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# RETELL

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#### From the Editors' Desk

#### Dear readers,

Research is a great opportunity for researchers, scientists and academicians to generate new theoretical frameworks that enable reassessment and refinement of current practices and thinking. RETELL facilitates the faculty and researchers from all fields to discover and to extend their acquired knowledge by exploring more wide-ranging scientific theories, articles and case studies through this journal. It not only presents the current status of different issues in all the fields but also provides methods to solve them. This unbiased attitude toward the scope of this journal allows the reader to have a global view on the topic of interest. The apex of the accomplishment depends on the number of researchers who take delight in publishing the article in this journal. On behalf of the RETELL team, we wish all faculty and students to exhibit their research skills by contributing unpublished quality research papers to this journal.

Dr. Y. Justin Koilpillai Associate Editor **Dr. L. Arockiam** Editor in Chief

#### **Epistle**

It's my great pleasure and honour to release the 21st Volume of RETELL, June 2019. It is one among the interdisciplinary journals which assist the staff and scholars of our college to publish their research work. RETELL represents the collective thinking of a group of innovative individuals to share their knowledge and skills at their initial state of research. It formulates the cohesive and comprehensive reference of current research in Science and Humanities. I appreciate the editorial team for their contribution and involvement in upholding the standard of this journal.

Rev. Dr. M. Arockiasamy Xavier SJ Principal

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*In vitro* Propagation and Conservation of *Maerua apetala* (Spreng.) M. Jacob

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# Abstract

The present investigation focused on *in vitro* propagation of *Maerua apetala* through nodal and shoot tip explants. The explants placed on Murashige and Skoog (MS) medium fortified with either BAP (0.5-3.0mg/l) or BAP (0.5-3.0mg/l) in combination with IAA (0.1-0.6mg/l) and TDZ (0.1-2.5mg/l) produced adventitious shoots. Maximum Shootlets were observed on MS medium supplemented with BAP 1.0 & 1.5 mg/l that produced 80% shoots. The explants inoculated on MS medium with BAP 1.0 mg/l yielded maximum average number of Shoots (14.5±1.18) and mean length of shoots (5.5 cm). The *in vitro* derived micro shoots were subjected to rooting on ½ MS medium with IBA (0.5-2.5mg/l), IAA (0.5-2.5mg/l) and NAA (0.1-2.5mg/l). The Maximum number of roots was observed in IBA 1.0 mg/l that initiated 80% roots and an average of  $6.4\pm0.61^{\circ}$  roots.

Keywords: Maerua apetala, nodal explants, MS medium, Plant Growth regulator

## Introduction

The medicinal tree *Maeraua apetala* belonging to Capparaceae are scattered in Tamil Nadu (Gamble and Fischer, 1915-1936; Hooker, 1872-1897; Matthew, 1981). There are 40 genera and 450 species of herbs, shrubs and rarely trees are distributed nearly equally over tropical and subtropical regions (Caius, 1998). Many of these plants have been used in traditional systems of medicine. *Maerua apetala* has not been explored extensively by the scientific world so far as it has very little previous record of use in traditional medicine.

*Maerua apetala* is commonly known as '*Iruvali*' in Tamil and is a medium sized tree of scrub jungles and endemic to Tamil Nadu and Andhra Pradesh (Daniel and Uma Maheswari, 2001). Traditionally, the root bark paste is applied for leucoderma and the extract given orally for the same by Chenchus and Lambadies (Reddy *et al.*, 1995). Tender leaves ground with spices and the paste made into pills are given orally for nervous disorders and foot pains by Chenchus (Diallo *et al.*, 2000).

#### **Materials and Methods**

The study plant was collected from Gangaikondan Spotted Deer park location. It is a tree about 4 m tall, young branches pale, glabrous; Leaves trifoliate, leaflets elliptic, linear obtuse or rounded at base, coriaceous; Flowers pale green, terminal corymbs, bracteolate; pedicels 2 cm long. Calyx tube 0.3 cm long. Petals absent. Stamens many; gynophores about 1.8 cm long. Ovary ovoid. Fruits ovoid; seeds trabeculate; Flowers and Fruiting season March-July.

The nodal and shoot tip explants were collected from the healthy mother plants, thoroughly washed with running tap water for 10 min. followed by Tween 20 treatments for 10 minutes to remove the superficial dust particles. Then the explants were surface sterilized inside the Laminar Air Flow chamber with 0.1% HgCl<sub>2</sub> solution for 3 minutes, followed by rinsing three times with double distilled water. The sterilized nodal segments were implanted vertically on MS medium (1962) fortified with 3% sucrose, 0.6% (w/v) agar and different concentrations and combinations of BAP (0.5-3.0 mg/l), IAA (0.1-0.6 mg/l) and TDZ (0.1-2.5) for shoot induction. Proliferated shoots initiated from nodal segments were sub cultured for further multiple shoot induction. Regenerated multiple shoots were cut and individual shoots were transferred into MS medium containing different concentrations of IBA (0.5-2.5 mg/l), IAA (0.5-2.5 mg/l) and NAA (0.1-2.5 mg/l) for root induction. For the purpose of hardening, the rooted plantlets were thoroughly washed to remove the traces of agar and planted in polycups containing a mixture of soil, sand and farmyard mixture in the ratio of 1:1:1 and covered with perforated plastic bags and hardened for four weeks in a mist chamber before transfer to the field.

