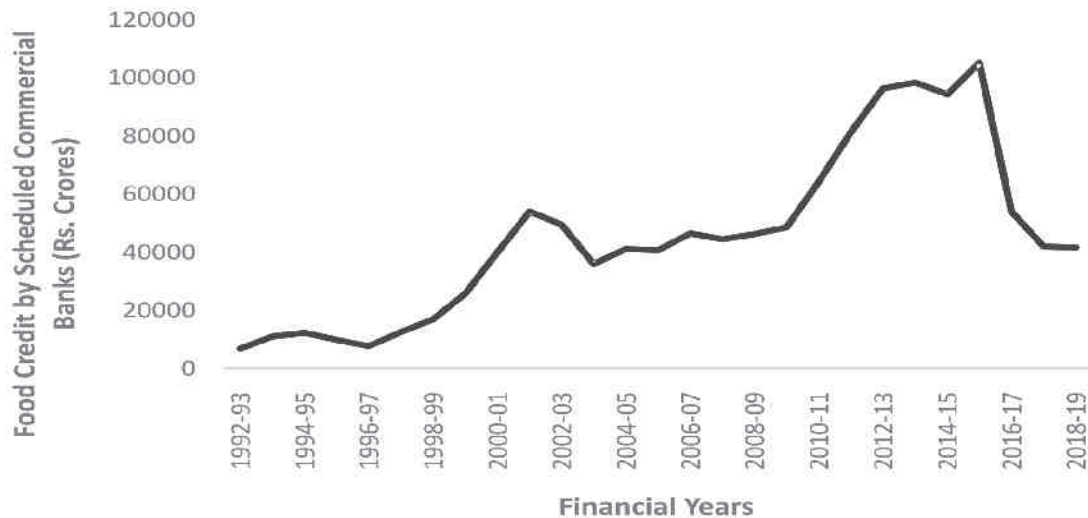
Diagram 4.1
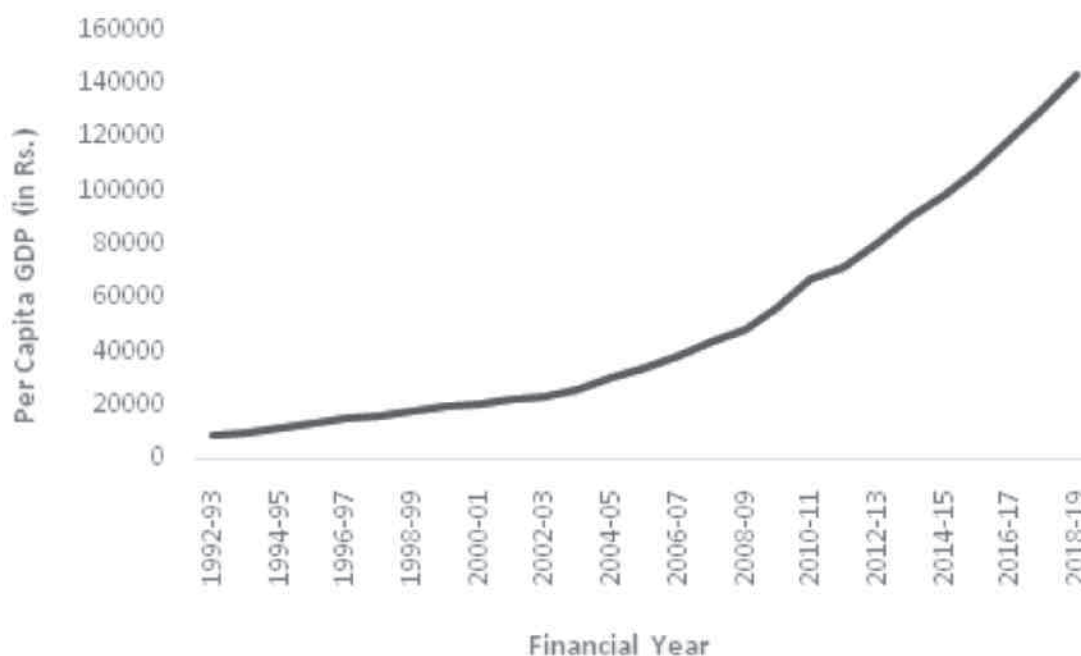
Source: Reserve Bank of India - Handbook of Statistics on Indian Economy for the year 2018-19

Food Credit: Food credit is one of the significant indicator of Indian economy which signifies quantum of funds dispersed by the scheduled commercial banks to Food Corporation of India and other agencies for conservation food items. Diagram 4.2 depicts the Food Credit rendered by scheduled commercial banks to Food Corporation of India and other agencies between the financial years 1992-93 and 2018-19. It is seen that the average food credit accountedto Rs. 68,062.7 crores after the financial crisis as compared to Rs. 27, 336.5 crores prior to financial crisis and eventually, after the financial crisis the coefficient of variation recorded at 35.47 per cent as compared to 60.65 per cent before the crisis.

