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ROLE OF MEDICINAL PLANTS IN HEPATOPROTECTION

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Abstract

From time immemorial mankind depends on nature for his livelihood. Natural products including plants, animals and minerals have been the basis of treatment of human diseases. Modern medicine has been developed by the efforts of scientists using ancient wisdom as the basis. Numerous therapeutic molecules have been synthesized from ayurvedic plants. Problems with drug resistant microorganisms, side effects of modern drugs and emerging diseases for which no medicines are available, has renewed the interest in plants as a significant source of therapeutics. Considerable research has been carried out on pharmacognosy, chemistry, pharmacology and clinical therapeutics of the ayurvedic plant sources. Liver disease is a major health problem in India. The leading cause of liver disease in India is the hepatitis virus. HBV infection especially is a serious concern among cases of liver disease which often leads to Fulminant Hepatic Failure. The modified food habits, alcohol consumption etc leads to liver disease and these days the percentage of people affected is on the raise. Hence the paper provides a short review on the plant sources that could be potential hepatoprotective agents.

1. Introduction

Man adapts to the environment and the effectiveness is measured with the parameters health and disease. From time immemorial mankind depends on nature for his livelihood and natural products including plants, animals and minerals have been used for the treatment of human diseases. The basis of development of the modern medicine and therapies is the

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ancient wisdom on natural healing and the use of herbs as medicine. The isolation of morphine from opium dates nearly 5000 years back following which many such chemicals were isolated from natural sources and used as therapeutic agents. The herbal drug kutki from *Picrorhiza kurroa* finds its first mention in the Atharva Veda (3000 BC) as a bitter tonic activating liver and its functions [1].

Numerous molecules have been synthesized from ayurvedic plants which include rauwolfia alkaloids for hypertension, psoralens for vitiligo, guggulsterones as hypolipidemic agents, baccosides for mental retention, picrosides in hepatic protection, phyllanthins as antivirals, curcumin in inflammation and many glycosides as immunomodulators. Natural product research continues to explore a variety of lead structures which may be used as templates for the development of new drugs. It is pertinent that these discoveries are based on traditional medicines [2].

Advances in synthetic chemistry led to the development of many novel molecules that are used as drugs for treating various ailments. Examples of such drugs include sulphonamides, anti-psychotics, anti- histamines and penicillin. The success of these molecules resulted in reduced interest in the natural product drug discovery [3]. Problems with drug resistant microorganisms, side effects of modern drugs and emerging diseases where no medicines are available, has renewed the interest in plants as a significant source of therapeutics. Considerable research has been carried out on pharmacognosy, chemistry, pharmacology and clinical therapeutics of the ayurvedic plant sources [4].

The medicinal plants combine three properties – curative, preventive and nutritive which provide the human body with necessary strength and vigour to cope with the disease and facilitate the action of the curative agents in the herbal drug [5].

Phyllanthus amarus Schum. & Thonn, *Picrorhiza kurroa* Benth, *Tephrosia purpurea* Linn, *Andrographis paniculata* Nees, *Eclipta alba* Linn, *Solanum nigrum* L, *Acorus calamus* L and *Tinospora cordifolia* Willd are few Indian herbs which have been traditionally used for centuries to protect and promote liver functions. *Phyllanthus amarus* has gained global reputation as a great hepatoprotector and is found to work against the virus causing Hepatitis B [5]. Hence the present review focuses on the plant sources that could be potential hepatoprotectors.

1.1 Liver Diseases

Liver is a versatile organ of the body that regulates the internal chemical environment. It is pivotal to the body and plays an astonishing array of vital functions in the maintenance and performance of the body. Some of these major functions include carbohydrate, protein, and fat metabolism, secretion of bile, an essential role in the xenobiotic metabolism and is involved in maintaining the biological equilibrium of the organism. Therefore, the maintenance of a healthy liver is vital to overall health and well being [6].

1.2 Prevalence of liver disease

Liver disease is a major health problem in India. The leading cause of liver disease in India is the hepatitis virus. HBV infection especially is a serious concern among cases of liver disease. 4.7% of the population of India are carriers of HBV, and the incidence of Fulminant Hepatic Failure was found to be 1.4 per 1000. A study was conducted to screen jaundiced patients in total of 1010 patients. 36.63% were from urban area and 36.36% were from rural areas. Out of 1010 jaundiced patients, 2.5% ended in FHF of which 61% ranged in the age group of 5-15 yrs. The etiology of disease was diagnosed in 68.48%. 61.08% were of viral etiology, 7.4% drug induced and 31.48% were idiopathic [7].

Of the worldwide incidence, mortality and prevalence of 26 cancers the most commonly diagnosed are lung (1.35 million), breast (1.15 million), and colorectal (1 million); the most common causes of cancer death are lung cancer (1.18 million deaths), stomach cancer (700,000 deaths), and liver cancer (598,000 deaths).

1.3 Drug induced liver disease

Many synthetic drugs which are alien to our body organs are being prescribed and consumed during diseased conditions which produce toxic manifestations [8]. Drugs can cause liver diseases in many ways. Some drugs are directly injurious to the liver while others are transformed to chemicals that can be injurious to the liver directly or indirectly. During the metabolic process the drug may also intoxicate the whole system by getting transformed into metabolites that have intrinsic chemical reaction towards cellular macromolecules [9].

1.4 Drugs that induce liver disease

- > Acetaminophen
- Statins
- > Amiodrane
- Industrial Toxins
 - a) Tetrachloromethane-CCl₄
 - c) Trinitrotoluene
 - e) Biphenyl

- > Methotrexate
- Nonsteroidal Antiinflammatory
 Drugs (NSAID)
- b) Ethylene chloride
- d) Acetylene tetrachloride

1.5 Herbs and Liver diseases

Herbs are staging a comeback and herbal 'renaissance' is happening all over the Globe. The herbal products today symbolise safety in contrast to the synthetics that are regarded as unsafe to human and environment. Of the 2, 50,000 higher plant species on earth, more than 80,000 are medicinal [10]. There are some important characteristics to be pointed out of the therapeutic modalities offered by these traditional herbal medicines.

- 1. Safety.
- 2. Broad action on the macro-organism.
- 3. Attention to the digestive processes.

Combining the strengths and knowledge base of the traditional systems which possess the power of combinatorial sciences a high thorough screening will provide new functional leads, reduce time, money and toxicity the three major hurdles in the development of new drugs. Herbal medicines are highly valuable, as they have been effectively tested for thousands of years on people. Ayurvedic knowledge database allows drug researchers to start from a well-tested and safe botanical material. In this process safety remains as the important beginning and efficacy becomes a matter of validation. Globally there is a positive trend towards holistic health, drug discovery and therapeutics [11].

2.0 Common plants used in the treatment of Liver Diseases

Phyllanthus niruri Linn has been reported to exhibit marked **antihepatitis B virus** surface antigen activity in in-vivo and in-vitro studies. Infectious hepatitis is due to the inability of the bodies' immune system to eliminate the virus from the liver cells: hence the **"carrier state"**.

2.1 Kizhanelli



Plate 1 Kizhanelli

Phyllanthin blocks DNA polymerase, the enzyme needed for the hepatitis B virus to reproduce. It also prevents jaundice, diabetes, dyspepsia, ulcers, sores, swellings, ophthalmia and

chronic dysentery. It is bitter, astringent, cold, anti-inflammatory, hepatoprotective and useful in liver disorders, cough, asthma, jaundice, spleen disorders. *Phyllanthin* may also help to decrease the hepatitis B virus load found in the blood stream. It also reduces the LDL and VLDL cholesterol levels. It reduces the capacity of the liver to synthesize cholesterol and increases the faecal bile acids[12]. *P. niruri* has been the subject of much phytochemical studies since the mid 1960s. Different classes of organic compounds with various medical interest have been reported, the major being the lignans, tannins, polyphenols, alkaloids, flavonoids, terpenoids and steroids [13].



Fig 1- Phyllanthin



Plate 2 Licorice

Glycyrrhiza glabra L is a powerful herb that has been used for the treatment of liver diseases. The active ingredient glycyrrhizic acid is obtained from its root and accounts for its sweet taste. The acid functions similarly to the body's hormone aldosterone and regulates the salt water balance in the body. It has been shown in some experimental procedures that it stimulates the production of interferons and hence used in the treatment of viral hepatitis.

2.2Licorice



Fig 2 - Glycyrrhizin

Licorice contains iron and is contraindicated in conditions of iron overloaded diseases such as hemochromatosis [14].

2.3Milk Thistle



Plate 3 Milk Thistle

Silymarine extracted from the medicinal herb *Silybum marianum* L is a powerful substance against liver disorders. The fruits contain medicinal substances flavonolignan formed by a flavanoid (taxifoline) and a phenol propanic molecule (coniferilic alcohol). The mixture of several types of flavanolignans is called silymarin.



Fig 3- Taxifoline

Silymarin stimulates the regeneration of hepatic cells damaged by toxic substances such as ethanol or CCl_4 and phallodine; a substance contained in amanita phalloides the poisonous mushroom. Silymarin stimulates protein synthesis in the liver and has anti-inflammatory properties on the mesenchyma of the liver. It is recommended in fatty degeneration of the liver, inflammation of the liver, acute viral hepatitis, CCl_4 poisoning, organo phosphoric insecticides and mushroom poisoning and hepatic cirrhosis [15].



Fig 4 - Silymarin

It has a regulatory action on cellular and mitochondrial permeability. It also stabilises the membrane in xenobiotic induced toxicity. It prevents the entry of toxins into hepatocytes by inhibiting the binding of toxins to the specific sites. [16, 17]

2.4 Turmeric

Turmeric (*Curcuma longa* L) has been used by the traditional practitioners of ayurveda as a cure for liver disease.



Plate 4 - Turmeric

One percent of turmeric in the diet has been prescribed to protect the system against diseases. [18] The active component of the herb is the yellow pigment curcumin and is widely used in the Unani and Ayurvdic methods of treatment in many diseases related to vital organs. It inhibits liver damage from aflotoxin and other liver toxins. The free radical scavenging activity of curcumin can arise by the resonance stabilization of its radicals from two phenolic OH groups (mainly) or from the CH_2 group of the β -diketone moiety. [19] Curcumin has been found to have hepatoprotective effects in protecting animal livers from a variety of hepatotoxic insults induced by chemicals and drugs. Turmeric and curcumin were also found to reverse biliary hyperplasia, fatty liver and liver necrosis induced by aflatoxin. [20]



Fig 5- Curcumin

2.5 Black and Long Peppers



Plate 5- Black and Long peppers

Black pepper is the king of spices and is widely used in the world. These are commonly used spices. Piperine is the active ingredient of both black pepper (*Piper nigrum* L) and long pepper (*Piper longum* Linn). Piperine reduces the effect of toxins on the liver.



Fig 6- Piperine

Piperine has the ability to prevent the depletion of glutathione form the liver and thus activates the antioxidant system, protecting the liver form the toxins [21]. It inhibits the activity of certain enzymes in the system thereby increasing the bioavailability of drugs to the body. It increases the bioavailability of curcumin 2000 times. [22]

2.6 Sacred Basil



Plate 6- Sacred Basil

Sacred basil (*Ocimum sanctum* Linn) has a long history of medicinal use. It is used in the treatment of a variety of conditions including pain, fever, vomiting, bronchitis, earache and diseases of the heart liver and diabetes, arthritis and asthma. The main constituents with likely pharmacological activity include the triterpenoid ursolic acid, rosmarinic acid, alkaloids, saponins, flavonoids (including apigenin and luteolin and glycosides), phenylpropane glucosides and tannins.



Fig 7- Ursolic Acid

Ursolic acid isolated from sacred basil protected against lipid peroxidation in liver microsomes *in vitro* [23]. Ursolic acid can serve as a starting material for synthesis of more potent bioactive derivatives, such as antitumor agents. [24] Sacred basil possesses multiple pharmacological effects including immuno-modulating, anti-stress, hepatoprotective, chemopreventive, and anti-inflammatory.

2.7 Gooseberry

Phyllanthus emblica L, also known as amla, has been used in Ayurveda, the ancient Indian system of medicine. It has been used for treatment of several disorders. It is a constituent of various multiherb formulations for liver ailments. Quercetin a bioflavonoid present in *P.emblica* is reported to prevent cytotoxicity in hepatocytes by carbon tetrachloride and tertbutyl hydroperoxide [25].



Plate 7- Gooseberry

Quercetin is categorized as a flavonol, one of the six subclasses of flavonoid compounds. Flavonoids are a family of plant compounds that share a similar flavone backbone. Quercetin may also induce insulin secretion by activation of L-type calcium channels in the pancreatic β -cells. [26]



Fig 8-Quercetin

Disease mongering makes healthy people into patients and is one of the reasons for over exposure to drugs. Risk factors like high cholesterol, liver damage, osteoporosis and irritable bowel syndrome are common features due to the drugs. The need of the hour is long term trials before the launch of a drug in the market. There is also need to encourage the age old traditional and alternative cures which will reduce the side effects caused by the chemical substituent. [27]

2.8 Majal Karisilankani

Wedelia calendulacea Less is a plant source which has been used indigenously in the ayurvedic system of medicine for its hepatoprotective activity [28].



Plate 8- Manjal Karisalankani

The leaves are used as a tonic and also useful in cough, cephalagia and diseases of the skin. In south east Asia it is used to treat hepatitis, swelling and distended stomach [29]. The juice of obtained from the herbs contained an oil soluble black dye, carotene, chlorophyll, tannin, saponin, phytosterol, waxy compounds and resin. Studies have showed the presence of alkaloid in the stem, leaves and flowers. Leaves contain isoflavonoids and wedlolactone (analogus to coumestrol an estrogen from clover) [30].



Fig 9- Wedlolactone

The plant has been scientifically validated for antioxidant [31], anticancer [32], wound healing [33], anti stress [34] and post menopausal anti osteoporotic [35] activities.

2.8 Sanku Pushpam

Clitoria ternatea L. is an ornamental perennial climber. The leaves and roots are used in the treatment of a number of ailments including body aches, infections, urinogenital disorders, and as an anti helmentic and antidote to animal stings [36]. The young shoots, leaves, flowers and tender pods are eaten as a vegetable. In Malaysia, the leaves are employed to impart a green color to food and the flowers to impart a bright blue colour to rice cakes [37]. The leaves are useful in hepatopathy and the seeds are cathartic [38]. The root, stem and flower are recommended for the treatment of snakebites and scorpion stings. [39].



Plate 9- SankuPushpam

Various pharmacological activities of *C. ternatea* have been reported in literature and some of them are antimicrobial, antipyretic, anti-inflammatory, analgesic, diuretic, local anaesthetic, antidiabetic, insecticidal, blood platelet aggregation inhibiting and vascular smooth muscle relaxant properties [37]. *C. ternatea* is commonly used in Ayurvedic medicine to treat various types of ailments including as memory enhancer, antistress, anxiolytic, antidepressant, anticonvulsant, tranquilizing and sedative agent [37].



Fig 10- Kaempferol

Various secondary metabolites such as polyphenolic flavonoids, anthocyanin glycosides, pentacyclic triterpenoids and phytosterols have been reported from this plant. Flavonols *i.e.*, kaempherols, quercetin and myricetin and their glycosides were also isolated from this plant [40].

3. Conclusion

India has a very large biodiversity which will contribute significantly for the treatment of liver diseases. The article has created an insight on the availability of the some medicinal plants that has been used by the folklore for the treatment of liver diseases. The knowledge base of traditional systems with a thorough biological screening will provide new leads in the field of drug development. This review will pave way towards the development of the healthier "green medicines" as a permanent cure for hepatic diseases.

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A STUDY ON WEYL ALGEBRAS

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ABSTRACT:

Classification of simple weight modules over weak generalized weyl algebras of rank one. The principal difference between weak generalized weyl algebras is that weak generalized weyl algebras are defined using an endomorphism rather than an automorphism of a commutative ring R. we reduce classification of simple weight modules over weak generalized weyl algebras to description of the dynamics of the action of the above mentioned endomorphism on the set of maximal ideals.

MSC CODE: 11R09.

Keywords: Simple weight modules, generalized weyl algebras, weak generalized weyl algebras.

1. INTRODUCTION:

Let R be a commutative unital ring, $\sigma: R \to R$ be an automorphism and $t \in R$.with the datum(R, σ, t) one associates a generalized weyl algebra $A = A(R, \sigma, t)$ of rank one defined as an R-ring generated by elements X and Y subject to the relations.

$$YX = t$$
, $XY = \sigma(t)$, $Xr = \sigma(r)X$, $rY = Y\sigma(r)$, for all $r \in \mathbb{R}$. (1.1).

One of the main reasons weyl these algebras attracted such a considerable attention is that the class of generalized weyl algebras contains many interesting algebras. Thus first weyl algebras, the universal enveloping algebra of s_2 , the quantum algebra U_q (s_2) and most of the

down –up algebras from [6] are all examples of generalized weyl algebras of rank one. Higher rank of , twisted and multi parameter generalizations cover much more, we refer the reader to the corresponding papers for examples.

One common feature of all studies mentioned above is that the datum defining a generalized weyl algebra (or its generalization) consists of a base ring (usually commutative and united), a collection of automorphism of this ring, a collection of elements of this ring and, perhaps, some more stuff. At the same time, the relations (1.1) may perfect sense for any **endomorphism** σ of R(which we always assume to be unital, that is $\sigma(1) = (1)$. To distinguish the latter case from the original generalized weyl algebras we will add the word weak to the classical name of the algebra and abbreviate weak generalized weyl algebras as ω GWA.

Weakening the requirement for σ from being an automorphism to being an endomorphism leads to a new family of interesting examples, namely the so – called generalized, Heisenberg algebras, see [7,14], defined as follows : let f(h) $\in \mathcal{C}$ [h]be a fixed polynomial. Then the corresponding generalized Heisenberg algebra $H_{\ell}(f)$ is defined as the \mathcal{C} -algebra generated by X,Y and h subject to the following relation:

$$hY = Yf(h); Xh = f(h)X; [X, Y] = f(h) - h.$$
 (1.2)

these algebras have many applications in theoretical physics, see the references in [14] for details. To realize $H_{\ell}(f)$ as a wGWA, we may, for example, take R = C[h, z], sett = h + z and choose σ as the endomorphism of R sending z to z and h to f(h). it is immediate to check that, using the correspondence $X \leftrightarrow X, Y \leftrightarrow Y$ and $YX \leftrightarrow h + z$, the defining relations (1.2) transfer into (1.1) and wise versa.

2. WEIGHT MODULES OVER WEAK GENERALIZED WEYL ALGEBRAS.

2.1 WEIGHT AND GENERALIZED WEIGHT MODULES

Let $A = A(R, \sigma, t)$ be a wGWA. Let max (R) denote the set of all maximal ideals in R .for an A – module M and m $\in \max(R)$ set .

$$Mm := \{ v \in M : mv = 0 \}, Mm := \{ v \in M : mkv = 0, k >> 0 \}.$$

A module M is called a weight module provided that:

$$M = \bigoplus_{M \in Max(R)} M^m$$

A module M is called generalized weight module provided that

$$M = \bigoplus_{M \in Max(R)} M_m$$

Clearly, any weight module is a generalized weight module.

For a weight A – module M define its support as the set

$$Sup(M) := \{ m \in max (R) : Mm \neq 0 \}.$$

2.2 ACTION OF GENERATORS ON WEIGHT VECTORS:

Lemma 1:

Let M be a weight A – module, $m \in supp(M)$ and $v \in M_m$ be a nonzero element. Then Xv = 0 implies $t \in m$.furthermore, Yv = 0 implies $\sigma(t) \in m$. **Proof:**

From Xv = 0 we have 0 = YXv = tv using (1.1) which implies $t \in m$. Similarly, from Yv = 0 we have $0 = XYv = \sigma(t)v$ (again using (1.1)) which implies $\sigma(t) \in m$.

Lemma 2:

Let M be a weight A – module and $m \in supp(M)$ then,

$$XM_m \subset \bigoplus_{n:\sigma(m)\subset n} M_n$$

Proof:Let v be a nonzero element in M_m . write $Xv = w_1 + w_2 + \dots + w_k$ where for each i we have, $n_iw_i = 0$ for some $n_i \in \max(R)$. without loss of generality we may assume $w_i \neq 0$ for all i and $n_i \neq n_j$ if $i \neq j$. Using(1.1) we have,

$$0 = Xmv = \sigma(m)Xv = \sum_{i} \sigma(m)w_{i}$$

which means that $\sigma(m)w_i = 0$ and hence $\sigma(m) \subset n_i$ (for each i).

Lemma 3:

Let m be a weight A- module and $m \in supp(M)$. Assume that one of the following holds

(a) we have, $\sigma(t) \notin m$.

(b) there is $n \in supp(M)$ such that $\sigma(n) \subset m$.

Then, $YM_m \subset \bigoplus_{n:\sigma(n)\subset m} M_n$

Proof:

Let v be the nonzero element in M_m . write $Yv = w_1 + w_2 + \dots + w_k$ where $n_iw_i = 0$ for some $n_i \in \max(R)$ (as above, we assume $w_i \neq 0$ for all i and $n_i \neq n_j$ if $i \neq j$).using (1.1) we have,

$$0 = n_1 n_2 \dots n_k Y v = Y \sigma(n_1 n_2 \dots n_k) v.$$

If we have $\sigma(t) \notin m$ (that is condition (a) is satisfied), then the action Y on M_m is injective, Let M be a weight A – module, $m \in supp(M)$ and $v \in M_m$ be a nonzero element.

Then Xv = 0 implies $\in m$. furthermore, Yv = 0 implies $\sigma(t) \in m$. And hence $\sigma(n_1n_2 \dots n_k)v = 0$, that is we have inclusion $R\sigma(n_1n_2 \dots n_k)R \subset m$. Then we have,

$$R\sigma(n_1)RR\sigma(n_2)R \dots R\sigma(n_k)R \in m$$

As m is maximal (and hence prime), we get $R\sigma(n_i)R \subset m$ (which is equivalent to $\sigma(n_i) \subset m$) for some i, this shows that condition (b) is satisfied.

Let us now prove the claim in the case when condition (b) is satisfied. If there is $n \in supp(m)$ such that $\sigma(n) \in m$, then from (1.1) we have $nYv = Y\sigma(n)v = 0$, which implies $n = n_i$ for all i,

Lemma 4:

For any $m \in Max(R)$ there is at most one $n \in Max(R)$ such that $\sigma(n) \subset m$.

Proof:

Assume $k, n \in max(R)$ are such that $\sigma(k) \subset m, \sigma(n) \subset m$ and $k \neq n$. Then k + n = R and hence $\sigma(R) = \sigma(k + n) \subset m$ which contradicts $\sigma(1) = 1$ (recall that σ was assumed to be a unital endomorphism of R).

2.3.ESSENTIAL ENDOMORPHISMS:

We say that σ is essential provided that for any $m \in \max(R)$ the canonical inclusion

$$\sigma(R)/(\sigma(R)\cap m) \to R/m$$

Is surjective. Obviously, if σ is an automorphism, then it is an essential endomorphism.

Example 1:

Assume that R is finitely or countably generated algebra over an uncountable algebraically closed filed K and σ is K-linear.then $K_m \cong K$ for any $m \in \max(R)$ (see lemma1) and hence any (unital) endomorphism of R is essential.

Example 2:

Let $\sigma: \mathcal{Q} \to \mathcal{Q}$ be a non-surjective ring homomorphism. Then such σ is obeviously not essential. Existance of such σ follows from the fact that the algebraic clousure of the field $\mathcal{Q}(x)$ of rational functions is isomorphic to \mathcal{Q} by steinitz theorem, see [20, p. 125]. as σ we thus can take the composition $\mathcal{Q} \subseteq \mathcal{Q}(x) \subseteq \overline{\mathcal{Q}(x)} \cong \mathcal{Q}$.

From now on we always assume that σ is essential.

Lemma 5:

Asseme that σ is essential. Let M be a A-module, $m \in supp(M)$ and $v \in M_m$ then

 $Rv = \sigma(R)v.$

Proof:

We have $Rv = K_m v$ since mv = 0. Further, $K_m v = \sigma(R)v$ since σ is essential.

Lemma 6:

Assume that σ is essential. let M be a A-module, $m \in supp(m)$ and assume that $YM_m \neq 0$. Then there is a unique $n \in supp(M)$ such that $\sigma(n) \subset M_m$, morever, $YM_m \subset M_n$.

Proof:

Taking into account by lemma, let m be a weight A- module and $m \in supp(M)$. Assume that one of the following holds

(a) we have, $\sigma(t) \notin m$.

(b) there is $n \in supp(M)$ such that $\sigma(n) \subset m$.

Then,
$$YM_m \subset \bigoplus_{n:\sigma(n)\subset m} M_n$$

and by the lemme, For any $m \in Max(\mathbb{R})$ there is at most one $n \in Max(\mathbb{R})$ such that $\sigma(n) \subset m$. *m*. To prove the existence of $n \in supp(M)$ such that $\sigma(n) \subset m$. Let v be a nonzero element in M_m such that $Yv \neq 0$. Write $Yv = w_1 + w_2 + \dots + w_k$ where $n_iw_i = 0$ for some $n_i \in \max(R)$ we assume $w_i \neq 0$ for all i and $n_i \neq n_j$ if $i \neq j$. On the one hand, $n_kYv = Y\sigma(n_k)v$ by(1.1). on the other hand,

$$n_k Y v = n_k (w_1 + w_2 + \dots + w_k) = n_k w_1 + n_k w_2 + \dots + n_k w_{k-1}$$

Since $n_k w_k = 0$. Moreover, $n_k w_i \neq 0$ for all i < k since $n_i \neq n_j$. Therefore we may assume k = 1 and set $w: w_1$ and $n: n_1$.

Assume $\sigma(n) \not\subset m$. We have $0 = nYv = Y\sigma(n)v$. Pick $a \in n$ such that $\sigma(a) \notin m$. As σ is essential, there is $b \in R$ such that, $(\sigma(b) + m)(\sigma(a) + m) = 1 + m$.

On the one hand, we have, baYv = 0 since aYv = 0. On the other hand, by (1.1) we have

$$baYv = Y(\sigma(b)\sigma(a)v = Y(1v) = Yv \neq 0$$

By our assumptions a contradiction. This completes the proof.

2.4 STRING MODULES:

Denote ∞Q_{∞} the set of all possible maps $Z \mapsto \max(R)$, $i \to m_i$ such that $\sigma(m_i) \subset m_{i+1}$ for all $i \in Z$. we will write $\underline{m} := (m_i) \in \infty Q_{\infty}$ if the collection (m_i) comes from such a map.

For $i \in Z$. define $X : K_{mi} \to K_{mi+1}$ as mapping $r + m_{i+1}$. to $\sigma(tr) + m_{i+1}$ Further, define $Y : K_{mi} \to K_{mi-1}$ as mapping $r + m_i$ to $s + m_{i-1}$ for some $s \in R$ such that $\sigma(s) \in r + m_i$

Such on $s \in R$ exists because σ is essential. For $\underline{m} :\in \infty Q_{\infty}$ set.

$$N(m) \coloneqq \bigoplus_{i \in Z} K_{mi}$$

Then $N(\underline{m})$ carries the natural structure of an R-module. by construction, the action of Y on $N(\underline{m})$ defined above is bijective.

Lemma 7:

The above defines on $N(\underline{m})$ the structure of a weight A-module.

Proof:

First let us check that the action of Y is well-defined. If $s, s \in R$ are such that $\sigma(s), \sigma(s') \in r + m_i$ then $\sigma(s, s') \in m_i$. Since σ is unital in particular, nonzero and K_{mi-1} is field, follows that $s, s' \in m_{i-1}$ therefore the action of Y is well-defined.

It remains to check relations (1.1).

for $r \in R$ and $i \in Z$ we have(using the notation above)

$$XY(r + m_i) = X(s + m_{i-1}) = \sigma(ts) + m_i = \sigma(t)r + m_i,$$
$$YX(r + m_i) = Y(\sigma(tr) + m_{i+1}) = tr + m_i.$$

Moreover, for $a \in R$ we also have $Xa(r + m_i) = X(ar + m_i) = \sigma(tar) + m_{i+1}$

$$= \sigma(a)(\sigma(tr) + m_{i+1}) = \sigma(a)X(r + m_{i.})$$

Finally, for $a \in R$ we have ,

$$aY(r + m_i) = a(s + m_{i-1}) = as + m_{i-1}$$
$$Y\sigma(a)(r + m_i) = Y(\sigma(a)r + m_i = s' + m_{i-1,i})$$

Where s' is such that $\sigma(s') + m_i = \sigma(a)r + m_i$ note that we have $r + m_i = a(s) + m_i$ and hence $\sigma(a)r + m_i = \sigma(a)\sigma(s) + m_i = \sigma(as) + m_i$.

Since σ is a homomorphism. By the previous paragraph, we thus $s' + m_{i-1} = as + m_{i-1}$ and the proof is complete.

Lemma 8:

And

For $m,\underline{n} \in \infty Q_{\infty}$ we have $N(m) \cong N(n)$ if and only if there is $\mathbb{K} \in \mathbb{Z}$ such that $m_i = n_{i+k}$ for all $i \in \mathbb{Z}$.

Proof :

The "if" part is clear. To prove the "only if" part we consider an isomorphism

$$\varphi: N(\mathbf{m}) \to N(\mathbf{n}) \text{ and let } v \in K_{m0}$$

Be a nonzero element. We have $\varphi(v) = \sum_{i \in Z} w_i$ with $w_i \in K_{ni}$. as $\varphi(v) \neq 0$ we may define $l : \max\{i \in Z : w_i \neq 0\}$. As φ is a isomorphism, we have $n_l = m_0$ now the fact that $n_{l-i} = m_{-i}$ for all $i \in \mathbb{N}$ follows Assume that σ is essential. let M be a A-module, $m \in supp(m)$ and assume that $YM_m \neq 0$. Then there is a unique $n \in supp(M)$ such that $\sigma(n) \subset M_m$, morever, $YM_m \subset M_n$ the fact that $n_{l+i} = m_{+i}$ for all $i \in \mathbb{N}$ follows by combining that φ is an isomorphism and that the action of Y is bijective on both N(m) and N(n).

Lemma 9:

The above defines on $N \uparrow (m)$ the structure of a weight A-module. **Proof**:

First let us check that the action of Y is well-defined. If $s, s \in R$ are such that $\sigma(s), \sigma(s') \in r + m_i$ then $\sigma(s, s') \in m_i$. Since σ is unital in particular, nonzero and K_{mi-1} is field, follows that $s, s' \in m_{i-1}$ therefore the action of Y is well-defined.

It remains to check relations (1.1). for $r \in R$ and $i \in Z$ we have(using the notation above)

$$XY(r + m_i) = X(s + m_{i-1}) = \sigma(ts) + m_i = \sigma(t)r + m_i,$$
$$YX(r + m_i) = Y(\sigma(tr) + m_{i+1}) = tr + m_i.$$

Moreover, for $a \in R$ we also have $Xa(r + m_i) = X(ar + m_i) = \sigma(tar) + m_{i+1}$

$$= \sigma(a)(\sigma(tr) + m_{i+1}) = \sigma(a)X(r + m_{i})$$

Finally, for $a \in R$ we have

And

$$aY(r + m_i) = a(s + m_{i-1}) = as + m_{i-1}$$
$$Y\sigma(a)(r + m_i) = Y(\sigma(a)r + m_i = s' + m_{i-1})$$

Where s' is such that $\sigma(s') + m_i = \sigma(a)r + m_i$. note that we have $r + m_i = a(s) + m_i$ and hence $\sigma(a)r + m_i = \sigma(a)\sigma(s) + m_i = \sigma(as) + m_i$.

Since σ is a homomorphism. By the previous paragraph, we thus $s' + m_{i-1} = as + m_{i-1}$

The module $N\uparrow(\underline{m})$ will be referred to as aright infinite string module. Note that some right infinite string modules are subquotients of double infinite string modules. The weight m_0 will be called the lowest weight.

Lemma 10:

For
$$\underline{m} \ \underline{n} \in Q_{\infty}$$
 we have $N \uparrow (m) \cong N \uparrow (n)$ if $\underline{m} = \underline{n}$.

Proof:

The "if" part is clear. To prove the "only if" part we consider an isomorphism

$$\varphi: N(\mathbf{m}) \to N(\mathbf{n})$$
 and let $v \in K_{m0}$

Be a nonzero element. We have $\varphi(v) = \sum_{i \in Z} w_i$ with $w_i \in K_{ni}$. as $\varphi(v) \neq 0$ we may define $l : \max\{i \in Z : w_i \neq 0\}$. as φ is a isomorphism, we have $n_l = m_0$ now the fact that $n_{l-i} = m_{-i}$ for all $i \in \mathbb{N}$ follows. Assume that σ is essential. let M be a A-module, $m \in supp(m)$ and assume that $YM_m \neq 0$. Then there is a uniqe $n \in supp(M)$ such that $\sigma(n) \subset M_m$, morever, $YM_m \subset M_n$ the fact that $n_{l+i} = m_{+i}$ for all $i \in \mathbb{N}$ follows by combining that φ is an isomorphism and that the action of Y is bijective on both N(m) and N(n). Denote by ∞Q the set of all maps $Z_- \coloneqq \{0, -1, -2, ...\} \rightarrow \max(R), i \mapsto m_i$, such that $\sigma(m_{i-1}) \subset m_i$ for all $i \in Z_-$ and, additionally, $t \in m_0$. we will write $\underline{m} := (m_i) \in \infty Q$ if the collection (m_i) comes from such map.

For
$$\underline{\mathbf{m}} \in \infty Q$$
 set $N \downarrow (m) : \bigoplus_{i \in \mathcal{I}} K_{min}$

Then $N \downarrow (m)$ carries the natural structure of an R-module. Set $XK_{mi} = 0$ and for $i \in \{-1, -2, -3, ...\}$ define $X: K_{mi} \to K_{mi+1}$ as mapping $r + m_i$ to $s + m_{i-1}$ for some $s \in R$ such that $\sigma(s) \in r + m_i$. such an $s \in R$ exists because σ is essential.

2.5 Simplicity of string modules:

We call $\underline{m} \in \infty Q_{\infty}$ periodic provided that there is a nonzero $\mathbb{K} \in \mathbb{Z}$ such that $m_i = m_{i+k}$ for all $i \in \mathbb{Z}$ and aperiodic otherwise.

Lemma: 11.

The above defines on M^f the structure of a simple weight A-module, moreover $M^f \in M^f$ if and only if f and \overline{f} are similar.

Proof :

To prove that M^f is an A-module, we have checked the defining relations. They all are immediate from the definitions. To prove simplicity let $v \in M^f$ be a nonzero weight element.

As the actions of Y is bijective, we may assume $\in M_m^f$. The linear operator Y^k on M_m^f is bijective by definition and hence defines on M_m^f the structure of a P- module which is isomorphic to L_f by constructions. Therefore the A-submodule generated by v contains M_m^f and thus the whole of M^f as the action of Y is bijective.

Define the Weight A-module N_f with $supp(N^f) := \{m_0, m_1, m_2, \dots, m_{k-1}\}$

As follows for $i \in \{1,2,3,...,k-2\}$ define the R-module M_m^f as $T_i^{-1}L_f$, that is $M_{mi}^f = L_f$ as the vector space but the action of R is twisted by T_i^{-1} that $isT_i(r+m)$. v = (r+m)v for $r \in R$ and $v \in L_f$. For i=0,1,2,...,k-2 define the action of X form $M_{mi}^f = L_f$ to $M_{mi+1}^f = L_f$ as the identity. Define the action of X form M_{mk-1}^f to M_{m0}^f as the action of X is bijective. Define the action Y on Xv as tv.

3. CONCLUSION :

Hence we conclude that the difference between weak generalized weyl algebras are defined endomorphism and automorphism of a commutative ring, and also know that the applications of our results to the study of generalized Heisenberg algebras.