# **Results and Discussion**

The nodal and shoot tip explants on MS medium supplemented with BAP (0.5 -3.0 mg/l), TDZ (0.1 - 2.5 mg/l) and IAA (0.1 - 0.6 mg/l) induced multiple shoots. The MS medium augmented with BAP (1.0 mg/l) induced 80% of multiple shoot formation and maximum number  $(14.5 \pm 1.18)$  of shoots per explant was observed. Maximum shoot length of 5.5 cm was observed on the same medium concentration (Table 1 & Plate 1). In the same way Purohit and Kukda (2004) were able to induce multiple shoots from nodal explants of a 30-yr-old tree of Wrightia tinctoria on MS medium supplemented with BAP 2.0 mg/l which affirms that BAP alone may also induce multiple shoots. In the same way Isabel et al. (2004) formulated a micropropagation protocol for Helianthemum stropogophyllum. Shoot tips and nodal segments isolated from seedlings were used as primary explants. Multiple shoot production was observed in MS medium supplemented with different concentrations of BAP. Lee and Chan (2004) also observed multiple shoots from the nodal segments of Orthosiphon Stamineus using MS + BAP 0.5 mg/l. However there are reports from Daniela et al. (2009) who observed BAP along with NAA yielded maximum number of shootlets from the nodal explants of Neoglaziovia variegate on MS media fortified with NAA 0.5 mg/l

and BAP 4.4 mg/l and Anand and Jeyachandran (2004) developed a protocol for *Zehneria scabra* (L.f.) Sonder, through nodal explants cultured on MS fortified with BAP 5 mg/l and IAA 0.5 mg/l and achieved high frequency of multiple shoots induction.

The *in vitro* raised shoots transferred into  $\frac{1}{2}$  MS medium supplemented with various concentrations and combinations of IBA, IAA and NAA were kept in darkness for four days. On 5<sup>th</sup> day the cultures were transferred to normal light condition for rooting. After 10 days, the roots were formed in the shoots on 1/2 MS medium supplemented with of IBA 1.0 mg/l and it produced maximum number  $(6.4\pm0.61)$  of roots and the rooting response was 80% (Table 2, Plate 1). The increased IBA concentration led to the formation of basal callus. Almost similar results have been observed by Mohapatra et al. (2008) who obtained 3-4 roots per shoot by culturing the shoots in MS media with IBA 0.5 mg/l in Centella asiatica. Likewise, Chandraprabha and Ramasubbu (2010) established roots in MS media with IBA 1.0 mg/l in Aristolochia tagala and Kumar et al. (2013) also have developed an *in vitro* propagation protocol for *Citrullus colocynthis* (Linn.) in which rooting was readily achieved upon transferring the shoots on to  $\frac{1}{2}$ strength MS medium supplemented with IBA 4.9 mg/l. On the other hand, there are reports where rooting have been induced by using plant regulators other than IBA or in combination with IBA. Sri et al. (2013) have worked on endangered wild medicinal plant Stemona tuberosa induced multiple roots containing 1/2 MS with 1.0 mg/l IAA and Eganathan (2012) have developed a micropropagation protocol for Sauropus androgynus (L.) Merr. using nodal explants in MS medium supplemented with various concentrations of BA and Kn and rooting was induced from shoots in MS medium supplemented with various concentrations of IBA and NAA.

# Acknowledgment

The first author is grateful to the University Grant Commission, particularly the Joint Secretary, University Grants Commission, South Eastern Regional Office, Hyderabad for sanctioning the Minor Research Project.

PGRs		Shooting	Average Number	Mean shoot	
BAP	IAA	TDZ	Response (%)	of Shoots per explant	length (cm)
0.5			75	$12.3\pm1.95^{cd}$	4.7 <sup>bc</sup>
1.0			80	$14.5\pm1.18^{\rm a}$	5.5 <sup>ab</sup>
1.5			80	$14.0\pm2.36^{ab}$	4.3 <sup>cd</sup>
2.0			70	$11.2\pm1.69^{\rm ef}$	4.0 <sup>de</sup>
2.5			65	$9.3\pm1.15^{\rm ef}$	3.9 <sup>de</sup>
0.5	0.1		70	$9.6\pm2.79^{cd}$	4.9 <sup>ab</sup>
1.0	0.2		70	$11.5\pm1.95^{\rm de}$	5.2 <sup>ab</sup>
1.5	0.3		70	$11.3 \pm 1.30^{\rm e}$	5.3ª
2.0	0.4		65	$11.1\pm1.91^{\text{ef}}$	5.1 <sup>ab</sup>
2.5	0.5		65	$9.8\pm1.69^{\rm g}$	4.3 <sup>cd</sup>
3.0	0.6		60	$9.5\pm1.95^{\text{gh}}$	3.3 <sup>fg</sup>
		0.1	55	$9.8 \pm 1.49^{\rm g}$	3.0 <sup>ghi</sup>
		0.5	60	$11.9\pm1.52^{\rm de}$	$2.5^{ m jkl}$
		1.0	65	$12.5 \pm 1.10^{bcd}$	3.1 <sup>fgh</sup>
		1.5	65	$12.3 \pm 0.96^{cd}$	3.9 <sup>de</sup>
		2.0	60	$11.4 \pm 1.57^{de}$	3.6 <sup>ef</sup>
		2.5	60	$11.0\pm1.06^{\rm ef}$	$2.4^{ m jkl}$

 Table-1: Effect of PGRs on induction of multiple shoot from nodal explants of Maerua apetala

*Note*: Mean value within the same column followed by the same superscript(s) are not significantly different ( $p \le 0.05$ ) according to ANOVA and LSD multiple range tests.