Diagram 4.2

Source: Reserve Bank of India - Handbook of Statistics on Indian Economy for the year 2018-19

Agricultural Production: The agricultural production, one of the significant indicator of Indian agricultural sector, during 2007-08 to 2018-19, the average production recorded at 2548.31 lakh tonnes as compared to 1975.66 lakh tonnes during 1992-92 to 2006-07. The coefficient of variation increased by 1.27 per cent after the financial crisis. Diagram 4.3 depicts the agricultural production of food grains (in lakh of tonnes) between the financial years 1992-93 and 2018-19.

Diagram 4.3
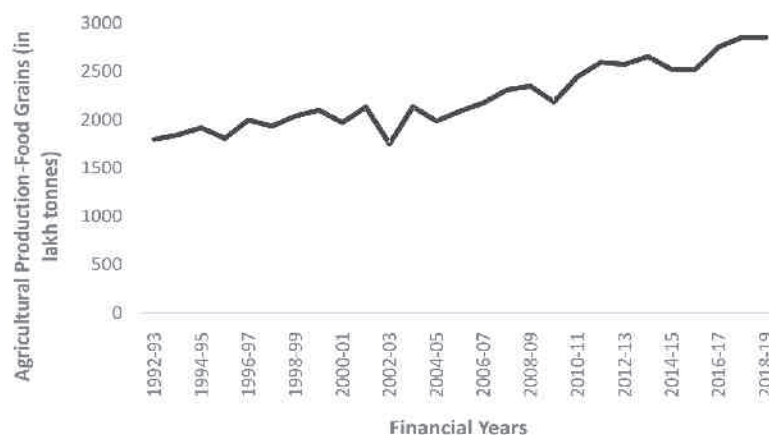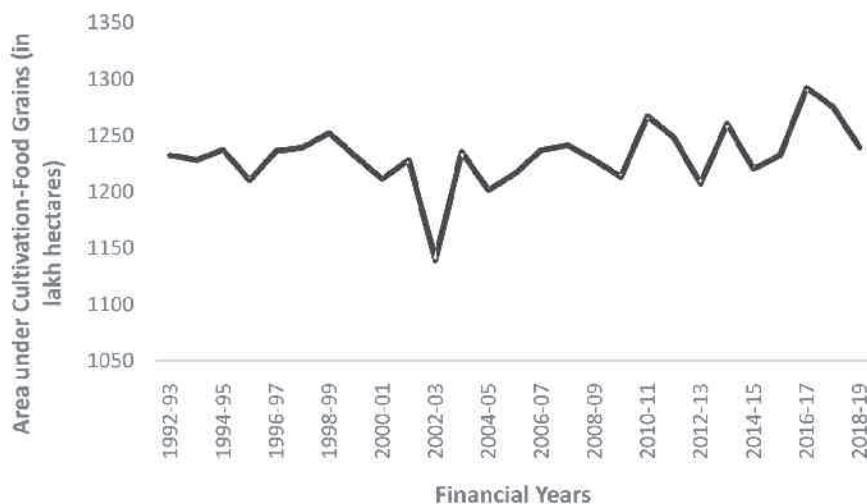

Source: Reserve Bank of India - Handbook of Statistics on Indian Economy for the year 2018-19

Area under Cultivation: Diagram 4.4 depicts the area under cultivation for food grains (in lakh hectares) between the financial years 1992-93 and 2018-19. The area under cultivation measured in lakh hectares for food grains has exhibited dynamic trend since the beginning of the study period. The average lakh of hectares for food grains cultivation during 1992-07 were 1222.13 lakh hectares as against 1234.5 lakh hectares during 2007-19 and the coefficient of variation remained equal with feeble decrease in its proportion.

Diagram 4.4

Source: Reserve Bank of India - Handbook of Statistics on Indian Economy for the year 2018-19

Food Grains-Yield per hectare: The average food grains yield per hectare has increased to 1646.5 kg during 2007-19 as compared to 1615.8 kg during 1992-07. Diagram 4.5 depicts the food grains yield per hectare (kg/hectare) between the financial years 1992-93 and 2018-19. In fact, the yield per hectare's coefficient of variation increased to 8.7 per cent during 2007-19 as compared to 5.86 per cent during 1992-07.