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A STUDY ON FIBONACCI AND LUCAS POLYNOMIAL

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ABSTRACT

In this paper, we are study about some arithmetic properties for the Fibonacci and Lucas polynomials associated with the Fibonacci and Lucas numbers. By applying some elementary methods and techniques for the Fibonacci and Lucas polynomials. We obtained the results for unsigned and signed generalized Lucas sequence from the Dickson polynomials. It turns out that some known results in the references are obtained as special cases.

MSC CODE:12D05

Keywords: Fibonacci, Lucas and Dickson Polynomials

1. INTRODUCTION

Leonardo Pisano Fibonacci [Approximately 13th century 1170-1250] was born in Pisa (now in Italy) but obtained his education in North Africa. He investigated sequence is 1,1,2,3,5,8,13,21,34,55,...,which was called Fibonacci Sequence. This sequence shows that each number is the sum of the two preceding numbers. It is a sequence that is seen and used in many different areas of mathematics and science. The sequence is an example of a recursive sequence.

The Fibonacci sequence was actually given the name by a French mathematician Edouard lucas in the 1870's.

Fibonacci polynomials are a great importance in Mathematics. Large classes of polynomials can be defined Fibonacci like recurrence relation and yield Fibonacci numbers. Such polynomials, called the Fibonacci polynomials were studied in 1883 by the Belgian Mathematician Eugene Charles Catalan and the German Mathematician E.Jacobsthal.

Francois Edouard Anatole Lucas [April 14, 1842 in Amiens-October 3, 1891] was a French Mathematician .Lucas was educated at the Ecole Normale Superieure. He worked in the pair's observatory and later became a professor of mathematics in pairs. In the meantime he served in the army.

Lucas is known for his study of the Fibonacci sequence. He investigated sequence (sequence 2, 1, 3, 4, 7, 11, 18,...) which was called Lucas Sequence. In many works, This sequence is notated as L_n (n=0, 1, 2, 3,...) to represent the first letter of the last name Lucas. Fibonacci and Lucas numbers are closely defined but they exhibit distinct properties.

2. Fibonacci and Lucas polynomials

Definition 2.1:

Consider the sequence of numbers f_1 , f_2 , f_3 , ... such that $f_1 = 1$, $f_2 = 1$ and $f_n = f_{n-1} + f_{n-2}$ for $n \ge 3$, then the terms of the sequence are called **Fibonacci numbers** and f_n is itself called the n^{th} Fibonacci number.

Clearly, any Fibonacci number other than the first two is the sum of the preceding two numbers.

Example 2.1:

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, ... are Fibonacci numbers.

Definition 2.2:

The **Lucas number** defined to be the sum of its two immediate previous terms, thereby forming a Fibonacci integer sequences. The first two Lucas number are $L_0 = 2$ and $L_1 = 1$ as opposed to the first two Fibonacci number $F_0 = 0$ and $F_1 = 1$.

Though closely related in definition, Lucas and Fibonacci numbers exhibit distinct properties.

The Lucas numbers defined as follows:

$$L_0 = 2$$
, $L_1 = 1$, $L_n = L_{n-1} + L_{n-2}$ for $n \ge 2$

Example 2.2:

The sequence of Lucas number is , 2 , 1 , 3 , 4 , 7 , 11 , 18 , 29 , 47 , ...

Definition 2.3:

The sequence of **Fibonacci polynomial** $F_n(x)$ is a sequence of polynomials defined by the recurrence relation,

$$F_1(x) = 1, F_2(x) = x, F_n(x) = x F_{n-1}(x) + F_{n-2}(x), \text{ if } n \ge 3 \qquad --(1.1)$$

We have to write this recurrence relation in another ways,

$$F_{n+1}(x) = x F_n(x) + F_{n-1}(x), \text{ if } n \ge 1 \qquad --(1.2)$$

(or)

$$F_{n+1}(x) = x F_n(x) + F_{n-1}(x)$$
, if $n \ge 2$ and -- (1.3)

$$F_{n+2}(x) = x F_{n+1}(x) + F_n(x), \text{ if } n \ge 1 \qquad --(1.4)$$

Definition2.4:

The sequence of Lucas polynomial $L_n(x)$ is a sequence of polynomials defined by the recurrence relation,

$$L_0(x) = 2, L_2(x) = x, L_n(x) = x L_{n-1}(x) + L_{n-2}(x), \text{ if } n \ge 2 \qquad \qquad \text{--}(1.5)$$

We can write this recurrence relation in another ways, that is

$$L_{n+1}(x) = x L_n(x) + L_{n-1}(x), \text{ if } n \ge 1 \qquad --(1.6)$$

and

$$L_{n+2}(x) = x L_{n+1}(x) + L_n(x), \text{ if } n \ge 0 \qquad --(1.7)$$

Example 2.4:

L₀(x)=2 , L₃(x)=
$$x^{3}+3x$$

L₁(x)=x , L₄(x)= $x^{4}+4x^{2}+2$
L₂(x)= $x^{2}+2$, L₅(x)= $x^{5}+5x^{3}+5x$

Theorem 3.1: The Generating Function of the Fibonacci and Lucas

polynomials:

$$G_{\{Fn(x)\}}(t) = \sum_{n=0}^{\infty} F_n(x) t^n = \frac{t}{1 - t(x + t)}$$
 -- (2.1)

$$G_{\{Ln(x)\}}(t) = \sum_{n=0}^{\infty} L_n(x) t^n = \frac{2 - xt}{1 - t(x+t)}$$
 -- (2.2)

We have,
$$\alpha(x) + \beta(x) = x$$
 --(2.3)

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$$\alpha$$
 (x) . β (x)=-1 --(2.4)

$$\alpha(x) - \beta(x) = \sqrt{x^2 + 1}$$
 --(2.5)

Where
$$\alpha(x) = \frac{x + \sqrt{x^2 + 4}}{2}$$
 and -----(2.6)

$$\beta(\mathbf{x}) = \frac{\mathbf{x} - \sqrt{\mathbf{x}^2 + 4}}{2}$$
 ------(2.7)

Properties 3.1:

Let m, n be any non negative integers. Then,

1)
$$F_n(x) = \frac{\alpha^{n}(x) - \beta^{n}(x)}{\alpha(x) - \beta(x)}$$
, $L_n(x) = \alpha^{n}(x) + \beta^{n}(x)$
2) $t^n = F_n(x) t + F_{n-1}(x)$

3)
$$F_{m+n+1}(x) = F_{m+1}(x) F_{n+1}(x) + F_m(x) F_n(x)$$

Theorem 3.2:

$$x \sum_{1}^{n} F_{i}(x) = F_{n+1}(x) + F_{n}(x) - 1$$

Proof:

Using the recurrence relation (1.3), we get

$$\sum_{1}^{n} F_{i+1}(x) = x \sum_{1}^{n} F_{i}(x) + \sum_{1}^{n} F_{i-1}(x)$$

 $F_n(x) + F_{n+1}(x) = x \sum_{i=1}^{n} F_i(x) + F_0(x) + F_1(x)$

That is,

Since $F_0(x) = 0$ and $F_1(x) = 1$, it follows that

 $x \sum_{1}^{n} F_{i}(x) = F_{n}(x) + F_{n+1}(x) - 1$ Hence proved.

Theorem 3.3:

Let m, n be any non negative integers, then

a)
$$F_{m+n}(x) = \sqrt{x^2 + 4} F_m(x) F_n(x) + \beta^m(x) F_n(x) + \beta^n(x) F_m(x)$$
 and
b) $L_{m+n}(x) = L_m(x) L_n(x) - \beta^m(x) L_n(x) - \beta^n(x) L_m(x) + 2\beta^{m+n}(x)$

Proof:

It is easy to see that for any non negative integer's m, n. Then,

$$\{\alpha^{m}(x) - \beta^{m}(x)\}\{\alpha^{n}(x) - \beta^{n}(x)\} = \alpha^{m+n}(x) - \alpha^{n}(x) \cdot \beta^{m}(x) - \alpha^{m}(x) \beta^{n}(x) + \beta^{m+n}(x)$$

$$= \alpha^{m+n}(x) - \beta^{m+n}(x) - \beta^{n}(x) \{ \alpha^{m}(x) - \beta^{m}(x) \} - \beta^{m}(x) \{ \alpha^{n}(x) - \beta^{n}(x) \}$$

Hence, Applying the first formula of property (1) to above equation, we get $\frac{\{\alpha^{m}(x) - \beta^{m}(x)\}\{\alpha^{n}(x) - \beta^{n}(x)\}}{[\alpha(x) - \beta(x)]^{2}} [\alpha(x) - \beta(x)]^{2} = \alpha^{m+n}(x) - \beta^{m}(x) - \beta^{n}(x) \{\alpha^{m}(x) - \beta^{m}(x)\} - \beta^{m}(x) - \beta^{n}(x) -$

$$\frac{\{\alpha^{m}(x)-\beta^{m}(x)\}\{\alpha^{n}(x)-\beta^{n}(x)\}}{[\alpha(x)-\beta(x)]^{2}}=\frac{\alpha^{m+n}(x)-\beta^{m+n}-\beta^{n}(x)\{\alpha^{m}(x)-\beta^{m}(x)\}-\beta^{m}(x)\{\alpha^{n}(x)-\beta^{n}(x)\}}{[\alpha(x)-\beta(x)]^{2}}$$

$$F_{m+n}(x) = \sqrt{x^2} + 4 F_m(x) \cdot F_n(x) + \beta^n(x) F_m(x) + \beta^m(x) F_n(x)$$

Similarly, we have to prove (b)

$$L_{m}(x).L_{n}(x) = \{ \alpha^{m}(x) + \beta^{m}(x) \} \{ \alpha^{n}(x) + \beta^{n}(x) \}$$

= $\alpha^{m+n}(x) + \beta^{m+n}(x) + \beta^{n}(x) \{ \alpha^{m}(x) + \beta^{m}(x) \} + \beta^{m}(x) \{ \alpha^{n}(x) + \beta^{n}(x) \} - 2\beta^{m+n}(x)$
 $L_{m+n}(x) = L_{m}(x) L_{n}(x) - \beta^{n}(x) L_{m}(x) - \beta^{m}(x) L_{n}(x) + 2\beta^{m+n}(x)$

Hence the proof.

Theorem 3.4:

Let $n \ge 2$ be any positive integer. Then for any non negative integer m. $L_{n+m} = F_{m+n}(x) L_{n-1}(x)$ + $F_{m+1}(x) L_{n-2}(x)$

Proof:

We shall prove the theorem by induction on m. It is obvious that equation (1.6) implies the case m=0.Now assumes that the theorem holds for any non negative integer m. Then,

$$L_{n+m} = F_{m+2}(x) L_{n-1}(x) + F_{m+1}(x) L_{n-2}(x)$$
(2.8)

So, from (1.1) and (2.8), we get

$$L_{n+m+1}(x) = x L_{n+m}(x) + L_{n+m-1}(x)$$

= $x[F_{m+2}(x) L_{n-1}(x) + F_{m+1}(x) L_{n-2}(x)] + [F_{m+1}(x) L_{n-1}(x) + F_m(x) L_{n-2}(x)$
 $L_{n+m+1}(x) = F_{m+3}(x) L_{n-1}(x) + F_{m+2}(x) L_{n-2}(x)$

Thus we conclude the induction step. Hence complete the proof of this theorem.

4. DICKSON POLYNOMIAL:

Definition 4.1:

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The **Dickson polynomial** $D_n(x \ , \ Q \)$ is a permutation polynomial for the field with q elements if n is coprime to q²-1 .

Definition 4.2:

For $a \in \mathbb{F}_q$, and any positive integers n and k and define the nth dickson polynomial of the $(\mathbf{k+1})^{\text{th}}$ kind $D_{n,k}(x, a)$ over \mathbb{F}_q by,

$$D_{n,k}(x, a) = \sum_{i=0}^{\left[\frac{n}{2}\right]} \frac{n-ki}{n-i} {\binom{n-1}{i}} (-a)^i x^{n-2i}$$
(3.1)

Definition 4.3:

For $a \in \mathbb{F}_q$, and positive integers n and k and define the nth reversed Dickson polynomial of the $(k+1)^{\text{th}}$ kind $D_{n,k}(a, x)$ over \mathbb{F}_q by,

$$D_{n,k}(a, x) = \sum_{i=0}^{\left[\frac{n}{2}\right]} \frac{n-ki}{n-i} {\binom{n-1}{i}} (-1)^i a^{n-2i} x^i \qquad -----(3.2)$$

5. The Results for Unsigned Generalized Lucas Sequences

Theorem 5.1:

Let $g_k(x) = \prod_{\substack{t=1 \ t \text{ is odd}}}^{2k} (x - (\eta^t + \eta^{-t}))$ be the characteristic polynomial of generalized

Lucas sequence of order $k \ge 1$ and $g_0(x) = 1$. Then

i) $g_k(x) = E_k(x) - E_{k-1}(x)$ for $k \ge 1$.

ii) $g_k(x)$ satisfies the following recurrence relation :

 $g_0(x) = 1$, $g_1(x) = x - 1$, $g_k(x) = x g_{k-1}(x) - g_{k-2}(x)$ for $k \ge 2$.

iii) The generating function of the above recurrence is

$$G(x;t) = \frac{1-t}{1-xt+t^2}$$

iv) $g_k(x) = \sum_{i=0}^k (-1)^{\left[\frac{i}{2}\right]} {k-\left[\frac{i}{2}\right] \choose \left[\frac{i}{2}\right]} x^{k-i}$

Proof:

i) Let $G_k(x) = E_k(x) - E_{k-l}(x)$ for $k \ge l$ (4.1)

Using the fundamental expression

$$E_k(y + y^{-1}) = \frac{y^{k+1} + y^{-(k+1)}}{y - y^{-1}}$$

Now substitute $x = y + y^{-1}$ in equation (4.1),

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$$G_{k}(y + y^{-1}) = E_{k}(y + y^{-1}) - E_{k-l}(y + y^{-1})$$

$$= \frac{y^{k+1} + y^{-(k+1)}}{y - y^{-1}} - \left(\frac{y^{k-1+1} + y^{-(k-1+1)}}{y - y^{-1}}\right)$$

$$\therefore \quad G_{k}(y + y^{-1}) = -\frac{(y^{2k+1} + 1)}{y^{k}(y + 1)}$$
Put $y = \eta^{t}$ then $G_{k}(\eta^{t} + \eta^{-t}) = -\frac{(\eta^{t(2k+1)} + 1)}{\eta^{kt}(\eta^{t} + 1)}$

Let η be a primitive $(4k + 2)^{\text{th}}$ root of unity

Hence
$$\eta^{(2k+1)} = -1$$
 and thus $G_k(\eta^t + \eta^{-t}) = \frac{(\eta^{t(2k+1)} + 1)}{\eta^{kt}(\eta^t + 1)} = 0 \forall odd t$

Hence all the roots of $g_k(x)$ are roots of $G_k(x)$.

Moreover, $deg(G_k(x)) = deg(g_k(x)) = k$ and both $G_k(x)$ and $g_k(x)$ are monic.

Hence,
$$g_k(x) = E_k(x) - E_{k-1}(x)$$
 ------(4.2)

ii) Using recurrence relation,

$$E_k(x) = x E_{k-1}(x) - E_{k-2}(x)$$
 (4.3)

Since, $g_0(x) = 1$. Then, put k = 1 in equation 1

$$g_k(x) = E_k(x) - E_{k-1}(x)$$

$$g_1(x) = x - 1$$
------(4.4)

Substitute equation (4.3) in (4.2),

$$g_k(x) = E_k(x) - E_{k-1}(x)$$
$$= xE_{k-1}(x) - E_{k-2}(x) - xE_{k-2}(x) + E_{k-3}(x)$$

Hence, $g_k(x) = x g_k(x) - g_{k-2}$ for $k \ge 2$.

iii) The generating function $G_k(x; t)$ of $g_k(x)$ can be derived from

$$(1 - xt + t^{2}) G_{k}(x; t)$$

$$= (1 - xt + t^{2}) \sum_{k=0}^{\infty} g_{k}(x) t^{k}$$

$$= 1 + (x - 1) t - xt + (\sum_{k=0}^{\infty} g_{k+2}(x) - x \sum_{k=0}^{\infty} g_{k+1}(x) + \sum_{k=0}^{\infty} g_{k}(x)) t^{k+2}$$

$$= 1 - t$$

Hence, $G_k(x;t) = \frac{1-t}{1-xt+t^2}$

iv) From equation (4.1),

$$g_k(x) = E_k(x) - E_{k-1}(x)$$

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$$= \sum_{j=0}^{\left[\frac{k}{2}\right]} {\binom{k-j}{j}} (-1)^{j} x^{k-2j} \cdot \sum_{j=0}^{\left[\frac{k-1}{2}\right]} {\binom{k-1-j}{j}} (-1)^{j} x^{k-1-2j}$$

Therefore, $g_k(x) = \sum_{i=0}^k \binom{k - [\frac{i}{2}]}{[\frac{i}{2}]} (-1)^{[\frac{i}{2}]} x^{k - i}$

Hence proved.

6. The Results for Signed Generalized Lucas Sequences

Theorem 6.1:

Let $f_k(x) = \prod_{\substack{t=1\\t \text{ is even}}}^{2k} (x - (\eta^t + \eta^{-t}))$ be the characteristic polynomial of signed

generalized lucas sequence of order $k \ge 1$ and $f_0(x) = 1$. Then

i) $f_k(x) = E_k(x) - E_{k-1}(x)$ for $k \ge 1$.

ii) $f_k(x)$ satisfies the following recurrence relation :

$$f_0(x) = 1$$
, $f_1(x) = x + 1$, $f_k(x) = x f_{k-1}(x) - f_{k-2}(x)$ for $k \ge 2$.

iii) The generating function of the above recurrence is $F(x; t) = \frac{1+t}{1-xt+t^2}$

$$iv) f_k(x) = \sum_{i=0}^k (-1)^{\left[\frac{i}{2}\right]} \binom{k - \left[\frac{i}{2}\right]}{\left[\frac{i}{2}\right]} x^{k - i}$$

Proof:

:.

i) Let $F_k(x) = E_k(x) + E_{k-1}(x)$ for $k \ge 1$

Using the fundamental expression of $E_n(x)$

$$E_k(y + y^{-1}) = \frac{y^{k+1} + y^{-(k+1)}}{y - y^{-1}}$$

Now substitute $x = y + y^{-1}$ in equation (5.1),

$$F_{k}(y + y^{-1}) = E_{k}(y + y^{-1}) + E_{k-1}(y + y^{-1})$$
$$= \frac{y^{k+1} + y^{-(k+1)}}{y - y^{-1}} + \left(\frac{y^{k-1+1} + y^{-(k-1+1)}}{y - y^{-1}}\right)$$
$$F_{k}(y + y^{-1}) = \frac{(y^{2k+1} + 1)}{y^{k}(y - 1)}$$
Put $y = \eta^{t}$

$$F_{ks}(\eta^{t} + \eta^{-t}) = \frac{(\eta^{t(2k+1)} + 1)}{\eta^{kt}(\eta^{t} - 1)}$$

(5.1)

Let η be a primitive $(4k + 2)^{\text{th}}$ root of unity.

Hence
$$\eta^{(2k+1)} = -1$$
 and thus $F_k(\eta^t + \eta^{-t}) = \frac{(\eta^{t(2k+1)} + 1)}{\eta^{kt}(\eta^t - 1)} = 0$ For all odd t.

Hence all the roots of $f_k(x)$ are roots of $F_k(x)$.

Moreover , $deg(F_k(x)) = deg(f_k(x)) = k$ and both $F_k(x)$ and $f_k(x)$ are monic .

Hence,
$$f_k(x) = E_k(x) - E_{k-1}(x)$$
 -----(5.2)

ii) Using recurrence relation,

$$E_{k}(x) = xE_{k-1}(x) - E_{k-2}(x)$$
 ------ (5.3)

Since, $f_0(x) = 1$. Then, put k = 1 in equation (1) we get, $f_k(x) = E_k(x) - E_{k-1}(x)$ $f_1(x) = x - 1$ -----(5.4)

Substitute equation (5.3) in (5.2),

$$\begin{split} f_k(x) &= E_k(x) - E_{k-1}(x) \\ &= x E_{k-1}(x) - E_{k-2}(x) - x E_{k-2}(x) + E_{k-3}(x) \end{split}$$

Hence,

 $e, \qquad f_k(x) = x f_{k-1}(x) - f_{k-2} \text{ for } k \ge 2 .$

iii) The generating function $F_k(x;t)$ of $f_k(x)$ can be derived from

$$(1 - xt + t^{2}) F_{k}(x; t)$$

$$= (1 - xt + t^{2}) \sum_{k=0}^{\infty} f_{k}(x) t^{k}$$

$$= 1 + (x + 1) t - xt + (\sum_{k=0}^{\infty} f_{k+2}(x) - xf_{k+1}(x) + f_{k}(x)) t^{k+2}$$

$$= 1 + t$$

Hence, $F_k(x; t) = \frac{1+t}{1-xt+t^2}$

iv) From equation (5.1)

$$\begin{split} f_{k}(x) &= E_{k}(x) - E_{k-1}(x) \\ &= \sum_{j=0}^{\left\lfloor \frac{k}{2} \right\rfloor} {\binom{k-j}{j}} (-1)^{j} x^{k-2j} - \sum_{j=0}^{\left\lfloor \frac{k-1-j}{2} \right\rfloor} {\binom{k-1-j}{j}} (-1)^{j} x^{k-1-2j} \\ &\therefore \quad f_{k}(x) = \sum_{i=0}^{k} (-1)^{\left\lfloor \frac{i}{2} \right\rfloor} {\binom{k-\left\lfloor \frac{i}{2} \right\rfloor}{\left\lfloor \frac{i}{2} \right\rfloor}} x^{k-1} \text{ hence proved.} \end{split}$$

7. CONCLUSION:

Hence, we conclude this paper the fundamental features of Fibonacci and Lucas polynomials were investigated. All the concepts based on the Number Theory and Algebraic polynomials.

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ON TERNARY QUADRATIC DIOPHANTINE EQUATION $x^2+xy+y^2 = 19z^2$

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Abstract

The Homogenous Ternary Quadratic Diophantine Equation is given by $x^2 + xy + y^2 = 19z^2$ is considered and analyzed for its patterns of non zero distinct integer solutions. Introducing the linear transformation x=v+u, y=v-u and employing the method of factorization, different patterns of non zero distinct integer solutions to the above equation are obtained. A few interesting the relation between the solution and polygonal numbers are obtained.

Keywords: Homogenous Quadratic, Ternary Quadratic, Integer solutions.

MSC2010: 11D09

1. INTRODUCTION

The ternary quadratic Diophantine equation offers an unlimited field for research because of their variety [1-2]. In particular, one may refer [3-16] for finding integer points on the some specific three dimensional surface. This communication concern with yet another ternary quadratic equation $x^2 + xy + y^2 = 19z^2$ representing cone for determining its infinitely many integral solutions. Employing the integral solutions on the given cone, a few interesting relations among the special polygonal numbers are given.
NOTATION USED
$$t_{m,n} = n \left(1 + \frac{(n-1)(m-2)}{2} \right) = \text{Polygonal number of rank n with sides m.}$$

2. METHOD OF ANALYSIS

Consider the equation

$$x^2 + xy + y^2 = 19z^2 \tag{1}$$

The substitution of linear transformations

$$x = v + u \text{ and } x = v - u \qquad (u \neq v \neq 0)$$
(2)

In (1) leads to

$$3v^2 + u^2 = 19z^2 \tag{3}$$

The above equation is solved through different methods and using (2), different patterns of integer solution to (1) are obtained.

2.1 PATTERN

Write 19 as

$$19 = (4 + i\sqrt{3})(4 - i\sqrt{3}) \tag{4}$$

Assume
$$z = a^2 + 3b^2$$
 where a, b>0 (5)

Using (4) and (5) in (3), and applying the method of factorization, define.

$$(u + i\sqrt{3}v) = (4 + i\sqrt{3})(a + i\sqrt{3}b)^2$$
(6)

Equating the real and imaginary parts, we have

$$u = u(a,b) = 4a^{2} - 12b^{2} - 6ab$$
$$v = v(a,b) = a^{2} - 3b^{2} + 8ab$$

Substituting the above u and v in equation (2), the value of x and y are given by

$$x = x(a,b) = 5a^{2} - 15b^{2} + 2ab$$

$$y = y(a,b) = -3a^{2} + 9b^{2} + 14ab$$
(7)

Thus (5) and (7) represent non-zero distinct integral solution of (1) in two parameters.

PROPERTIES

- 1. $x(a,1) t_{8,a} t_{8,a} \equiv 0 \pmod{3}$
- 2. $z(a, a+1) t_{24,a} t_{28,a} \equiv 23 \pmod{48}$

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- 3. $y(1,b) + t_{94,b} + t_{94,b} \equiv 0 \pmod{4}$
- 4. $x(a,1) + z(a,1) t_{10,a} t_{8,a} \equiv 0 \pmod{5}$
- 5. $y(2,b) + t_{102,b} + t_{86,b} \equiv 0 \pmod{4}$

2.2 PATTERN

Treating (1) as a quadratic in x and solving for x, we get

$$X = \frac{1}{2} \left[-y \pm \sqrt{y^2 - 4y^2 + 76z^2} \right]$$

Replacing y by 2Y the above equation is

$$x = -y \pm \sqrt{19z^{2} - 3y^{2}}$$
(8)
Let $\alpha^{2} = 19z^{2} - 3y^{2}$
 $= 3z^{2} + (4z)^{2} - 3y^{2}$
 $\alpha^{2} - (4z)^{2} = 3(z^{2} - y^{2})$
(9)

Write (9) in the form of ratio as

$$\frac{\alpha+4z}{z+y} = \frac{3(z-y)}{\alpha-4z} = \frac{A}{B}$$

This is equivalent to the following two equations

$$-A\alpha + z(3B+4A) - 3By = 0$$
$$-B\alpha + z(A-4B) + Ay = 0$$

On employing the method of cross multiplication, we get

$$\alpha = 4A^{2} - 12B^{2} + 6AB$$

$$Y = -A^{2} + 3B^{2} + 8AB$$

$$z = 3B^{2} + A^{2}$$
(10)

Substituting the values of y and z from (10) in (8), the non-zero distinct integer value of x, are given by

$$\mathbf{x} = -(-A^2 + 3B^2 + 8AB) \pm (4A^2 - 12B^2 + 6AB)$$
(11)

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Thus (10) and (11) represent the non-zero distinct integer solution of equation (1) in two parameters.

SET I:

$$x = -(-A^{2} + 3B^{2} + 8AB) + (4A^{2} - 12B^{2} + 6AB)$$

$$y = -A^{2} + 3B^{2} + 8AB$$

$$z = 3B^{2} + A^{2}$$

SET II:

$$x = -(-A^2 + 3B^2 + 8AB) - (4A^2 - 12B^2 + 6AB)$$

 $y = -A^2 + 3B^2 + 8AB$
 $z = 3B^2 + A^2$

PROPERTIES

- 1. $y(2, B) + t_{6,B} + t_{3,B} \equiv 0 \pmod{4}$
- 2. $Z(2A+1, A) t_{8,A} t_{10,A} \equiv 0 \pmod{1}$
- 3. $x(A,3) t_{8,A} t_{6,A} \equiv 0 \pmod{5}$
- 4. $x(A+1.A+1) + t_{6,A} t_{12,A} \equiv 0 \pmod{2}$

2.3 Mathematical Model

Equation (9) can also be expressed in the form of ratio in three different ways as follows:

1.	$\frac{\alpha+4z}{3(z-y)} =$	$=\frac{z+y}{\alpha-4z}=$	$=\frac{A}{B}$
2.	$\frac{\alpha + 4z}{3(z+y)} =$	$=\frac{z-y}{\alpha-4z}=$	$=\frac{A}{B}$
3	$\alpha + 4z$	<u>z+y</u>	<u> </u>

$$3. \quad \frac{1}{3(z-y)} = \frac{1}{\alpha - 4z} = \frac{1}{B}$$

Repeating the analysis as above, we get different pattern of solution to (1).

2.4 PATTERN

Rewrite (3) as

$$3v^2 = 19z^2 - u^2 \tag{12}$$

Write 3 as,
$$3 = (\sqrt{19} + 4)(\sqrt{19} - 4)$$
 (13)

Let
$$v = 19a^2 - b^2$$
 (14)

Using (13) and (14) in (12) and employing the method of factorization, we write

$$\sqrt{19}z + u = (\sqrt{19} + 4)(\sqrt{19}a + b)^2$$

Equating the rational and irrational parts, we have

$$z = z(a,b) = 19a^2 + b^2 + 8ab$$
(15)

$$u = u(a,b) = 76a^2 + 4b^2 + 38ab$$
(16)

Satisfying (14) and (16) in (2), the value of x and y are

$$x = x(a,b) = 95a^{2} + 3b^{2} + 38ab y = y(a,b) = -57a^{2} - 5b^{2} - 38ab$$
 (17)

Thus (17) and (15) represent the integer solution to (1)

Properties

- 1. $Z(a,1) t_{32,a} t_{10,a} \equiv 0 \pmod{1}$
- 2. $x(1,b) t_{6,b} t_{4,b} \equiv 0 \pmod{5}$
- 3. $y(a, a+1) + t_{112,a} + t_{92,a} \equiv 0 \pmod{5}$
- 4. $z(1,4b) t_{6,b} t_{6,b} \equiv 19 \pmod{37}$
- 5. $x(a,1) z(a,1) t_{102,a} t_{54,a} \equiv 0 \pmod{2}$

CONCLUSION

In this paper ,we have presented different pattern of integer solutions to the ternary quadratic equation $x^2 + xy + y^2 = 19z^2$ representing the cone .As this Diophantine equations are rich in variety , one may attempt to find integer solutions to other choices of equations along with suitable properties.

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A STUDY ON REGULAR GENERALIZED b-CLOSED MAPS AND REGULAR GENERALIZED b-CONTINUOUS FUNCTIONS IN TOPOLOGICAL SPACES

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ABSTRACT

The aim of this paper is to introduce Regular generalized b-closed maps & Regular generalized b-continuous functions in topological spaces and study their properties .Using these continuous functions several characterizations and properties have been obtained.

Mathematics subject classification: 54A05.

Keywords: RGb-closed maps, Rgb-open maps, Rgb-continuous functions.

1. INTRODUCTION

In 1970, Leviene introduced the concept of generalized closed set and discussed the properties of such closed and open maps, compactness, normal & separation axioms. Later in 1996 Andrijivic gave a new type of generalized closed set in topological space called b-closed set. Also we studied a new class of closed ser called regular generalized b-closed set is already introduced [1]. Levine introduced semi continuous functions [2]. Using semi open sets the study on the properties of semi-continuous functions is further carried out by Noiri [3], Crossly and Hiidlebrand and many others Sundaram [4] introduced the concept of generalized continuous

functions includes the class of continuous functions and studied several properties related to it . In this paper we introduce the concept of Regular generalized b- closed maps and its continuous functions in topological spaces is introduced and study their properties.

2. PRELIMINARIES

Definition: 2.1

Let A subset A of a topological space (X, τ) is called

- (1) a pre-open [5] if $A \subseteq int(cl(A))$
- (2) a semi-open [6] if $A \subseteq cl(int(A))$
- (3) a α -open [7] if A \subseteq int(cl(int(A)))
- (4) a semi pre-open [8] if $A \subseteq cl(int(cl(A)))$
- (5) a generalized closed [9] if $cl(A) \subseteq A$ whenever $A \subseteq U$ and U is open in X
- (6) a generalized b-closed [10] if $bcl(A) \subseteq U$ whenever $A \subseteq U$ and U is open in X
- (7) a generalized semi pre-closed [11] if $spcl(A) \subseteq U$ whenever $A \subseteq U$ and U is open in X
- (8) a generalized α b-closed [12] if bcl(A) \subseteq U whenever A \subseteq U and U is α -open in X
- (9) a regular generalized b-closed [1] if bcl(A) ⊆U whenever A⊆U and U is Regular open in X

Definition: 2.2

A function f:(X, τ) \rightarrow (Y, σ) is called

- (1) g-continuous [13] if f⁻¹(V) is g-closed in (X, τ) for every closed set V in (Y, σ)
- (2) gp- continuous [14] if f⁻¹(V) is gp-closed in (X, τ) for every closed set V in (Y, σ)
- (3) gsp- continuous [15] if f⁻¹(V) is gsp-closed in (X, τ) for every closed set V in (Y, σ)
- (4) ω continuous [16] if f⁻¹(V) is ω -closed in (X, τ) for every closed set V in (Y, σ)
- (5) α continuous [17] if f⁻¹(V) is α -closed in (X, τ) for every closed set V in (Y, σ)

3. Rgb-CLOSED MAPS AND Rgb-OPEN MAPS

Definition: 3.1

A map $f:(X, \tau) \to (Y, \sigma)$ is said to be an Rgb-closed map if the image f(A) is Rgb-closed set in (Y, σ) for each closed set A in (X, τ)

2

Example: 3.2

Taking X=Y={a,b,c} and $\tau = \{X, \phi, \{a\}\}, \sigma = \{Y, \phi, \{b,c\}\}$. Now Rgb-closed set of (Y, σ)={ Y, $\phi, \{a\}, \{b\}, \{c\}, \{a,b\}, \{b,c\}, \{a,c\}\}$.

Proposition: 3.3

If $f:(X, \tau) \rightarrow (Y, \sigma)$ is a closed map then it is Rgb-closed but not conversely

Proof:

Since every closed set id Rgb-closed [by theorem 3.2 [1]]

The converse of the above theorem need not be true as seen from the following

Example: 3.4

Consider the topological spaces $X=Y=\{a,b,c\}$ with topologies $\tau = \{X, \phi, \{a\}\}, \sigma = \{Y, \phi, \{b,c\}\}$. Hence the closed maps are $(X, \tau)=\{X, \phi, \{b,c\}\}$ and $(Y, \sigma)=\{Y, \phi, \{a\}\}$. Now Rgb-closed sets of $(Y, \sigma)=\{Y, \phi, \{a\}, \{b\}, \{c\}, \{a,b\}, \{b,c\}, \{a,c\}\}$. Now take A={b,c} be a closed set in (X, τ) , then A is Rgb-closed set in (Y, σ) .

Definition: 3.5

A map $f:(X, \tau) \to (Y, \sigma)$ is said to be an Rgb-open map if the image f(A) is Rgb-open set in (Y, σ) for each open set A in (X, τ)

Theorem: 3.6

If $f:(X, \tau) \rightarrow (Y, \sigma)$ is an open map then it is Rgb-open but not conversely

Proof:

Let $f:(X, \tau) \to (Y, \sigma)$ be an open map. Let A be any open set in (X, τ) , then f(A) is an open set in (Y, σ) . Thus f(A) is Rgb-open (By Rgb-open)

Since every open is Rgb-open, Therefore f is Rgb-open

The converse of the above theorem need not be true as seen from the following example

Example: 3.7

Consider the topological spaces $X=Y=\{a,b,c\}$ with topologies $\tau=\{X,\phi,\{a\}\},\sigma=\{Y,\phi,\{b,c\}\}$. Hence the closed maps are $(X,\tau)=\{X,\phi,\{b,c\}\}$ and $(Y, \sigma)=\{Y,\phi,\{a\}\}$. Now Rgbopen sets of $(Y, \sigma)=\{Y,\phi,\{a\},\{b\},\{c\},\{a,b\},\{b,c\},\{a,c\}\}$. Now take A={a} be a open set in (X, τ) , then A is Rgb-open set in (Y, σ) .

Proposition: 3.8

For any bijection f: $(X, \tau) \rightarrow (Y, \sigma)$ then the following statements are equivalent

- (i) $f^{-1:}(X, \tau) \rightarrow (Y, \sigma)$ is Rgb-continuous
- (ii) f is an Rgb-closed map
- (iii) f is an closed map

Proof :(i) \Rightarrow (ii) Let A be a closed set of (X, τ) .f⁻¹(V) is Rgb-closed in (Y, σ) , By hypothesis,(f⁻¹)⁻¹(V) is Rgb-closed in (Y, σ) . Thus f⁻¹(V) is Rgb-closed in (Y, σ) . Thus f is Rgb-closed.