PGRs		Rooting	Number of	Basal Callus	
IBA	IAA	NAA	Response (%)	Roots per Shoot	rating
0.5			65	$4.5 \pm 1.31^{b}$	-
1.0			80	$6.4\pm0.61^{\circ}$	-
1.5			75	$5.5\pm0.4^{\mathrm{ab}}$	-
2.0			48	$3.0\pm1.31^{ab}$	-
2.5			-	0.0ª	++++
	0.5		-	0.0 <sup>a</sup>	-
	1.0		46	$2.4\pm0.50b$	-
	1.5		62	$4.5 \pm 1.61^{\circ}$	-
	2.0		42	$3.6\pm0.56^{\rm b}$	-
	2.5		-	0.0 <sup>a</sup>	+++
		0.1	-	0.0 <sup>a</sup>	-
		0.5	55	$1.2\pm0.34^{\circ}$	-
		1.0	60	$3.0 \pm 0.74$ °	-
		1.5	65	$4.8 \pm 0.58$ °	-
		2.0	60	$2.0 \pm 0.46^{\circ}$	-
		2.5	-	0.0 <sup>a</sup>	++++

 Table 2: Effect of PGRs on multiple roots induction from *in vitro* derived shoots of *Maerua apetala* (½ MS medium)

Note: Mean value within the same column followed by the same superscript(s) are not significantly different ( $p \le 0.05$ ) according to ANOVA and LSD multiple range tests.

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Plate - 1 Micropropagation of *Maerua apetala* (Roth) Jacobs



a) Habit;
b) Shoot initiation from nodal eplant;
c - d) Basal callus formation from nodal explant;
e - f) Multiple shoots induction & elongation; g) Root initiation

# Micropropagation and Conservation of an Endemic Medicinal Plant *Tylophora subramanii* A. N. Henry

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## Abstract

A standard protocol has been established for the *in vitro* propagation of an endemic medicinal plant *Tylophora subramanii* A. N. Henry, using nodal and shoot tip explants. The surface sterilized explants were inoculated on Murashige and Skoog (MS) medium containing various concentrations and combinations of BAP, KIN 0.5-3.5 mg/l and NAA, 2,4-D 0.2-1.2 mg/l respectively. The cultures inoculated on MS medium with BAP 1.5 mg/l and NAA 0.4 mg/l showed maximum number ( $4.0\pm0.8$ ) of shoot induction. The shootlets thus derived were inoculated on  $\frac{1}{2}$  MS medium provided with NAA and IBA 0.2-1.2 mg/l respectively and the maximum number ( $3.8\pm1.8$ ) of roots were induced from the shootlets with IBA 0.6 mg/l.

# **Keywords:**

Tylophora subramanii, Medicinal plant, Nodal explants, Micropropagation

#### Introduction

Plants are the basic source of knowledge of modern medicine that have been utilized for basic preventive and curative healthcare. All over the world, various medicinal plants have been used for years to treat various diseases (Fransworth and Soejarto, 1991). In the Indian context, it is estimated that about 43% of the total flowering plants are reported to be of medicinal importance (Pushpangadan, 1995). Conservation of these medicinal plants is therefore important to ensure sustainable human development.

Mass propagation of plant species through *in vitro* culture is one of the best and most successful ways of commercial application of plant tissue culture technology. In a special way nodal and shoot culture, which is often utilized to maintain clonal fidelity would be of special advantage. With this background, the present study was undertaken aiming at multiplying the ornamental, medicinal as well as indigenous endemic plant *Tylophora subramanii* A. N. Henry belonging to Asclepidaceae.

#### **Materials and Methods**

The endemic medicinal plant *Tylophora subramanii* was collected from the field area in Gangaikondan and subjected to *in vitro* propagation for the purpose of *ex situ* conservation (Plate-1). It is an endemic climbing herb belonging to the family Asclepiadaceae found growing along the Southern Western Ghats. The major alkaloid tylophorine has been reported to have immune suppressive, anti-inflammatory and antitumor properties. The powdered leaves, stems and roots also contain other minor alkaloids, including cryptopleurine, antofine and ficuseptine C which are pharmacologically active.

The explants like node, shoot tip and leaves were collected from the disease-free mother plants and excised into desirable sizes. Then they were washed well in running tap water for 15 minutes to remove the soil or sand particles and also to reduce the microbial load on the surface of the explants. After which they were treated with Tween -20 and rinsed in running tap water for 15 minutes. Once again, the explants were treated with fungicide and rinsed in distilled water for 15 minutes. The rest of the procedure was done in inside the laminar airflow hood. In the next step, explants were treated with 70% ethanol for 20 seconds and washed with sterile distilled water for 4 times. Thereafter, the explants were treated with 0.1% (w/v) mercuric chloride for 2-3 minutes. Finally, they were thoroughly washed in distilled water for four times before inoculating on the MS culture medium with 3% sucrose, 0.6% (w/v) agar containing various concentrations and combinations of BAP, KIN 0.5-3.5 mg/l and NAA, 2,4-D 0.2-1.2 mg/l respectively for multiple shoot induction.