Diagram 4.5
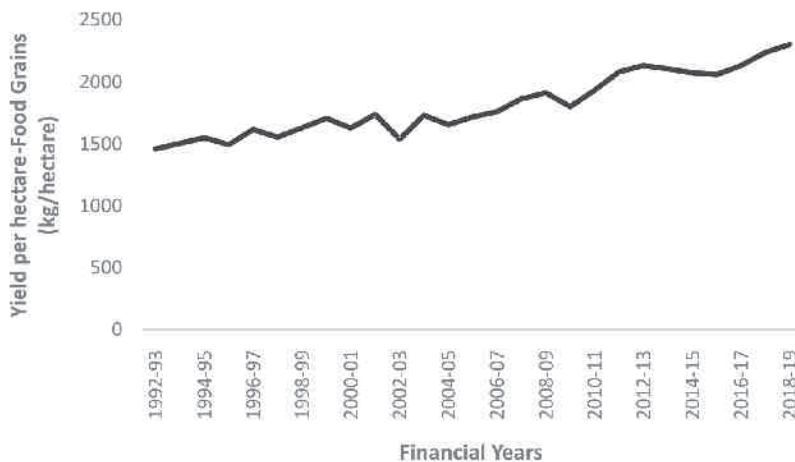
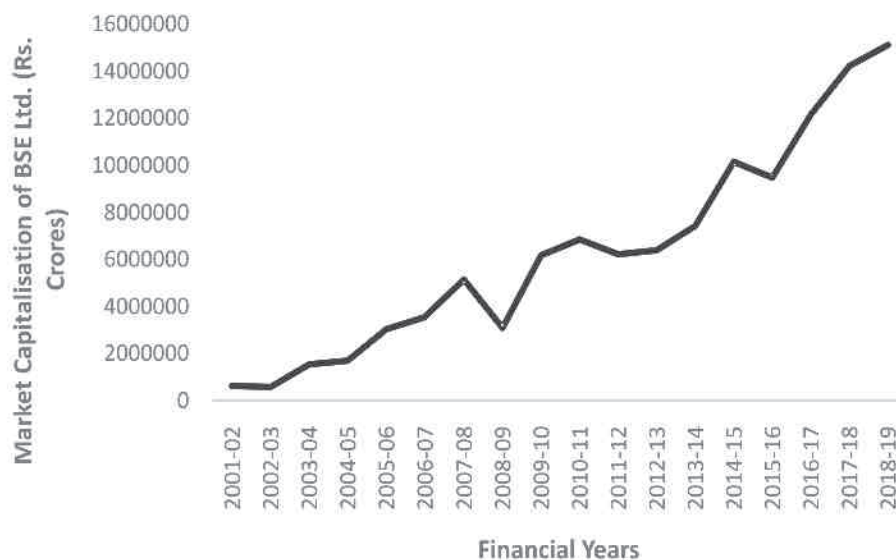*Source: Reserve Bank of India - Handbook of Statistics on Indian Economy for the year 2018-19*

Market Capitalisation of BSE Limited: The BSE Limited, erstwhile known as Bombay Stock Exchange Limited is the barometer of Indian economy. In order to study the impact of financial crisis, the BSE Limited's market capitalisation has been considered for the financial years between 2001-02 and 2018-19. Diagram 4.6 depicts the Market capitalisation of all securities traded at BSE Limited between the financial years 2001-02 and 2018-19. Though, during the initial phase of financial crisis, the Indian securities markets both primary and secondary markets trembled and apparent investors' turmoil, due to very strong fundamentals of Indian industry verticals, markets shown the growth trajectory to the investing community nationally and internationally. It is seen that the average market capitalisation of BSE Limited were Rs. 18,31,613 crores prior to financial crisis and after the financial crises, the average market capitalisation recorded Rs. 85,29,978 crores. Surprisingly, after the financial crisis, the coefficient of variation has drastically reduced to 41.89 per cent as it was 61.16 per cent before the financial crisis.

Diagram 4.6

Source: Reserve Bank of India - Handbook of Statistics on Indian Economy for the year 2018-19

The data analysis has been carried in four distinct phases.

Phase 1: Measuring the parameter stability pertaining to Per Capita GDP on agricultural production, area under cultivation and agricultural yield before and after the financial crisis.