(ii) \Rightarrow (iii)Let A be a closed set of (X, τ) and f(A) is Rgb-closed set in(Y, σ). f^c(A) is Rgb-closed in (X, τ)(f^c)^c(A) is Rgb-closed in (X, τ), Since closed map=>Rgb-closed map . A is Rgb-closed in (X, τ). Thus f is a closed.

(iii) \Rightarrow (i)Let A be a closed set in (X, τ), by Rgb-continuous, (f⁻¹)(A) is Rgb-closed in (X, τ) for every closed set V of (Y, σ). By hypothesis (f⁻¹)⁻¹(A) is Rgb-closed in (X, τ). Thus f is an closed map.

Theorem: 3.9

If $f:(X, \tau) \to (Y, \sigma)$ be a closed map and $g: (Y, \sigma) \to (Z, \zeta)$ be an Rgb-closed map then $g \circ f: (X, \tau) \to (Z, \zeta)$ is Rgb-closed

Proof:

Let A be a closed set of (X, τ) . Hence f(A) is closed in (Y, σ) . Now $(g \circ f)(U) = g(f(U))$ which is Rgb-closed in (Z, ζ)

Theorem: 3.10

If $f:(X, \tau) \rightarrow (Y, \sigma)$ is a continuous, Rgb-closed map from a normal space X onto a space Y, then Y is normal.

Proof:

Let A & B be disjoint closed set of Y. Then $f^{-1}(A) \& f^{-1}(B)$ are disjoint closed sets of X. Since X is normal, then they are disjoint open sets U,V in X such that $f^{-1}(A) \subseteq U \& f^{-1}(B) \subseteq V$. Since f is Rgb-closed set P,Q in (Y, σ) such that $A \subseteq P \& B \subseteq Q$. Then $f^{-1}(P) \subseteq U \& f^{-1}(Q) \subseteq V$. Since U,V are disjoint int(P) & int(Q) are disjoint open sets. Thus P is Rgb-open.

Then A is closed and $A \subseteq P \Longrightarrow$ int (P). Similarly $B \subseteq$ int (P). Hence the theorem.

4. RGB-CONTINUOUS FUNCTIONS IN TOPOLOGICAL SPACES

Definition: 4.1

A map $f:(X, \tau) \to (Y, \sigma)$ from a topological space X into a topological Y is called Rgbcontinuous if the inverse image of every closed set in (Y, σ) is Rgb-closed in (X, τ)

Theorem: 4.2

If a map $f:(X, \tau) \rightarrow (Y, \sigma)$ is continuous, then it is Rgb-continuous but not conversely.

Proof:

Let $f:(X, \tau) \to (Y, \sigma)$ be continuous. Let F be any closed set in (Y, σ) . By continuous, the inverse image $f^{-1}(F)$ is closed in (Y, σ) . Since every closed set is Rgb-closed. $f^{-1}(F)$ is Rgb-closed in (X, τ) . Therefore f is Rgb-continuous.

The converse of the above theorem need not be true as seen from the following example

Example: 4.3

Consider the topological spaces $X=Y=\{a,b,c\}$ with topologies $\tau=\{X,\phi,\{b\}\}, \sigma=\{Y,\phi,\{a,b\}\}$. Let $f:(X,\tau) \rightarrow (Y, \sigma)$ be the identity map. Then f is not continuous. Since for the closed {c} in (Y, σ) , $f^{-1}(c) = \{c\}$ is not closed in (X,τ) . Now Rgb-closed sets of $(X,\tau) = \{X,\phi,\{b\},\{c\},\{a,b\},\{b,c\}\}$. But f is Rgb-continuous

Definition: 4.4

A map $f:(X, \tau) \rightarrow (Y, \sigma)$ from a topological space X into a topological Y is called bcontinuous if the inverse image of every closed set in (Y, σ) is b-closed in (X, τ)

Example: 4.5

Consider the topological spaces X=Y={a,b,c} with topologies $\tau = \{X, \phi, \{b,c\}\}, \sigma = \{Y, \phi, \{a\}\}$. Hence the closed maps are $(X, \tau) = \{X, \phi, \{a\}\}$ and $(Y, \sigma) = \{Y, \phi, \{b,c\}\}$. Now b-closed sets of $(X, \tau) = \{X, \phi, \{a\}, \{b\}, \{c\}, \{a,b\}, \{a,c\}\}$. Now take A={b,c} be a closed set in (Y, σ) , then f⁻¹(A_={b,c} be a b-closed set in (X, τ) . Therefore f is b-continuous

Theorem: 4.6

If a map $f:(X, \tau) \rightarrow (Y, \sigma)$ is Rgb-continuous, then it is b-continuous but not conversely

Proof: Let $f:(X, \tau) \to (Y, \sigma)$ be Rgb-continuous. Let F be any closed set in (Y, σ) .[Since by Rgb-closed map]. $f^{-1}(F)$ is b-closed in (X, τ) , Therefore f is b-continuous. The converse of the above theorem need not be true as seen from the following example

Example: 4.7

Consider the topological spaces $X=Y=\{a,b,c\}$ with topologies $\tau=\{X,\phi,\{a\}\},\sigma=\{Y,\phi,\{b,c\}\}$. Hence the closed maps are $(X,\tau)=\{X,\phi,\{b,c\}\}$ and $(Y,\sigma)=\{Y,\phi,\{a\}\}$. Now Rgbclosed sets of $(Y,\sigma)=\{Y,\phi,\{a\},\{b\},\{c\},\{a,b\},\{b,c\},\{a,c\}\}\$ b-closed sets of $(X,\tau)=\{X,\phi,\{a\},\{b\},\{c\},\{a,c\}\}\$. Now take A={b,c} be a Rgb-closed et in (Y,σ) and A= {b,c} is not b-closed set in (Y,σ) . Therefore is not a b-continuous

Theorem: 4.8

Let $f:(X, \tau) \to (Y, \sigma)$ be a map. Then f is Rgb continuous if and only if the inverse image of each open set in (Y, σ) is Rgb-open in X

Proof:

Assume that $f:(X, \tau) \to (Y, \sigma)$ is Rgb-continuous. Let G be open in (Y, σ) . Then G^c is closed in (Y, σ) . Since f is Rgb-continuous $f^{-1}(G^c)$ is Rgb-closed in X. But $f^{-1}(G^c) = (X, \tau) - f^{-1}(G)$ is Rgb-open in (X, τ) . Conversely, assume that the inverse image of each open set in (Y, σ) is Rgb-open in (X, τ) . Let F be any closed set in (Y, σ) , By assumption C is Rgb-open in (X, τ) . But $f^{-1}(F^c) = (X, \tau) - f^{-1}(F)$. Thus X- $f^{-1}(F)$ is Rgb-open in (X, τ) and so $f^{-1}(F)$ is Rgb-closed in X. Therefore f is Rgb-continuous. Hence the theorem.

Theorem: 4.9

If a map $f:(X, \tau) \rightarrow (Y, \sigma)$ is α -continuous, then it is Rgb-continuous.

Proof:

Let $f:(X, \tau) \rightarrow (Y, \sigma)$ be a α -continuous. Let F be any closed set in (Y, σ) . Since it is Rgb-closed . $f^{-1}(F)$ is Rgb-closed in (X, τ) . Therefore f is Rgb-continuous

Theorem: 4.10

If a map $f:(X, \tau) \rightarrow (Y, \sigma)$ is a Rgb-continuous then it is gsp-continuous

Proof:

Let $f:(X, \tau) \rightarrow (Y, \sigma)$ be a map . Let F be any closed set in (Y, σ) . By Rgb-continuous

 $f^{-1}(F)$ is Rgb-continuous in (X, τ) . Since every closed map implies gsp closed map . Now $f^{-1}(F)$ is closed map in (X, τ) . Therefore f is gsp-continuous.

5. CONCLUSION

The classes of regular generalized b-closed set is defined using regular open set form a topology that lies between the class of the class of b-closed set and Rgb-closed set. The Rgb-closed map can be used to derive a new decomposition of continuity, closed map, open map, continuous functions closure and interior and some important properties. This idea can be extended to bitopological spaces and fuzzy topological spaces.

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Review: Smartphone Technology in Education and Research 2015

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Abstract

The mobile movement is demanding the companies to rethink their training strategies and to create learning programs especially for mobile devices. The students are moving forward and using them for learning. Mobile Learning Facts 47% of organizations are now using mobile devices to support formal learning. In 2017, it is expected that tablets will outsell PCs and Laptops. Android devices control 73% of the mobile learning market share. The Smartphone technology could make tracking sleep disorders easier than visiting a sleep lab.

Key words: Mobile learning, penetration rate, online video servics, tracking sleeping disorder.

1.Introduction

The Smartphone are equipped with the capabilities to display photos, play games, play videos, navigation, built-in camera, audio/video playback and recording, send/receive e-mail, built in applications for social web sites and surf the Web, wireless Internet and much more. Due to same reasons the Smartphone's now become a common choice for consumers along with the use in business as it was initially intended for business users only.

The latest surveys show that the popularity of Smartphone is increasing in general public with the more pace than it is increasing in Corporations. Initially the Smartphone's were only perceived for business use due to their cost and application, but not today. At present we are in a frenetic Smartphone society populated with the Smartphone's from many vendors providing a range of advanced functionalities and services on a piece of hardware. The forecast estimates that the number of Smartphone users will reach about 43.4 million by 2017 [1].

Given the sizable slice of the internet access pie that mobile phone usage represents, it is interesting to see some projections of growth in the use of Smartphone. The share of mobile phone users that use a Smartphone in India from 2010 to 2017 will increase [2]. Literature survey shows that the statistics estimates that the Smartphone penetration rate may reach about 21 percent by 2013 in India [3].

2. Ultimate mobile email usage statistic

Mobile email will account for 15% to 70% of email opens, depending on target audience, product and email type [4]. The following statistics shows that the most popular activities on smart phones. Email 78%, web browsing 73%, Facebook 70%, Maps / direction 64%, games 60%, general search 57%, share /post photos 53%, local search 46%, read news sports 44% and watch video 37%, Camera usage 1.1%, music video applications 2.3%, Dialer 5.4% Social networking applications 5.5%, and Text messaging 13.4%. The statistics shows that the people likes to get details of 15% of the new products, 21% of the real time delivery tracking, 12% of news letters, 21% of the promos + vouchers , 27% of the special offers and 4% of others from the smart phones[5].

Cisco's latest forecast has predicted that online video services will represent 66% of global Mobile Broadband traffic by 2017 (up from 51% in 2012), which will help to push total mobile data use from 0.9 Exabytes per month (i.e. 885 Petabytes) now to 11.2 EB in just five years' time and outpace global fixed data traffic. The Mobile Visual Networking Index (VNI) forecast for 2012 to 2017 notes that global mobile data traffic will outpace global fixed data traffic by a factor of three, which reflects a Compound Annual Growth Rate (CAGR) of 66%. We would expect Smartphones, laptops and tablet computers will fuel 93% of global mobile data traffic by 2017 [5].

Similarly total mobile users will rise from 4.3 billion in 2012 to 5.2 billion by 2017 and the average global mobile network speed will jump from 0.5Mbps (Megabits per second) in 2012

to 3.9 Mbps over the same period (wi-fi excluded). Curiously Smartphone connection speeds seem to do a lot better [5].

3. Smartphone for education

The mobile devices are changing corporate learning forever. However, this doesn't mean classroom-based training or formal eLearning courses are going away, it just means the mobile movement is demanding companies to rethink their training strategies and to create learning programs especially for mobile devices.

"Within the next five years, we are going to be not just changing but transforming how we train and educate based on mobile," predicts Daniel Burrus, chief executive officer of Burrus Research Associates Inc., a Hartland, Wis.-based consulting firm. "Mobile learning is a bigger deal than most organizations realize. It represents an amazing disruption and opportunity in how we educate" he adds.

The real growth in portable devices is in the tablet sector. According to a recent forecast, the shift from traditional Personal Computers to Mobile Devices continues forward faster than expected, and with no slowing down in sight. It's expected that by 2016, global tablet sales reach 375 million units, an almost seven times increase from the 2012-56 million sales, with one-third purchased by businesses and two-fifths by emerging market[6].

4. The advantages of mobile learning

Study shows that mobile learning increases motivation and in turn, increases attendance. 70% of the students surveyed in this study report an increase in their motivation to learn when mobile devices are used properly.

Besides the fact that it make up 36% of the workforce at the end of 2014, a new study provides a body of research which supports the idea that students use cell phones to learn. In fact, students say using mobile devices like tablets makes them want to learn more. This same study reveals that whether allowed to use their devices in school or not, students are moving forward and using them for learning.[7]

5. Smartphone Could Soon Listen for Sleep Disorders

More than 40 million people in the United States suffer from a chronic sleep disorder. Researchers are working on a more convenient way to track people breathing while they sleep: by putting a microphone-equipped pair of earphones and a Smartphone on their bedside table. The technology could make tracking sleep disorders easier than visiting a sleep lab. A team at Stevens Institute of Technology and Florida State University conducted a six-month study in which ear buds that included an in-line microphone were plugged into an iPhone that recorded sounds as six people slept.

The researchers say that even with the earphones placed on a table next to the bed, they were able to use the microphone to monitor participants' breathing to within half a breath per minute of what could be recorded with a chest-worn respiration monitor and a microphone clipped to participants' collar. Yingying Chen, an associate professor at Stevens, says researchers plan to release a Smartphone application related to their work next year.[8]

6.Conclusion

Smartphones are utilized by the different types of human beings for various purposes. Now the recent advances in smartphone technology uptakes the education and research to a new era for better growth of the young nation all over the world to a positive growth.

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A STUDY ON JOB SATISFACTION OF COLLEGE TEACHERS WITH SPECIAL REFERENCE TO MALAPPURAM DISTRICT, KERALA

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ABSTRACT

Job satisfaction is one of the most commonly discussed issues in personnel and human resource management and organizational management. In teaching profession, job satisfaction also plays an important role, because it requires a great deal of thoroughness and commitment. In teaching it is more important to have mental commitment and loyalty than physical presence. The relevance of job satisfaction and motivation are very crucial in the growth and smooth functioning of education system in our nation. It is one of the important factor that determinants of educational success and performance. Among the factors that influence job satisfaction are salary, professional development, administrative relationship and rapport. If the teachers have a high level of job satisfaction, it can be assured that a more enjoyable, energetic and effective teaching earning environment can be developed which directly and indirectly will give positive effects on the students' academic achievement.

Keywords: Job Satisfaction, College teachers.

1. INTRODUCTION

College Teachers are the most important group of professionals who are capable of building our nation. Therefore, it is very important to know that many of the college teachers are dissatisfied with their jobs. Job satisfaction of college teachers is not only affecting the students

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but also the society as a whole. Job satisfaction may increases productivity and classroom performance in the college. Apart from this, the teachers are responsible for undertaking research and development in their respective fields for enriching the quality of teaching and research As such, teachers who possess high level of satisfaction in their job will be a source of motivation to the students to succeed in their studies. A better understanding of job satisfaction and factors associated with it helps top level management in educational institutions guide employees' activities in a desired direction. The morale of employees is a deciding factor in the institution's efficiency (Chaudhary and Banerjee, 2004). The affective component encompasses the good and bad feelings about a job, such as how people feel about their supervisors, coworkers, Salaries, fringe benefits, office settings and commute to work.

2. OBJECTIVES OF THE STUDY

- 1. To identify the level of job satisfaction of College teachers working in the colleges located in Malappuram District, Kerala
- 2. To find out the impact of job satisfaction and attitude of Teachers on Education.
- 3. To suggest appropriate measures to improve the level of job satisfaction.

3. SCOPE OF THE STUDY

India has one of the largest higher education systems in the world. The growth rate of educational institutions in India was slow before independence in 1947, but now there are 543 universities, including 18 central universities, 275 state universities, 96 deemed universities, 13 national importance institutions, 136 research institutes, 5 institutions established under states legislature Act, along with 16885 colleges that provide education in all disciplines. The number of teachers is nearly half a million, with about one hundred thousand students enrolled in higher education.

4. METHODOLOGY

College teachers are selected from the regions of Malappuram district, Kerala. The data and information were collected from the college teachers by adopting convenient sampling technique. For the present study data was collected with the help of questionnaire.

6. LIMITATIONS OF THE STUDY

- The present study based on the data collected from sample-selected places of Malappuram District, Kerala only and the result may vary from other regions of India.
- 2. In this present study only those teachers were considered, who were presently working in the colleges.

7. INTERPRETATIONS OF THE STUDY

From the study it is revealed that most of the respondents are respondents were satisfied with their job. All teachers are opined that it is a noble profession. The study also revealed that Govt. College teachers are more satisfied than the private college teachers. This is due to the flexibility, security of job, high wage and independence enjoyed by govt. college teachers. Private college teachers are very sensitive as regards wage payment. The Private Sector should revise the salary structure. They argued that Both Central and State Government shouldn't consider their problems and provide more attention only in Government sector.

At the same time, both private and govt. schools teachers are dissatisfied on fair promotion procedures. At present the structure is Assistant Professor, Associate Professor and Professor. The orientation courses given to the teachers were very poor. It is said that in refresher courses and orientation courses, the authorities completely neglect the private college teachers. The authorities should organize regular training programs to enrich and equip teachers with latest developments. In today's era Information and Communication Technology plays a very important role in imparting knowledge. But unfortunately most of the teachers are far away from this kind of techniques and the simply follows traditional methods of teaching. Another important factor recognized through this study is that the teachers of both Government and private colleges were not satisfied with the operating conditions i.e., too many rules and regulations, too much administrative related office work and paper work. This indicate that the staff were concentrating more on administrative work like sending reports, purchases, etc. with less time on teaching and research.

8. CONCLUSION

Teachers are the main backbone of the education system of any country. They shoulder the huge responsibilities in moulding the young minds to achieve the vision and mission of the country. In this era teachers are playing greater roles and given bigger commitments in the profession. Job satisfaction is indeed most crucial not only in determining the faithfulness of an employee to an organization but more importantly it is the main indicator of an individual's level of commitment and productivity in his or her profession. It is widely believed that teaching is not the first choice for most of the youth as there are far more attractive professional options available. In many cases, including the most prestigious institutions of the country, the number of faculty members are so few or their quality so poor.

Failure of the educational institutions in providing a healthy working environment would lead to more problems in the near future, especially in the teachers' work performance. Providing desktop computers for each staff with internet / intranet connection and making effective use of computers will help to send reports and returns through e-mails, its monitoring and taking electronic back up of the communication can save time and help to create a paperless office.

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A STUDY ON KEY CONTRIBUTORS OF EMPLOYEE JOB SATISFACTION OF CLASSY FURNITURE

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Abstract

The small-scale industrial sector plays a vital role in the economic growth of the country. It contributes almost 40% of the gross industrial value added in the Indian economy. The wood industries in the small scale industrial sector also play a very important role in shaping the robust growth of Indian economy. The study attempts to evaluate and find the key contributors of job satisfaction of employees in Classy Furniture – a wood products manufacturing unit. It focuses on the relative importance of job satisfaction factors and their impacts on the overall job satisfaction of employees. The result shows that pay, fringe benefits, co-worker relation and work environment are the most important factors contributing to job satisfaction. This research paper highlights some of these problems and presents a picture of level of job satisfaction among employees of wood manufacturing industries. It also identifies unique issues of job satisfaction in such industries.

Key Words: Job satisfaction factors, fringe benefits, overall job satisfaction

1. Introduction

A wood product manufacturing industry has a true potential to grow manifolds from the existing levels and is poised for a sustainable growth annually. The last decade has seen India fast becoming the manufacturing hub for the global markets. The Wood, Plywood & Allied Products Industry is one of the key sectors having immense potential for gaining from these developments as India is one of the major wood-users in the Asia pacific region. 'Classy' is the brand name under which the world knows Kottakkal Wood Complex Furniture. Wood Complex was established in 1982 in Kottakkal, Kerala. Its world class furniture brought it into a position of leadership with in a very short span of time.

It uses a combination of imported state-of-the art machinery and cutting edge technology to produce exquisite wood furniture without compromising its quality under strict supervision in each stage Hundreds of highly skilled and dedicated craftsmen are the assets of the company which helped it to carve a niche for itself. This depicts the importance of the study to learn the level of job satisfaction in the employees of the organization.

Job satisfaction is an emotional response to the job situation. It is often determined how well outcomes meet or exceed expectations and represents several related attitudes. The most important characteristics of job which employees have affective responses are the work itself, pay, promotion opportunities, work group and working conditions. An employee's overall satisfaction with his job is the result of a combination of several factors and financial compensation is only one of them. Management's role in enhancing employees' job satisfaction is to make sure the work environment is positive, morale is high and employees have the resources they need to accomplish the tasks they have been assigned. For satisfying Human resource, the management of Classy Furniture had perfect plan, organization, and complete control over the procurement, development, compensation, integration, maintenance and reproduction of human resources to the end that individual, organizational and social objective are established.

The mission of the organization is to create an enabling culture within the organization to attract and retain the personnel and direct their efforts in the achievement of individual and organization goal.

- Provide excellent working environment
- Build long term employment culture
- Provide support and guidance to employees appropriately
- Motivate and retain stuff through effective methods
- Strive to maintain employee satisfaction and commitment
- Create a distinguished climate for the individual growth of the employees
- Treat employees with respect and give them an opportunity to contribute as much as they can.

2. Objectives of the study

The objective of the study is as follows:

- •To assess the satisfaction level of employees in Wood Manufacturing Industries
- •To identify the factors that influences the job satisfaction of employees
- •To identify the factors that improves the satisfaction level of employees

3. Scope of the study

This study emphasis in the following scope:

- To identify the employee's level of satisfaction on the job
- The study is helpful to the similar industries for conducting further research
- This is helpful to identify the employer's level of satisfaction towards welfare measure
- This study is helpful to the industry for identifying the area of dissatisfaction of job of the employees
- This study helps to make a managerial decision to the company.

4. Research Problem

The study has its own relevance since the survey reports signify that wood products manufacturing unit requires more labour intensity but shows the least labour efficiency. The following is the CII-BCG report showing labour intensity across manufacturing in India* (number of workers per INR hundred thousand of output generated).





According to the chart above, the paper and wood products industry tends to be more labour-intensive compared to other industrial sectors. The chart below shows the labour efficiency in the different segments, which depicts that the paper and wood products have lowest labour efficiency when compared to others.

Thus, the research problem is clear that though the wood product manufacturing industries need high labour intensity because of its nature of work but proves to have a very low labour efficiency. One reason behind this can be considered as lack of employee satisfaction and employee engagement. The study observes the different job satisfaction factors among the employees of Classy furniture and finds the key contributors affecting job satisfaction.

Setting of hypothesis

 H_o = There is no significant difference between observed and expected frequencies of job satisfaction factors.

Research Methodology

A descriptive research design with survey method is applied in the study. The researcher has used both the primary and the secondary data for the purpose of this study. Secondary data were collected from available books, publications, research studies, articles and websites. The questionnaire and interview methods were adopted to collect the primary information from 30 employees.

Test statistic

The chi-square test is being used to test the discrepancies between observed and expected frequencies and to determine the association between the attributes. The following table includes different variables of job satisfaction, the number of employees satisfied, not satisfied and individual chi-squares.

Chi-square= $\sum (O-E)^2/E$ where O is Observed frequency and E is expected frequency Here, the expected frequencies are taken as 50% for both satisfied and non-satisfied employees.

Variable	N	Satisfactory	Non- satisfactory	Chi-square
Job satisfaction level	30	26	4	16.13**
Pay & promotion	30	20	10	3.33
Fringe benefits	30	15	15	0
Co-operation with co- workers	30	27	3	19.2**
Work environment	30	26	4	16.13**

*P<.05

**p<.01

The above table mentions that in case of job satisfaction level, co-operation with workers and work environment, the difference between observed and expected frequencies are significant since the test rejects the above mentioned null hypothesis both at 5% significance level and 1% significance level. But, for pay and promotion and fringe benefits the test accepts the null hypothesis. In these cases, no significant difference is found between the observed and expected frequencies.

5. Analysis and Interpretation

As part of the analysis of the questionnaire collected from 30 employees, this part discusses the respondents' overall perception of employee job satisfaction in the Company and sub-dimensions such as pay and promotion, job security, work conditions, fairness and relationship with co-workers and management.

Factors influencing job satisfaction	Response
Working condition	Satisfied
Pay and Promotion	Satisfied
Job Security	Partially Satisfied
Motivation and recognition	Satisfied

Overall level of employee satisfaction in Classy Furniture

Training and development	Satisfied
Non-monetary benefits	Dissatisfied
Relation with co-workers	Partially Satisfied
Relation with supervisors	Satisfied

In terms of working conditions, pay and promotion, motivation and recognition, training and development and relationship with their immediate supervisor, the employees are found satisfied but in case of job security and relationship with co-workers the study found that the level of employee job satisfaction is "neither happy nor unhappy". In terms of non-monetary benefits, the level of employee job satisfaction is "somewhat unhappy".

6. Findings and Suggestions

With the help of the study it is clear that 86% of the employees have overall job satisfaction though a little discrepancy is found in the results of other factors affecting job satisfaction levels. Following are the suggestions as the part of the study:

- Monetary and non-monetary incentives vary in their roles, effectiveness, and appropriateness, a balance between both should be used to satisfy the diverse needs and interests of associates.
- Not only the materialistic factors but also the psychological factors are equally important to increase the job satisfaction levels.
- The idea of Human Resource Management strategy should be that of development of innovations, skills and aptitude, improve quality of performance of employees and to reduce costs in an organisation by motivating workers to work harder, applying their best efforts, skills and knowledge towards their work and organisation.
- If an organization is concerned about employee job satisfaction, management may conduct surveys to determine what type of strategies to implement. This approach can help the management to define the job satisfaction objectively.

7. Conclusion

Employee job satisfaction can improve service, quality and increase employee engagement. In such a circumstance, now-a-days the policy makers and managers have turned their attention to provide different kinds of facilities to their employees in order to satisfy their employees. This study tested factors affecting job satisfaction of the company. The results suggest that the factors had satisfactorily explained job satisfaction and that the policy makers and managers should focus on the factors that affect employee job satisfaction, if they want to enhance their businesses. Based on the results for the standardized values, we are able to see that work conditions, fairness, promotion, and pay, are key factors affecting the company's employees' job satisfaction. The leaders of the company have the responsibility for creating high level of job satisfaction. All the latest studies come to the point that the leaders can improve the motivation within the organization through providing a positive working environment, reward and recognition, involve and increase employee engagement, developing the skills and potential of the workforce and timely evaluation and measurement of job satisfaction.

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A STUDY ON CUSTOMER PREFERENCE TOWARDS BRAND AWARENESS IN SELECTED FAST MOVING CONSUMER GOODS (FMCG) WITH SPECIAL REFERENCE TO TIRUCHIRAPPALLI DISTRICT

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Abstract

Fast Moving Consumer Goods (FMCG) Industry in India is one of the fastest developing sectors in the Indian economy. The FMCG sector in India happens to be the fourth largest in the world. According to experts this industry will reach US\$ 33.4 billion by 2015. Both the organized and the unorganized sectors are largely responsible for the success of the Indian FMCG industry. A rapid urbanization, increase in demands, presence of large number of young population, a large number of opportunities is available in the FMCG sector. The Finance Minister has proposed to introduce an integrated Goods and Service Tax by April 2010. This is an exceptionally good move because the growth of consumption, production, and employment is directly proportionate to reduction in indirect taxes which constitute no less than 35% of the total cost of consumer products - the highest in Asia. The bottom line is that Indian market is changing rapidly and is showing unprecedented consumer business opportunity. Hence, the study undertaken to know the customer preference and brand awareness of selected fast moving consumer goods in Tiruchirappalli district. The research was undertaken with a sample size of 50 respondents in the study area. The study objective is to know the customer preference towards selected fast moving consumer goods and also to know the factors which influence customers to prefer the particular brand. And analyses were made by using statistical tools such as percentage analysis and chi-square test.

Key words: Customer preference, brand awareness, quality and brand preference

1. INTRODUCTION

'The Fast Moving Consumer Goods (FMCG) sector is a corner stone of the Indian economy. This sector touches every aspect of human life. The FMCG producers have realized that there is ample opportunity for them to enter into the rural market. Today we notice this shift towards branded FMCGs in rural areas as a result of Socio Economic & Political changes in the last 5 years. This has made rural areas more viable markets even compared to urban areas.

2. BRAND AWARENESS AND CUSTOMER PREFERENCES:

Brand awareness is the degree of familiarity among consumers about the life and availability of the product. Brand awareness includes both brand recognition as well as brand recall. Brand recognition is the ability of customer to recognize prior knowledge of brand when they are asked questions about that brand or when they are shown that specific brand, while brand recall is the potential of customer to recover a brand from his memory.

Consumer preferences are defined as the subjective (individual) tastes, as measured by utility, of various bundles of goods. They permit the consumer to rank these bundles of goods according to the levels of utility they give the consumer. Note that preferences are independent of income and prices. Ability to purchase goods does not determine a consumer's likes or dislikes. This is used primarily to mean an option that has the greatest anticipated value among a number of options.

3. STATEMENT OF THE PROMBLEM

The above discussion indicated the need for strategies and managerial principles and policies to creatively and innovatively sustain customer preference to the brand for fast moving consumer goods market, hence the problem statement. Many companies are aiming for high satisfaction because consumers who are just satisfied still find it easy to switch when a better offer comes along. Those who are highly satisfied are much less to switch. High satisfaction or delight creates an emotional bond with the brand, not just, a rational preference. The result is high consumer's loyalty. To understand the existing preference of the customers, it is imperative to investigate and suggest ways and means to improve the customer satisfaction. The aim of the study was to obtain customer preference towards brand awareness in selected fast moving consumer goods (FMCG) with special reference to Tiruchirappalli district.

4. OBJECTIVES OF THE STUDY

- To know the brand awareness of consumers towards FMCG products
- To analyze the consumer preference towards selected FMCG products.
- To find out the factors influencing the consumers while buying the FMCG products

5. METHODOLOGY

Collection has mainly been from two sources namely primary and secondary data.

Primary data:

The primary data are collected for the first time and they happen to be original in character. Primary data is collected from the respondents with the help of structured and well – designed questionnaire.

Secondary data:

For this research work the secondary data were collected from books, magazines, websites and referred journal.

6. RESEARCH DESIGN

Universe of the study : In Trichirappalli district customers who visit Big Bazaar,

Femina shopping Mall, Reliance fresh and Kaveri super market.

Sample Size: 50 respondents

Sampling Technique: Convenient Sampling Method

Statistical Tools Used : Percentage analysis and Chi-square test is used to verify the different objectives

7. HYPOTHESIS

• There is no significant association between occupation of the respondents and their opinion about often discounts & incentives are provided by the departmental stores

• There is no significant association between reason for purchase of the respondents and their opinion about often discounts & incentives are provided by the departmental stores.

PERIOD OF THE STUDY

The study was made during the period from February 2014 to May 2014.

8. LIMITATIONS OF THE STUDY

- The study is limited to Tiruchirappalli District
- Findings were drawn only on the basics of information collected from the respondents. So it may not be representative in nature
- The study is made based on the information supplied by respondents and therefore it cannot be generalized

9. REVIEW OF LITERATURE

The following are the various reviews collected from various journals and websites to acquire the knowledge about FMCG and consumer awareness and preference about FMCG.

Franco, et al. (2012) analyzed and focused on use of modern portfolio theory in price promotions, which have become a key component in the marketing mix of stimulating sales, particularly in the FMCG environment. The hypothesis of this study is that previous limitation of modern portfolio theory in marketing can be overcome through use of brackets of price promotion. This is proven through study of FMCG data and it is shown that price promotions can be optimized to improve return without increased risk. **Vaishnani (2012)** examined and measured brand equity perception with reference to sales promotion schemes for selected FMCG products and it is concluded that there is no significant difference between of brand equity perception among gender as one of the demographic variables. Apart from it, it is concluded that there is significant difference between brand equity perceptions among various employment status. Adding to it, it is clear that self employed consumers compare to not employed consumers perceive sales promotion schemes less favorably. Furthermore, it is concluded that there is no significant difference between brand equity perception and equity perception and equity market and equity perception and equity perception schemes less favorably. Furthermore, it is concluded that there is no significant difference between brand equity perception and equity perception and equity market is no significant difference between brand equity perception and equity perception and equity perception schemes less favorably.

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FMCG products. The paper concluded that FMCG companies would have to really gain inroads in the rural markets in order to achieve double-digit growth target in future. **Rajendhiran N. Saiganesh S. Asha P. (2006)** explored that brand ambassadors play an important role in putting an impact on the brand preferences of rural India. Keeping the Literacy scenario in to consideration the promotion of Brands in rural markets requires the special measures. The same becomes the base for brand awareness and preference in the markets.

Rao G Srinivas (2002) studied that rural India buys small packs, as they are perceived as value for money. There is brand stickiness, where a consumer buys a brand out of habit and not really by choice. Brands rarely fight for market share; they just have to be visible in the right place. Hence, a marketer needs to focus his attention primarily on the major source of information for the rural consumers.

10. ANALYSIS AND INTERPRETATION

Age	No. of respondents (n=50)	Percentage
Below 20 years	8	16.0
21-30 years	31	62.0
31-40 years	11	22.0
Above 40 years	0	0
Total	50	100.0

 Table 1: Age wise classification of the respondents

The above table inferred that 62% of the respondents are in the age group of 21 - 30 years.

 Table 2: Gender classification of Respondents

Gender	No. of respondents (n=50)	Percentage
Male	23	46.0
Female	27	54.0
Total	50	100.0

The above table shows that 54% of the respondents are female.

Qualification	No. of respondents (n=50)	Percentage
School level	18	36.0
Degree Diploma	16	32.0
PG	16	32.0
Total	50	100.0

 Table 3: Educational Qualification of the Respondents

The above table revealed that 36% of the respondents are qualified with school level education.

Particulars	No. of respondents (n=50)	Percentage
Student	15	30.0
House wife	10	20.0
Employed	19	38.0
Business	6	12.0
Total	50	100.0

Table 4: Occupational Status of the Respondents

38% of the respondent's occupational status are employed in either private or public concern

 Table 5: Retail Stores do the Respondents prefer most for buying FMCG's

Rank	4	3	2	1	TOTAL
RETAIL SHOPS					
FSM	13(26%)	10(20%)	11(22%)	16 (32%)	50 (100%)
Reliance	3 (6%)	10 (20%)	22 (44%)	15 (30%)	50 (100%)
Kaveri	16 (32%)	21 (42%)	10 (20%)	3 (6%)	50 (100%)
Mega mart	14 (28%)	6 (12%)	9 (18%)	21 (42%)	50 (100%)

The above table indicates that 32% of the respondents preferred most for shopping FMCG in Kaveri super market and 42% of the respondents least preferred for buying FMCG in Mega mart.

opinion	No. of respondents (n=50)	Percentage
Always	13	26.0
Often	19	38.0
Sometimes	15	30.0
Not at all	3	6.0
Total	50	100.0

 Table 6: How often Discounts & Incentives are provided by the Departmental Stores

From the above table shows that 38% of the respondent's state that their preferred store often provide discounts and incentives

Particulars	No. of respondents (n=50)	Percentage
Discount	14	28.0
Variety	20	40.0
Service	11	22.0
Proximity	3	6.0
Ambience	2	4.0
Total	50	100.0

Table 7: Reason for making Purchase in the Preferred Store

From the above table it is inferred that 40% of the respondents state that variety is the most preferred reason for making purchase of FMCG in preferred store.

Table 8: Which Brand would you prefer more while purchasing the FMCG's

Particulars	No. of respondents (n=50)	Percentage
Horlicks	17	34.0
Boost	16	32.0
Complan	10	20.0
Bourn Vita	6	12.0
Viva	1	2.0
Total	50	100.0

Table 8.a. HEALTH DRINKS

The above table states that 34% of the respondents most preferred health drink is Horlicks.