Regenerated multiple shoots were transferred to  $\frac{1}{2}$  MS media supplemented with various concentrations and combinations of NAA and IBA 0.2-1.2 mg/l so as to induce roots. The cultures were then incubated in the culture room at 25±2 °C for 12 hours photoperiod with 3,000 lux light intensity. The plantlets with well-developed roots were taken from culture tubes and agar was removed carefully by washing the roots under the running tap water. Then, they were planted separately in poly cups filled with sterilized soil and maintained in the culture room for 3-4 weeks. While hardening, the plants were covered with perforated polythene bags to keep the moisture. Then the plants were transferred to 1.5 cm dia pots with potting mixture of sterilized soil, sand, farmyard manure (1:1:1) and maintained in the green house with a relative humidity of 80-85%.

#### **Results and Discussion**

The Nodal explants inoculated on MS media supplemented with different concentrations and combinations of cytokinin and auxin for the purpose of shootlet initiation yielded desired results. Of the various combinations of plant growth regulators tested, 90% of the explants developed maximum number  $(4.0\pm0.8)$  of shootlets in the hormone combination of BAP 1.5 mg/l and NAA 0.4 mg/l (Table-1 & Plate-2). Higher concentrations of hormones paved way for the development of calli rather than shootlets. The present study indicates the need for cytokinin along with auxin for the adventitious shoot induction. Likewise, the results obtained by Daniela et al. (2009) emphasize the need for the combination of BAP and NAA that yielded maximum number of shootlets from the nodal explants of Neoglaziovia variegate on MS media fortified with NAA 0.5 mg/l and BAP 4.4 mg/l. Also, Sazdur et al. (2013) were able to obtain maximum shoot length of 4.9 cm when the explants were inoculated on BAP 3.0 mg/l and NAA 1.0 mg/l. Also, the induction of callus and subsequent differentiation and organogenesis was accomplished by the differential application of growth regulators such as BAP, Kin and NAA in the culture medium. Among the growth regulators tested BAP 2.0 mg/l and NAA 0.5 mg/l induced maximum frequency of shoot regeneration in Achyranthes aspera (Kumer Sen et al., 2014).

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Similar to the present investigation, Shinso Yokota *et al.* (2007) was able to successfully micropropagate *Aralia elata* and *Phellodendron amurense* from nodal segments, on MS medium supplemented with BAP 2.0  $\mu$ M and NAA 0.5  $\mu$ M respectively. However, there is a report from Purohit and Kukda (2004) who were able to induce multiple shoots from nodal explants of a 30 year-old tree of *Wrightia tinctoria* on MS medium supplemented with BAP 2.0 mg/l which affirms that BAP alone may induce multiple shoots. But then the shoot tip culture yielded maximum percentage (80%) of multiple shoot induction on MS media augmented with BAP 1.2 mg/l and NAA 0.5 mg/l and the maximum number of (3.0±0.4) shoots. Das *et al.* (2008) could also successfully induce multiple shoots from cotyledons and shoot tips of wood apple (*Aegle marmelos*) on MS medium augmented with BAP 2.0 mg/l and NAA 0.2 mg/l within fourteen days of inoculation. This report confirms the similar combination of plant growth regulators used for the present study.

Initiation of roots at the base of *in vitro* grown shootlets is essential and indispensable step to establish a tissue culture derived plantlets to the soil. The most effective auxin for rooting is IBA (Uddin *et al.*, 2005). The multiple shootlets derived from the cultures were separated individually and subjected to rooting on <sup>1</sup>/<sub>2</sub> MS medium provided with NAA and IBA 0.2-1.2 mg/l. Root induction could be seen within 15 days and after that prolific roots were initiated within a period of two weeks. About 80% of rooting was observed on MS media fortified with IBA 0.6 mg/l only (Table 2).

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Almost similar results were observed by Animesh *et al.* (2007) who developed suitable protocol for the *in vitro* propagation of *Abrus precatorius* and the microshoots were rooted in MS containing IBA1.0 mg/l and Pandey *et al.*, (2013) reported that 95% shoots were able to produce roots with an average number of 6.8 roots per shoot on MS medium supplemented with IBA 2.5 mg/l.

On the contrary, there are several reports in which the in vitro raised shootlets when transferred to MS media augmented with different concentrations and combinations of IBA with NAA gave good results. Mehbooba et al., (2011) was able to induce multiple roots on MS medium supplemented with IAA 1.0 mg/l and IBA 0.8 mg/l in Morus nigra and Shinso et al., (2007) were able to induce rooting on the in vitro raised shootlets of Aralia elata and Phellodendron amurense when they were inoculated on MS medium augmented with NAA 2.0 mg/l for A. elata and MS medium with IBA 2.0 mg/l that produced maximum percentage and number of rooting. Also, Jadimath et al. (1998) could induce rooting on the microshoots of Guizotia scabra and G. abyssinca on MS medium supplemented with 0.2 mg/l NAA alone. Ogunsola and Ilor (2008) investigated the *in vitro* propagation of miracle berry through embryo and nodal explants using different combinations of auxins and cytokinins in MS medium. They were able to generate rooting of the embryo regenerated plantlets with IBA 1.0 - 2.0 mg/l + BAP 0.1 mg/l. It is interesting to note that BAP alone could induce rooting as reported by Senthilkumar (2007) who observed root initiation and the higher root growth in the basal medium containing BAP at 3.0 and 2.5 mg/l in the shootlets of Acmella calva.