Phase 2: Measuring the parameter stability pertaining to agricultural production (food grains) on food credit before and after the financial crisis

Phase 3: Measuring the parameter stability pertaining to agriculture yield (food grains) on food credit before and after the financial crisis

Phase 4: Measuring the parameter stability pertaining to market capitalisation of BSE Limited on Per Capital GDP before and after the financial crisis

The first phase of data analysis is presented in Table 4.1

Table 4.1 describes the results of structural break related to Per Capita GDP

Pooled regression (1992-93 to 2018-19): $R^2 = 0.9196$			
Intercept / Explanatory Variable	Coefficient (t, Sig.)	df	Unexplained Variance (Residuals)
Constant term	-140414.92 (-1.2003, *0.2422*)		
Agricultural Production	-10.10* (-1.7856, *0.0874*)	23	3456645600
Area Under Cultivation	-72.46 (-0.7205, *0.4785*)		
Agricultural Yield	166.69*** (13.4270, *0.0000*)		
Before financial crisis regression (1992-93 to 2006-07: 15 years): $R^2 = 0.7787$			
Constant term	605980.91 (0.6285, *0.5425*)		
Agricultural Production	289.25 (0.5802, *0.5735*)	11	237090700.8
Area Under Cultivation	-583.17 (-0.7382, *0.4758*)		
Agricultural Yield	-275.12 (-0.4518, *0.6602*)		
After financial crisis regression (2007-08 to 2018-19: 12 years): $R^2 = 0.8289$			
Constant term	-344190.02 (-1.2863, *0.2343*)		
Agricultural Production	-6.41 (-0.7829, *0.4562*)	8	1965489302
Area Under Cultivation	37.44 (0.1664, *0.8720*)		
Agricultural Yield	195.37*** (5.5682, *0.0005*)		
Chow Test: F-ratio = 2.7045			
F-distribution critical values at 0.01, 0.05, 0.1 for (4,19) = 4.5, 2.9, 2.27			
Decision: *Retain the H₀ at 0.01 and 0.05, Reject the H₀at 0.1 level of significance*			
*** 0.01, ** 0.05, * 0.1 Level of Significance			

The Per Capita GDP, although it is constituted by various components, the study considers only the selected agricultural indicators. From the financial year 1992-93 to 2006-07 has been considered as pre-financial crisis period and from 2007-08 to 2018-19 has been considered as post-financial crisis period. The regression results pertaining to pre-financial crisis period has shown no statistically significant results though the model could explain 77.87 per cent variation in Per Capital GDP, however, post-financial crisis results showed that agricultural yield's systematic risk is statistically significant at 0.01 level of significance and other indicators such as agricultural production and area under cultivation remained insignificant. The pooled regression results showed that agricultural production is statistically significant at 0.1 level of significance, agricultural yield is statistically significant at 0.01 level of significance and area under cultivation remained insignificant. The pooled multiple regression model from the year 1992-93 until 2018-19 exhibited 91.96 per cent coefficient of determination. The parameter stability examination through Chow test has rendered the following results.

- At 0.01 and 0.05 level of significance → Statistically insignificant→$\alpha_1 = \beta_1 = \gamma_1, \alpha_2 = \beta_2 = \gamma_2, \alpha_3 = \beta_3 = \gamma_3, \alpha_4 = \beta_4 = \gamma_4$, which signifies that there were no structural change due to financial crisis.

- At 0.1 level of significance → Significant→$\alpha_1 \neq \beta_1 \neq \gamma_1, \alpha_2 \neq \beta_2 \neq \gamma_2, \alpha_3 \neq \beta_3 \neq \gamma_3, \alpha_4 \neq \beta_4 \neq \gamma_4$, which narrates that there have been observed structural change in the constant term and systematic risk exposure from respective selected agricultural indicators. However, the study does not attempt to measure whether the structural change has occurred only in the constant term or systematic risk exposure or both.