Particulars	No. of respondents (n=50)	Percentage	
Head & Shoulder	11	22.0	
Clinic Plus	10	20.0	
Pantene	19	38.0	
Meera	8	16.0	
Garnier	2	4.0	
Total	50	100.0	

Table 8.b: HAIRCARE

The above table revealed that 38% of the respondents most preferred hair care product is Pantene

Particulars	culars No. of respondents (n=50)			
Tide	10	20.0		
Power	15	30.0		
Arial	7	14.0		
Surf	9	18.0		
Rin	9	18.0		
Total	50	100.0		

Table 8.c: DETERGENT POWDER

From the above table states that 30% of the respondent's most preferred detergent powder is Power.

Table 9: Factors that influenced most, to purchase the stated Brands

Table 9.a: HEALTH DRINKS

Factors/Brand	Price	Availability	Brand	Promotional	Advertisement	Quality	Total
			image	offers			
Horlicks	2(4%)	1 (2%)	4 (8%)	1 (2%)	4 (8%)	5 (10%)	17 (34%)
Boost	1(2%)	1 (2%)	0	0	5 (10%)	4 (8%)	11 (22%)
Complan	0	1 (2%)	1 (2%)	1 (2%)	5 (10%)	3 (6%)	11 (22%)
Bourvita	1(2%)	0	2 (4%)	1 (2%)	3 (6%)	2 (4%)	9 (18%)
Viva	0	0	1 (2%)	0	0	1 (2%)	2 (4%)
From the above table it is inferred that, quality is the factor that influence more for the purchase of horlicks (10%), boost (10%) and complain (10%) regarding Bourn vita (6%) advertisement is the most influencing factor and for viva it is brand image and quality (2%).

Factors/Brand	Price	Availability	Brand	Promotional	Advertisement	Quality	Total
			image	offers			
Head and	0	0	4 (8%)	1 (2%)	4 (8%)	2 (4%)	11 (22%)
shoulder							
Garnier	0	0	2 (4%)	1 (2%)	0	1 (2%)	4 (8%)
Pantene	0	2 (4%)	4 (8%)	1 (2%)	3 (6%)	5 (10%)	15 (30%)
Clinic plus	2(4%)	0	1 (2%)	3 (6%)	1 (2%)	6 (12%)	13 (26%)
Meera	0	0	0	0	2 (4%)	5 (10%)	7 (14%)

Table 9.b: Hair Care

From the above table it is inferred that regarding hair care the factors influence more for the purchase of clinic plus (12%) and pantene (10%) is for quality and for the reason they preferred to purchase head and shoulders (8%) is brand image and advertisement.

Factors/Brand	Price	Availability	Brand	Promotional	Advertisement	Quality	Total
			image	offers			
Tide	1(2%)	1 (2%)	1 (2%)	1 (2%)	2 (4%)	1 (2%)	7 (14%)
Power	1(2%)	1 (2%)	3 (6%)	3 (6%)	6 (12%)	3 (6%)	17 (32%)
Ariel	0	0	2 (4%)	0	4 (8%)	2 (4%)	8 (16%)
Surf	0	0	3 (6%)	0	0	4 (8%)	7 (14%)
Rin	0	2 (4%)	1 (2%)	1 (2%)	4 (8%)	3 (6%)	11 (22%)

Table9.c: Detergent powder

From the above table it is inferred that most influencing factor for purchase of power detergent powder (12%) is advertisement, Ariel (8%) for advertisement and surf (8%) for quality.

Table 10: Association between reason for purchase of the respondents and their opinion about often discounts & incentives are provided by the departmental stores

Research hypothesis

There is a significant association between reason for purchase of the respondents and their opinion about often discounts & incentives are provided by the departmental stores.

Null hypothesis

There is no significant association between reason for purchase of the respondents and their opinion about often discounts & incentives are provided by the departmental stores. **Statistical test :** Chi-square test.

Reason	Ofte	Statistical				
for		dep	partmental sto	ores		statistical
purchase	Always	Often	Sometimes	Not at all	Total	merence
	(n=13)	(n=19)	(n=15)	(n=3)	(n=50)	
Discount	5(38.5%)	6(31.6%)	3(20%)	0	14(28%)	X2=20.012
Variety	7(53.8%)	5(26.3%)	8(53.3%)	0	20(40%)	Df=12
Service	1(7.7%)	6(31.6%)	2(13.3%)	2(66.7%)	11(22%)	.067>0.05
Proximity	0	2(10.5%)	1(6.7%)	0	3(6%)	Not
Ambience	0	0	1(6.7%)	1(33.3%)	2(4%)	Significant

Findings

The above table reveals that there is no significant association between reason for purchase of the respondents and their opinion about often discounts & incentives are provided by the departmental stores. Hence, the calculated value greater than table value (p>0.05). So the research hypothesis is rejected and the null hypothesis is accepted.

Table 11: Association between occupation of the respondents and their opinion about often discounts & incentives are provided by the departmental stores

Research hypothesis

There is a significant association between occupation of the respondents and their opinion about often discounts & incentives are provided by the departmental stores.

Null hypothesis

There is no significant association between occupation of the respondents and their opinion about often discounts & incentives are provided by the departmental stores.

	Ofter					
Occupation		Statistical				
Occupation	Always	Often	Sometimes	Not at all	Total	inference
	(n=13)	(n=19)	(n=15)	(n=3)	(n=50)	
Student	7(53.8%)	6(31.6%)	2(13.3%)	0	15(30%)	X2=14.621
House wife	2(15.4%)	1(5.3%)	6(40%)	1(33.3%)	10(20%)	Df=9
Employed	3(23.1%)	10(52.6%)	4(26.7%)	2(66.7%)	19(38%)	.102>0.05
Business	1(7.7%)	2(10.5%)	3(20%)	0	6(12%)	Not
						Significant

Statistical test: Chi-square test

Findings

The above table reveals that there is no significant association between occupation of the respondents and their opinion about often discounts & incentives are provided by the departmental stores. Hence, the calculated value greater than table value (p>0.05). So the research hypothesis is rejected and the null hypothesis is accepted.

Research Findings:

- More than half of the respondents are in the age group of 21 30 years.
- Majority of the respondents are female in the study area.
- 38% of the respondents are employed in either private or public sector organisations.
- 32% of the respondents preferred most for shopping FMCG in Kaveri super market.
- 40% of the respondents state that variety is most preferred reason for making purchase in preferred store.
- Nearly one third of the respondents state that their preferred store often provide discounts and incentives.
- 34 % of the respondents most preferred health drinks is Horlicks.
- 38 % of the respondents most preferred hair care product is Pantene.
- 30 % of the respondents most preferred detergent powder is Power.
- That most influencing factor for purchase of power detergent powder (12%) is advertisement.

• There is no significant association between educational qualification of the respondents and their opinion about often discounts & incentives are provided by the departmental stores.

11. Suggestions

Most of the customers are using few brand items and also they prefer to purchase that product when the company offers discounts. It helps the manufacturers to increase the sales when it comes down. Manufactures should maintain product quality always because majority of the respondents suggest that if they are satisfied they will definitely recommend others to buy that particular brand.

12. Conclusion:

People in Tiruchirappalli district are not worried about the price of the product. They are showing willingness to spend higher price when they realize that they can afford to spend. Since the usage of branded products of reputed companies will elevate their status as well as stature in that city. The high income groups residing in Tiruchirappalli are ready to spend more on the highly priced branded products.

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WORKING CAPITAL MANAGEMENT OF DELUX WOOD

INDUSTRIES

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ABSTRACT

A well designed and implemented working capital management has a significant contribution for firm's profitability as well as to maintain liquidity powers. The purpose of this study is to assess working capital adequacy and its impact on profitability; to investigate the relationship between profitability and liquidity of firms. Working capital refers to the firm's investment in term assets. The management of working capital is important to the financial health of business of all sizes. The amounts invested in working capital are often high in proportion to the total assets employed and so it is vital that these amounts are used in an efficient way. The management of working capital affects the liquidity and the profitability of the corporate firm and consequently its net worth (Smith, 1980). Working capital management therefore aims at maintaining a balance between liquidity and profitability while conducting the day to day operations of business but also ultimately lead to financial crises, Chowdhury and Amin (2007). The study aims to provide empirical evidence about the effects of in current assets and current liabilities of Deluxe Wood Industries.

Keywords :Working Capital, Liquidity Ratio, Short Term Liquidity Position, Current Ratio, Acid Test Ratio Cash Ratio, Current Liabilities and Current Assets.

1. INTRODUCTION

Today, every management is desirous to know their financial strength to make best se of available resources to the maximum extent and able to sort out its weaknesses to initiate and adopt suitable corrective actions to improve its industrial operations in terms of solvency, efficiency and profitability. The management can adopt various techniques like, trend analysis, common size statements, comparative statements, schedule of changes in working capital, fund flow statements, cash flow statements, cost-volume- profit analysis and ratio analysis for its financial evaluation and performance.

Ratio analysis is recognized as one of the most powerful tool of financial analysis. It is a process of establishing and interpreting quantitative relationship between figures and group of figures. Ratios are indicators of financial strength, soundness, position and weakness of a firm. Ratio can assist the management in its basic functions like forecasting, planning, coordinating, control and communication. If ratios are properly analyzed and interpreted the management can strengthen its solvency position, improve its efficiency and growth in profits.

Taking this as central idea, a research work on comparative analysis was undertaken on Deluxe Wood Industries., and Marain Wood Industries at micro level to examine and evaluate its current financial position in terms of solvency, liquidity, efficiency and profitability by adopting Ratio Analysis. An attempt has been made to analyze the financial results basing on the financial statements from 1st April 2005 to 31st March 2014.

2. RESEARCH METHODOLOGY

The primary aim of this paper is to investigate the impact of Working Capital Management on profitability of Wood Industries. This is achieved by developing a similar empirical framework first used by Shinand Soenen (1998) and the subsequent work of Deloof (2003). The study focuses exclusively on the Wood Industries. The data reported in this paper were collected for a period of 2005 to 2014. As a part of study designed to analyze profitability and working capital management from financial reports. And the primary data was collected by means of personal visits to the manufacturing unit and having private interviews with the officials concerned and the secondary data constitutes audited financial statements, broachers, bulletins, statistical returns and company profiles.

3. REVIEW OF LITERATURE

Many researchers have studied working capital from different views and in different environments. The following study were very interesting and useful for our research: According to Eljelly, 2004, working capital management requires planning and controlling current assets and current liabilities in such a way that eradicate the threat of inability to meet short term t short term liabilities and evade excessive investment in these assets.

According to Eljelly, 2004, working capital management requires planning and controlling current assets and current liabilities in such a way that eradicate the threat of inability to meet short term liabilities and evade excessive investment in these assets. Narasimhan and Murty (2001), focus on improving return on capital employed by targeting some critical areas such as cost containment, reducing investment in working capital and improving working capital efficiency. Amit, Mallik, Debashish and Debdas (2005) in their study regarding the relationship between working capital and profitability of Indian pharmaceutical industry found and concluded that no definite relationship could be established between liquidity and profitability. Vishanani and Shah (2007) studied the impact of working capital management policies on corporate performance of Indian consumer electronic industry by implemented simple correlation and regression models.

They found that no established relationship between liquidity and profitability exist for the industry as a whole; but various companies of the industry depicted different types of relationship between liquidity and profitability, although majority of the companies revealed positive association between liquidity and profitability and also Ganesan (2007) studied working capital management efficiency in Telecommunication equipment industry and the study revealed significant statistical evidence and negative relationship between profitability and liquidity. Bhunia (2007) studied liquidity management of public sector Iron and Steel enterprise in India.

He has found that the actual values of working capital lower than the estimated value of working capital for both companies under study and poor liquidity position in case of both companies. All the above studies provide base and gives idea regarding working capital management and its components. They also give us the results and conclusions of those researches already conducted on the same area for different countries and environment from different aspects. On basis of these researches done in different countries, researcher has developed own methodology for research.

4. OBJECTIVES OF THE STUDY

The specific objectives of the study are:

- To review the concept and importance of working capital and the concept of ratio, utility of ratio analysis, compiling of ratios.
- To evaluate the financial performance through Ratio Analysis of Deluxe Wood Industries. and Marain Wood Industries., on comparative basis in terms of short term.
- 4 To discuss summary of findings in form of conclusions and suggestions for

effective functioning of Deluxe Wood Industries., and Marain Wood Industries.,

5. PLAN OF ANALYSIS

The primary data collected through discussions and the secondary data obtained from published sources have been processed in tune with the objectives and relevant tables were prepared. In the analysis of data standard statistical techniques like percentages and averages have been used.

6. FIELD STUDY

The reference period for the study was 1st April 2005 to 31st March 2014. The field investigation was conducted from 1st April 2014 to June 2014. The personal interview method was adopted. In this regard, spontaneous help has been received from officials. However, there were few problems in the collection of information, owing to the tendency of people to keep the facts in secrecy, fear about tax assessment, poor memory and reluctance of respondents. These problems were partly over came by eliciting information through discussions. The scholar has made quite a few visits to the plants at regular intervals.

7. SCOPE OF THE STUDY

The present comparative study was mainly confined to Deluxe Wood Industries., and Marain Wood Industries., This is an attempt to have a micro level imperial analysis in the financial progress and performance of Wood Industries. The findings and suggestions throw light on the guidelines for future policy formulation and implementation for the effective functioning of Wood Industries in other districts of the state and the country also. Every effort has been made to conclude relevantly and suggest for the best performance in the most adoptable way, keeping in view the market and production levels.

8. LIMITATIONS OF THE STUDY

The ratios have been calculated, analyses and interpreted for the period under study i.e. From 1st April 2005 to 31st March 2014. Ratios are computed on the basis of historical financial statements. Hence, future performance of the manufacturing units not reflected. The financial statements are subject to window dressing. It will affect the results in the process of analysis. The absolute figures may prove decorative as ratio analysis is primarily quantitative analysis and not qualitative analysis. Many people may interpret the results in different ways as ratio is not an end by itself. Anyhow, every effort has been made to draw conclusions to all firms facing similar situations. But non- availability of certain financial data makes difficulty on comparative analysis.

Ratio Analysis

The short term creditors of a company are primarily interested in knowing the company's ability to meet its current or short-term obligations as and when these become due. A firm must ensure that it does not suffer from lack of liquidity or capacity to pay its current obligations which is goodwill to the company. And this can be known by liquidity position. This paper deals with a critical evaluation and analytical interpretation of the financial performance of Deluxe Wood Industries and Marain Wood Industries as a comparative study relating to short-term solvency for the study period from 2005 to 2014. This study of solvency is now analyzed by adopting short-term liquidity position.

Short Term Liquidity Position

· Current Ratio (Working Capital Ratio)

This ratio measures the general liquidity position in short term by establishing relationship between current assets and current liabilities. A relatively high current ratio is an indication that the firm presumed to be liquid and has the ability to pay its current obligations in time. A relatively low current ratio represents, the liquidity position of the firm is not satisfactory and it may not be able to pay current obligations. The formula to calculate current ratio is as follows.

Current Ratio (WCR) = Current Assets / Current Liabilities

The statistical data relating to calculation of current ratio was computed through the financial statements referred in their respective annual reports of Deluxe Wood Industries and Marain Wood Industries for the study period from 2005-06 to 2013-14 are depicted in the below table.

Table 1: A 2005 to 20	ssets and C 14	urrent Liabilities of Deluxe Wo	ood Industries & Marain Wood	Industries
	Year	Deluxe Wood Industries	Marain Wood Industries.	

Year	Deluxe Wood Industries			Marain Wood Industries.		
Ending 31 st March	Current Assets	Current Liabilitie	Ratio	Current Assets	Current Liabilitie	Ratio
2005-06	138665	79836	1.74:1	141928	78796	1.80:1
2006-07	152342	81124	1.88:1	151716	104927	1.45 : 1
2007-08	153000	87715	1.74:1	172508	122295	1.41:1
2008-09	156026	144875	1.08:1	179198	127037	1.41:1
2009-10	181658	125624	1.45 : 1	215129	140100	1.54:1
2010-11	220100	133447	1.65 : 1	235353	166312	1.42:1
2011-12	239018	159756	1.50:1	212467	118192	1.80:1
2012-13	248351	128402	1.93:1	227096	105843	2.15:1
2013-14	289865	144558	2.00:1	367154	110226	3.33:1

* Source: Annual Reports

As a conventional rule, a current ratio of 2:1 is considered satisfactory. This rule of thumb should not blindly be followed because, low current ratio indicates that the unit may not be having sufficient funds to pay off liabilities or it may be trading beyond its capacity. Higher current ratio may not be favorable because of slow moving stocks, stocks may pile up due to poor sale, debt collection may not be satisfactory, cash and bank balances may be lying idle because of insufficient investment opportunities. This ratio is below the accepted standard norm both in Deluxe Wood Industries and Marain Wood Industries in the entire study period, excepting 2013-14 in Deluxe Wood Industries, 2012-13 and 2013-14 in Marain Wood Industries. It clearly indicates, the normal general accepted solvency to meet their current obligations in time is not satisfactory during 2005-2012. This ratio just reached at standard in 2013-14 in Deluxe Wood Industries compared with previous years. It was noticed from 2011-12 the percentage of the cash and bank balances, loans and advances in total assets were increased as against a short fall in value of inventories in 2012-13 in Deluxe Wood Industries. A moderate decrease in current liabilities percentage in total liabilities are identified in 2009-10 and subsequent increase in 2013-14. The percentage of loans and advances were increased rapidly from 4.09 in 2012-13 to 5.74 in 2012-13 and 27.60 in 2013-14 in Marain Wood Industries. In both firms the current ratio is stable with effect from 2012-13 which indicates the short term financial position is quite satisfactory. However, the management of Deluxe Wood Industries must initiate necessary steps to utilize its idle cash and bank balances in attractive investments or to pay back its short term liabilities.

Quick Ratio (Acid Test Ratio)

Quick ratio is more rigorous test of liquidity than current ratio. It establishes the relationship between quick or liquid assets and quick liabilities. Quick assets mean current assets as reduced by inventory and prepaid expenses. Quick liabilities refer to current liabilities as reduced by bank overdraft, on the argument that bank overdraft generally permanent way of financing and not subject to be called on demand. However, quick assets and current liabilities have been used for calculation of quick ratio. The formula to calculate quick ratio is as follows.

Quick Ratio = Quick Assets / Current Liabilities

The statistical data relating to calculation of quick ratio obtained through the financial statements referred in their respective annual reports of Deluxe Wood Industries and Marain Wood Industries for the study period from 2005-06 to 2013-14 and are depicted in the below table.

Year	Deluxe Wood Industries.			Marain Wood Industries.		lustries.
Ending 31 st March	Quick Assets	Current Liabilitie	Ratio	Quick Assets	Current Liabilitie	Ratio
2005-06	58888	79835	0.74:1	11393	78797	1.45:1
2006-07	65118	81114	0.80:1	10829	104913	1.03:1
2007-08	66754	87712	0.76:1	12556	122300	1.03:1
2008-09	75096	144871	0.52: 1	12924	127032	1.02:1
2009-10	92187	125626	0.73: 1	16016	140113	1.14:1
2010-11	115293	133447	0.86: 1	16482	166315	0.99:1
2011-12	103765	159757	0.65: 1	14413	118182	1.22:1
2012-13	132483	128415	1.03: 1	17928	105839	1.69:1
2013-14	168719	144568	1.17:1	32227	110214	2.92:1

 Table 2: Quick Assets and Current Liabilities of Deluxe Wood Industries & Marain Wood

 Industries 2005 to 2014

* Source: Annual Reports

Interpretation

A quick ratio of 1:1 is considered to represent a satisfactory current financial condition. A quick ratio of 1:1 does not necessarily mean satisfactory liquidity position, if all debtors cannot be realized and cash is needed immediately to meet current obligations. A low quick ratio does not necessarily mean a bad liquidity position as inventories are not a absolutely non-liquid. It is observed from the above data the quick ratio is less than the accepted norm in Deluxe Wood Industries from 2005-06 to 2011-12, whereas it is just above the standard in Marain Wood Industries Further the quick ratio is above the standard in Deluxe Wood Industries from 2013-14.

In Marain Wood Industries this ratio is at standard from 2005-06 to 2009-10 with a slight fall in 2010-11. Thereafter it is increasing progressively. It is noticed in the composition of current assets, the percentage of inventory in total assets is high in proportion in Deluxe Wood Industries compared to Marain Wood Industries considering other current assets like debtors, loans, advances, cash and bank balances. Therefore, quick ratio is more satisfactory in Marain Wood Industries with Deluxe Wood Industries in the entire study period.

· Cash Ratio (Absolute Liquid Ratio)

Cash is the most liquid asset. The relationship between cash including cash at bank and short term marketable securities with current liabilities is examined to know the immediate solvency. Although receivables, debtors and bills receivable are generally more liquid than inventories, yet there may be doubts regarding their realisation into cash immediately or in given time. The formula to calculate the cash ratio is as under.

Cash Ratio = Cash* + Marketable Securities / Current Liabilities.

* Cash means, cash in hand and cash at bank.

The statistical data relating to calculation of cash ratio obtained through the financial statements referred in their respective annual reports of Deluxe Wood Industries and Marain Wood Industries for the study period from 2005-06 to 2013-14 and are depicted in table 3 with its graphical representation.

Fable 3: Cash +Marketable Securities and Current Liabilities of Deluxe Wood Industriation	ies
& Marain Wood Industries 2005 to 2014	

Year	Deluxe Wood Industries.			Marain Wood Industries.		
Ending	Cash and	Current	Ratio	Cash and	Current	Ratio
31 st March	Bank	Liabilitie		Bank	Liabilitie	
2002-03	5648	79836	0.07:1	46037	78792	0.58:1
2003-04	7955	81125	0.10:1	47895	104923	0.46:1
2004-05	6126	87717	0.07:1	59578	122301	0.49:1
2005-06	7776	144872	0.05: 1	61899	127037	0.49:1
2006-07	9729	125633	0.08: 1	72100	140116	0.51:1
2007-08	13291	133455	0.10:1	80456	166315	0.48:1
2008-09	8078	159752	0.05: 1	64414	118800	0.54:1
2009-10	13763	128418	0.11:1	91685	105831	0.87:1
2010-11	20684	144565	0.14:1	28847	110216	0.26:1
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* Source: Annual Reports

Interpretation

The ideal cash ratio is 1:2 or 0.5 or 50 percent. This ratio in Deluxe Wood Industries is less than the standard and not encouraging for the entire study period i.e. 2005-06 to 2013-14. The cash ratio is above the standard in Marain Wood Industries in 2005-06 and a sharp decrease up to 2008-09, thereafter sturdily increased to 87 percent in 2012-13. But subsequently it has fallen to 26 percent in 2013-14, which is less than the standard.

The percentage of cash and bank balances in total assets in Deluxe Wood Industries was 1.27 in 2005-06, reduced to 0.90 percent in 2008-09 and thereafter with increasing trend reached to 1.71 percent in 2010-11. Similarly, in Marain Wood Industries the cash and bank percentage in total assets was 13.98 percent in 2005-06 increased to 15.06 percent in 2008-09, reduced to 12.34 percent and 3.30 percent in 2009-10 and 2013-14 respectively.

Net Working Capital Ratio

Working capital is very much required sufficiently for any organization for effective functioning of its operations successfully. Generally, working capital is directly related to sales.

Net working capital is the difference between current assets and current liabilities. This ratio is calculated by dividing net working capital with net assets. Net assets represents aggregation of net fixed assets, current assets, value of capital works-in- progress and investments. High net working capital ratio is not a good sign. This ratio can be calculated by using the following equation.

Net Working Capital Ratio = Net Working Capital / Net Assets.

The statistical data relating to net working capital ratio obtained through the financial statements referred in their respective annual reports of Deluxe Wood Industries and Marain Wood Industries for the study period from 2005-06 to 2013-14 and are presented in the table.

Year	Deluxe Wood Industries		Marain Wood Industries.			
Ending	Net	Net	Ratio	Net	Net	Ratio
31 st March	Working	Assets		Working	Assets	
2002-03	58826	434717	0.14:1	63138	329512	0.19:1
2003-04	71228	442361	0.16:1	46796	343821	0.14:1
2004-05	65289	481118	0.14:1	50218	405459	0.12:1
2005-06	11125	857428	0.01:1	52164	411000	0.13:1
2006-07	56025	103752	0.54:1	75028	575926	0.13:1
2007-08	86658	110016	0.08:1	69037	748016	0.09:1
2008-09	79236	115891	0.07:1	94275	748620	0.13:1
2009-10	119956	116893	0.10:1	121264	743060	0.16:1
2010-11	145317	120152	0.12:1	256948	873813	0.29:1

Table 4: Net Working Capital and Net Assets of Deluxe Wood Industries and MarainWood Industries 2005 to 2014

Interpretation

The net working capital ratio in Deluxe Wood Industries was steady during 2005-06 to 2007-08. It was increased to 54 percent in 2009-10 which was ever highest due to abnormal increase in current liabilities in the relevant period. Thereafter, this ratio varies from 8 percent to 12 percent from 2010-11 to 2013-14. This ratio was between 12 percent to 19 percent in Marain Wood Industries between 2005-06 to 2013-14 and later reduced to 9 percent in 2010-11.

Thereafter, it was steady between 13 percent to 29 percent during 2011-12 to 2013-14. The percentage of current assets in total assets was at 31.35 in Deluxe Wood Industries in 2005-06 reduced to 17.45 percent in 2006-07 and registered a moderate increase upto 24.12 percent in 2010-11. The current liabilities percentage in total liabilities was 18.05 in

^{*} Source: Annual Reports

2005-14, reduced to 12.07 percent in 2009-10 and 12.03 percent in 2013-14.

In Marain Wood Industries the current assets percentage in total assets was 43.07 in 2005-06, reduced to 37.35 percent in 2006-07 and with fluctuations reached at 42.02 percent in 2013-14. The percentage of current liabilities in total liabilities was at 23.92 in 2005-06 increased to 30.91 in 2008-09, thereafter with declining trend reached to 12.61 percent in 2013-14. This means the units are spending working capital sources for capital investment proposals, not a good sign for effective organization of funds in the long period of time. It is advisable to utilize the existing cash and bank balances to pay off its current obligations every year instead of purchasing or incurring capital expenditure.

9. CONCLUSIONS

From the above study we can analyze that, the management of Deluxe Wood Industries must initiate necessary steps to utilize its idle cash and bank balances in attractive investments or to pay back in short term liabilities.(current ratio). The low quick ratio may also have liquidity position, if it has fast moving inventories and is more satisfactory in Marain Wood Industries with Deluxe Wood Industries. Cash ratio is not satisfactory in Deluxe Wood Industries as compared to Marain Wood Industries and it needs the attention of the management to induce effective utilization of cash and bank balances.

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A STUDY ON EMPLOYEE SATISFACTION WITH SPECIAL REFERENCE TO KSRTC MALAPPURAM (BUS DEPOT)

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Abstract

Employee satisfaction is essential to the success of any business. A high rate of employee contentedness is directly related to a lower turnover rate. Thus, keeping employees' satisfied with their careers should be a major priority for every employer. While this is a well known fact in management practices, economic downturns like the current one seem to cause employers to ignore it. In order to execute well-informed business decisions, managers need more than a ledger of numbers to understand what is really taking place "on the front line." The employees who work day to day with the customers can provide invaluable feedback drawn upon first-hand experience. Encouraging bidirectional communications in this matter can create an organizational culture that breaks down silos and fosters teamwork between management and their staff. This type of employee-centric culture has an effect that extends beyond the internal sphere of an organization - it can actually affect a company's bottom line with a direct and noticeable impact on profits. Take, for instance, the average annual turnover rate in the United States. Depending on the industry, this can range from 15-40%. With that in mind, consider also that it costs 10 times more to hire and train a new employee than it does to retain one. Furthermore, extensive research has shown that motivated and satisfied employees tend to contribute more in terms of organizational productivity and maintaining a commitment to

customer satisfaction. Satisfaction is infectious – and it indeed permeates across the employeecustomer boundary, where revenue and brand image are continuously at stake. This paper demonstrates the significance of employee satisfaction and how companies can successfully implement a program to positively impact both organizational culture and ultimately bottom line profits.

Keywords: Employee satisfaction, Employee engagement, Loyalty, Productivity

1. Introduction

Satisfaction is fulfillment of a need or desire and the pleasure obtained by such a fulfillment. Satisfaction is a good measure to evaluate personal attitude to the professional activity of enterprises. It also expresses a level of happiness of a person in his professional environment connected with interpersonal relations with colleagues and superiors. Employee satisfaction is a key part of successful business. Knowing the employee needs and achieving satisfaction are the basis for successful business activities the employee feedback is most important source of information for improving product and services. Satisfied and convinced employees ensure the company's success in the long term. Research has shown that companies that encourage or engage their employees to provide ideas or suggestions have a consistently higher employee retention rates, productivity and job satisfaction.

Road Transport occupies a pivotal position in the transport system of the country .No other mode of transport system therefore can adequately or efficiently meet the demand for transport arising out of the economic ,social ,wealth ,cultural or religious needs of the people .Road passenger transportation was nationalized after the independence and transport organization were set up under the Road Transport corporation Act 1950 in almost all states and territories to operate road passenger Transport.

2. History of Kerala State Road Transport Corporation

The history of Kerala State Road Transport Corporation began whilst the development of the transport industry it wasn't booming enough like today. The Travancore State Transport Department was constituted by the erstwhile Travancore Government with a view to reorganize the transport service of the State.Mr E.G. Salter, Assistant, and Operating Supdt of London Passenger Transport Board was appointed as Supdt on 20.9.1937.

The State Motor Service was inaugurated by His Highness Sree Chithirathirunal on 20.2.1938. His Highness and his kin were the first passengers of the inauguration trip and Mr. Salter was himself the driver to that bus. This bus along with the 33 other buses brought on road driving through the Kawdiar Square was seen to be a beautiful attraction.

Consequent on the enactment of Road Transports Corporation Act in 1950, Govt. of Kerala formulated KSRTC rules in 1965 by sec.44 and the department was converted into an autonomous corporation on 1.4.1965. The Kerala State road Transport Corporation was established by the government of Kerala by the notification dated, 15-3-1965. The arrangements required for the smooth taking over of the services run by the Kerala State Transport Department were made expeditiously by the Corporation.

At the time of transfer there were only a countable number of bus schedules - 661 bus schedules and 36 lorry schedules. It possessed a fleet of 901 buses 51 Lorries and 29 other vehicles. The new working of the corporation started with 30 new buses and 8 new Lorries. 10 old buses and 7 old Lorries and one tractor trailer were converted for other uses. Plant and machinery owned by Kerala State Road Transport Corporation is extended throughout all its workshops in the whole of Kerala

3. Review of Literature

While going through the various literature surveys the following points could be highlighted. Employers that are untrustworthy are a burden to their employees and may cause stress. Distrust can result from a variety of situations (**Branham, 2005**). Harassment, in any form, may cause a new level of stress for the employee. It becomes increasingly difficult to do a respectable job at work when one is consistently faced with an uncomfortable working environment. This anxiety is caused by trying to avoid troublesome confrontations and situations. Workers may agonize about the consequences they would face if the harassment were to be reported, as well as the repercussions of not reporting it. Dissatisfaction with the job may come from sources other than stress Dissatisfaction may also arise, with the same result in turnover, when the work environment fails to have any flexibility or any source of amusement

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for the employees; the tone of the business will become stressful or tedious (Kaye & Jordan-Evans, 1999). Lack of communication in the workforce is a major contributor to dissatisfaction. This is usually the result of managerial staff that is isolated and does not know how to relate to their employees on a personal or professional level (Branham, 2005). Often companies become more focused on production and revenues, rather than with their own employees, or even their customers. It becomes difficult for workers to see a bright future while working for the company. Those employees who do work well to support the company may not be compensated for their efforts. Employers that choose to under-compensate know that these employees will work hard for minimal pay, and these employers will compensate accordingly (Timpe, 1986). At the same time, the same employers will pay more to other employees who are not willing to work for minimal compensation. This compensation disparity leads to dissatisfaction because eventually the hard worker will notice that he or she is not being compensated fairly for the amount of work they are doing, and will begin searching for another company that will appreciate his or her labor. Employers should prepare for the interview by doing a job assessment to see what skills are necessary for the position, then testing applicants to see if they have the ability to be trained to the position and have the skills and knowledge that correspond with the job description (Kaye & Jordan-Evans, 1999). It is critical that during this phase, the employer give an accurate description of the job to candidates so they can prepare for the challenges ahead.

4. Scope of the Study:

The scope of the study consists of data collection from the employees of Malappuram depot through the questionnaire regarding the facilities provided by KSRTC to motivate employees and to know the benefits they are getting and the study also covered the suggestions given by the employees to motivate them. 50 permanent employees were taken for the study.

5. Research Methodology

The research is based on primary and second data.

- **Primary data:** The primary data is collected through proper questionnaire distributed to the employees of the KSRTC.
- Secondary data:-The secondary data is collected through books, journals & internet

Period of the study

The period taken for the study is 1 month.

Size of the sample

The sample size taken for the study is from 50 Respondents

Tools applied for the study

The statistical tool averages and percentage methods are applied for the study.

6. Limitations

- 1. The survey is done with respect to the permanent employees of Malappuram Depot only.
- 2. Through this study, the satisfaction or the dissatisfaction level of employees is known but analyses could not be made as to which aspect directly leads to satisfaction or dissatisfaction. This actually differs from person to person.
- 3. Only the middle level management and lower level management could be contacted for the survey because the top level management was busy in their work schedule.

The duration of the study was for a limited period of 1 month.

7. DATA ANALYSIS & INTERPRETATION

Table 1. Showing the number of years, the employees are working with KSRTC.

Experience	No of employees	Percentage
0-2 years	17	34%
3-5 years	13	26%
6-7 years	10	20%
More than 7 years	10	20%

Interpretation

From the above table, it is found that 34% of employees are working job since 2 years, 26% since 3 -5 years, 20% since 6 to 7 years and 20% since more than 7 years are working with the organization.

Opinion	Number of Respondents	Percentage
Excellent	23	46%
Good	19	38%
Moderate	6	12%
Poor	2	4%

Table 2. Showing level of satisfaction of employees towards the training provided by KSRTC

From the above table, it is found that 46% of the employees are satisfied with the training provided by the organization, 30% of the employees hold that the training facilities are good, 12% and that it's moderate whereas 4% 90% of employees are not satisfied with the training provided by KSRTC.

Table 3. Showing employees opinion towards the work environment in KSRTC

Opinion	Number of Respondents	Percentage
Yes	45	90%
No	5	10%

Interpretation

From the above analysis, it can be inferred that 90% of the employees satisfied with the working environment in KSRTC whereas 10% are not satisfied with the working environment in KSRTC

Table 4. Showing employees opinion towards the job or work given to them

Particulars	No. of employees	Percentage
Excellent	26	52%
Good	17	34%
Moderate	5	10%
Poor	2	4%

From the above table it can be interpreted that 52% of the employees feel the job or task given to them is excellent,34% feel that the quality of work allotted to them is good, 10% feel its moderate whereas 4 % do not feel so.

Particulars	No of employees	Percentage
Yes	38	76%
No	12	24%

Table 5. Showing the level of satisfaction towards the job security in employees of KSRTC

Interpretation

From the above data it could be found that 76% of the employees believe that there is sufficient job security while 24% feel that they do not have required job security.

Table 6. Shows employees opinions towards the organization providing LTC facilities to their family

Particulars	articulars No of employees	
Yes	33	66%
No	17	34%

Interpretation

From the above, it could be inferred that 66% of the employees say that the provided LTC facility for the respective families while 34% of the employees do not believe so

Table 7. Shows employees expectations towards the further better working environment

Particulars	No of employees	Percentage
Yes	13	26%
No	37	74%

From the above table, it can be concluded that 26% of the employees expect better working environment while 74% of the employees are already satisfied with the working environment of the organization

Table 8. Shows the employees level of satisfaction toward the payment of salary to them in KSRTC

Particulars	No of employees	Percentage
Yes	44	88%
No	6	12%

Interpretation

It could be found that 88% of the employees are satisfied with the salary given by KSRTC while 12% of the employees are not much satisfied.