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Plant Growth Regulators (mg/l)			Number of	Shooting	Average Number of	
BAP	NAA	2,4-D	KIN	studied	%	shoots per explant
0.5	0.0			10	20	$1.5 \pm 0.4$
1.0	0.2			10	60	$2.8 \pm 1.2$
1.5	0.4			10	90	$4.0\pm0.8$
2.0	0.6			10	80	3.0± 1.1
2.5	0.8			10	70	$3.3 \pm 1.4$
3.0	1.0			10	-	+++
3.5	1.2			10	-	+++
		0.0	0.5	10	20	$1.5 \pm 0.4$
		0.2	1.0	10	30	$2.8 \pm 1.2$
		0.4	1.5	10	40	3.0± 1.1
		0.6	2.0	10	60	$3.4 \pm 0.8$
		0.8	2.5	10	_	+++
		1.0	3.0	10	-	+++
		1.2	3.5	10	-	+++

 

 Table-1: Effect of PGRs on shoot multiplication from the nodal cultures of Tylophora subramanii

+++: High frequency of callus.

 Table-2: Effect of PGRs on roots induction from in vitro derived shoots of Tylophora subramanii (½ MS medium)

NAA	IBA	Rooting response %	Average Number of roots induction per shoots	Average roots length (cm)
0.2		-	-	-
0.4		-	-	-
0.6		30	2.3±1.6	2.0±0.2
0.8		50	2.3±1.4	2.4±1.6
1.0		60	1.8±0.1	1.1±1.0
1.2		50	2.3±1.4	2.7±1.0
	0.2	40	1.8±0.1	3.0±0.2
	0.4	60	2.3±1.4	2.7±1.0
	0.6	80	3.8±1.8	3.5±0.2
	0.8	40	1.8±0.1	3.5±0.2
	1.0	20	2.3±1.4	2.4±1.6
	1.2	20	$1.4 \pm 0.2$	1.0±1.6

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Plate 1 : Tylophora subramanii Henry.





Plate 2: In vitro propagation of Tylophora subramanii Henry.

a) Shoot initiation from nodal explant ; b - e) shoot elongation ; f) Root initiation and elongation.

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## Abstract

The present investigation was aimed at to develop a new micropropagation system for *Dipteracanthus prostrates*, using different explants. About 90% of the seeds were germinated on MS basal media followed by 80% on ½ MS media supplemented with BAP or Kinetin. The leaf explants were inoculated on MS media fortified with different concentrations of 2,4-D alone or in combinations with Kinetin. Green nodular callus was observed in media supplemented with 2.4-D in combination with Kinetin. Nodal and shoot tip explants were inoculated on to media supplemented with different concentration and combination of cytokinins. The number of multiple shoots developed per explant was registered as  $6.0\pm1.1$  cm on medium supplemented with 8.88  $\mu$ M l<sup>-1</sup> BAP in combination with 0.53  $\mu$ M l<sup>-1</sup> of NAA. Maximum number of roots was observed as  $5.8\pm1.1$  in IBA 4.92  $\mu$ M l<sup>-1</sup> and root length recorded as  $6.6\pm1.1$  cm on the same media. The in vitro derived plantlets were successfully transferred to soil after hardening, with a high rate of survival. The plants were comparable to natural population in growth and vigour.

# Introduction

An attempt has been made to micropropagate the medicinal herb *Dipteracanthus prostrates* (Poir) Nees. (Acanthaceae). It is an important medicinal plant belonging to the family Acanthaceae. It is rare in distribution. *Dipteracanthus prostrates* (Poir.) Nees very important traditional medicinal plant and the whole plant juice is used as a remedy for snakebite by Palliyar tribals in Sirumalai Hills, Western Ghats, Tamil Nadu (Maruthupandian and Mohan, 2011).

The herb is reported to possess astringent, anodyne, tonic and alexipharmic properties and helpful in dysentery, cholera, diabetes, consumption, influenza, bronchitis, swellings and itches, piles gonorrhea.

A decoction of the plant is a blood-purifier. It is used to cure torpid liver and jaundice. It forms the major constituent of the Ayurvedic drug SG-1 Switradilepa that is effective in treating Vittiligo, a dermatological disease. The macerated leaves and juice together with certain species, such as cardamom, clove and cinnamom are made into pills and prescribed for relief from gripe and other stomach ailments in infants. A decoction of infusion of the leaves is useful in general debility and dyspepsia. The leaves and roots are also used as febrifuge, tonic stomachic.

#### **Materials and Methods**

Young healthy shoots of Dipteracanthus prostrates were collected during the month between June-July from 3 year-old plant growing at the green house maintained by Sathyabama University, Chennai, Tamil Nadu, India. Fresh leaves were collected and washed in running tap water to remove debris and soil from their surface followed by soaked in 5 % (v/v) liquid detergent (Tween 20, Himedia, India) for 10 minutes, then washed under running tap water. Then the leaves were surface sterilized with 0.05% (w/v) HgCl2 for 12-15 minutes and thoroughly rinsed with sterile distilled water for 4 or 5 times. The explants (10 mm) were excised and placed on solid medium. The medium used in this experiment was MS (Murashige & Skoog, 1962) medium with 3% (w/v) sucrose and 0.6 % (w/v) agar (Himedia, India). Depending on the experiment, the basal medium was supplemented with various plant growth regulators as required. The pH of the media was adjusted to 5.8±0.02 and dispensed into culture tubes (15×2.5 cm, Borosil, India) and plugged with non-adsorbent cotton prior to autoclaving at 121 °C for 15 minutes. Cultures in all experiments were incubated in the culture room maintained under 16/8 hr (light/dark) photo period at 25±1 °C under cool white fluorescent tubes (Philips, India) at an intensity of 50 µmol m<sup>-2</sup>s<sup>-1</sup> and 85-90% relative humidity. Each experiment was repeated thrice with 10 replicates per treatment. Various combinations of plant growth regulators were tried for shoot differentiation and rooting of the plant regenerated. The rooted plants were washed and shifted to greenhouse condition in small poly cups (covered with a perforated plastic bag) containing soil and sand mixture (1:1). Subsequently they were transferred to the garden and after one month they were planted in the field.