Table 4.2 describes the results of structural break related to Agricultural production (food grains)

Pooled regression (1992-93 to 2018-19): $R^2 = 0.1641$			
Intercept / Explanatory Variable	Coefficient (t, Sig.)	df	Unexplained Variance (Residuals)
Constant term	1829.49*** (11.0960, *0.0000*)	25	5222465
Food Credit	0.0068** (2.2156, *0.0361*)		
Before financial crisis re	gression (1992 -93 to 2006- 07: 15 years):		$R^2 = 0.2118$

Constant term	1876.67***		
	(30.2960, *0.0000*)	13	201219.9
Food Credit	0.0036*		
	(1.8690, *0.0890*)		

After financial crisis regression (2007-08 to 2018-19: 12 years): $R^2 = 0.0372$			
Constant term	1987.72***		
	(3.2857, *0.0082*)	10	4908525
Food Credit	0.0052		
	(0.6213, *0.5483*)		

Chow Test: F-ratio = 0.2537

F-distribution critical values at 0.01, 0.05, 0.1 for (2,23) =5.67, 3.42, 2.55

Decision: *Retain the H_0 at 0.01, 0.05 and 0.1 level of significance*

*** 0.01, ** 0.05, * 0.1 Level of Significance*

As iterated in Table 4.2, analysis has been carried to examine the parameter stability pertaining to agricultural production on food credit by scheduled commercial banks. From Table 4.2, it is seen that the constant term (Intercept of regression line) pertaining to three stages of regression (Pre & Post financial crisis and Pooled regression) remained statistically significant at 0.01 level of significance. The explanatory variable of the regression i.e. food credit was statistically significant at 0.1 level of significance during pre-financial crisis period but after the financial crisis period, it has become insignificant to explain the explained variable i.e. agricultural production. However, considering the pooled regression data, the food credit stood statistically significant at 0.05 level of significance. Although all the models' coefficient of determination exhibits low degree, since we have statistically significant explanatory variable, the model is expected to yield the desired outcome. Analysis pertaining to parameter stability for detecting structural changes has shown the following results.

- Retain the null hypothesis → No statistically significant evidence found for structural changes i.e. $\alpha_1 = \beta_1 = \gamma_1, \alpha_2 = \beta_2 = \gamma_2$

This accentuate that the financial crisis has not impacted the model's constant term and beta component pertaining to food credit. Similar exercise has been carried to examine the parameter stability relating to agricultural yield on food credit and the results are summarized in Table 4.3.

Table 4. 3 describes the results of structural break related to Agricultural yield (food grains)

Intercept / Explanatory Variable	Coefficient (t, Sig.)	df	Unexplained Variance (Residuals)
Pooled regression (1992-93 to 2018-19): $R^2 = 0.5343$			
Constant term	1523.38*** (24.1968, *0.0000*)	25	761461.3
Food Credit	0.0063*** (5.3552, *0.0000*)		
Before financial crisis regression (1992-93 to 2006-07: 15 years): $R^2 = 0.4658$			
Constant term	1509.20*** (40.7587, *0.0000*)	13	71898.44
Food Credit	0.0039*** (3.3670, *0.0051*)		
After financial crisis regression (2007-08 to 2018-19: 12 years): $R^2 = 0.0166$			
Constant term	1997.47*** (14.8603, *0.0000*)	10	242323.1
Food Credit	0.0008 (0.4107, *0.6899*)		

Chow Test: F-ratio = 16.3683

F-distribution critical values at 0.01, 0.05, 0.1 for (2,23) = 5.67, 3.42, 2.55

Decision:*Reject the H_0 at 0.01, 0.05 and 0.1 level of significance*

*** 0.01, ** 0.05, * 0.1 Level of Significance*

It is seen from Table 4.3 that the constant term pertaining to pre-financial crisis, post-financial crisis and pooled regression remained statistically significant at 0.01 level of significance, however, the systematic risk exposure from food credit remained statistically significant during pre-financial crisis period as well as for the consolidated period at 0.01 level of significance, but it exhibited statistically insignificant result during the post-financial crisis period. The coefficient of determination has moderately better explaining power for pooled regression and pre-financial crisis period, but it contained less explaining power pertaining to post-financial crisis regression. While examining the structural break for constant term and systematic risk exposure between three regressions, Chow

test results revealed that there is significant structural change had occurred amongst intercept term and systematic risk exposure ($F_{Cal.}$: $16.3683 > F_{Crit.}[2,23]$: $5.67, 3.42, 2.55$) at all levels of significance. Hence, we can concretely attribute the structural change to financial crisis but no validation has been carried whether the financial crisis has impacted the intercept term or slope of regression or both. On all parlance, it can be iterated that the food credit influences the agricultural yield pertaining to food grains. Although there are mixed parameter stability outcomes pertaining to Per Capita GDP and key agricultural indicators, attempt has been made to examine the structural change related to market capitalisation of BSE Limited while regressing with Per Capita GDP from financial years 2001-02 to 2018-19 and the results are summarized in Table 4.4.