Table 9. Showing the employees opinion towards the compensation policy as tool of motivation.

Particulars	No of Employees	Percentage
Excellent	25	50%
Good	15	30%
Moderate	6	12%
Poor	4	8%

Interpretation

From the above analysis, 50% of the employees rates the compensation policy as an excellent effective tool, 30% of the employees rate the policy as good, 12% as moderate whereas the remaining 8% of the employees also believe the same.

Particulars	No of employees	Percentage
Yes	50	100%
No	0	0%

From the above table it is inferred that the whole 100% of the employees are satisfied with the company's accidental insurance

Table 11. Showing employees perception on the sufficiency of accident insurance amount paid to them

Particulars	No of employees	Percentage
Yes	50	100%
No	0	0

Interpretation

From the above analysis, it can be said that 100% of the employees that the amount re-embossed sufficient.

Table 12. Showing the employed	es opinion on satisf	action level towards th	he other facilities in KSRTC
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Particulars	No of employees	Percentage
Provident fund	15	15%
Pension	35	35%
Children	50	50%
education		

Interpretation

From the above table it is clear that only 15% of the employees are satisfied towards expected the provident policy provided by the company, 35% of the employees are satisfied towards pension scheme of the organization where as 50% of the employees are satisfied with regard to the children education facilities provided by the company.

8. FINDINGS & CONCLUSIONS

It is found that Majority of employees are working with KSRTC, Malappuram depot since 2 years. The Majority of employees feel that they have a high level of job security and as such they want to continue their services.

- The employees at the depot are satisfied with training provided to them and also with the working environment
- Large numbers of employees say that they are provided with LTC and also accident insurance is provided to 100%. The children education facilities, canteen and refreshment facilities are also provided to the employees.
- > Most of the employees are satisfied with the salary paid to them towards the job performed.
- Employees can strongly contribute to an organization's success by having a customer-centric approach in their work and in their work-related interactions. However, they are more likely to do so if they are satisfied with their job.
- The employee's views about their job not only have an impact on their work experience, but also on tangible business outcomes such as customer satisfaction, sales, and profit.
- Because of the implications for profitability and growth, customer satisfaction is potentially one of the most powerful weapons that companies can employ in their fight to gain a strategic advantage and survive in today's ever-increasing competitive environment.
- In a business environment that requires employees who are flexible, creative, and willing to take risks, it is necessary to find ways to help employees feel fulfilled and empowered in their work.
- The single biggest contributor to these feelings of fulfillment, empowerment, and satisfaction lie in the day-to-day relationship between employees and their managers.

Employee satisfaction leads to customer satisfaction. When internal customers (employees) are happy, they treat external customers well. Customers will keep coming back for more. This grows the relationship and leads to customer loyalty.

9. SUGGESTIONS

It is suggested to improve the depth of training and it must involve more in career programmes.

- The employees are expecting better working condition, so the organization is advised to provide the same to the employees.
- To provide the children education facilities and recreation facilities in a better and broader way.
- The organization should improve the Superior-subordinate relationship so that there may be a smooth flow of work in the organization.
- To provide equal pay for equal work and to increase the Pay-scale of the employees who work fruitfully & productively..
- The organizations should take measures to appreciate and reward the employees who find innovative and better ways of doing the tasks.
- It should consider the suggestions and recommendations given by the employees and should take corrective actions.
- A grievance cell should be established so that the employees can put forth their problems without any hesitation or hindrance.
- When the employees believe that they have a voice that carries influence, it deepens their commitment to the organization and encourages a continuous, positive dialogue
- Employee satisfaction, in turn, translates directly into added value in terms of performance, customer relations, and profitability
- It is suggested that by opening up channels for feedback and assessing employee satisfaction, management can make informed decisions that will allow for increased productivity, job satisfaction, and loyalty by targeting key areas of concern.

Clearly, while organizational leaders are rethinking how to manage the corporation, they must also rethink how they lead the people who drive it. We found that leadership skills directly related to employee satisfaction include: having a clear direction for the group; having realistic and clear objectives; and being able to give appropriate feedback, recognition, and support.

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A STUDY ON IMPACT OF FOREIGN INSTITUTIONAL INVESTMENT ON INDIAN STOCK MARKETS

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ABSTRACT

In the recent past Foreign Institutional Investors have emerged as an inevitable player in Indian capital market. Inflow of foreign capital depends on many factors other than economical growth of the country. Foreign Institutional Investment has great role on country like India with unfavourable foreign exchange reserve to meet trade deficit. This study makes an attempt to understanding trading behaviour and examines contribution of foreign institutional investment particularly on National Stock Exchange and Bombay Stock Exchange. In this study, I also examined impact of foreign institutional investment on different sectors in Indian stock market. It is observed that foreign institution investors are interested to invest in blue-chip companies and companies with higher volume of shares holding by general public. It is also observed that an inverse relationship between foreign institution investment and promoters holding in company. The study concludes that foreign institution investment and Indian stock market are directly related. The determining factors of FIIs to Indian stock markets are market characteristics, macro economic factors and international events.

Key words: FIIs (Foreign institutional Investors)

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1. INTRODUCTION TO FOREIGN INSTITUTIONAL INVESTORS

Foreign institutional investors have gained a significant role in Indian capital market. In developing countries like India, there is a great need of foreign capital, not only increase productivity of labour but also to build sound foreign exchange reserve to meet trade deficit and balanced growth.

After rapid change in economy because of liberal economic policies and pace change due to globalization in 1990s, Indian stock market has become a focus point of foreign investors. These foreign capital lends a hand to developing countries in increasing productivity of labour and building up exchange reserve to meet the current account deficit, is comprised of foreign Institutional investment and foreign direct investment.

India has emerged as one of the most favoured platform for foreign investment. This is reflected in the number of in the number of foreign institutional investors (FIIs) registered with Securities and Exchange Board of India and net foreign institutional investment. The number of foreign institutional investors has increased 18 in 1993 to1765 in 2012 and total net investment of has increased from 5957.2 in March 1998 to 52573.8 by March 2008 and reached 99413crore in December 2014. This is due to promotional activities of foreign institutional investment and relaxation of FII regulation.

1.1 Meaning of Foreign Institutional Investors

"Foreign Institutional Investors means an institution established or incorporated outside India, which propose to make investment in India in securities. Provided that a domestic asset management company or domestic portfolio manager who manage funds raised or collected or brought from outside India for investment in India on behalf of a sub-account, shall be deemed to be Foreign Institutional Investors "- Securities and Exchange Board of India (Foreign Institutional Investors) Regulation ,1995- 2 (f).

1.2 Entities Eligible To Invest Under FII Route

The entities eligible to register as FII are an institution established or in corporate outside India as a pension fund, mutual fund, insurance company or reinsurance company and investment company or an asset management company, investment advisor or manager, institutional or portfolio manager, bank that established or incorporated outside India and propose to make investment in India on behalf of board based funds or an international or multilateral organization or a foreign government agency or foreign central bank, sovereign wealth fund and Charitable trust or charitable societies, foundation, university fund. Broad based funds means a fund that is established or incorporated outside India, which investors with no single individual investor holding more than 49 percentages of the shares or units of the fund such as asset management companies, institutional portfolio managers, trustees and power of attorney holders.

1.3 The Eligibility Criteria for Applicant Seeking FIIs Registration

To get registered as FIIs, applicant should have proper track record, professional competence, financial soundness, general reputation of fairness and integrity. Apart from this applicant should get permission under the provision of Foreign Exchange Management Act, 1999 (FEMA) from Reserve Bank of India and legally permitted to invest in securities outside country or its incorporation/establishment. The applicant must be a fit and proper person and have to pay registration fee. The applicant has to appoint a local custodian and designated bank to route its transaction.

1.4 Financial Instruments Available To FIIs

FIIs can access to various investment avenues in Indian capital market such as securities in primary and secondary market including shares, debentures and warrants of companies, unlisted or to be listed on a recognized stock market exchange in India, dated government securities, unit of mutual funds, Commercial papers and derivatives traded on a recognized stock exchange.

FIIs are eligible to invest in equity up to their limit. According to SEBI guidelines FII can invest in equity up to 10% of total issued capital of an Indian company and investment can made on

behalf of each sub account up to 10% of total issued capital of an Indian company. The sub account registered under foreign companies or individual category, the investment permitted up to 55 of issued capital.

1.5 Foreign Institutional Investment Prohibited Areas

Foreign institutional investment prohibited in equity shares issued by Asset reconstruction company and certain companies such as business of chit fund, agricultural and plantation business, farm houses, nidhi company and real estate business or construction business.

1.6 Evolution of Policy Framework

India's significant change in policy change in the early 1990s from inward looking development strategy to a globalized market base approach resulted attractive foreign investment environment in India. Until the 1990s, India's policy was heavy restrictive. Foreign equity was permitted only high technological industries. Restrictive oriented reforms radically changed such perception with foreign investment policy become progressively liberal following steady withdrawal and external capital control and implication process.

Since the inception of economic reform in 1990s, India's policy stand has changed significantly with focus of attracting foreign investments. The board approach to reforms taken after Gulf crisis. The report of High level Committee on Balance of Payment headed by C Rangarajan recommended many reforms including restriction of external borrowings especially short term nature, composition of shift in capital flows away from debt to non debt creating flows, gradual liberalization of outflow of flow of funds and discrimination in the flow of external assistance.

After liberalization of reforms in early 1990s, it led gradual shift towards capital account convertibility. In September 14, 1992 foreign institutional investors (FIIs) and overseas corporate bodies (OCBs) were permitted to invest in financial instruments. This allows foreign institutional investors to invest directly Indian capital market after getting initial registration with Securities and Exchange Board of India and also Reserve Bank of India's general permission under FERA. The initial registration with Securities and Exchange Board of India and Exc

India's general permission were to hold five years and can be renewed after that period. Reserve Bank of India's general permission under FERA enabled the foreign institutional investors to trade and realizes gain on investment on recognized Indian stock market through a designated bank and custodians for custody of shares and investment. In 1992 government guidelines for aspirants to register as foreign institutional investors have to fulfil basic condition such as impressive tract records, financial soundness, professional competence and other important criteria, including registration with regulatory organizations in India.

The major guidelines and regulatory frame work for foreign institutional investor was incorporated under the SEBI (foreign institutional investors) Regulation in 1995. The regulation and restriction under this act continue to maintain a link with government guidelines through an additional clause that makes foreign institutional investment subject to government guidelines. The maintenance of linkage allowed government to prescribe various investment restrictions

The introduction of Foreign Exchange Management Act (FEMA) in 1999 instead of Foreign Exchange Regulation Act (FERA) permitted foreign institutional investors to transact foreign exchange. Right from 1992 foreign institutional investors have been allowed to invest all securities traded on the primary and secondary market including shares, debentures, bond, warrants and mutual funds.

2. OBJECTIVES

- 1- To find out foreign institutional investment impact on National Stock Exchange (NSE) and Bombay Stock Exchange (BSE).
- 2- To get an overall picture about foreign institutional investors.
- 3- To identify influential factors of foreign institutional investors.
- 4- To identify foreign institutional investment's impact on different sectors.
- 5- To analyze the investment pattern of foreign institutional investors on Indian stock market.
- 6- To analyze the sector wise investment pattern of FII.

3. METHODOLOGY

The tools used for this study are Karl Pearson's coefficients of correlation, Simple Linear Regression Analysis and Multiple Regression Analysis.

4. REVIEW OF LITERATURE

- Banaji. J (2000) found that the presence of foreign institutional investors led capital market reforms like transparency of trading, dematerialization, automation and regulation on reporting and disclosure standard.
- Dhwani Mehtra (2009) in her research paper titled 'FII flows in India', Research on Indian Stock Market Volatility. This research tells that Indian stock market experiencing multitude amount of FII flows. This has affected unfavorably the sentiments retail investors that markets are rigged. Further it found that the performance of Indian stock market co related to other emerging and developed market that probably may cause return.
- Gupta (2011) analyzed the foreign institutional investors' investment and Indian stock market. This study found that FIIs and stock market are influencing each other however their timing of influence is different.
- K.B Singh and S.K Singh (2012) examined FIIs impact on CNX-Nifty. They found that there was a significant impact of FIIs on CNX-Nifty and there was a moderate impact of FIIs investment in the fluctuation of the CNX-Nifty.
- Kumar (2002) in his research paper titled 'foreign institutional investors and stock market volatility' concludes that foreign institutional investors and domestic institutions (including mutual funds) are most powerful and influential force in Indian capital market.
- Mukherjee (2003) in his research paper titled 'taking stock of foreign institutional investors' found that performance of Indian stock market is most influential factors of FIIs flows. Further, this research found that exchange rate return variation and change in fundamental of economy also determinant of FIIs decision, but such influence don't prove to be strong enough. Another highlighting finding of this research is that FIIs may not use Indian financial asset for the purpose of diversification of their investment.

- Murthy, Rangnathan and Rao (1999) conducted a research to study on stock market development. The study was over the period of 8 years (from 1990 to 1998). Their finding of this study was foreign institutional investment would help the Indian stock market directly through widening investors base and improve trading system.
- Prasanna (2008) examined the relationship between FII and firm's specific characteristics such as financial performance, stock performance, and ownership structure. The study found that FII choose the companies where family shareholding of promoters is not substantial and further FIIS were interested in investing companies those who have large number of public participation in terms of subscription of shares. Another major variable of financial performance in term of deciding their investment are earning per share and share return of the company.
- Raj Chaitanya (2003) in his research paper titled 'foreign institutional investment' examined impact foreign institutional investment on the Indian capital market. The study concludes that foreign institutional investment is the sole driver of performance of Indian stock market.
- Ramanarayanan and Goudarzi (2010) conducted a study about the co integration and causality between the Indian stock market and foreign institutional investment during the period financial crunch in 2008. The study found that the BSE500 stock index and foreign institutional investment series are co integrated and causality between them is bilateral. The study concludes that, co integration and causality are two important factors determining foreign institutional investors' investment in capital market and its development.
- Tanu Agarwal (2013) in her research paper titled 'FII: Study of co relationship with mutual funds investment and sensex' concludes that both Sensex and MFs have high degree of positive correlation with FIIs net investment. Whereas foreign institutional investment has more positive correlation with Sensex than mutual fund investment. They both impacted the volatility and movement of FIIs net investment.
- Trivedi and Nair (2005) in their research paper titled 'volume of foreign institutional investment and profit booking in Indian stock market. They found that huge volume of

foreign institutional investment enables FIIs play the role of market marker and FIIs most seen that they buying financial asset when the prices are declining and selling when the asset prices are increasing. Hence there may bi-directional relationship between foreign institutional investment and Indian stock market return.

Venkata Subba Reddy and Mahammed Saleem (2013) in their research paper titled 'impact of FIIs on Indian stock market' examined impact of FDIs and FIIs on Indian stock market. This research found that foreign investment determined by stock market return. Further FIIs' investment is not a major factor for Indian capital market boom and FII are increasingly dominant in the Indian capital market. The domestic institution and retail investors remain not so dominant.

5. ANALYSIS AND INTERPERTATION

Foreign Institutional Investors are institutions established or incorporated outside India, which propose to make investment in India in securities. Provided that a domestic asset management company or domestic portfolio manager who manage funds raised or collected or brought from outside India for investment in India on behalf of a sub-account, shall be deemed to be Foreign Institutional Investors. In this study I try to analyze FII from all points of view. The prime motto of this study is to identify FII impact on Indian stock market. For this Bombay Stock Exchange (BSE) and National Stock Exchange (NSE) underwent for study. Further I analysed FIIs impact on major sectoral indices in Indian stock market namely BSE Metal, BSE IT, BSE FMGC and BSE Bank. Then I analysed FIIs impact on major individual company shares. For this I took major four companies from different sectors. At last I analysed major macro economic variables determine FII inflow into Indian capital market.

Financial Year	FII Net Investment	Fll Net Investment in Equity	Fll Net Investment In Equity in Primary Market	FII Investment in Debt in Stock Exchange	FII Investment in Debt in Primary Market
March -1998	5957.2	5267		691.05	
March-1999	-1364.8	-482.1		-882.9	
March -2000	10643.7	10115.2		528.5	
March -2001	9638.9	9942.4		-303.5	
March -2002	8771.7	8085.5		686.2	
March -2003	3081.3	2508		573.3	
March -2004	48918.3	43568.6		5349.7	
March -2005	42982.9	41053.5		1929.4	
March -2006	41624.2	49017.9		-7393.7	
March -2007	32865	26871.3		5993.7	
March -2008	65073.2	52573.8		12499.4	
March -2009	-46381.9	-48248.4		1866.5	
March -2010	143218.4	110752		32466.4	
March -2011	146438.1	110121.1	34112	36317	-19000.8
March -2012	93725.5	43737.6	-3344.9	49987.9	-7308.7
March -2013	168367	140032.6	20257.4	28334.4	14283.3
March-2014	200394.5	90,162.00	17371.00	483254.2	3838.60

TABLE	1:	Showing	Net	Foreign	Institutional	Investment	in	Equity,	Primary	Equity
Market,	Deb	t Market a	and P	Primary I	Debt Market					

Source: CMEI data Centre

From the above table, it is observed that the FII investment showed huge investments in equity market by 5267 in March -1998 crore to 140032.6 crore in March -2013. There has been steep rise in FII in equity in 2003, except for 2009 due to recession period. In 1999 and 2009 only foreign institutional investors turned net sellers. In recession period FIIs turned net selling in both equity and debt market for profit booking and seeing the panic sells out of shares in Indian

market. FII net investment hit historic high in 2013 with net amount of 168367crore. FIIs were net sellers in primary debt market, except last financial year. Further this table showing that FII were active in debt market with significant amount of investment. It is also observed that FIIs were net buyers in debt marker in 2009 irrespective of financial crunch. FIIs debt market investment also reported steed rice investment by 691.05 in March -1998 to 28334.4 crore in March -2013. It is noticed that FIIs net investment were stable in the last four years.

5.1 ANALYSIS OF IMPACT OF FIIS ON BOMBAY STOCK EXCHANGE (BSE)

5.1 Research Question:

Does Foreign Institutional Investment can Impact on Bombay Stock Exchange (BSE)?

5.1.1 Results & Interpretations:

Correlations					
		SENSEX	Flls		
Decrean Caulation	SENSEX	1.000	.371		
Pearson Cor lation	FIIs	.371	1.000		
	SENSEX		.000		
Sig. (1-tailed)	FIIs	.000			
	SENSEX	130	130		
N	FIIs	130	130		

The statistical test of Pearson Correlation shows that there is a moderate degree of correlation between FIIs' investment and Sensex. As depicted in the above table, the correlation coefficient between FIIs investment and Sensex is 0.371 and which is significant at 1%. This means FII inflows influence to a considerable extend on the Sensex volatility. In this study two observations is considered as outlier. So the number of observation for this analysis is 130.
Model	R	R	Adjusted R	Std. Error of		Change Statistics					
		Square	Square	the Estimate	R Square	F	df1	df2	Sig. F	Watson	
					Change	Chang			Chang		
						е			е		
1	.371ª	.138	.131	.07519	.138	20.427	1	128	.000	1.744	

Table 3: Model Summary^b

a. Predictors: (Constant), FIIs

Model summary explains the number of model being predicted. In this table, R can explain as relationship between independent and dependent variables. Here correlation between FIIs and BSE .371 i.e. 37.1%. So there is a moderate correlation between BSE and FIIs.

A measure of the strength of the computed equation is R-Square. It also called coefficient of determination. R- Square is simply the square of multiple correlation coefficients listed under R in the Model Summery table. So FIIs has capacity to explain BSE at 13%.

Adjusted R-Square is intended to control for overestimating of the population R-Square resulting from high co linearity and small samples.

Adjusted R square tells about proportion of variance in the Sensex which can be predicted by FIIs. So 13% of all the variance in Sensex can be predicted or explained from the behaviour of FIIs. It also tells that not only FIIs are only factor for determining movement or direction of Sensex. But FII is the one of the factor can't be completely ignored.

lat	ble 4 :	ANOV	Aª	

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	.115	1	.115	20.427	.000 ^b
1	Residual	.724	128	.006		
	Total	.839	129			

a. Dependent Variable: SENSEX

Anova is the tool for testing overall fit of the model or checking whether our model can be predicts the outcome variable significantly well. It basically tells us whether the regression equation is explaining a statically significant portion of the variability in the dependent variable from variability in the independent variables. It is showing that statistically significant at 1 % level. So our model is good predictor of the result. P value compared to alpha level (which is basically .05), so this model BSE has significant relation with FIIs.

					. 0000111						
Model Unstandardiz Coefficient		idardized ficients	rdized Standardized ents Coefficients		Sig.	Correlations			Collinearity Stati <u>stics</u>		
		В	Std. Error	Beta			Zero- order	Partial	Part	Tolera nce	VIF
1	(Constant)	.019	.007		2.787	.006					
	FII	.006	.001	.371	4.520	.000	.371	.371	.371	1.000	1.000

Table 5: Coefficients^a

a. Dependent Variable: SENSEX

Coefficient table tells the predictor is statistically significant. Here the predictor is significant at 1% level. The size of beta indicates the strength of their independent relationships .It tells that one unit change in FIIs will impact or affect at .371 on Sensex. The coefficient table gives values to write regression equation. The regression equation can be form Predicted variables (Y) = a+bx Where a is alpha value, b is beta value and x is independent value. The regression equation can be formed as

Y=2.932+4.502

5.2 ANALYSIS OF IMPACT OF FIIS ON NATIONAL STOCK EXCHANGE (NSE)

5.2 Research Question:

Does Foreign Institutional Investment can Impact on National Stock Exchange (NSE)?

Hypothesis:

Ho: Foreign Institutional Investment has no significant impact on National Stock Exchange.

Ha: Foreign Institutional Investment has significant impact on National Stock Exchange

5.2.1 Results & Interpretations:

Table 5. Correlations									
		NSE	FII						
Decrean Correlation	NSE	1.000	.393						
Pearson Conelation	FIIs	.393	1.000						
Sig (1 toiled)	NSE		.000						
Sig. (1-tailed)	FIIs	.000							
N	NSE	130	130						
IN	FIIs	130	130						

Table F. Convolations

The statistical test of Pearson Correction shows that there is reasonable degree of correlation between FII and CNX Nifty. As depicted in the above table, the correlation coefficient between FIIs investment and CNX Nifty is .393 and which is significant at 1 % level. This means FII inflows influence to a considerable extend on CNX Nifty movement or direction. This study, two observations considered as outlier. So the number of observation of this study is 130.

	Table 6: Model Summary														
Model	R	R	Adjusted R	Std. Error of	Change Statistics Dur										
		Square	Square	the Estimate	R	F	df1	df2	Sig. F	Watson					
					Square	Chang			Change						
					Change	е									
1	.393ª	.155	.148	.45345	.155	23.433	1	128	.000	2.077					

a. Predictors: (Constant), FIIs

b. Dependent Variable: NSE

Model summary explains the number of model being predicted. In this table, R is the relationship between independent and dependent variables. Here correlation between FIIs and NSE is .393 i.e. 39%. So there is a moderate correlation between FII and NSE.

A measure of the strength of the computed equation is R-Square. It is also called coefficient of determination. R-Square is simply the square of multiple correlation coefficients listed under R in the model Summary table. So FIIs has capacity to explain NSE at 14.8%.

Adjusted R-Square is intended to control for overestimating of the population. R-Square resulting from co linearity and small samples. Adjusted R square tells about proportion of variance in the CNX Nifty which can be predicted by FIIs. So 14% of all the variance in CNX Nifty can be predicted or explained from the behaviour of FIIs. From this it is clear that FII is not only a trigger of the movement of CNX Nifty. But FII is influence over CNX Nifty can't be ignored.

Table 7 : ANOVA^a

Model		Sum of Squares	Df	Mean Square	F	Sig.
	Regression	4.818	1	4.818	23.433	.000 ^b
1	Residual	26.319	128	.206		
	Total	31.138	129			

a. Dependent Variable: NSE

b. Predictors: (Constant), Flls

Anova is the tool for testing overall fit of model or checking whether our model can be predicts the outcome variable significantly well. It basically tells us whether the regression equation is explaining a statically significant portion of the variability in the dependent variable from variability in the independent variables. It is showing that our variables are statistically significant at 1% level. So our model is good predictor of the result. P value compared to alpha level (basically .05), so this model FIIs has significant relation with NSE.

	Table 8: Coefficients ^a													
Model		Unstandardized		Standardized	t	Sig.	Correlations			Collinearity				
		Coeff	icients	Coefficients					Statistics					
		В	Std.	Beta			Zero- Partia		Part	Tolerance	VIF			
			Error				order							
1	(Constant)	.070	.040		1.728	.086								
	FIIs	.041	.009	.393	4.841	.000	.393	.393	.393	1.000	1.000			

a. Dependent Variable: NSE

Coefficient table tells about the predictor is statistically significant. Here the predictor is significant at 1% level. Beta value can explain as change in one unit in FII may influence or make positive change at .393 on CNX Nifty

The regression equation can be formed as

Predicted variables (Y) = a+bx

Where a is alpha, b is beta value and x is independent variables.

Y=1.728+4.841

5.3 ANALYSIS FIIS MOVEMENT WITH SECTORAL INDICES (BSE IT INDEX, BSE FMGC INDEX AND BSE METAL INDEX

REGRESSION ANALYSIS

<u>Multiple Regressions between FIIs and sectoral indices</u> Dependent variable: FII Method: Least Squares Sample (adjusted): 01-03-2003 to 01-03-2013 Include observations: 121 after adjustments

Variables	Std error	Coefficient	t-statistics	Probability
(Constant)	466		1 287	200
METAL	131	345	3 344	.200
IT	.148	020	-0.203	.840
FMGC	.145	238	-2.039	.044
BANK	.221	.840	4.353	.000
R-square	.875	R	.936	
Adjusted R square	.871	Regression	51.9 4	
S E of regression	.252	Residual	7.39	
F-statistic				
Prob(F-statistic)	.000			

The above table shows that multiple regression. This table shows 121 observations and four variables such as BSE Metal, BSE IT, BSE FMGC, BSE Bank. The above labelled column of coefficient is the values for the regression equation for predicting the dependent variable from the independent variables and measures of success of the regression is based on the prediction of

the value of dependent variables by independent variables. The coefficient explains amount of increase in dependent variable that would be predicted by independent variables.

The table shows that FII has influence over BSE Bank, BSE Metal and BSE FMGC. BSE Bank index and Metal are significant at 1 % and BSE FMGC significant at 5%. BSE Bank shows the coefficient of .840. It means that every one unit increase in BSE Bank index will results a positive increase of .840 in FIIs. So there is a direct relation between BSE Bank index and FII. The coefficient of BSE Metal is .345. That means one unit change in BSE Metal will result .345 changes in FII. This indicates direct relationship between FII and BSE Metal.

The coefficient of BSE FMGC is -.238. It implies that one unit increase in BSE FMGC index will results .238 negative changes in FIIs. So this indicates inverse relationship between FII and BSE FMGC index. So we can assume that FIIs prefer to invest in FMGC sector when FMGC sector falling and FIIs are investing BSE Metal and Bank shares when sectoral indices moving up. BSE IT doesn't influence the FIIs, because not significant at any level.

The success of regression is depending on the prediction of value of dependent variable by independent variables. BSE Bank index, BSE Metal index and BSE FMGC can predict level of FII inflow at 87%. The correlation of BSE Metal index, BSE FMGC and BSE Bank shows at 93%. That shows high correlation between FII and these sectors. So tells that FII inflow moves with movement of major sectoral indices. Adjusted R-square indented to control over estimation of population. It also shows 87%. So variance in FII can be predicted by three sectors .i.e. BSE Bank index, BSE FMGC index and BSE Metal index at 87%.

The major finding of this analysis is FII has influence over BSE Bank, BSE FMGC, BSE Metal indexes and BSE IT index has no influence of FIIs' investment. So retail investors are advisable to invest in IT sectors. Further I found that FIIs prefer to invest metal and banking sectors when sectoral indices performing well and FIIs prefer to invest in FMGC sector when sectoral indices

falling. Apart from this the study reveals that FII has high correlation between all sectoral indices and FII has inverse relationship with BSE FMGC.

5.4 Analysis Fiis Inflow Determine Factors (Marco Economic Variables)

REGRESSION ANALYSIS

Multiple Regressions between FII and Macro Economic Variables.

Dependent variable: FII Method: Least Squares Sample (adjusted): 01-03-2003 to 01-03-2013 Include observations: 120 after adjustments

Variables	Std error	Coefficient	t-statistics	Probability
(Constant)	4.148		4.381	.000
DOLLAR	.819	527	-5.774	.000
CRUDE	.176	280	-2.437	.016
CRR	.326	0.76	.898	.371
WIP	.478	.759	5.828	.000
R-square	.754	R	.868	
Adjusted R square	.745	Regression	41.4	
S E of regression	.341	Residual	13.4	
F-statistic				
Prob(F-statistic)	.000			

The above table shows multiple regression of FII and various macro economic factors such as crude oil, dollar, whole sale price index, cash reserve ratio and gold. The period of study consists of ten years with 120 observations. In this rest I try to analyse various macro economic factors which determine or influence FII inflow into Indian Capital market.

The table shows dollar, crude and whole sale price index influence the FII inflow into Indian capital market. Dollar and whole sale price index are significant at 1 % level and crude oil significant at 5%. CRR does not influence FII, because it is not significant at any level.

The coefficient of dollar shows -.527. It means every unit increase in dollar will results .527 negative changes in FII. So relationship of dollar and FII is inverse or opposite. Generally a countries' economical performance will reflect in its currency. So when a country performing badly it FII inflow may also affect unfavourably. The coefficient of whole sale price index is .756. It means that one unit increase in WPI will results at .756 on FII. So this indicates direct relationship between wholesale price index and FIIs. The coefficient of crude is -.280. It means one unit increase in crude will negatively influenced FII inflow. When crude price increases, it will impact unfavourably the balance of payment position of county. FII may induce to sell off shares when crude price increases.

So overall result of this analysis is major determining factors of FIIs inflow is Dollar, crude and wholesale price index and CRR not a major determining factor of FII inflow. Another finding of this study is Dollar and crude has inverse relationship with FII.

6. CONCLUSION

This study mainly focuses on impact of FII on Indian stock market and factors determining FII inflow into Indian capital market. For this first I analysed BSE Sensex with FII using regression model. This study reveals that moderate correlation between BSE Sensex and FII. That means FII inflow influences to a considerable extend on the BSE Sensex volatility. The model investigates that the variable FIIs net inflow has explained the variance nearly 13%. It means that whenever changes taken place in BSE Sensex for the study period the FII are accountable for extend of 13%. Anova shows that model is fit for study and showing significant at 1 % level. Under this study coefficient table tells that FII has greater influence over BSE Sensex. It showing that 1% change in FII will make change in BSE Sensex at .377.

Further I analysed FIIs impact on NSE Nifty. The Pearson correlation test is carried out. From the table it is established that the correlation between NSE Nifty and FII is .393. This shows that there is good relationship between the both variables and further both variable positively correlated at % significant level. The anova table under of this analysis showed that the study is fit in all respect. The model investigates that the variable FIIs net inflow has explained the variance nearly 1%. It means that whenever changes taken place in NSE Nifty for the study period the FII are accountable for extend of 14%. This study revealed that FII has greater influence over NSE Nifty. It justified this study by showing coefficient table.

The next study was to analyse relationship between FII and four sectoral indices namely BSE Metal, BSE IT, BSE FMGC and BSE Bank. This study reveals that FII has influence over BSE Bank, BSE Metal and BSE FMGC. BSE Bank index and Metal are significant at 1 % and BSE FMGC significant at 5%. BSE Bank shows the coefficient of .840. It means that every one unit increase in BSE Bank index will results a positive increase of .840 in FIIs. So there is a direct relation between BSE Bank index and FII. The coefficient of BSE Metal is .345. That means one unit change in BSE Metal will result .345 changes in FII.. So this indicates inverse relationship between FII and BSE FMGC index. So we can assume that FIIs prefer to invest in FMGC sector when FMGC sector falling and FIIs are investing BSE Metal and Bank shares when sectoral indices moving up. BSE IT doesn't influence the FIIs, because not significant at any level. Further I found that BSE Bank index, BSE Metal index and BSE FMGC can predict level of FII inflow at 87%. The correlation of BSE Metal index, BSE FMGC and BSE Bank shows at 93%. That shows high correlation between FII and these sectors. So it evident that FII inflow moves with movement of major sectoral indices. The major finding of this analysis is FII has influence over BSE Bank, BSE FMGC, BSE Metal indexes and BSE IT index has no influence of FIIs' investment. So retail investors are advisable to invest in IT sectors. Further I found that FIIs prefer to invest metal and banking sectors when sectoral indices performing well and FIIs prefer to invest in FMGC sector when sectoral indices falling. Apart from this the study reveals that FII has high correlation between all sectoral indices and FII has inverse relationship with BSE FMGC.

Further I analyse FII with macro economic variables to understand influential factors which fetch FII to Indian capital market. The macro economic variables are Dollar, whole sale price index, crude oil and CRR. The major finding of this analysis is dollar and whole sale price index are significant at 1 % level and crude oil significant at 5%. CRR does not influence FII, because it is not significant at any level. Further coefficient of dollar shows -.527. It means

every unit increase in dollar will results .527 negative changes in FII. So relationship of dollar and FII is inverse or opposite. Generally a countries' economical performance will reflect in its currency. So when a country performing badly it FII inflow may also affect unfavourably. The coefficient of whole sale price index is .756. It means that one unit increase in WPI will results at .756 on FII. So this indicates direct relationship between wholesale price index and FIIs. The coefficient of crude is -.280. It means one unit increase in crude will negatively influenced FII inflow. When crude price increases, it will impact unfavourably the balance of payment position of county. FII may induce to sell off shares when crude price increases.

So overall result of this analysis is major determining factors of FIIs inflow is Dollar, crude and wholesale price index and CRR not a major determining factor of FII inflow. Another finding of this study is Dollar and crude has inverse relationship with FII.

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Educational Loan Analysis of Nationalized Banks and New Generation Banks - A Comparative Study

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Abstract

This study presents comparison of Educational Loan analysis for the period 2005-2014 and mainly focus Educational loan divided into three aspects, such as Loan Sanction, Loan Recovery and NPA. All the data collected for secondary sources. The sample banks have been taken from five Nationalized Banks namely Indian Overseas Bank, Indian Bank, Canara Bank, Corporation Bank and Syndicate Bank. Five New Generation Banks namely ICICI Bank, HDFC Bank, AXIS Bank, ING Vysya Bank and Kotak Mahindra Bank. Percentage Analysis is the statistical tools used in this study. Finally this study found that the Educational Loan analysis of Nationalized Banks is higher as compared to New Generation banks. This study is to analyze both banks Educational Loan and to provide some information to improve their banking loan.

Keywords: Loan Sanction, Loan Recovery and NPA.

1.INTRODUCTION

The banking system of India should not only be hassle free but it should be able to meet challenges posed by the technology and any other factors. Indian banking system has reached even to the remote corners of the country. This is one of the main reasons of Indian's growth process. The intention of this study is to analyze the Nationalized banks and New Generation banks Educational loan data for the period of 2005-2014. An Educational loan is one of the loan facilities among the consumer credit scheme of different banks. It is also a modern loan systems, which preferred by the banks management and customers for the sake

of convenience. From the banks perspective, it appears to be a small loan and it has low delinquency rate. Because of the above factors the banks dealing with this scheme have a wide market for their retail operation. Again, in the perspective of customer, it is easy to get, payment through installment, no cash collateral or security, relaxed terms and conditions are the key points. There are some differences when they provide credit services towards educational loan scheme. In India lots of private, Public, foreign banks are working on educational loan scheme. Therefore, has been made an attempt to analyze between Nationalized banks and New Generation Banks on some concerned issues. Finally to find out the educational loan scheme in the sample banks, Loan sanction, Loan recovery, NPA. Therefore, the main objective of this study is to classify the both banks to provide guidelines for future development.