Standard error is given to indicate the variation among the means of three experiments based on 10 replicates for each treatment. The data regarding shoots and roots were collected after 35 days and 25 days respectively, after inoculation and were analyzed by ANOVA with a confidence limit of 0.05.

# Results

The seeds were inoculated on full and  $\frac{1}{2}$  MS media either in the presence or absence of plant growth regulators. About 90% of the seeds were germinated on MS basal media followed by 80% on  $\frac{1}{2}$  MS media supplemented with BAP or Kinetin. The results were represented in the Table-1. The seeds cultured on the basal media were germinated and produced single shoot and root. Maximum shoot length was recorded as  $6.7\pm1.0$  on  $\frac{1}{2}$  MS media supplemented with Kinetin 4.64  $\mu$ M l<sup>-1</sup>. The root length was measured as  $5.0\pm2.2$  on MS basal media. The seeds inoculated on media fortified with cytokinins were produced only single shoot, it results in the poor development of root system. The shoots were excised and subjected for *in vitro* rooting. The *in vitro* seedlings emerged on basal media were subjected for hardening.

Basal Media	Plant growth regulators (µM l <sup>-1</sup> )		of seeds culated	centage esponse	of shoots iferated seed	erage et length cm)	rerage t length (cm)
used	BAP	KIN	No. o inoo	Per of r	No. G prol	Av Shoc (	Av root
MS	-	-	20	90	1	3.8±2.2	3.8±2.2
½ MS	-	-	20	70	1	5.6±1.5	5.0±2.2
½ MS	4.44	-	20	80	1	6.1±1.3	4.8±1.1
½ MS	-	4.64	20	80	1	6.7±1.0	4.5±1.0

 Table-1: The effect of plant growth regulators on *in vitro* seedling of

 Dipteracanthus prostrates

The leaf explants were inoculated on MS media fortified with different concentrations of 2,4-D alone or in combinations with Kinetin (Table-2). The callus pronunciation was observed on margin of the explants after 10 days. About 90% of the callusing was observed in almost all the media combination studied. Green nodular callus was observed in media supplemented with 2.4-D in combination with Kinetin. After 30 days, the regeneration of multiple shoots was observed from the nodular callus. Maximum of  $5.8\pm0.7$  shoots were recorded from the callus culture after 45 days on media fortified with 4.82  $\mu$ M l<sup>-1</sup>.

 Table-2: Effect of plant growth regulators on callus cultures and regeneration

Plant growth regulators (µM l <sup>-1</sup> )		Number of explants	Percentage of callus	Type of callus
KIN	2, 4-D	inoculated	observed	
-	4.52	20	80	Green colour
-	9.04	20	90	Green colour
2.32	4.52	20	80	Green nodular
4.64	2.68	20	80	Green nodular
4.64	9.04	20	80	Green nodular
9.28	4.82	20	80	Green nodular

Nodal and shoot tip explants were inoculated on to media supplemented with different concentration and combination of cytokinins. Out of the media combination tested, 90% of the explants were found to develop multiple shoots (Table-3).

Plant Growth Regulators (µM l <sup>-1</sup> )		No. of Explants	Percentage	Average no. of Shoot	Average Shoot	
BAP	KIN	NAA	Inoculated	of Response	proliferation /Explant	Length (cm)
4.44	-	-	20	80	3.8±1.2	4.1±1.3
8.88	-	-	20	70	5.0±1.1	5.8±1.1
-	4.64	-	20	60	2.8±0.7	4.8±1.2
-	9.28	-	20	70	4.0±0.8	4.5±1.3
4.44	-	0.53	20	80	5.3±1.4	4.4±1.1
8.88	-	0.53	20	70	6.0±1.0	5.5±1.1
-	4.64	0.53	20	80	4.1±0.9	5.1±1.8
-	9.28	0.53	20	70	4.8±1.1	4.7±1.3

Table-3: Effect of plant growth regulators on shoot multiplication

The number of multiple shoots developed per explant was registered as 6.0 $\pm$ 1.1 cm on medium supplemented with 8.88  $\mu$ M l<sup>-1</sup> BAP in combination with 0.53  $\mu$ M l<sup>-1</sup> of NAA.

In vitro shoots measuring 3-4 cm were subjected to half strength MS medium with singular or combination of auxins. The initiation of roots was observed after 15-20 days. The number of lengths of the roots were recorded and represented in the Table-4. Maximum percentage (90%) of rooting was observed on media supplemented with IAA 5.7  $\mu$ M l<sup>-1</sup>. Maximum number of roots was observed as 5.8±1.1 in IBA 4.92  $\mu$ M l<sup>-1</sup> and root length recorded as 6.6±1.1 cm on the same media.