Table 4. 4 describes the results of structural break related to market capitalisation of BSE Limited

Pooled regression (2001-02 to 2018-19): $R^2 = 0.9599$			
Intercept / Explanatory Variable	**Coefficient (t, Sig.)**	**df**	**Unexplained Variance (Residuals)**
Constant term	-1386136.29*** (-3.0891, *0.0070*)	16	13630300000000
Per Capita GDP	112.86*** (19.5777, *0.0000*)		
Before financial crisis regression (2001-02 to 2006-07: 15 years): $R^2 = 0.9539$			
Constant term	-3616434.14*** (-5.9238, *0.0041*)	4	347000000000
Per Capita GDP	189.74*** (9.1022, *0.0008*)		
After financial crisis regression (2007-08 to 2018-19: 12 years): $R^2 = 0.9213$			
Constant term	-1195817 (-1.2547, *0.2381*)	10	12100000000000
Per Capita GDP	110.82*** (10.8200, *0.0000*)		
Chow Test: F-ratio = 0.6655			
F-distribution critical values at 0.01, 0.05, 0.1 for (2,14) = 6.51, 3.74, 2.73			
Decision:*Retain the H_0 at 0.01, 0.05 and 0.1 level of significance*			
*** 0.01, ** 0.05, * 0.1 Level of Significance			

It is seen from Table 4.4, the R^2 i.e. coefficient of determination pertaining to all three regression lines such as a) pooled regression for the period between 2001-02 and 2018-19 b) pre-financial crisis regression for the period between 2001-02 and 2006-07 and c) post-financial crisis for the period between 2007-08 and 2018-19 were 95.99 per cent, 95.39 per cent and 92.13 per cent respectively. This signifies that the Per Capita GDP explains higher proportion of variance in BSE's market capitalisation. Regression results of all three notions revealed that the systematic exposure is statistically significant at 0.01 level of significance and constant term is statistically significant for pooled regression and pre-financial crisis period, but insignificant for post-financial crisis period. It was quite evident from the extant literature that the financial crisis had impacted Indian financial markets to a large extent (Ali & Afzal, 2012) as compared to neighbouring nations. Hence, in order to validate the structural change in the proposed regression model, the Chow test has been carried and the results are as follows.

Retain the null hypothesis i.e. there is no structural change during the entire period of study ($F_{Cal.}$: 0.6655 <$F_{Crit.}$(2,14 for 0.01, 0.05 & 0.1): 6.51, 3.74, 2.73 respectively), which signifies that the financial crisis did not cause any impact in the parameters under study i.e. the intercept term of the regression model and systematic risk exposure of the regression model. Thus, the influence from Per Capita GDP to explain the market capitalisation of BSE Limited remained unchanged during the study period, although the financial crisis impacted the Indian financial markets.

CONCLUSION

The global financial crisis which began during the year 2007 after the break-out of United States sub-prime mortgage market had instantly influenced the Asian markets including India and made all the stakeholders to learn the hard lessons. This study aimed to validate the structural break attributing to financial crisis on selected economic, agricultural and financial market indicators in India. From 1992-93 to 2006-07 and 2007-08 to 2018-19 have been considered as pre-financial crisis period and post-financial crisis period to examine the parameter stability of the aforementioned key indicators. The study shows that Per Capita GDP is negatively influenced by agricultural production (food grains) and area under cultivation (food grains), but positively influenced by agricultural yield (food grains) which is statistically significant at 0.01. The relation between Per Capita GDP and the selected agricultural indicators namely agricultural production (food grains), area under cultivation (food grains) and agricultural yield (food grains) have under gone structural change attributing to financial crisis at 0.1 level of significance. Pooled regression pertaining to agricultural production (food grains) and agricultural yield (food grains) on food credit exhibits positive systematic risk exposure at 0.05 and 0.01 level of significance respectively. Parameter stability examination relating a) agricultural production (food grains) on food credit b) agricultural yield (food grains) on food credit showed no

statistical evidence for the former and statistically strong structural change evidence for the latter. Statistically significant systematic risk is evident from the pooled regression pertaining to market capitalisation of BSE Limited on Per Capital GDP at 0.01 level of significance. The relationship between market capitalisation of BSE Limited and Per Capital GDP of Indian economy have not undergone any structural change on account of financial crisis. Although, on account of global financial crisis, India had had few black-Mondays during 2007-08 and continued impact during 2008-09, the strong fundamentals of Indian industry verticals and investment climate, India has become the most preferred investment designation to all categories of investors especially global investors.

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