2. NEED FOR THE STUDY

- The banking business is becoming highly competitive.
- This study has been selected as the banks are the financial centre for both public and government.

3. OBJECTIVES OF THE STUDY

The main objectives of the study are to analyze the Educational Loan within Nationalized Banks and New Generation Banks. In particular the study aims to explore following objectives:

- To evaluate comparative position of the Loan sanction, Loan recovery, NPA status of educational loan analysis between the Nationalized Banks and New Generation Banks.
- To examine different aspects of the educational loan between the Nationalized Banks and New Generation Banks.

4. TYPE OF RESEARCH

The Present study is analytical in nature. The study was done to analyze Educational Loan of Nationalized Banks and New Generation Banks. For this study, screening data have been selected from 2005 to 2014.

5. METHODOLOGY OF THE STUDY

In this study an attempt has been made to compare the Educational Loan Analysis of Nationalized Banks and New Generation Banks. The Educational Loan Analysis of the selected banks has been studied on the basis of three aspects, such as Loan Sanction, Loan Recovery and NPA.

6. SAMPLE OF THE STUDY

The present study seeks to evaluate the Educational Loan Analysis of the ten top banks based in India, representing the biggest Five Nationalized Banks such as Indian Bank, Corporation Bank, Canara Bank, Indian Overseas Bank and Syndicate Bank and Five New Generation Banks such as AXIS Bank, ING VYSYA Bank, Kotak Mahindra Bank, ICICI Bank and HDFC Bank. These ten banks were purposely selected for the study, keeping in view their role and involvement in shaping the economic conditions of India.

7. DATA COLLECTION

For this study, the secondary data have been collected from relevant sample banks such as banks website, annual reports, reference journals, websites, books, periodicals, research articles. This data is related to 10 years (2005-2014).

8. FRAME WORK OF STATISTICAL TOOLS

The following statistical tools are used for the fulfillment of objectives of the study.

• Percentage Analysis

9. LIMITATION TO THE STUDY

- 1. The study covers only 5 Nationalized Banks and 5 New Generation Banks.
- 2. The secondary data was collected from the all over India for the period of 2005 to 2014.

10. RESULTS AND DISCUSSION

The Results and Discussions of the study are described under the following parameters such as Loan Sanction, Loan Recovery and NPA.

Table.1

EDUCATIONAL LOAN ANALYSIS OF NATIONALIZED BANKS

This table shows the Educational Loan Analysis of Nationalized Banks of ten years period from 2005 to 2014.

(Amount in crore)

	Loan Sanction		Loan	Recovery	NPA		
Bank	Total Amount 10 years	per cent	Total Amount 10 years	per cent to education loan	Total Amount 10 years	per cent to education loan	
Indian Bank	13128.60	19.59	10468.30	79.74	2660.3	20.26	
Indian overseas Bank	15206.24	22.69	13136.22	86.39	2070.02	13.61	
Corporation Bank	11966.11	17.86	10753.53	89.87	1212.58	10.13	
Syndicate Bank	11339.64	16.92	9827.26	86.66	1512.38	13.34	
Canara Bank	15375.47	22.94	13527.96	87.98	1847.51	12.02	
Total	67016.06	100.00					
Average	13403.20			86.13		13.87	

Source: Compiled Annual Reports of Nationalized Banks (2005-2014)

Table 1 show that, On the whole, out of the Nationalized Banks, Canara Bank tops in loan sanctioning which is followed by Indian Overseas Bank, Indian Bank, Corporation Bank and Syndicate Bank. The recovery rate is high in Corporation Bank which is followed by Canara Bank, Syndicate Bank, Indian Overseas Bank and Indian Bank. NPA is very high in Indian Bank followed by Indian Overseas Bank, Syndicate Bank, Canara Bank and Corporation Bank. Hence it is inferred that Canara Bank is good at lending whereas Corporation Bank is good at recovery of loan and NPA is high in Indian Bank.

Table.2

EDUCATIONAL LOAN ANALYSIS OF NEW GENERATION BANKS

This table shows the Educational Loan Analysis of New Generation Banks of ten years period from 2005 to 2014.

	Loan San	ction	Loan Rec	overy	NPA			
Bank	Total Amount 10 years	per cent	Total Amount 10 years	per cent to education loan	Total Amount 10 years	per cent to education loan		
ICICI Bank	12030.98	25.66	10209.67	84.86	1821.31	15.14		
HDFC Bank	9856.52	21.02	7935.14	80.51	1921.38	19.49		
AXIS Bank	10246.78	21.85	8847.14	86.34	1399.64	13.66		
ING VYSYA Bank	8239.92	17.57	6579.38	79.85	1660.54	20.15		
Kotak Mahindra Bank	6513.77	13.89	5295.27	81.29	1218.5	18.71		
Total	46887.97	100.00						
Average	9377.59			82.57		17.43		

(Amount in crore)

Source: Compiled Annual Reports of New Generation Banks (2005-2014)

Table 2 shows that, On the whole, out of the New Generation Banks, ICICI Bank tops in loan sanctioning, which is followed by Axis Bank, HDFC Bank, ING Vysya Bank and Kotak Mahindra Bank. The recovery rate is high in Axis Bank which is followed by ICICI Bank, Kotak Mahindra Bank, HDFC Bank and ING Vysya Bank.NPA is very high in ING Vysya Bank followed by HDFC Bank, Kotak Mahindra Bank, ICICI Bank and AXIS Bank. Hence, it is inferred that ICICI Bank is good at lending whereas Axis Bank is good at recovery of loan and NPA is high in ING Vysya Bank.

11. FINDINGS OF THE STUDY

Findings related to the Educational Loan shows that among the Nationalized Banks, Canara Bank tops in loan sanctioning. The recovery rate is high in Corporation Bank. Indian Bank suffers of high NPA.

On the whole, out of the New Generation Banks, ICICI Bank tops in loan sanctioning, the recovery rate is high in Axis Bank. ING Vysya Bank suffers of high NPA.

12. RECOMMENDATIONS

- RBI has to make some stricter rule over getting back the loans sanction to the customer.
- RBI has to introduce onetime payment of educational loan on very low rate interest in New Generation Banks as followed by Nationalized Banks.

13. CONCLUSIONS

The RBI, Nationalized Banks and New Generation Banks are playing important role of controlling inflation and deflation of money value. The researcher studied Educational Loan analysis of Nationalized Banks and New Generation Banks in three aspects such as Loan Sanction, Loan Recovery and NPA. The researcher has given appropriate suggestions to overcome the problem of both the banks, if the Banker, RBI and Government follow the suggestions, it will help to increase the performance of both commercial banks.

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A STUDY ON INVESTORS' AWARENESS ABOUT MUTUAL FUNDS AND THEIR PORTFOLIO

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1. INTRODUCTION

An investor considering investment securities is faced with the problem of choosing from a large number of securities. His choice depends upon the risk- return characteristics of individual securities. He would attempt to choose the most desirable securities and like to allocate his funds over this group of securities. Again he is faced with the problem of deciding which securities to hold and how much to invest in each. The investor faces an infinity number of possible portfolios or groups of securities. The risk and return characteristics of portfolios differ from those of individual securities combining to from a portfolio. The investor tries to choose the optimal portfolio taking into consideration the risk return characteristics of all possible portfolios.

As the economic and the financial environment keeps changing the risk return characteristics of individual securities as well as portfolios also change. This calls for periodic review and revision of investment portfolios of investors.

An investor invests his funds in a portfolio expecting to get a good return consistent with the risk that he has to bear. The return realized from the portfolio has to be measured and the performance of the portfolio has to be evaluated.

2. PORTFOLIO ANALYSIS:

A portfolio is a group of securities held together as investment. Investors invest their funds in a portfolio of securities rather than in a single security because they are risk

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averse. By constructing a portfolio, investors attempt to spread risk by not putting all their eggs into one basket. Thus diversification of one's holdings is intended to reduce risk in investment.

Security analysis provides the investor with a set of worthwhile or desirable securities from this set of securities. From this set of securities in identifying large number of portfolios can be constructed by choosing different sets of securities and also by varying the proportion of investment in each security.

3. OBJECTIVES OF THE STUDY

- To study the consumer awareness about MUTUAL FUND and their Portfolio
- ✤ To study the risk return characteristics of different mutual Fund
- ✤ To evaluate the different schemes dealing with mutual funds
- To study the level of satisfaction
- To know about the equity linked saving scheme compared with Mutual funds
- To list out the problems facer while investing in mutual fund.

4. RESEARCH METHODOLOGY

Primary data has been collected from the customers of Mutual Funds who are having the habit of regular investment. For the primary data the questionnaire and the interview technique have been used for collection of data. For the secondary data the related books and journals dealing with investment of portfolios have been consulted and the necessary extracts taken from them for arriving at broad conclusions.

5. ANALYTICAL TOOLS USED

Simple average is used to draw useful conclusions in addition all the available data obtained through the administration of questionnaire were computerized in order to study the customer behavior and other special features relating to the demand for new investment opportunities.

6. HYPOTHESIS

The project was under taken to test the following hypothesis:

H1: Investing in portfolio is an alternative to investing in Gold and Land

H2: There are some problems involved which can be attended to by suitable corrections.

7. FRAME WORK OF ANALYSIS

Data collected from the respondents were incorporated in a master table and number of cross tables was prepared from the master table as per the needs of the study. Statistical tools such as simple percentage analysis are employed to draw inferences.

Variables	No of respondents		Total	Danaanta co	
variables	Male	Female	Total	Percentage	
Bank deposit	21	13	34	62	38
Insurance policies	5	7	12	42	58
Provident	14	6	20	70	30
NSC	3	1	4	75	25
Equity shares	2	2	4	50	50
Debentures	2	-	2	100	-
Gold	-	2	2	-	100
Real estate	2	-	2	100	-
Others	16	4	20	80	20

TABLE SHOWING THE ASSET RANK PREFERENCE

Interpretation

From the above Table that 34 % of the Respondent are having the asset rank of bank deposit, 12 % of the Respondent are having the asset rank of insurance policies, 20 % of the Respondent are having the asset rank of Provident Fund , 4 % of the Respondent are having the asset rank of MSC, 4 % of the Respondent are having the asset rank of Equity Shares , 2 % of the Respondent are having the asset rank of Gold , 2 % of the Respondent are having the asset rank of Real Estate and 20 % of the Respondent are others.

Variables	NO OF R	ESPONDENTS	Tatal	Demonstere	
variables	Male Female		Total	Percentage	
MONTHLY ONCE	22	18	40	55	45
QUERTERLY ONCE	14	8	22	64	36
HALF YEARLY ONCE	9	5	14	64	36
YEARLY ONCE	6	8	14	43	57
AT IRREGULAR	7	3	10	70	30
INTERVALS	/	5	10	70	50

TABLE STATING THE PERIOD OF INVESTMENT

Interpretation:

From the above Table that 40 % of the Respondent are having monthly once as their investment period , 22 % of the Respondent are having quarterly once as their

investment period, 14 % of the Respondent are having half yearly once as their investment period, 14 % of the Respondent are having yearly once as their investment period and 10% are irregular interval.

Variables	NO OF RESPONDENTS Male Female		Total	Percentage	
					U
UPTO 10%	16	22	38	42	58
11 TO 20%	12	8	20	60	40
21 TO 30%	14	16	30	47	53
ABOVE 30%	9	3	12	75	25

TABLE SHOWING THE PERCENTAGE OF MUTUAL FUNDS

Interpretation:

From the above Table that 38 % of the Respondent are having upto 10% investment interest, 20 % of the Respondent are between 11% to 20% investment interest, 30 % of the Respondent are between 21% to 30% investment interest and 12% are above 30% investment interest.

RESI ONDENDENTS					
Variables	No of re	T-4-1	Percentage		
v arrables	Male	Female	Total	Male	Female
PUBLIC SECTOR	35	21	56	63	38
PRIVATE SECTOR	13	5	18	72	28
BOTH	17	9	26	65	35

TABLE SHOWING PREFENCE OF MUTUAL FUND RESPONDENDENTS

Interpretation:

From the above Table that 56 % of the Respondent are invest their mutual fund in public sector, 18 % of the Respondent are invest their mutual fund in private sector and 26% are invest their mutual fund in both.

TABLE SHOWING REASONS FOR PREFERRING PUBLIC SECTOR MUTUAL FUNDS

Variables	Male	Female	Total	Percei	ntage		
SAFETY	29	23	52	56	44		
LIQUIDITY	7	5	12	58	42		
RETURN	5	5	10	50	50		
APPRECIATION	8	4	12	67	33		
TAX BENEFIT	6	2	8	75	25		
OTHERS	1	5	6	17	83		

Interpretation:

From the above Table that 52 % of the Respondent are having safety invest in public sector, 12 % of the Respondent are having liquidity invest in public sector, 10 % of the Respondent are having return invest in public sector, 12 % of the Respondent are having appreciation invest in public sector, 8 % of the Respondent are having tax benefit invest in public sector and 6 % of the Respondent are having other invest interest.

Variables	Male	Female	Total	Perce	entage
TELEVISION	9	7	16	56	44
NEWS PAPER	27	13	40	68	33
SIGN BOARDS	1	3	4	25	75
AGENTS	16	16	32	50	50
OTHERS	5	3	8	63	38

TABLE SHOWING SOURCE OF INFORMATION

Interpretation:

From the above Table that 16 % of the investors are having television as their advertising media, 40% of the investors are having newspaper, 4% of the investors are seeing sign board as their advertising media, 32 % of the investors are having agents and 8% of them having some other medias.

Variables	No of respondents		Total	Percentage		
variables	Male	Female	Total	Male	Female	
HIGH	11	5	16	69	31	
MEDIUM	27	13	40	68	33	
LOW	8	10	18	44	56	
NIL	17	9	26	65	35	

TABLE SHOWING RISK PREFERENCE

Interpretation:

From the above Table that 16 % of the investors are having high risk, 40 % of the investors are having medium risk, 18 % of the investors are having low risk and 26% are having no risk level.

VADIABLES	NO OF RES	SPONDENTS	PERCENTAGE		
VARIADLES	Male	Female	Total	Male	Female
ACCEPTING	27	21	48	56	44
NOT ACCEPTING	33	19	52	63	37

TABLE SHOWING FEATURES OF MUTUAL FUND

Interpretation:

From the above Table that 48 % of the Respondent are accepting the features of mutual fund. 52 % of the Respondent are not accepting the features of mutual fund.

VARIABLES	NO OF RESPONDENTS		PEF	RCENT	AGE
	Male	Female	Total	Male	Female
OPEN ENDED	37	21	58	64	36
CLOSED ENDED	28	14	42	67	33

TABLE SHOWING PREFERENCE OF SCHEME

Interpretation:

From the above Table that 58 % of the Respondent are prefer open ended scheme, 42% are closed ended scheme.

Variables	No of re	No of respondents		Percentage	
v arrables	Male	Female	Total	Male	Female
UPTO 3 YEARS	13	11	24	54	46
BETWEEN 3 TO 5 YEARS	19	15	34	56	44
BETWEEN 5 TO 7 YEARS	17	7	24	71	29
ABOVE 7 YEARS	13	5	18	72	28

TABLE SHOWING INTENTION PERIOD

Interpretation:

From the above Table that 24 % of the Respondent are having up to 3years intension period of investment, 34 % of the Respondent are between 3years to 5 years intension period of investment, 71 % of the Respondent are between 5 years to 7 years intension period of investment and 18% are above 7 years intension period.

8. MAJOR FINDINGS

- 1. It was found that there is lot of scope to the respondents who invest in Mutual funds
- 2. The yield from mutual fund will be in easing order in the future
- 3. The investors need some sort of guidance in types of investments
- 4. Closed end investment funds are differentiated from open end investment schemes 5.16% of the respondents prefer television advertising media, and 40 % of the respondents prefer newspapers and 4% of the respondents prefer signboards and

32% of the respondents prefer agents and 8% of the respondents prefer others medias.

- 5. From the above study it was find that 24 % of the Respondent are having up to 3years intension period of investment, 34 % of the Respondent are between 3years to 5 years intension period of investment, 71 % of the Respondent are between 5 years to 7years intension period of investment and 18% are above 7 years intension period.
- 6. From the above study it was find that 58 % of the Respondent are prefer open ended scheme, 42% are closed ended scheme.
- 7. From the above study it was finding that 48 % of the Respondent is accepting the features of mutual fund. 52 % of the Respondent is not accepting the features of mutual fund.
- 8. From the above study it was finding that 16 % of the investors are having high risk, 40% of the investors are having medium risk, 18 % of the investors are having low risk and 26% are having no risk level.

9. SOLUTIONS

- 1. There can be some kind of increased Sherries to the investors.
- 2. Some of the investors are not well known about the types of Investment. They can be guided in proper way.
- 3. The market ups and downs are to be informed to the investors immediately
- 4. The percentage of Investment preference will be improved proper advertisement channels.

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1

A Study on Employee Morale in Ellora Engineering Company

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ABSTRACT

Organizational effectiveness considerably depends on the morale of its work force. Morale is the enthusiasm with which workers as individuals and as groups respond to their work situation and requirements. It is a state of healthy balance in the organization in which people make their respective contributions to achieve their set goals, maintain their sense of worth besides developing their abilities, knowledge and skills. Every organization should have personnel policies in order to accomplish the objectives of the personnel as well as the organization. It is found that to attain goals, factors like men, money, materials and machines are involved, out of which man power is the most important. The relationship between the employer and employee is an integral part for success of any organization. In fact, productivity morale reflects attitude of employees and there are a number of variables between employee's attitude and productivity. An attitude in the individual tends to interpret, understand, or define a situation or relationship with others.

Key words: Employee morale, Organizational efficiency, Attitude, productivity

1. Introduction

Human relations focus on people who contribute to the common goal in varying degree. Morale is the degree of discipline and confidence with which individual members of a group set out to perform an allotted task, it underlines the prevailing mood and spirit conductive to willing and dependable performance. In short, morale is the extent to which the individual perceives that satisfaction as stemming from his total job satisfaction.

Psychologists have found that human beings differ from one another in their basic mental abilities, skills, attitudes, qualifications and also psychological mental makeup which gets multiplied when they interact with one another in a group or an organization, it is, therefore absolutely essential that the group as a whole is charged with enthusiasm about the work entrusted to it. Such zeal or enthusiasm is usually referred to as morale. It is a continuous process that should be possessed throughout the life of the organization.

Morale is purely emotional. It is an attitude of an employee towards his job, his superior and his organization. This may range from very high to very low. It is not a static thing but it changes depending on working conditions, superiors, fellow workers, pay and so on.

When a particular employee has a favorable attitude towards his work, he is said to have high morale. In the organizational context, we usually talk of group morale as each person has an influence over the other's morale. A person's enthusiasm for his job reflects his attitude of mind to work, environment and to his employer and his willingness to strive for the goals set for him by the organization in which he is employed.

2. EFFECTS OF GOOD MORALE

- 1. Job satisfaction.
- 2. Higher productivity.
- 3. Better goods and services.
- 4. Cheaper goods and services.
- 5. Lower costs.
- 6. Higher profits.
- 7. Better wages.
- 8. Employment stability.
- 9. Employee identification with company.
- 10. Employee initiative, regularity and punctuality.

People with high morale generally tend to increase productivity, to show more initiative and drive, to take on added responsibilities, to come up with various ideas and suggestions to improve the operations, eliminate waste, cut costs and save raw materials, to show great loyalty to the boss and the company. But it may be hasty to conclude that high employee morale alone will contribute to all the beneficial results cited, but given proper management, tools, equipment, and environment, high morale can help cause many good results for the organization, management and the employees.

3. EFFECTS OF POOR MORALE

- 1. being irregular to work.
- 2. Apathy and non-involvement.
- 3. Fatigue and monotony.
- 4. Employee turnover.
- 5. Work stoppages.
- 6. Disciplinary problems.
- 7. Restriction of output.
- 8. Increased grievances.
- 9. Employee unrest.
- 10. Lack of interest.

Employees with low morale tend to show the least interest in their jobs and are what they are doing. Work is drudgery and misery to them. They are generally dissatisfied.

4. FACTORS AFFECTING MORALE

"ROACH" determined that there are twelve factors that influence the morale.

- 1. General workers attitude towards the company.
- 2. General workers attitude towards supervisor.
- 3. The level of satisfaction with job standards.
- 4. The level of consideration the supervisor shows to his subordinates.
- 5. To work load and the work pressure level.
- 6. The treatment of individuals by management.
- 7. The level of workers satisfaction with salaries.
- 8. Worker reactions to the formal communication network in organization.
- 9. Intrinsic job satisfaction level of the workers.

10. The level of workers pride in the company and its activities.

11. Worker satisfaction with the progress and opportunities for further progression.

The worker attitude towards fellow workers.

5. PREVENTIVE MEASURES FOR IMPROVING EMPLOYEES MORALE

After determining the current state of employee morale, the management can determine the need for maintenance and improvement of morale. If the management feels that there is such need, there are two ways by which it can maintain and improve the morale viz; Preventive measures, and Remedial measures.

PREVENTIVE MEASURES

These measures prevent the fail in the level of morale. These measures include

(a) Creation of whole job

Creating and assigning the whole job to a single worker with a view to satisfy his need for achievement.

(b) Job enrichment

"Job design and job analysis" designing the vertical slice of the tasks into a job and assigning it to an employee satisfies his needs for recognition, responsibility, growth etc.

(c) Modifying the work environment

Creating and providing conductive and challenging work environment.

(d) Flexible working hours

Development of human resource management and flexible working hours provide freedom to the workers in doing the job and in attending to his personal affairs.

(e) Job rotation

Job rotation reduces monotony of work and boredom and thus increases morale.

(f) Point individual prosperity in company prosperity

If the management can show to the worker that there is scope for his prosperity in the company prosperity, there can be better motivation for the worker to strive toward the company goals.

(g) Adaptation of "how-shall-we-do-it" attitude

By adapting this kind of attitude, the management can give the worker a feeling that he has made the decision himself which makes any job easier for the management to make workers accept its decisions.

Any morale improvement programme of management must embrace the following rules

- a. Respect the individual
- b. Be fair and just
- c. Encourage initiative
- d. Design effective communication
- e. Give fair compensation
- f. Provide good work environment
- g. Provide job security
- h. Be alert
- i. Leave door open
- j. Be courteous

Improvement and maintenance of high morale is possible when the employee enjoys job satisfaction, when he identifies the attainment of his interest with the interest of the company, and when he is proud of his association with the company.

Attitudes and morale, in turn, are determined by the satisfaction of individuals, which is again affected by organizational and individual's factors. Through is possible to achieve the desirable high productivity with low morale this position cannot continue for long because in the long run employees will show their resistance, dissatisfaction, and restriction, which eventually lead to low productivity.

Various research studies also support the view that morale and productivity are not perfectly related, though there is positive correlation between two.

6. OBJECTIVES OF THE STUDY

To measure the nature and extent of morale of employees

- 1. To study the socio-economic background of employees
- 2. To study the factors influencing the morale of employees
- 3. To list out the various problems affecting the morale and also the steps to overcome it.

4. To enumerate findings of the study and also to give proper suggestion

7. HYPOTHESES OF THE STUDY

- 1. Age of the employees does not influence the morale
- 2. Educational qualification of the employees does not influence the morale.
- 3. Experience of the employees does not influence the morale
- 4. Income of the employees does not influence the morale.

8. METHODOLOGY

Survey method was adopted to find out the morale of employees .Primary data with regard to the various facilities extended by the organization and the extent of morale of employees and the factors influencing the morale are gathered through the interview schedule method from the male workers. The variables to be studied have been identified. Preliminary discussions were held with executives, and employees belonging to worker cader.

The sample taken for the study is 100 employees belonging to worker cader. They were selected for the study by following lottery method. The analysis is carried out to study the extent of morale of employees and the factors influencing such morale. The data are analyzed with the help of percentages and chisquare test .

9. FIELD WORK AND COLLECTION OF DATA

Researcher has used the interview schedule for collecting information regarding the extent of morale of employees.

9.1 MEASUREMENT OF VARIABLES AND CONSTRUCTION OF SCALE

The main purpose of the study is to find out the extent of morale of employees .At the time of analysis the study of the extent of morale of employees and the factors influencing morale have been analyzed using statistical methods. In order to measure morale of the workers, morale scale has been constructed for measuring the variables. There are two types of variables in the study viz, dependent and independent variables.

The dependent variables of the study is "Morale" researcher have identified 5 components to measure the extent of morale. As there is no readymade scale to measure the extent of morale, a scale namely "Morale Scale" has been developed on the basis of the scores awarded to the components, with the help of this scale, extent of morale has been measured.

The five components are working environment, monetary benefits, safety and welfare, advancement and achievement. The independent variables, which influence the dependent variable are the following:

- 1. Age of the employees
- 2. Educational Qualification
- 3. Income of the employees
- 4. Experience of the employees

9.2 FRAME WORK OF ANALYSIS

First, the extent of morale of employees has been measured through the scale namely "Morale Scale" constructed on the basis of 5 components. These 5 components have been qualified with the help of a scoring scheme. The variables identified for the study have been analyzed with the help of classification tables.

Secondly, four factors promoting the extent of morale have been categorized for analyzing the relationship between morale and various personal factors, chi-square test has been applied.

Age	No. of respondents
20 - 30	30
30 - 40	40
40 - 50	20
Above	10

Table 1. Age wise distribution

Table 2. Income for employess

Income	No. of respondents
2000 - 3000	4
3000 - 4000	38
4000 - 5000	36
5000 - 6000	12
Above 6000	10

Experience	No. of respondents
1-5 years 6-10 years 11-20 years Above 20 years	48 34 6 12

Table 3. Experience of employees

9.3 MORALE SCALE

In this study researcher had identified five components to measure the morale as there is no readymade scale to measure the morale level, a scale namely "morale scale has been developed by awarding scores. The five components with the help of this scale the extent of morale have been measured. The various components and their scores are shown in table 5.28.

S. No	Components	Strongly agree	Agree	Neither agree nor disagree	Disagree	Highly disagree
1.	Working environment	5 x 2	5 x 1	5 x 0	5 x -1	5 x -2
2.	Monetary benefits	5 x 2	5 x 1	5 x 0	5 x -1	5 x -2
3.	Safety and welfare	5 x 2	5 x 1	5 x 0	5 x -1	5 x -2
4.	Advancement	5 x 2	5 x 1	5 x 0	5 x -1	5 x -2
5.	Achievement	5 x 2	5 x 1	5 x 0	5 x -1	5 x -2

 TABLE 4 Various components and their scores

Table.4 shows that the components selected for the study and the scores given to them depending upon their significance. Researcher had applied 5 points scale for the study of the respondents.

9.4 Age of the employees

The age of the employees has a close relationship with the extent of morale. Table 6 shows the age of the employees. The average age is 39 years [(20+58)/2] is taken as the basic of classification.

S. NO	Level	Age group of informants		Total
		20-39	40-58	
1.	High Level	44(63%)	20(67%)	64
2.	Medium Level	26(37%)	10(33%)	36
	Total	70	30	100

Table. 5	Age grou	p of the	employees	and the	extent
I doite e		p or the	employees		Chiconic

Source : Primary data

Table 5 reveals that the 67% percent of employees having high level of morale in case of employee belonging to the age group of 40 - 58, 37 percent of employees belonging to the age group of 20 - 39 having medium level of morale.

In order to see whether there is any co – relation between age and morale Chi – square test has been applied.

Hypothesis I

There is no relationship between age of the employees and morale

Age	0	Е	O-F	$(O-E)^2$	$(O - F)^2 / F$
0	_			(U-L)	(0 L)/L
R1C1	44	44.8	- 0.8	0.64	0.0142
R2C1	20	19.2	0.8	0.64	0.0334
_	_				
R1C2	26	25.2	0.8	0.64	0.0254
RIC2	20	23.2	0.0	0.04	0.0234
D 2C2	10	10.8	0.8	0.64	0.0202
K2C2	10	10.0	-0.0	0.04	0.0392
					0.1000
					0.1322
Degree of Freedom = $(C-1)(R-1)$					
= (2-1) (2-1)					
		- (21	.) (2 1)		
		= 1			

$1 a \beta (c, 0)$ Age of the employees and motate $C m = square 1 cst$

Calculated Value	=	0.1322
Table value at 5% level	=	3.841

Since the calculated value is less than the table value, the hypothesis is accepted. Age does not influence morale.

9.5 FINDINGS

The extent of morale of employees in Ellora Engineering Company has been measured with the help of "morale scale" five components namely, working environment, monetary benefits, safety welfare measures, advancement and achievement have been identified for the purpose of constructing the scale. The total scores of all five components have constituted the morale score for an employee. The analysis further shows that out of 100 respondents, 64 respondents have high level of morale and 36 respondents have medium level of morale and no respondents belong to low level of morale.

9.6 SUGGESTIONS

Provide employees with a work environment that is challenging but fun as well. Add a bit of humor to situations when it is appropriate. Show employees that mistakes will be made by being able to admit it, when mistake is made and also being able to laugh about it. By doing so it helps to establish an environment that encourages employees to take risks without fear.

Share with employees the company's mission, purpose and goals. When you share the mission statement with employees it gives them a sense of belonging and a connection to the company and what it hopes to achieve.

Conclusion

The purpose and motto of this study are to see the employees morale. According to Khan and Katz "morale is a combination of attitudes towards the company, Job and the immediate supervisor". Hence this research is designed according to the definition of Khan and Katz to study the employee morale. The organizational climate in private sector industrial units can substantially be improved by ensuring adequate monetary rewards to the employees for their work. Provision of welfare facilities and proper grievance handling system are the other important factors contributing to the creation of conductive climate in on organization. However the climate factors responsible for the success or failure of an industrial organization are to be constantly identified and appropriate schemes need to be implemented for maintaining the positive organization climate which may facilities harmonious labour management relations and the ultimate organizational performance satisfaction, work initiative, loyalty, enthusiasm, devotion to duty and the like which are essential for a better public service, which cannot be bought by more pay, (i.e.) money. So these things can be earned only by humanitarian attitude towards employees, providing good working condition, proper recognition of distinguished performance and so on.

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- 5. Principle and practice of Management: Dr. J.N. Chabra
- 6. Effective Human Resource Management: Edward E. Lawler III; John W. Boudreau.



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A REVIEW OF INVESTOR PSYCHOLOGY – RESPECT TO SHARE TRADING SECTOR

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Abstract

The Internet revolution has been changing the fundamentals of our society. It shapes the way we communicate and the way we do business. It brings us closer and closer to vital sources of information. It provides us with means to directly interact with service-oriented computer systems tailored to our specific needs; therefore, we can serve ourselves better by making our own decisions. This prevailing shift of the business paradigm is reshaping the financial industry and transforming the way people where they invest. This paper aims to identify the current situation of investors in the field of stock market.

1. INTRODUCTION

Internet stock trading can be an exciting way to trade stocks, with transactions being accomplished within minutes and sometimes seconds. Web based stock trading has become a very popular method, and Internet stock brokers with specialized websites offer expedient trades for fast moving markets.

A capital market is a network of financial institutions and facilities that interact to mobilize and allocate long term savings in an economy. The long-term funds are exchanged for financial assets issued by borrowers or traded by holders of outstanding eligible securities. Therefore, it provides services that are essential to a modern economy, mainly by contributing to capital formation through financial intermediation, financial advisory services, and managerial skill development. In addition, the capital market facilitates
portfolio diversification that allows savers to maximize returns on their assets and reduce risks. Consequently, an efficient capital market optimizes the amount of savings that finances investment at any level of savings (Samson Ogege, 2012)

There is a category of investors who are well versed with the online trading systems of other countries and hence are very choosy about opting for an online trader. There is another category of investors who still prefer the good old broker to provide service. Also, there are a few investors who are willing to experiment with the new system and understand how it can be worked to one's benefit.

- a) Stock Markets,
- b) Stock exchanges.

a) Stock Markets: Stock Market is a market where the trading of company stock, both listed securities and unlisted takes place. It is different from stock exchange because it includes all the national stock exchanges of the country. For example, we use the term, "the stock market was up today" or "the stock market bubble."

b) Stock Exchanges: Stock Exchanges are an organized marketplace, either corporation or mutual organization, where members of the organization gather to trade company stocks or other securities. The members may act either as agents for their customers, or as principals for their own accounts.

Stock exchanges also facilitates for the issue and redemption of securities and other financial instruments including the payment of income and dividends. The record keeping is central but trade is linked to such physical place because modern markets are computerized. The trade on an exchange is only by members and stock broker do have a seat on the exchange.

David Whitely has started that the use of the internet is taking off among private investors in stocks and shares. The internet can make available to the private investors the minute information. The use of online brokerage services automates the process of buying and selling and hence allows a reduction of commission charges. Also the commodity being traded is intangible; the ownership of stocks and shares can be recorded electronically so that there is no requirement for physical delivery.

2. HISTORY OF INDIAN STOCK MARKET

Indian stock market marks to be one of the oldest stock market in Asia. The informal group of stockbrokers organized themselves as the Native Share and Stockbrokers Association which, in 1875, was formally organized as the Bombay Stock Exchange (BSE). In 1956, the Government of India recognized the Bombay Stock Exchange as the first stock exchange in the country under the Securities Contracts (Regulation) Act.

The foot-dragging by the BSE helped radicalise the position of the government, which encouraged the creation of the National Stock Exchange (NSE), which created an electronic marketplace. NSE started trading on 4 November 1994.

i. National Stock Exchange: National Stock Exchange incorporated in the year 1992 provides trading in the equity as well as debt market. Maximum volumes take place on NSE and hence enjoy leadership position in the country today

ii. Bombay Stock Exchange: BSE on the other hand was set up in the year 1875 and is the oldest stock exchange in Asia. It has evolved in to its present status as the premier stock exchange.

With over 20 million shareholders, India has the third largest investor base in the world after the USA and Japan. Over 9,000 companies are listed on the stock exchanges, which are serviced by approximately 7,500 stockbrokers. The Indian capital market is significant in terms of the degree of development, volume of trading and its tremendous growth potential, as stated by (Mehra Saniya 2007).

3. OBJECTIVE OF THE STUDY

The main aim of the study is to identify the investors' psychology in the field of stock market by various reviews given in previous studies.

REVIEWS

1. Welch, 2000 found that the irrational view of herding focuses on individual investors, where investors disregard their prior beliefs and blindly follow the actions of other investors. The rational view, in contrast, focuses on the principal-agent problem in which managers mimic the actions of others. Thus, managers may completely ignore

their own private information in order to maintain their reputational capital in the market.

- 2. Natarajan, 2000 feels that prices will be determined by market forces and the availability of a particular product. Depending on the supply and a comparative list of similar products, the customer will be able to choose the best stocks available in the market.
- 3. Agarwala, Lal and Agarwala, 2000 feel that the underlying theme behind the development of technologies and techniques for customer interfaces will be to make the customers' experience as close to real life as possible. It will bridge the gap between the electronic world and the real world and significantly add to the comfort level of the consumer.
- 4. Bodie, Kane and Marcus, 2001 elaborated that risk play vital role in the investment decision making process. This study also suggested that forecasting of the risk always give the undesirable result because when investor do forecasting then he always ignores social and psychological factors. These factors change the outcome.
- 5. D'Avolio, 2002 in his research shows that arbitrage tends to be particularly risky and costly for certain stocks: namely those that are young, small, un profitable, or experiencing extreme growth. Such stocks tend to be more costly to buy and to sell short.
- 6. Brown, Goetzmann, Hiraki, Shiraishi, and Watanabe, 2002 propose an overall market sentiment measure based on how fund investors are moving into and out of, for example, "safe" government bond funds and "risky" growth stock funds.
- 7. Gary and Uri, 2003 found that in reality, investors do not receive all information freely; they have to decide whether and which information to gather prior trading and investors end up staying afloat in a sea of uncertainty which in turn affects their level of awareness.
- 8. Dahlquist et al., 2003 analysed foreign ownership and firm characteristics for the Swedish market. They found that foreigners have greater presence in large firms, firms paying low dividends and in firms with large cash holdings. They explained that firm size is driven by liquidity. They measured international presence by foreign listings and export sales. They reiterated that foreigners tend to underweight the firms with a dominant owner.