Plant Growth Regulators (µM l <sup>-1</sup> )		Number of Explants	Percentage of Besponse	Average No. of Root initiated/	Average Root Length	
IBA	IAA	moculateu	Kesponse	explant	(cm)	
4.92	-	20	80	5.8±1.1	6.6±1.1	
9.84	-	20	70	5.3±0.8	6.2±0.8	
-	5.70	20	90	4.5±1.3	5.1±1.4	
-	11.40	20	80	4.7±0.9	6.3±1.2	
4.92	0.57	20	80	5.1±1.4	5.6±0.8	
-	5.70	20	70	4.9±1.1	5.8±1.2	

Table-4: Effect of plant growth regulators on root formation

The *in vitro* seedlings as well as plantlets derived from the callus, node and shoot tips cultures were subjected for hardening in poly cups containing sterile soil. The plantlets were maintained in the culture room for 20 days at  $25\pm1$  °C with 3000-lux photo intensity. Then, they were transferred to poly cups with garden soil and maintained in the green house for 20-30 days. The percentage of survivability was registered as 90% for the *in vitro* derived seedlings and 85% for the *in vitro* derived plantlets.

# Discussion

In the present investigation, the most commonly used MS media was used to study the morphogenetic responses of this plant either in the presence or absence of plant growth regulators. The seeds cultured on hormone free medium produced short and pale green seedlings with well-developed root system. The percentage of seed germination (90%) was observed and recorded. The same observation has been reported earlier in other plants including *Hemidesmus indicus* (Patnaik and Chand, 1996) and *Curculigo orchioides* (Raghu *et al.*, 2004). However, the seeds subjected to 2.22  $\mu$ M 1<sup>-1</sup> BAP were produced only single shoot with poor root development.

Multiple shoots from the nodal and shoot tip cultures were recorded in almost all the media combinations studied. The results revealed that BAP alone in the medium is not sufficient to induce multiple shoot buds indicating the necessity of using combinations of auxins and cytokinins. The effect of NAA/IAA with BAP on adventitious shoot bud productions has been noticed in other species including *Rauwolfia* (Mukhopadhay *et al.*, 1991; Ghosh *et al.*, 1998).

This present study also revealed that, the numbers of shoots were increased on media supplemented with BAP in combination with NAA. Maximum of 6.0±1.0 shoots per explants was recorded on media fortified with BAP 8.88  $\mu$ M l<sup>-1</sup> and NAA 0.53  $\mu$ M l<sup>-1</sup>.

The establishment, growth and regeneration of plantlets from callus culture have been reported by several workers (Simmonds and Cummings, 1976; Chen *et al.*, 1988). In this present investigation also, the shoots were regenerated from the nodular callus derived from leaf explant on medium fortified with 2,4-D in combination with Kinetin 9.28  $\mu$ M l<sup>-1</sup>.

The promotive effect of roots by IBA has been reported in many plants. In the present study, maximum number of roots was observed in IBA 4.92  $\mu$ M l<sup>-1</sup> and maximum root length also recorded on the same media. The rooted plantlets were transferred and established well in the green house. The *in vitro* grown plants exhibited high survival rate (75-80%) in the green house. It indicates that could be easily adopted for large-scale cultivation.

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# **Cloud Computing: Opportunities and Challenges**

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# Abstract

Cloud computing is a shared resource pool with hardware, software and networks. The shared resources are maintained by the third-party Cloud Service Provider (CSP). Cloud service providers provide services according to the requirements of cloud users on-demand. Cloud users have to pay for what they have used in cloud environment. This paper describes the cloud and its opportunities and challenges in various fields like Education, Health care and Entrepreneurs.

Keywords: Cloud Computing, Cloud Services, Cloud Opportunities

## 1. Introduction

Cloud computing is one of the current which grows very fast all around the world. Cloud computing is a construct which allows accessing applications which are stored in the remote locations. In other word, cloud computing is distance data center. It is the internet-based enabler for sharing of technological Infrastructural resources, software and digital content and it offers the Infrastructure, Platforms, and Software on pay-for-use basis [1]. The stored information and shared resources can be accessed any time anywhere in the world through the internet. Cloud computing provides various facilities for the users like scalability, special computational mean and reducing workload and reducing capital expensive. Though there are many advantages in cloud, some challenges are also there.

# 2. Cloud Services

- Software as a Service (SaaS)
- Platform as a Service (PaaS).
- Infrastructure as a Service (IaaS)or (HaaS Hardware as a Service)

#### 2.1 Software as a Service (SaaS)

Software as a Service (SaaS) is a way of delivering applications over the Internet as a service. Instead of installing and maintaining software, simply it can be accessed via the Internet. It is free from complex software and hardware management. Software as a service (SaaS) is a software distribution model in which a third-party provider hosts application and makes them available to customers over the Internet [2].

# 2.2 Platform as a Service (PaaS)

The development tools are hosted in the cloud and accessed through a browser. With PaaS, developers can develop web applications without installing any tools or software on their systems, and then deploy those applications without any specialized administrative skills. The user does not require managing or controlling the underlying infrastructure, but has control over deployed applications [2].

# 2.3 Infrastructure as a Service (IaaS)

The cloud user outsources the equipment used to support operations, including storage, hardware, servers and networking components. The provider owns the equipment and is responsible for housing, running and maintaining it. The user typically pays on a per-use basis. The user does not require managing or controlling the underlying Cloud infrastructure, but has the control over operating systems, applications and programming frameworks [2].