- 9. Song, 2003 recommends that positive information for investor increase the stock price and negative information always decreases the stock prices. Positive and negative information mean like announcement of dividend, changes in the interest rate, macroeconomics policies, and political system.
- 10. Huang, 2003 human behaviour is not only cognitive, but also emotional which influences investor behaviour when trading. And the need to incorporate psychology attempts to explain how perception of investors and their reaction to uncertainties affect the investment decision there by influencing price movements of stocks.
- 11. Fama and French, 2004 and Perold, 2004 found that investors are rational and risk averse in these models, the market risk premium is always positive, though it may change over time.
- 12. Baker and Stein, 2004 note that if short-selling is costlier than opening and closing long positions (as it is, in practice), irrational investors are more likely to trade, and thus add liquidity, when they are optimistic and betting on rising stocks rather than when they are pessimistic and betting on falling stocks.
- 13. Alexander, 2004 found that better the expertise and knowledge an investor has, the lower the risk perception and the higher the levels of trading. On the other hand, in analysing the perceived risk attitudes of investors, there is need to attempt to predict future movements on the stock market when important news about companies listed on the market are issued hence affecting the buy/sell decision of the investor.
- 14. Andrew *et al*, 2005 found that investors are seen to be generally irrational exhibiting a number of predictable and financially ruinous biases, often attributed to psychological factors- fear, greed, and other emotional responses to price fluctuations and dramatic changes in an investor's wealth.
- 15. Shefrin, 2005 relies on differences of opinion across investors, sometimes combined with short sales constraints, to generate misevaluation. When aggregated, these models make predictions about patterns in market wide investor sentiment, stock prices, and volume.
- 16. Dominitz and Manski, 2005 use the Michigan Survey of Consumer Attitudes to examine stock market beliefs, but draw upon different survey questions than ours. In particular, they analyze respondents' assessments of the probability that a typical diversified stock mutual fund will increase in value over the coming year a measure

related to both risk and return. Their findings suggest that many investors expect persistence in stock market performance.

- 17. Sapienza and Zingales, 2005 individuals who are knowledgeable are significantly more likely to buy stocks and risky assets and also invest in stock. In order to enhance awareness of the capital markets in the communities, the USE has put in place programs such as annual financial literacy weeks, issuing of annual reports and Quarterly bulletins among others.
- 18. Baker and Wurgler, 2006 utilize interim advances in behavioural finance theory to provide sharper tests for the effects of sentiment.
- 19. Lemmon and Portniaguina, 2006 show that changes in the consumer confidence measure correlate especially strongly with small stock returns and the returns of firms held disproportionately by retail investors.
- 20. The inexperienced retail or individual investor is more likely than the professional to be subject to sentiment. Greenwood and Nagel, 2006 found that younger investors were more likely than older investors to buy stocks at the peak of the Internet bubble.
- 21. More generally, Barber, Odean, and Zhu, 2006 and Kumar found in micro-level trading data that retail investors buy and sell stocks in concert, which is consistent with systematic sentiment. Kumar and Lee suggest constructing sentiment measures for retail investors based on whether such investors are buying or selling.
- 22. Cortor and Chen, 2006 found that risk seeker investor always prefers the risky portfolio.
- 23. Covirg et al., 2007 concluded that foreign fund managers have less information about the domestic stocks than the domestic fund managers. They found that ownership by foreign funds is related to size of foreign sales, index memberships and stocks with foreign listing.
- 24. Boudoukh *et.al*, 2007 to mitigate such concerns and to employ a unique aspect of our data, we augment the set of repressors with respondent's recollection of past returns. As shown in columns (1) and (4), both idiosyncratic perceptions of past returns and actual past returns are highly influential in shaping respondents' outlook over the medium- and long-run horizons.

- 25. Rooij and Lusardi, 2007 found that individuals have become increasingly active in financial markets and market participation has greatly been promoted by invention of new financial products.
- 26. Sevil, Sen and Yalama, 2007 assert that investors experience regret when they feel that their past decisions were wrong and try to avoid the pain arising out of the poor decision.
- 27. Nidhi walia and Ravinderkumar, 2007 examined the investor's preference for traditional trading and online trading. The major findings of the study were that Indian investors are more conservative, they do not change easily and Indian traditional traders still choose brokers for trading. But Internet traders are more comfortable with online trading because of its transparency and complete control over the terminal.
- 28. Barber and Odean, 2008 also confirm that individual investors prefer to buy attention grabbing stock that is in news or that has experienced higher unexpected trading volume or stocks which have provided some excessive one day returns and that behaviour also signals towards the good expectation relative to the past performance or publicity of that particular stock.
- 29. Coval, Jurek and Stafford, 2009 elaborated that the information about the risk of security is essential for the investor because if investor has not knowledge about risk which is associated with product. Investor cans not make the proper investment decision. Risk perception play vital role in the investment decision making process because always think before the investment for this purpose they make the feasibility for the investment which is elaborate the risk.
- 30. Naveed, *et.al*, 2011 argue that small/ individual investor decision making on the stock market is driven by heuristics, prospect theory and regret aversion. This is seen to be based on psychology of investors as well as emotional and social influences.
- 31. Samson Ogege, 2012 argued that the capital market facilitates portfolio diversification that allows savers to maximize returns on their assets and reduce risks. Consequently, an efficient capital market optimizes the amount of savings that finances investment at any level of savings.

4. CONCLUSION

From the above reviews it concluded that

- The investor of share market is to be influenced mostly by the brokers and relatives.
- They are more sensitive in the return aspect
- They have to learn more while investing under share trading; they invest more on the basis of past returns
- Share market investors mostly prefer online trading method to trade
- Young people are willing to invest under share trading
- They decide based on their psychological factors.

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ROLE OF WOMEN ENTREPRENEURSHIP IN INDIA

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ABSTRACT

The recent development in technology would demands the effective leadership and initiations from the educated women class and dynamic women entrepreneurs, who really vouch for contributing to the economic growth of Nations. Entrepreneurship has been a maledominated phenomenon from the very early age, but time has changed the situation and brought women as today's most memorable and inspirational entrepreneurs. The role of Women entrepreneur in economic development is inevitable. Now-a-days women enter not only in selected professions but also in professions like trade, industry and engineering. Women are also willing to take up business and contribute to the Nation's growth. There role is also being recognized and steps are being taken to promote women entrepreneurship. It is high time that the Government should make policy reforms for increasing the ability of Women to participate in the labour force, creation of Women's business ownerships, to facilitate effective women's entrepreneurship to develop noteworthy and other valuable web based and collaborative tools for societal development and promotion of leadership qualities. Women entrepreneurship must be moulded properly with entrepreneurial traits and skills to meet the changes in trends, challenges global markets and also be competent enough to sustain and strive for excellence in the entrepreneurial arena.

Key words: Women Entrepreneur, Role in India, Government policies and schemes.

1. INTRODUCTION

A women entrepreneur is expected to do everything that enterprise creation and running requires, right from coming up with a viable business propositions to setting it up and growing the firm. The Indian economy has been witnessing a drastic change since mid -1991, with new policies of economic liberalization, globalization and privatization initiated by the Indian government. India has great entrepreneurial potential. At present, women involvement in economic activities is marked by a low work participation rate, excessive concentration in the unorganized sector and employment in less skilled jobs. The Indian economy has been witnessing a drastic change since mid -1991, with new policies of economic liberalization, globalization and privatization initiated by the Indian government. India has great entrepreneurial potential. At present, women involvement in economic activities is marked by a low work participation rate, excessive concentration in the unorganized sector and employment in less skilled jobs. Women's entrepreneurship is both about women's position in society and the role of entrepreneurship in the same society. Women are faced with specific obstacles (such as family responsibilities) that have to be overcome in order to give them access to the same opportunities as men. Also, in some countries, women may experience obstacles with respect to holding property and entering contracts. Increased participation of women in the labour force is a prerequisite for improving the position of women in society and self-employed women.

2. CONCEPT OF WOMEN ENTREPRENEURS

Women Entrepreneurs may be defined as the women or a group of women who initiate, organize and operate a business enterprise. The Government of India has defined women entrepreneurship as "an enterprise owned and controlled by women having a minimum financial interest of 51 per cent of the capital and giving at least 51 per cent of the employment generated in the enterprise to women. The term "Women Entrepreneurship" means, an act of business ownership and business creation that empowers women economically, increases their economic strength as well as position in society (Commerce Dictionary).Hence women-entrepreneurs have been making a considerable impact in all most all the segments of the economy which is more than 25% of all kinds of business. In India "Entrepreneurship" is very limited amongst women which are less than 5% of all the business. Women Entrepreneurship role in the emergence of

entrepreneurs in a society depends to a great extent on economic, social, religious, cultural and psychological factors prevailing in the society. In U.S women own 25% of all business, even though their sales on an average are less than 2/5th of those of other small business groups. In Canada, 1/3rd of small business are owned by women and in France, it is 1/5th. In U.K., since 1990, the number of self-employed women has increased 3 times as fast as the number of self employed men.

3. CHARACTERISTIC ROLES IN A WOMEN ENTREPRENEURSHIP

Imaginative:

It refers to the imaginative approach or original ideas with competitive market. Wellplanned approach is needed to examine the existing situation and to identify the entrepreneurial opportunities.

Attribute to work hard:

Enterprising women have further ability to work hard. The imaginative ideas have to come to a fair play. Hard work is needed to build up an enterprise.

Persistence:

Women entrepreneurs must have an intention to fulfill their dreams. They have to make a dream transferred into an idea enterprise; Studies show that successful women work hard.

Ability and desire to take risk:

The desire refers to the willingness to take risk and ability to the proficiency in planning making forecast estimates and calculations.

Profit earning capacity:

She should have a capacity to get maximum return out of invested capital.

4. PROBLEMS OF WOMEN ENTREPRENEURS IN INDIA

Women in India are faced many problems to get ahead their life in business. A few Problems can be detailed as;

1. The greatest deterrent to women entrepreneurs is that they are women. A kind of patriarchal – male dominant social order is the building block to them in their way towards business success. Male members think it a big risk financing.

2. The financial institutions are skeptical about the entrepreneurial abilities of women. The bankers consider women loonies as higher risk than men loonies.

3. The women entrepreneurs are suffering from inadequate financial resources and working capital. The women entrepreneurs lack access to external funds due to their inability to provide tangible security. Very few women have the tangible property in hand.

4. Women's family obligations also bar them from becoming successful entrepreneurs in both developed and developing nations. "Having primary responsibility for children, home and older dependent family members, few women can devote all their time and energies to their business" (Starcher,)

5. The business success is depends on the support the family members. The interest of the family members is a determinant factor in the realization of women folk business aspirations.

5. WOMEN EMPOWERMENT AND PLANNING PROCESS IN INDIA

The all round development of women has been one of the focal point of planning process in India. The First Five-Year Plan (1951-56) envisaged a number of welfare measures for women. Establishment of the Central Social Welfare Board, organization of Mahila Mandals and the Community Development Programmes were a few steps in this direction.

In the Second Five-Year Plan (1956-61), the empowerment of women was closely linked with the overall approach of intensive agricultural development programmes.

The Third and Fourth Five-Year Plans (1961-66 and 1969-74) supported female education as a major welfare measure.

The Fifth Five-Year Plan (1974-79) emphasized training of women, who were in need of income and protection. This plan coincided with International Women's Decade and the submission of Report of the Committee on the Status of Women in India. In 1976, Women's welfare and Development Bureau was set up under the Ministry of Social Welfare.

The Sixth Five-Year Plan (1980-85) saw a definite shift from welfare to development. It recognized women's lack of access to resources as a critical factor impending their growth.

The Seventh Five-Year Plan (1985-90) emphasized the need for gender equality and empowerment. For the first time, emphasis was placed upon qualitative aspects such as inculcation of confidence, generation of awareness with regards, to rights and training in skills for better employment.

The Eight Five-Year Plan (1992-97) focused on empowering women, especially at the grass roots level, through Panchayati Raj Institutions. The Ninth Five-Year Plan (1997-2002) adopted a strategy of women's component plan, under which not less than 30 percent of funds/benefits were earmarked for women-specific programmes.

The Tenth Five-Year Plan (2002-07) aims at empowering women through translating the recently adopted National Policy for Empowerment of Women (2001) into action and ensuring Survival, Protection and Development of women and children through rights based approach.

The Eleventh Five-Year Plan lays down six monitorable targets

(1) Raise the sex ratio for age group 0–6 from 927 in 2001 to 935 by 2011–12 and to 950 by 2016–17;

(2) Ensure that at least 33% of the direct and indirect beneficiaries of all government schemes are women and girl children;

(3) Reduce IMR from 57 to 28 and MMR from 3.01 to one per 1000 live births;

(4) 51 Reduce malnutrition among children of age group 0–3 to half its present level;

(5) Reduce anaemia among women and girls by 50% by the end of the Eleventh Plan;

(6) Reduce dropout rate for primary and secondary schooling by 10% for both girls as well as boy

6. GOVERNMENT SCHEMES FOR WOMEN EMPOWERMENT

The government programme for women development began as early as 1954 in India but the actual participation began only in 1974. At present, the Government of India has over 27 schemes for women operated by different departments and ministries.

Some of these are:

Integrated Rural Development Programme (IRDP)

Training of Rural Youth for Self-Employment (TRYSEM)

Prime Minister's Rojgar Yojana (PMRY)

Women's Development Corporation Scheme (WDCS)

Working Women's Forum

Indira Mahila Yojana

Indira Mahila Kendra

Mahila Samiti Yojana

Rashtriya Mahila Kosh

Khadi and Village Industries Commission

Indira Priyadarshini Yojana

SIDBI's Mahila Udyam Nidhi Mahila Vikas Nidhi

SBI's Sree Shaki Scheme

NGO's Credit Schemes

National Banks for Agriculture and Rural Development's Schemes

The efforts of government and its different agencies are ably supplemented by Nongovernmental organizations that are playing an equally important role in facilitating women Empowerment. Despite concerted efforts of governments and NGOs there are certain gaps. Of course we have come a long way in empowering women yet the future journey is difficult and demanding.

6. FACTORS INFLUENCING WOMEN ENTREPRENEURS

Setting up an enterprise is not an easy job for women entrepreneurs and at the same time running the enterprise is a greater task. A challenge is always there for these women entrepreneurs to run their enterprise successfully earning profit and ensuring the growth of the enterprises which will severely test their entrepreneurial skill and survival of the unit. Despite various odds against them, several women are off to run their own enterprises It is found that women are entering more in this venture as compared to man to start their own business to make social contribution in addition to desire of exploring their inner self and fulfilling their means of livelihood.

TIPS & SUGGESTIONS FOR WOMEN ENTREPRENEURS

- Start a business that works for you and your personal life
- Research the product/ service
- Assess the market
- Start business with adequate funds
- Do networking.
- Consult with professionals.

Here are some suggestive measures, to solve the problems confronted by them and for running their enterprise smoothly. Proper technical education to the women and opening of women development cells. Improvement of identification mechanism of new enterprise.

- Assistance in project formulation and follow up of training programmes.
- Credit facilities, financial incentive and subsidies.
- Adequate follow-up and support to the women enterprises.
- Women Enterprises research and application from time to time have to be documented.

7. CONCLUSION

It can be said that today we are in a better position wherein women participation in the field of entrepreneurship is increasing at a considerable rate. Women sector occupies nearly 45% of the Indian population. At this juncture, effective steps are needed to provide entrepreneurial awareness, orientation and skill development programs to women. From these suggestions it is quite visible that for development and promotion of women entrepreneurship, in the region, there is a need for multi dimensional approach from different sector, namely from the government side, financial institutions, individual women entrepreneurs and many more, for a flexible integrated and coordinated specific approach. For ages together they have been confined to a secondary role and confined to the homes and you have to bring out so that they become self-reliant, self-respecting enterprising people. Though there are several factors contributing to the emergence of women as entrepreneurs, the sustained and coordinated effort from all dimensions would pave the way for the women moving into entrepreneurial activity thus contributing to the social and economic development of the members of the family and thereby gaining equality and equal importance for themselves.

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EVOLUTION TREND INTO THE JOURNAL OF ADVANCES IN GEOSCIENCES: A BIBLIOMETRIC STUDY

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Abstract

This paper deals with the evaluation trend of geosciences literature output. Maximum numbers of papers have been contributed on the topic of earth science and Geography, Majority of the contributed paper was by collaborative authors.

Keyword: Bibliometric techniques, scattering of articles, Doaj.

1. Introduction:

The term Bibliometric was coined by Pritchard in 1969, and he defined that bibliometric is the application of mathematical and statistical methods for measuring quantitative and qualitative changes in collections of books, journals, and other publications.

By using quantitative analysis it is possible to measure the scattering of articles to different journals and also make it possible to measure growth and obsolescence of literature in different subjects.

The most used bibliometric methods such as citation analysis, bibliographic coupling, coward analysis and co-citation analysis can be used to map the knowledge structure and the use of literature.

Bibliometric techniques have evolved over time and are continuing to do so. The counting of papers with attribution by country, by institution and by author, the counting of citations, to measure the impact of published work on the scientific community, etc.

All of these techniques combine to give more detailed and more effective measurements. Recently, the new dimensions emerged in the growth and development in the area of **bibliometrics** such as **web metrics, cyber metrics and informatics**.

Web metrics can be defined as using of bibliometrics techniques in order to study the relationship of different sites on the World Wide Web. Such techniques may also be used to map out (called "scientific mapping") areas of the web that appear to be most.

2. Objectives:

- Year-wise productivity of literature
- Productivity of authors and their ranking
- Authorship pattern of contributors
- Institutional-wise distribution of Indian contributors
- Indian foreign contributors
- Country-wise contributors
- City-wise contributors
- Institution-wise contributor and
- Subject-wise/Year-wise distribution of contributors.

3. Methodology:

An independent study has been conducted in a systematic manner for presenting the bibliometric study. The following technique has been adopted in this study. The articles published in the journal of Advances in Geosciences' were downloaded from the **DOAJ** (Directory open Access journal) database and all needed data has been downloaded on a data input sheet designed for the purpose. For presenting the data in graphic the MS-Excel was used. The collected data has been analyzed and presented in the following tables.

4. Limitation:

Available articles are accessed from the DOAJ database in the journal of "Advances in Geosciences" during 2003 to 2013. Totally 951 articles were collected from the mentioned database and converted to the necessary format used by MS Excel for further calculating.

5. Analysis and interpretation:

5.1 year wise distribution of articles:

Year	No. of	cumulative	% of
	articles	articles	articles
2003	22	22	2.31
2004	-	22	-
2005	95	117	9.98
2006	139	256	14.61
2007	68	324	7.15
2008	208	532	21.87
2009	96	628	10.09
2010	202	830	21.24

Table 5.1: year wise distribution of articles

2011	55		5.78
		885	
2012	46		4.83
		931	
2013	20		2.10
		951	
Total	951		



Figure 5.1 shows that Year wise distribution of research output

Out of the total 951 articles the maximum numbers of articles are reported to have been published in the year 2008(208 articles; 21.87%) while the least number of articles have been published in the year 2013 (20 articles; 2.10%). On an average, geosciences literature output is increased in 2008 and 2010 and so on it was decreased in 2003, 2004 and 2013.

5.2. Authorship pattern of Contributors:

Number of authors	No. of contributors	% of articles	Total authorship	% of authors
1	117	12.30	117	3.51
2	177	18.61	354	10.61
3	261	27.44	783	23.47
4	173	18.19	692	20.74
5	105	11.04	525	15.74
6	62	6.52	372	11.15
7	23	2.42	161	4.83
8	13	1.37	104	3.12
9	5	0.53	45	1.35
10 & >10 (till 20)	15	1.58	183	5.49
Total	951	100	3336	

Table 5. 2: Authorship pattern of Contributors



Figure 5.2 shows that Authorship pattern of contributors:

Table 5.2 indicates that majority of authors preferred to publish their research results in three authorship mode (27.44%) followed by two authorship mode (18.61%), four authorship mode (18.19%) and individual authorship mode (12.30%) while, the three authorship dominated the geo science literature and Nine authors dominated the least position of geosciences Literature.

5.3Year Wise Distribution of Authorship pattern:

Table 5.3 Y	ear Wise	Distribution	of Authorship	pattern:
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Year	Number of Authors											
	1	2	3	4	5	6	7	8	9	10 +	Total	%
2003	-	-	-	8	20	30	28	40	9	10	145	2.33
2005	1	2	15	52	125	126	70	80	27	-	498	8.02
2006	3	-	6	68	170	192	112	152	81	87	871	14.03
2007	2	-	-	20	45	126	112	80	18	24	472	7.60
2008	7	4	6	84	150	294	245	216	81	261	1348	21.72
2009	6	-	-	32	40	144	84	96	81	155	638	10.28
2010	10	4	12	40	145	328	273	128	126	304	1370	22.08
2011	-	4	6	8	30	78	84	64	18	82	374	6.02
2012	-	-	-	-	30	24	70	144	54	20	342	5.51
2013	2	-	-	-	10	24	28	-	18	64	146	2.35
	32	16	48	316	770	1372	1113	1008	522	1007		

The above table shows that Geo science Literature has leading the following position of distribution of authorship pattern, the year 2010 has leading the dominant position having the 22.08% percentage and getting the more number of authors.(1370). In the year 2013 has taken the least number of Contributed authors 2.35% p (16). Multi authors are focused the geosciences literature output. Single authors are very limited to their research performance.

5.4. Country wise research output of geosciences Literature:

S.No	Country	no. of contribution	%
1	India	197	45.06
2	Italy	52	12.03
3	Germany	35	8.10
4	Spain	34	7.87
5	Greece	20	4.62
6	UK	15	3.47
7	Cyprus	13	3.00
8	Israel	11	2.54
9	Austria	10	2.31
10	USA	9	2.08
11	Belgium	4	0.92
12	France	4	0.92
13	France	4	0.92
14	Japan	4	0.92
15	Portugal	4	0.92
16	Prague	4	0.92
17	Iran	2	0.46
18	Netherlands	2	0.46
19	Switzerland	2	0.46
20	Ukraine	2	0.46
21	Argentina	1	0.23
22	Athens	1	0.23
23	Poland	1	0.23
24	Turkey	1	0.23
	Total	432	100

 Table 5. 4. Country wise research output of geosciences Literature:

Among 24 countries, India is leading the first rank position having the 197 of contribution with 45.06%, the other countries like Argentina, Athens, Turkey and Poland having the least 1 number of contribution among the 24 countries.

5.5. Country wise Distribution of Authors in geosciences literature output:

S. no	Country	No. of authors	Percentage	Cumulative Authors
1	Italy	656	21.16	656
2	Germany	569	18.36	1225
3	Spain	262	8.45	1487
4	France	167	5.38	1654
5	Greece	156	5.03	1810
6	USA	152	4.90	1962
7	UK	137	4.42	2099
8	Austria	131	4.22	2230
9	Cyprus	104	3.35	2334
10	Israel	79	2.54	2413
11	Russia	75	2.42	2488
12	Peru	58	1.87	2546
13	Brazil	51	1.64	597
14	Canada	47	1.51	2644
15	Japan	44	1.41	2688

 Table5. 5: Country wise Distribution of Authors in geosciences literature output:

8

16	Argentina	36	1.16	2724
17	Chile	35	1.12	2759
18	Colombia	33	1.06	2792
19	Netherlands	32	1.03	2824
20	Switzerland	31	1.00	2855
21	Portugal	30	0.96	2885
22	Belgium	28	0.90	2913
23	China	23	0.74	2936
24	Prague	20	0.64	2956
25	Ukraine	14	0.45	2970
26	Norway	14	0.45	2984
27	Mexico	14	0.45	2998
28	Denmark	14	0.45	3012
29	Sweden	9	0.29	3021
30	Costa Rica	9	0.29	3030
31	Georgia	6	0.19	3036
32	Australia	6	0.19	3042
33	Poland	6	0.19	3048
34	Finland	4	0.12	3052
35	Turkey	4	0.12	3056
36	Guayaquil	4	0.12	3060
37	Iran	4	0.12	3064
38	Athens	4	0.12	3068

39	Azerbaijan	4	0.12	3072
40	Uganda	3	0.09	3075
41	Croatia	3	0.09	3078
42	New Zealand	3	0.09	3081
43	Indonesia	2	0.06	3083
44	Malta	2	0.06	3085
45	Albania	2	0.06	3087
46	Paramaribo	2	0.06	3089
47	Chiffon	2	0.06	3091
48	Hamburg	2	0.06	3093
49	South-Africa	1	0.03	3094
50	India	1	0.03	3095
51	Kazakhstan	1	0.03	3096
52	Ireland	1	0.03	3097
53	Kenya	1	0.03	3098
54	Singapore	1	0.03	3099
		3099	100	

Among the 54 countries contributed the research output of geosciences literature Italy having the first place among the contributed countries having the 656 literature output in geosciences literature. 21.16% the countries like south- Africa, India, Kazakhstan, Ireland, Kenya and Singapore having the least contribution of geosciences literature output.

6. Findings and conclusion:

On the basis of what has been discussed above, we are able to formulate the following findings:

- Majority of the contributed papers are by collaborative authors -3219 (96.49 %);
- 197(20.71%) papers are contributed by Indian authors;
- Out of the 951 papers, foreign countries has contributed 754 (79.29 %) papers
- Maximum numbers of papers have been contributed on the topic of earth science and Geography;
- Advance in Geosciences is the most prolific contributor with a contribution of 12 and 10 articles.
- The authors of S. Michaelides; K. Nicolaides and K. Savvidou were identified the most productive authors in the sample journal.

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Need for digital Library in the information world: An overview

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1. Introduction:

Digital library is one, where the entire reading material will be in digital format. The basic concept behind a digital library is to exploit the facilities of information technology with a mission of sharing resources available globally for providing right and nascent information to the user community at right time. Computer and Telecommunication technologies along with tools and techniques used for digitalization are essential for the digital library. Digital technologies and their applications have also come into every part of our life. Many of the institutions in India and abroad, digitization activities are going on and most of the publishers are publishing their content through digital form. This paper discusses about the digital library and digital collections available at libraries globally.

Keywords: Digital Library; E-Resources; Digital Information; Digital Technologies; Digitization format.

2. Objectives of Digital Library:

Following are the objectives of the digital library:

- To capture, store, manipulate and distribute of information.
- To introduce and produce new services.

- To have large number of databases to CDs.
- To avoid routine and redundant activities.
- To provide facility for networking and resource sharing.
- To access national and international journals which are being published only in machinereadable forms.
- To support library functions such as circulations, serial control, acquisition control, stock maintenance and other routing office works and develop in house databases.

3. Characteristics of Digital library:

Digital Libraries have certain special characteristics such as:

- Global infrastructure.
- Network accessibility
- User friendly interface
- Advanced search and retrieval
- Supporting multimedia content
- Accessibility from anywhere, home, school, libraries etc. 24/7 accessibility
- Greater opportunity for publishing
- Equal opportunity of access
- Reduce physical space
- Break the time, space and language barriers
- Searching and retrieval facilities
- Usage of electronic information will steadily increase and usage of printed Material will decrease
- Access to the digital library is not bounded in space or time. It can be accessed from anywhere and anytime in preservation and conservation.

4. Functions of Digital Library:

The basic functions of digital libraries are to:

- Capture, store, manipulate information and provide access to a large collection
- Improve the cost effectiveness of library operations
- Digitize documents for networking and resource sharing
- Provide facilities for networking and resource sharing
- Access national and international journal, which are being published only in machine readable form
- Support advanced search and retrieved
- Support all sorts of Library operations or functions
- Digitize documents for preservation and for space saving

5. Criteria for Digital Library:

Developing digital library needs careful planning and some of the criteria should be considered before going for digitizing the library.

- Selection of software and hardware for reasonable cost
- Technically simple to install and manage
- Open and inter- opera table
- Modular
- User friendly
- Robust
- Scalable

6. Principles of Digital Library Design:

The following principles are very important for development of digital architecture:

a) **Open Architecture:** The architecture should be open extensible and should support interoperability

b) Privacy: The architecture must be sensitive to privacy

c) Modularity: The architecture should represent a mixture of new technology and legacy, all of which must inter operate while involving at different rules.

d) **Time Frame:** The time frame for system migration for next year as well as planning for technology generation framework should be updated.

7. Limitation of Digital Library:

- The developed countries are the major producers of digitalized information sources which lack coverage of literature produced from world countries.
- ▶ Fiscal allocation in libraries is not always in tune with the inflation.
- Imbalance between the manpower produced in library science schools and the manpower requirements in libraries.
- ▶ Lack of indigenous, efficient and effective library software packages.
- > Lack of information policy and information culture.
- > Lack of information audit in libraries and information centers.
- Problems relating to the conversion of the existing manual databases into computer readable databases.

Digital libraries are libraries that provide information in digital form, which needs specialized staff to select, structure, offer intellectual access to web, distribute and ensure the preservation so that they will be readily and economically available for the users.

8. Digital Library and the Resources:

Digital technology has forced the librarians to make a decision that what information should be acquired, how it should be preserved, to which the access facilities should be provided. In digital libraries these decisions are complicated by number of factors. Digital objects can be text ,images, sounds, moving images, multimedia data sets, software and theses information are available in many file formats such as plain text , word , postscript , PDF and marked up in the HTML or another SGML or XML document types.

9. Direct Search:

End users of library will access Online Public Access Catalog (OPAC') and commercial online secondary services retrieval usually based on exact match query that is the result contains exactly what users specified. On the other hand Internet search engines demonstrate almost infinite variations on the themes of 'type something and get by to find the best answer. Query words are usually stemmed and almost invariably something is retrieved (may be in some cases results may have very little relevance). Direct research in digital libraries is usually similar to the OPAC or online searching model, employing search templates or index on navigation tools. Also many digital libraries contain non text object which do not lend themselves to text based statically retrieval algorithms. Digital libraries frequently employ one of the prevailing standards for managing search.

10. User Tracing:

User tracing (i.e.) Bibliography instruction can make many forms, Guides, Manuals, Path finding workshops and videos. Few digital libraries have well developed user tracing. Many digital libraries carry guides to using the collectors.

11. Current Awareness:

The digital libraries get to close awareness is a "what's new" page or a regular newspaper available at the website. In future, digital library services will include the development of personalized information spaces that with customize the user's expense based on the knowledge about individuals past behavior and performance and their connecting technologies.

12. Economic Support:

Most large scale digital libraries got their start with a contribution of grant funding and institutional support. It is not quite so easy to close doors of a funded digital library once the money runs out. Whether institutions might be able to support such activities in the normal course of business and in some cases an additional grant moneys can be obtained. On the other hand, this type of infrastructure is likely to already be in place for right management purposes and will become increasingly necessary as libraries to produce access to e- Books owned by publishers.

13. Maintenance of Digital Library:

The maintenance of digital library involves equipment and the collection. If any computer based services, hardware and software upgrades and modifications need to be carefully planned. Collection management set of activities, which are intended to ensure that a library internally held and externally provided resources that meet the needs of its users lead to weeding and acquisition. Adding and deleting digital objects require control of URL versions of the object and complicated by inter object relationships.

14. Right Management for Digital Library:

The right Libraries Knowledge necessities, coping with Delivery User Queries licensing agreements, Knowledge User Query Formulates Feedback payment system, secure Query Language Users transaction, user authentication, and usage USER Information/ tracking. In some cases, it Digital

Library Access Tools Knowledge Delivery Interface Features may be difficult to determine intellectual ownership. Clearly right Digital Information System management is a challenge Digital Information Storage and our understanding of Digital Information Sources the legal administrative Digital Document and technological aspect of E-mail intellectual property of E-mail copyright in digital Fax environment is still evolving.



15. Digital Information access and Retrieval:

Figure 1: Digital information access and dissemination process.

16. Conclusion:

Digital Librarian has many roles in providing information services. He is the guardian of the information; he has to ensure the digital preservation and access the resources and should be increasingly towards offering consultancy to the users in their efforts in providing digital reference

services, electronic information services, navigating, searching and retrieval of digitized information through Web documents that span the Universal Digital library or Global Digital Library. Digital librarians should acquire new sets of skills and can play a meaningful and leading role in the networked information society of the millennium. The knowledge that "digital libraries" bring to this knowledge environment would make sense of multiplicity of digital collections and resources, provide access to new network of key contacts, identifying cost effective strategies for the information retrieval and assist user in the publication and creation of new knowledge.

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E-RESOURCE MANAGEMENT IN LIBRARIES –AN OVERVIEW

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Abstract

The twenty-first century is witnessing information explosion due to advancements with rapid developments in Information and Communication Technology (ICT). Information in this digital environment plays essential role in all walks of human life. Libraries are not exceptional, and information explosion has changed the libraries appearance. Libraries are transforming the traditional printed materials into electronic material, which has more features, when comparing with the printed resources. Efficient resource sharing is possible with the new technologies, for which the available electronic information sources should be properly managed. This paper discusses about e-Resource, management of e-Resources and responsibilities of librarians in managing the e-Resources.

Keywords: E-Resources, E-Books, E-Journals, E-Resource Management.

1. Introduction

In the digital information age, Information and Communication Technology (ICT) plays vital role in the field library and information service. Developments such as Digital Library, Library Consortia, Institutional Repositories (IR), Social Networks, Content Management Systems, and
Open Sources and so on, for forced the libraries to spend more time on procuring e-Resource Management. Cloud Computing, which is also entered to libraries have removed the computer phobia, and it is the duty of librarians to secure organize and disseminate the required information to the user community. The basic functions of e-Resource Management are

- Guiding knowledge resources for user community
- Provide relevant information to the users
- Preservation of digital material for future use
- Alphabetic order of title and subjects etc.,

2. Electronic Resources

Electronic resources, which are easy to distribute to the multiple users. At present, whatever the printed resources, we are witnessing, which has equal counterpart in electronic form. There are many institutes, organizations and publishers have started publishing the information over the web and some of the information available over the web can be accessed freely, which is called open source resources. The present libraries, are transforming from traditional library to digital library, which has many features that the information can be accessed by many users simultaneously from any part of the world and also can be retained multiple copies to avoid damage. E-Resources are a comprehensive term for all types of media for recording, communicating, preserving knowledge. These include e- Books, e-Journal e-Newspaper, e-Theses and Dissertations, and so on. The electronic form in any portable medium, which can be preserved for long time for the future use.

2.1 E-Journals

E-journals in an electronic form that is the machine readable form. E-Journals are available both in internet and CD-ROM. In the recent years, full text of electronic journals has also become easier. Some times e-journals are published only in electronic form and now both in electronic and print form. Back issues of online journals are available in the CDs form with some additional charges. There are different types of e-journals, online e-journals, and CD ROM- e journals.

The web technology has made the publication very easy. The scholars and faculty members can submit their research papers through e-Mail, which has made to bring out the journals quickly. The researchers can also access the e-Journals from their desktop itself, and material can be accessed at any time. In this situation, librarian has to maintain a dual role in providing information services through print as well as electronic form.

2.2 E-Books

E-Books or electronic books are published electronically and accessed through Internet. It can be described that the entire flow of information from author to researcher is in machine-readable form. E-Books are available either fee based or free of cost. They are arranged in several ways.e- Book is another for electronic resources same like as e- Journals. Now, most of the publishers have started publishing e-Books through their web site. Libraries are slowly starting to purchase e- Books and its impact in the near future may be more. Over the last two years, many factors have influenced the need for development of e-Book.

2.3 E-Database

E-Database is collection of records in the electronic form. Many databases on various subjects are available with reasonable cost in the market. These databases can be accessed through web by multiple users simultaneously. Libraries should identify the database, which are needed for their users and should be managed properly.

2.4 Digital / Institutional Repository

Institutional Repository is one of the important digital information service is a digital archive for publishing preprints, post prints, articles, theses and dissertations, institution's publication, seminar papers and so on. There are number of digital library software's such as E - Prints, Greenstone, D Space, Fedora are available to preserve the digital information.

2.5 Internet/Web Resources:

Internet has various types of information resource which can be accessible through web and these resources include various document like e-Book, e-Newspaper, e- Articles, websites, e-Databases etc.

2.6 Features of Electronic Resources

Some of the major features of Electronic Resources

- Global access
- Simultaneous access
- Multiple copies can be taken
- Easy to edit, modify the content
- Less bulk than paper
- Speedy delivery
- Adding value to service
- Saves user as well as staff time
- Less cost when comparing with print sources

3. Electronic Resources Management

Management is basically a process consisting of diverse activities such as planning, organizing, staffing, directing and coordination, reporting and budgeting. In library services, managing of e-Resources involves various activities such as selection of document, acquisitions, licensing, access, promotional activities etc. In order to make the service better, the library staff should be trained. The training should include excellent guidance and legal consultancy to perform the service in a better way. Due to innovation of e-Resources, shrinking budgetary allocation inflammation cost diverse user information needs etc., has changed paradigm to redefine the role of library process and library professionals. At this stage the library professionals have to update their knowledge by participating various activities such as training program, short term course, seminars, and conferences and so on. It is the prime duty of the library professionals to involve in various activities such as digital library, library automation,

open source development, Institutional Repository and so on. By developing such activities, it is possible to bring the e-Resources in single platform and will help to provide better services to the user community. The following activities will help to manage the resources.

- Requirement assessment
- Interactive vendor
- Trial e-resources to be procured
- Acquisition of e-resources
- Access to procured resources
- User support and promotional activities
- Monitoring the usage of e-Resources

3.1 Advantages of E-resource Management:

- 1. Preservation and Conservation of e-journals is very easy.
- 2. It occupies less space.
- 3. Easy cross-references to the back issues of that particular journal.
- 4. It is easily access multiple users at a time.
- 5. High speed and worldwide distribution.
- 6. Powerful search techniques and facilities.
- 7. E-mail alert.
- 8. Increasing the storage capacity.
- 9. Saves the time of the reader.
- 10. They are not damaged for the frequent usage.
- 11. Information is transfer easily.

3.2 Disadvantages of E-resource Management:

The E-resource management has the following disadvantages.

- 1. Without internet facilities we are not able to read.
- 2. Without power or generators, we are not able to read.
- 3. If any problem occurred in using computer access, we are not able to read.
- 4. It involves copyright and licensing issues with the publishers.

5. It is difficult to access in some situations like searching techniques.

3.3 Challenges faced by Librarian in the E-resource Management:

There are lots of harms faced by the librarian in the present e-resource management concept. Some of the important problem faced today.

- 1. To provide adequate training for the library professionals.
- 2. To be ready to invest for e-resource facilities.
- 3. To be make proper user friendly management environment.
- 4. To be equipped fully fledged of E-resources.
- 5. To provide proper training to the users.

4. Conclusion

Electronic resources are available in different form and if there is proper mechanism adopted, it will be complex process. Hence, there should be proper planning, policy and guidelines for procuring, organizing and disseminating the e-Resources. It is also very important to educate the users through orientation program or promoting the library resources through web site so that the users will get maximum benefit from the e-Resources.

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Impact of Web 2.0 Technology on Library Professionals at Chennai :

A Study

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Abstract

This paper is attempted to find the use of web 2.0 by library professionals in Chennai India. A structured questionnaire was prepared and distributed and primary data gathered, analysed and discussed in accordance with the purpose of the study. It was found that majority of the respondents are aware of the web 2.0 technology. The study also reveals that Content message is the most popular way of sharing the message by using web 2.0.

Keywords: Web 2.0, content message, facebook, twitter, lislinks, social network, digital library, information sharing, education, library softwares.

1. Introduction

According to Wikipedia the term **Web 2.0** describes World Wide Web sites that use technology beyond the static pages of earlier Web sites. The term was coined in 1999 by Darcy DiNucci and was popularized by Tim O'Reilly at the O'Reilly Media Web 2.0 conference in late 2004. The term also describes the changing trends in the use of World Wide Web technology and Web design that aims to promote creativity, secure information sharing, increase collaboration, and improve the functionality of the Web. A Web 2.0 site may allow users to interact and

collaborate with each other in a social media dialogue. The examples for web 2.0 are social networking sites like linkedin.com, lislinks.com, facebook.com, video sharing sites like youtube.com, blogs, and mashups and through Web 2.0 a user can create social networking profiles on these sites.

2. Objectives of this study

- > To find the use of web 2.0 applictaions by the library professionals in Chennai
- \blacktriangleright To find the awareness of web 2.0
- > To find the popular way of message sharing in web 2.0
- > To find the social networks used by the library professionals
- > To find whether web 2.0 can be implemented in libraries and Library softwares

3. Techniques & Features in web 2.0

Web 2.0 sites includes some of the following features

Search: keyword searching can be used to find the information

Links: Connects the information system together

Editing: it is able to create and update contents in the blogs and posts

Tags: We can categorize the contents by adding tags

Syndication: Syndication technology can be used like RSS to notify users with current information

4. Use of Web 2.0

The technology f Web 2.0 is used in number of online tools and platforms where people share their ideas, thoughts and experiences. Web 2.0 applications helps to interact with end user through Web voting, blogging, social networking, RSS. Some of the other important benefits are easy accessibility, many people can use their comfort level, low cost, minimum requirement of IT support and very little downtime.

Web 2.0 in education

Web 2.0 could be used in colleges and universities in education by teaching, learning and assessment through contact with school communities, widening participation, interfacing with industry, and maintaining contact with alumni, teachers and students. By making the shift to a

Web 2.0 classroom, teachers are creating a more open atmosphere where students are expected to stay engaged and participate in class discussions. Weblogs makes students a public space to interact with one another and the content of the class.

Web 2.0 in social work

Web 2.0 enables social enterprises to plan to increase and encourage the widest possible dissemination and development of "Social Work" and "Work into social environment", by facilitating the methodology of working groups, online planning of social organizations, communicating through online and less time spent on non productive activities.

5. Methodology

For the survey of the primary data, questionnaire method was used. For that a structured questionnaire was prepared on the basis of the objective of the study and was distributed randomly among the Library professionals. The questionnaires distributed by e-mail also to some of the professionals. Totally 95 nos. of questionnaires were distributed and 51 questionnaires were received back after filling by the users. Statistical tests were applied to find out the findings of this study

Data Analysis and Interpretation

Table 1 reveals that among the 51 respondents 31(60.7%) are male and 20 (39.3%) are female

Gender	No.of Respondents	%
Male	31	60.7
Female	20	39.3

Table 1. The respondents Gender distribution



The respondents are requested to mention their designations. Table 2 shows that Out of 51 respondents 23 (45.09%) respondents are Librarians, 14 (27.45) respondents are Assistant Librarians and 05 (9.80%) respondents are Deputy Librarians and 09 (17.64%) respondents are Library and Information Assistants.

Designation	No.of Respondents	%
Librarian	23	45.09
Deputy Librarian	05	09.80
Assistant Librarian	14	27.45
Library & Information Assistants	09	17.64

Table 2. Professional Distribution of respondents



The type of libraries in which the respondents are working are also raised in the questionnaire. The result of Table 3 shows that 40 (78.43%) respondents working in Academic Libraries, 03 (05.88%) respondents are working in special libraries and 09 (15.68%) respondents are working in Public Libraries

Institutes	No.of	%
	Respondents	
Academic Libraries	40	78.43
Special Libraries	03	05.88
Public Libraries	08	15.68

Table 3.	Institute wise	Distribution	of	respondents
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The result of Table 4 shows that 26 (50.98%) respondents are aged between 26-35, 18 (35.29) respondents are aged between 36-45 and 07 (13.72%) respondents belongs to more than 45 years of age.

Table 4. Age wise	Distribution	of respondents
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Age	No.of Respondents	%
26-35	26	50.98
36-45	18	35.29
More than 45	07	13.72



The result of Table 5 shows that 42 respondents having the qualification MLISc.,M.Phil., 02 respondents cleared their Ph.D and 07 respondents having the qualification of MLISc with their basic degree.

Qualification	No.of Respondents	%
MLISc., M.Phil	42	82.35
Ph.D	02	03.92
MLISc with basic degree	07	13.72

Table 5. Qualification wise Distribution of respondents



The respondents were asked about their awareness of web 2.0. In the 51 respondents 42 (82.35%) respondents are well aware about web 2.0, 02 of the respondents are not aware about web 2.0 (03.92%) and 07 (13.72%) of the respondents are aware of web 2.0 but not fluent on the same.

Status	No.of Respondents	%
Yes	42	82.35
No	02	03.92
Aware but not fluent	07	13.72

Table 6: Awareness	of wel	b 2.0 by	respondents
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The respondents were requested that whether they are using the technology web 2.0.in their libraries. Out of the 51 respondents only 30 (58.82%) respondents are using and 21 (41.18%) respondents are not using web 2.0 in their libraries.

Level	No.of Respondents	%
Yes	30	58.82
No	21	41.18

 Table 7: Use of web 2.0 by respondents



The respondents were requested to mention that how they are sharing the messages by using web 2.0. Out of the 40 (78.43%) respondents sharing as content messages, 08 (15.68%) respondents sharing by audio chat & content message and 03 (05.88%) respondents sharing video chat and content message.

Туре	No.of	%
	Respondents	
Content message	40	78.43
Audio chat & Content message	08	15.68
Video chat & Content message	03	05.88



The respondents were asked to mention that which social sites they were using for the technology web 2.0. Out of the 51 respondents, 26 (50.98%) of the respondents using facebook, 8 (15.68) of the respondents using twitter, 9(17.64%) of the respondents using Lislinks and 05 (9.80%) of the respondents using linkedin and 03 (5.88%) of the respondents using other sites.

Name of the websites	No.of Respondents	%
Facebook.com	26	50.98
Twitter.com	08	15.68
Lislinks.com	09	17.64
Linkedin.com	05	09.80
Other sites	03	05.88
Social sites usage 50.98 50.		

Table 9: Social sites	used by	respondents
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The respondents were asked that is web 2.0. can be used in digital libraries. Among the 51 respondents 45 () respondents said that we can use web 2.0, and 06 respondents mentioned that the same cannot be used in digital libraries.

Status	No.of Respondents	%
Yes	45	88.23
No	06	11.77

Table 10: Web 2.0 in digital libraries



The respondents were asked that is web 2.0. can be implemented in libraries. Among the 51 respondents 39 (76.47%) respondents said that they can implement web 2.0, and 12 (23.53%) respondents mentioned that the same cannot be implemented libraries.

Table 11: Implementation	of Web 2.0 in libraries
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Status	No. of Respondents	%
Yes	39	76.47
No	12	23.53



The respondents were requested to mention that is web 2.0. can be used in library softwares. In the 51 respondents 38 (74.50%) respondents said that web 2.0 can be used in library software by connecting the software with their institute websites and 13 (25.50%) of the respondents said that web 2.0 could not be used in library softwares.

 Table 12: Web 2.0 in library softwares

Status			No.of Respondents	%
Yes	through	institute	38	74.50
website	es			
No			13	25.50



Out of the 51 respondents participated, 09 of the respondents suggested that an awareness seminars and workshops could be conducted to learn more about web 2.0 technology and how it is used in libraries.

Status	No.of Respondents	%
Suggestions given	09	17.64
Not suggested	42	82.36



 Table 13: Suggestions by respondents

6. Major findings of the study

In the above conducted study it was observed that majority of the respondents are aware of the concept web 2.0.; It was found that 31 (60.7%) of respondents were male respondents and 20 (39.3%) of respondents were female respondents. The study found that majority of the respondents i.e. 50.98% were between the age group of 26-35 years. The study found that majority of the respondents 58.82% are using web 2.0. The Facebook.com was the most popular Social site used by majority of the respondents followed by Lislinks.com and Twitter.com. Majority of the respondents i.e 78.43% are sharing the information by content message. 88.23% respondents said web 2.0 can be used in digital libraries and 76.47% of respondents said web 2.0 can be used in digital libraries and 76.47% of respondents 74.50 %

stated that web 2.0 can be used in library softwares through institute websites. Many respondents suggested to conduct seminars/workshops to create more awareness on web 2.0.

7. Conclusion

The use of web 2.0 is increasing regularly by the Library professionals. All the library professionals must be committed and well aware of using the technology to deliver better information services to the users. Library professional associations and Library & Information science schools, Professional bodies must realize the role of library professionals and should conduct seminars, conferences, workshops on web 2.0 technology for the effective use of technology by the professionals to deliver the best information services to the user community.

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திருக்குறள் போற்றும் பெண்மை

முனைவர் ப.சண்முகம்,

உதவிப்பேராசிரியர், ஸ்ரீமத்ஆண்டவன் கலை மற்றும் அறிவியல் கல்லூரி, திருவானைக்கோவில் - 5.

தமிழில் கிடைத்துள்ள மிக அரிய நூலாம் திருக்குறள். இது மிகப் பழமையான வாழ்க்கையின் முழுநிறை இலக்கணமாக நூலாகும். அமைந்த நூலாகவும், திருவள்ளுவர் இவ்விலக்கணத்தை அறம், பொருள், இன்பம் என்ற முப்பால்களாக 'எல்லாப் பொருளும் இதன்பால் வகுத்துள்ளார். உள் இதன் பால் இல்லாத எப்பொருளும் இல்லையால்'' என்று மதுரைத் தமிழ் நாகனாராலல் பாராட்டப்பட்டது. (மதுரைத் தமிழ் நாகனார் திருவள்ளுவ மாலை செய்.29) பெண்களின் நலனைப் பற்றி கருத்துக்கள் ஏதேனும் கூரப்பட்டுள்ளனவா? என்பதை இக்கட்டுரை வழியாகக் காண்போம்.

இல்லறம்

இல்லநத்துக்கு வேண்டியவை பண்பு, அன்பு. அவ்வன்பைப் பெருக்கிக் கொள்ளவே மேந்கொள்ளப்படுகிறது. பெண்ணானவள் இல்லரம் ஒ(ந ஓர் ஆண்மகனுக்கு துணையாக அமையும் போது இல்லநத்தில் அன்பு நிறைந்தவளாக இருக்க வேண்டும். தலைவன் செய்கின்ற செயலில் எவ்வித இடையூறும் ஏற்படாதவாறு பாதுகாக்கும் தகுதியுடையவளாகவும் தலைவனின் வருவாய்க்குத் தகுந்த வாழ்க்கை நடத்த முடியாமல் போனால் தலைவனின் வாழ்க்கையில் துன்பம் நேரிடும். ஆகையால் வாயிலாக கிடைத்த தன்னை மணந்த தலைவனின் ஆற்றல் வருவாயால் தக்க வாழ்க்கை நடத்தும் தகுதி அவளிடம் அமைய வேண்டும் என்பதை,

''மனைத்தக்க மாண்புடைய ளாகித் தற்கொண்டான்

வளத்தக்காள் வாழ்க்கைத் துணை"

(குறள் : 51)

இக்குறள் உணர்த்துகிறது.

நற்பண்பு

தலைவன் எவ்வளவு வருமானம், செல்வாக்கு, தகுதி பெற்றவனாய் இருந்தாலும், தன்னைத் தேடி வருகின்ற பெரியோர், இரவலர், சுற்றத்தார், விருந்தினர் போன்றோரிடத்தில் தன் மனைவியானவள் அன்பு காட்டவில்லையெனின் அவனுடைய போகும். இவ்வாழ்க்கை பயனர்நே ஆகையால் இல்லாம் சிருப்பாக விளங்க மனைவியானவள் நற்பண்பினை நிறைந்திருக்க வேண்டும் என்பதை,

"மனைமாட்சி இல்லாள்கண் இல்லாயின், வாழ்க்கை எனைமாட்சித்து ஆயினும் இல்"

(குறள்: 52)

பெண்ணின் இயல்பானது அன்பால் நிறைந்திருக்கிறது என்று வள்ளுவர் இக்குறள் வழி உணர்த்துகிறார்.

கணவனிடத்து அன்பு கொள்ளுதல்

தமிழ்நாட்டுப் பெண்கள் தம் கணவன் பால் மாறாத பேரன்பு உடையவர்கள். தெய்வமாகவே எண்ணிக் கணவனை வழிபடுபவர்கள்.

> "தெய்வம் தொழாஅள் கொழுநன் தொழுதெழுவாள் பெய்எனப் பெய்யும் மழை"

> > (குறள்: 55)

"தற்காலத்துத்தற் கொண்டான் பேணித் தகைசான்ற சொற்காத்துச் சோர்வு இலாள் பெண்"

(குறள்: 56)

கற்பு நெறியில் தன்னையும், தன் கணவனையும் காப்பாற்றி, தகுதியமைந்த புகழையும் காத்துச் சோர்வு அடையாமல் வாழ்பவளே சிறந்த பெண்ணாவள் என்று இக்குறட்பாக்களில் இதனைக் காணலாம்.

P.Shanmugam., (2015)., Int. J. Res. Ins., Vol 2(Issue 1)., 185-187.

குறுந்தொகைத் தலைவி ஒருத்தி தான் தன் கணவன் மீது கொண்டுள்ள காதலை, ''தோழி என் தலைவனிடத்து யான் கொண்டுள்ள அன்பானது நிலத்தினும் அகன்றது. வானினும் உயர்ந்தது, கடலினும் ஆழமானது! என்று கூறுகிறாள்''. இதனை,

> "நிலத்தினும் பெரிதே வானினும் உயர்ந்தன்று! நீரினும் ஆரளவின்றே சாரல் கருங்கோல் குறிஞ்சிப்பூக் கொண்டு பெருந்தேன் இழைக்கும் நாடனோடு நட்பே''

> > (குறுந்: பா : 3)

என்ற பாடல் எடுத்துரைக்கின்றது.

பெண்மையைப் போற்றுதல்

பெண்ணை விடச் பொருள் ഖേദ്വെട്ടവപ്പില്ലാക്കില്ലാം പ്രത്യം പാരം പ്രത്യം പാരം പ சிறந்த இவ்வுலகில் ஒரு பெண்ணுக்கு ഗ്രവ്രത്തി போன்றது அப்பெண் கற்பு. ஆனால், கற்பு என்னும் பொற்பினைப் பெற்றவளாக இருக்க வேண்டும் என்கிறார்.

> "பெண்ணிற் பெருந்தக்க யாவுள கற்பென்னும் திண்மை உண்டாகப் பெறின்"

> > (குறள் : 54)

தொல்காப்பியர் காலத்திலேயே பெண்மை போற்றப்பட்டது. ஆனால் கற்பை அடிப்படையாக வைத்து தான் அது போற்றப்பட்டது.

> "உயிரினும் சிறந்தன்று நாணே நாணினும் செயிர்தீர் காட்சிக் கற்புச் சிறந்தன்று"

(தொல்-பொருள்-களவியல் நூ-22)

என்பது தொல்காப்பிய நூற்பா.

முடிவுரை

இல்லநம், நற்பண்பு, கணவனிடத்து அன்பு கொள்ளுதல், பெண்மையைப் போற்றுதல் என்று இக்குறள் வாயிலாக பெண்மை நலம் போற்றப்படுகிறது.

3



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தமிழ்மொழியில் கணினியின் அறிமுகம் - சிக்கல்கள்

அ. இளவரசி,எம்.ஏ.,எம்.்.பில்.,

முனைவர்ப்பட்ட ஆய்வாளர் (பகுதிநேரம்), காவேரி மகளிர் கல்லூரி, திருச்சிராப்பள்ளி.

இன்றைய தமிழ்மொழி நிலையான வளர்ச்சியில் உள்ளது என்றால் அதற்கு ஒருவகையான காரணம் கணினி. சங்க இலக்கியங்கள் இன்றும் மேன்மையடைகிறது என்றால் அதற்கு காரணம் நம் முன்னோர்கள் மற்றும் இலக்கிய ஆர்வலர்கள், ஆராய்ச்சியாளர்கள் தமிழ் ஆர்வலர்கள் என்று கூறிக் கொண்டேச் செல்லலாம். என்றாலும் ஊடகங்கள் வாயிலாக தமிழ் இலக்கியம் வளர்ச்சியடைய ஒரு சாதகமான சாதனமாக கணினி உள்ளது. அவ்வகையில் இக்கட்டுரையில் தமிழ் மொழியில் கணினியின் அறிமுகம் சிக்கல்கள் பற்றியச் மற்றும் செய்திகளை எடுத்துக் கூறுவதாக அமைகிறது.

"காலத்தின் ஓட்டம் கணினியிலும்

கணினியின் ஒட்டம் தமிழிலும்"

என்ற வரிகளுக்கு ஏற்ப காலத்தைக் கணக்கிட்டு கணினியின் பயன்பாடு முழுவதும் தமிழிலேயே இருக்க வேண்டும், என்ற நோக்கில் இக்கட்டுரை ஆராயப் பெறுகிறது.

கணினியில் தமிழின் முதல் பதிப்பு

முதன்முதலில் கணினியில் தமிழ் தோன்றியது 1980 இல் தான். அதன் பின்னர் மக் ஓ.எஸ் (Mac OS) மற்றும் மைகரோசாப்ட் (Microsoft Dos) ஓ.எஸ்.2 (Os2) வகை இயக்கு தளமுடைய கணினிகள் கிட்டத்தட்ட ஒரு பொதுக் கருவியாக உருவெடுக்கத் தொடங்கியது. இவ்வகைக் கணினிகள் மேசைக் கணினிகளாக விற்பனைக்கு வந்தது. கிட்டத்தட்ட 1983 – 84 அளவில் தான் இவற்றின் வளர்ச்சியினால் தமிழ்க் கணினி வல்லுநர்கள், தமிழைக் கணினியில் கொண்டு வரும் முயற்சிகளைத் தொடங்கினர். கணினிகள் பெரும்பாலும் ஆங்கிலத்திலேயே இயக்கக் கட்டளைகளையும் (Operation Commands) மறு மொழிகளையும் கொண்டிருந்தன. நாளடைவில் மக்களின் பல தேவைகளை மிக எளிதாகச் செய்து முடிக்கப் பெரும் உதவியாக அமைந்தது.

தமிழில் முதல் மென்பொருள்

ஆங்கில மொழியில் மட்டுமே பயன்படுத்தப்பட்டு வந்த கணினியின் பயன்பாடு பின்பு தமிழிலும் பெற முயற்சிக்கப்பட்டது. தமிழ்க் கணினி வல்லுநர்கள் இம் முயற்சிகளின் பலனாக முதலில் தோன்றிய மென்பொருட்களில் ஆவணங்கள் எழுதும் ஆதமி (Adami) என்ற எழுத்துருவைக் கண்டுபிடித்தனர். இது 1984 இல் கனடாவில் வாழும் முனைவர் ஸ்ரீ நிவாசன் என்பவரால் உருவாக்கப்பட்டது. இதன் வாயிலாக கணினிப்பொறியில் தமிழில் எழுதி அவற்றை அச்சுப் பதிவு செய்துக் கொள்ளலாம். இம்மென்பொருளைத் தொடர்ந்து 'ஆதவின்' (Adavin) என்ற மென்பொருளும் MS Windows இயங்கு தளத்தில் பயன்படக் கூடியதாக பின்னாளில் உருவாக்கம் பெற்றது. இம் மென்பொருட்கள் அந்நாளில் தமிழ்க் கணினிப் பயனாளர்களிடம் பிரபலமாக இருந்தன.

அதன் பின்னர் தோன்றிய மென்பொருள் தான் **'பாரதி'** (Bharathi) என்பதாகும். இது சிங்கப்பூர், மலேசியா ஆகிய நாடுகளில் பிரபலமாக இருந்தன. தொழில் நுட்பம் வளரும் போது, தனித்தனியாகத் தன் தன் வேலைகளைப் பார்த்துக் கொண்டிருந்த கணினிகள், வலை வேலைப்பாட்டால் இணைக்கப்பட்டன. இணைக்கப்பட்ட கணினிகளும் அவற்றின் உபயோகங்களும் மனிதனின் தேவைகளை மேலும் செம்மையாகப் பூர்த்தி செய்யத் தொடங்கின.

இணையத்தில் தமிழ்

முதலில் தமிழை இணையத்தில் ஏற்றி வைத்தவர் சிங்கப்பூரைச் சேர்ந்த நா. கோவிந்தசாமி என்பவர் தான். 1995 ஆம் ஆண்டு அக்டோபர் திங்களில் சிங்கப்பூர் அதிபர் மேன்மை மிகு. ஒங் டாங்சாங் துவக்கி வைத்தார். Journey:- Words Home and Nation -Anthology of Singapore Poetry (1984)1995) என்கிற நான்கு கேசிய மொழிக் கவிதைகளுக்கான வலையகத்தில் தான் முதன் முதலில் தமிழ் மொழி இணையத்தில் அடி எடுத்து வைத்தது.

மின்னஞ்சல் தொடர்பால் தமிழில் தகவல்களைப் பரிமாரிக்கொள்ள முடியும் என்ற நிலையில் இன்னொரு புரட்சிகரமான மாற்றம் கணினி உலகில் ஏற்படத் தொடங்கியது. இது ஒரு புது யுகத்திற்கும் வித்திட்டது. அதுதான் இணைய யுகம் (Internet) மனிதனின் தேவைகளை மேலும் செம்மையாகப் பூர்த்தி செய்யத் தொடங்கின. வலையில் இணைக்கப்பட்ட கணினிகள், இயந்திரக் காலகட்டத்தில் மின்னஞ்சல் பயன்பாடு பெருகத் தொடங்கியது. என்றாலும் தனிக் கணினிகளில் (Personal Computers) மின்னஞ்சல் தொடர்பு பரவலாகத் தொடங்கும் போது தான் தமிழ்மொழியைத் தொடர்ந்து தகவல் பரிமாற்றத்திற்கும் இதர செயல்பாடுகளுக்கும் பயன்படுத்தும் தேவை எழுந்தது.

முதல் தமிழ் எழுத்துருக்கள் அறிமுகம்

1980 களின் பிற்பகுதியில் திரு. தமிழ் அர்த்தனாரி என்பவர் ஒரு எழுத்துருவை உருவாக்கியதாக அறியப்படுகிறது. 1990 களின் முற்பகுதியில் மக்கின்டாஸ் என்பவர் கணினியில் தமிழ் எழுத்துருவை (Tamil Fonts) அறியுமுகப்படுத்தினார். ஆதமி (1984) உருவாகும் முன்னர் பேராசிரியர் ஜியார்ஜ் னடர்ட் அவர்கள் ஆப்பிள் கணினியில் கமிழ் எழுத்துருக்களை இதே யூனிக்சு (UNIX) அறிமுகப்படுத்த்தியிருந்தார். நேரத்தில் இயங்கு <u>களக்கிலு</u>ம் முதன்முதலாக முனைவர் பால சுவாமிநாதன் அவர்களும் அவர்தம் உடன்பிறந்தார் முனைவர் ஞானசேகர் அவர்களும் யூனிக்சில் தமிழுருக்கள் ஆக்கினார்கள். அத்தோடு Latex எழுதியில் பயன்படுத்த Wintamil என்னும் எழுத்துருமுறை அறிமுகப்படுத்தப்பட்டது. ஐ-ட்ரான்ஸ் (I-trans) என்ற நிறுவனமும் யூனிக்சில் தமிழில் எழுத வசதியாக எழுத்துருக்களையும், உதவிகளையும் வழங்கியிருந்தது. இந்த எழுத்துருக்களை கணினியில் அடிக்க எழுத்துப் பெயர்ப்பு (Transliteration) முறையே உபயோகிக்கப்பட்டது.

அதாவது அம்மா என்பதை ammaa என்று கணினி விசைப்பலகையில் அடிக்க வேண்டும். எழுத்துருக்கள் உருவாக்கமும் எழுதும் முறையும் இலகுவாக இருக்க கணினிகளில் மேலதிக மென்பொருள் தேவையின்றியே தமிழில் எழுத இவ் எழுத்துருக்களில் கனடாவில் முடிந்தது. நூற்றுக்கணக்கான வாமும் முனைவர். விஜயகுமார் அவர்கள் ஆக்கிய எழுத்துருக்கள் குறிப்பிடத்தக்கது. இவ்வெழுத்துருக்களுக்கு கருநாடக இசை இராகங்களின் பெயர்களைச் பெ. குப்புசாமி ஆக்கிய 'കல്வி' சூட்டினார்கள். முனைவர். அவர்கள் என்னும் பயன் மென்பொருட்களுக்கு பயன்படுத்திய எழுத்துருக்களும், முனைவர் கல்யாணசுந்தரம் அவர்கள் (Mylai) யும், பாமினி (Bamini) போன்றவையும் பரவலாக பயன்பாட்டிற்கு ஆக்கிய 'ഞ്ഞെ) தோற்றங்களால் நன்மைகள் ஏந்படலாயின. வந்தன. இந்த எழுத்துருக்களின் பல எழுத்துருக்களை வைத்துக் கொண்டு, ஏற்கனவே ஆங்கிலம் மூலம் கிடைக்கும் எழுத்துக்கோர்ப்பு கணிக்கும் அட்டவணை உருவாக்கி Word, Excel போன்றவற்றில் தமிழிலேயே பயன்படுத்த முடிந்தது.

தமிழ்இலக்கியத்திற்கான முதல் மென்பொருள்

தமிழ் மென்பொருள் முயற்சிகள் ஒருபுறமிருக்க, இன்னொரு புறம் சங்கத் தமிழிலிருந்து இகலக்கியம் வரை அனைத்தையும் இணையத்தில் முயற்சிகளும் தீவிரமாக நவீன ஏற்றும் கொண்டிருக்கின்றன. ஸ்விட்சர்லாந்தைச் சேர்ந்த டாக்டர் கல்யாணசுந்தரம் மதுரைத் நடந்து (Project Madurai) என்ற பெயரில் முயர்சியைத் தீவிரமாக கிட்டம் ஓர் இணைய பத்துப்பாட்டு, எட்டுத்தொகை, காப்பியங்கள், சைவ, வைணவ நூல்கள் மேற்கொண்டிருக்கிறார். இலக்கியங்களை இதுவரை சுமார் 200 ഖകെല്പാത தமிழ் இணையத்தில் இடம்பொச் என செய்திருக்கிறார். ஜெர்மனியிலுள்ள பெர்ன் நூலகத்தில் மட்டும் 1000 தமிழ் ஒலைச் சுவடிகள் இருப்பதாக அறியப்படுகிறது. இதைப்போல் பிரிட்டிஷ் மற்றும் ஆம்ஸ்டர்டாம் நூலகத்திலுள்ள ஒலைச் சுவடிகளின் பிரதிகளைப் பெற்று இணையத்தில் ஏற்றும் முயற்சியில் இக்குழு தீவிரமாக செயல்பட்டு வருகின்றன.

கணினியில் தமிழ் எதிர்நோக்கும் சிக்கல்கள்

கணினித் தமிழ் வளர்ச்சி என்பது வெறும் தொழில்நுட்ப ரீதியாக மட்டும் தடைகளைச் சந்திக்கவில்லை. தொழில்நுட்பங்கள் தாண்டி, அரசியல், பொருளாதாரம் எனப் பல காரணிகளும் கணினித் தமிழைப் பின்னுக்கு இழுக்கின்றன. பிறமொழி பேசும் மக்கள் அனைவரும் இந்தியக் கணினி வழியில் கற்பதற்கான மென்பொருளைத் தயாரித்தல், இந்தி பேசாத மக்கள் ஆங்கிலத்தில் தரும் தகவல்களை இந்திக்கு மொழிபெயர்க்கும் மென்பொருளைத் தயாரித்தல், கணினியில் இந்தியைப் பயன்படுத்துவதற்கான பயிற்சிகளை நடுவன் அரசு ஊழியர்களுக்கும் அளித்தல், இந்த மென்பொருட்களைப் பயன்படுத்துவது குறித்த கருத்தரங்குகள், பயிலரங்குகள், கண்காட்சிகள் நடத்துதல் போன்ற பணிகளைச் செய்து வருகிறது.

சென்னை உயர்நீதிமன்றத்தில் வழக்காடு மொழியாகத் தமிழ் இல்லை. அண்ணா பல்கலைக் கழகம், தமிழ்நாடு டாக்டர் எம்.ஜி.ஆர் மருத்துவப் பல்கலைக்கழகம் போன்றவை வாயிலாக வழங்கப்படும் உயர்க்கல்விப் பாடங்களுக்குத் தமிழில் கலைச்சொற்களுடன் கூடிய புத்தகங்கள் இல்லை. இத்தனை நடைமுறை சிக்கல்களைத் தாண்டித்தான் கணினித் தமிழ் என்பது சிந்து நடைபயில வேண்டியிருக்கிறது.

கணினித் தமிழ் வளர செய்யவேண்டியவை

தரமான பல்கலைக்கழகங்கள், உயர்கல்வி நிறுவனங்கள் போன்றவற்றில் மொழித் மேற்கொள்ள வேண்டும். தொழில்நுட்பப் படிப்புகளையும், ஆய்வுகளையும் தமிழகத்தில் கணினிகள், அலைபேசிகள் கிடைக்கும் போன்றவற்றில் தமிழைப் புழங்கும் ഖകെല്പാത நடவடிக்கைகளை அரசு எடுக்க வேண்டும். தமிழகத்தில் விற்பனை செய்யப்படும் கணினிகளில் கட்டாயம் தமிழ்த் தட்டச்சு விசைகள் அடங்கிய விசைப்பலகையே விற்பனை செய்ய வேண்டும் என்று கட்டாய ஆணை வழங்கலாம். என்பன போன்ற கருத்துக்களை கணினியில் தமிழ் வளர்ச்சி பெற அரசு செய்யவேண்டுவனவாக நம் தமிழறிஞர்களின் கருத்துக்கள் வெளிபடுத்தப்படுகிறது.

தொகுப்புரை

மேற்கண்ட செய்திகளின் வாயிலாக தமிழ்மொழியில் அறிவியல் சாதனமாக விளங்கும் கணினியின் அறிமுகம் பற்றியும், எதிர்கொள்ளும் சிக்கல்கள் பற்றியும் அறிந்துகொள்ள முடிந்தது. ஆனால், பெரும்பாலும் வளர்ச்சி நிலைகளை விட சிக்கல்களைத் தான் அதிகம் கண்டுவருகிறது. எனவே மத்திய அரசோ அல்லது மாநில அரசோ இதற்கென ஒரு முக்கியத்துவம் கொடுக்க வேண்டும். கணினியில் தமிழ் வளர்ச்சி நிலையை எட்டுவதற்கு தகுந்த அங்கீகாரங்களையும், நிதியுதவிகளையும், நவீன வசதிகளையும் செய்து கொடுக்கும் முயற்சியை மேற்கொள்ள

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வேண்டும் என்பதை இவ் ஆய்வின் வாயிலக எடுத்துரைத்துக் காட்டப்படுகிறது. மொழிகளுக்கெல்லாம் மூத்த மொழியாக விளங்கும் தமிழ் மொழி அனைத்து துறைகளிலும் முதன்மை பெற்று விளங்க வேண்டும். மூத்த மொழியாகவும், செம்மை மொழியாகவும் விளங்கும்,

"தமிழ் கணினிக்கு தனியொரு இடம் வேண்டும் அதற்கு... தரமேம்பாட்டு திட்ட அமைப்பு வேண்டும்''

என்ற புதுமொழிகளின் வாயிலாக இவ் ஆய்வுக்கட்டுரை தமிழ்மொழியில் கணினியின் அறிமுகம் மற்றும் சிக்கல்கள் பற்றிய செய்திகளை தொகுத்துரைக்கின்றன.