# **3.** Opportunities in Cloud

# **3.1 Cloud Opportunities in Education**

Education plays an important role in maintaining the economic growth of a country. Nowadays the class room teaching is changing and students are becoming more technology oriented. Therefore, in this changing environment, it is important to incorporate latest technologies in the teaching and learning process.

The cloud helps the students, teachers, faculty, parents, and staff to have ondemand access to critical information using any device from anywhere. Both public and private institutions can use the cloud to deliver better services, even as they work with fewer resources.

Cloud computing technology can provide solutions for the problems in smart education system. Cloud computing enables users to control and access data via the Internet. The primary users of a typical higher education cloud include students, faculty, administrative staff, Examination Branch and Admission Branch as shown in Figure 1. All the primary users of the institution are connected to the cloud. Separate login is provided for all the users for their respective works. Teachers can upload their class Tutorials, assignments, and tests on the cloud server which students will be able to access all the teaching materials cab be provided by the teachers via Internet using computers and other electronic devices both at home and college and 24/7. The education system will make it possible for teachers to identify problem areas in which students tend to make mistakes, by analyzing students' study records. In doing so, it will also allow teachers to improve teaching materials and methods. This will not only make it



possible for students to use online teaching materials during class hours but also at home [7].

Fig 1: Smart Education System

Utilization of cloud computing systems will reduce the cost of operation because servers and learning materials are shared with other colleges. Figure 2 shows how the different categories of university users may consume cloud services.



Fig 2: Users of an Education Cloud Computing System

# 3.1.1 Challenges

# Security and Privacy:

This is a major concern among many institutions of higher learning to adopt cloud computing. Cloud computing calls for the introduction of a third party who is the platform providers. Hence, the privacy and security of data is hard to maintain.

## Benefits

Most institutions of higher education are not yet convinced of the benefits that come with cloud computing. Such institutions are more concerned with their conventional IT portfolio and how to make cloud computing part of it. Students can learn at any time as they wish. If any class is missed, they can go through the class again which is stored in the cloud.

# Service Quality

This is one of the reasons cited by learning institutions for not shifting to cloud computing. Institutions argue that the SLAs stipulated by the providers of cloud services are insufficient when it comes to availability and security as well as scalability.

# Lack of adequate network responsiveness

In case inadequate bandwidth of the network, it becomes impossible to deliver complex services. Most of the learning institutions lack adequate bandwidth, hence cannot adopt cloud computing affectively.

## Integration

Different applications require complex integration as to connect to the available on-premise applications, as well as cloud applications. This calls for the integration of existing university data structures and systems with cloud applications. Thus, there is a need to have a quick, cost effective and simple way to connect university systems with cloud applications.

# **3.2 Opportunities for Entrepreneurs**

Several corporations are hoisting their computer networks into the "clouds". Cloud Computing is an emerging IT development, deployment and delivery model that enables real-time delivery of products, services and solutions over the Internet. With cloud computing and associated cloud services coming in a myriad of forms like software-as-a-service, storage on demand, internal and external clouds, etc. Large corporations across multiple industries are now discovering their ability to utilize cloud services to achieve cost-savings, expand their businesses, and even decrease their carbon footprints [7].

# 3.2.1 Challenges

Cloud computing, which some people claimed as a new technology, has helped a lot of organizations in doing business. Although cloud computing brings some benefits to the organizations as aforementioned, there are some shortcomings for

decision makers that need to be taken into consideration. When cloud capacity is more than 80% occupied, the computers will be irresponsible. There is a chance of crashing between servers and computers. This will lead to the loss of valuable data such as customers' data, organizations' sales report etc. Cloud attack is also a major issue in cloud computing. Cloud computing is a place for the users to host their web services such as web hosting and cloud storage. This has attracted the hackers to steal the business data, such as daily sales, profit reports, financial reports etc.

## 3.3 Opportunities for Health Care

Health care, as with any other service operation, requires continuous and systematic innovation in order to remain cost effective, efficient and timely, and to provide high-quality services. Many managers and experts believe that cloud computing can improve health care by reducing electronic health record startup expenses, such as hardware, software, networking, personnel, and licensing fees, and therefore will encourage its adoption. One example of a cloud-based healthcare service is a proposed system that automates the process of collecting patients' vital data via a network of sensors connected to legacy medical devices, and to deliver the data to a medical center's "cloud" for storage, processing and distribution. However, there are many challenges facing health-care providers in moving all their data to the cloud.



Fig. 3: Smart Health Care System

A typical smart health care system is depicted in Fig. 3. According to this system, the patients' can register their details through online and their information will be stored in the cloud. After selecting the trustable doctor, the patients can go for the diagnosis phase. The doctors can analyze the patients' history by retrieving the

previous information about patients from cloud and also analyze the history with the present condition. After that doctors will give prescription via online and the treatment will be started. The patients and doctors can also interact via online for the review. The health care analysis about the patients can be done via cloud.

#### 3.3.1 Challenges

The biggest issue in Health care industry is security and privacy of information. For example, if medical data is stored on the cloud, then health-care services no longer have complete control over the security of their patients' information. There are some risk factors related to the privacy which increase the possibility of the data being exposed or lost. Additionally, there are different regulations that can vary from region to region regarding patient information, making compliance with these various regulations potentially complicated. And, if there are online server outages, availability of the data is severed during that time [8].

# 4. Conclusion

Cloud technology mitigates the need to invest in IT infrastructure, by providing access to hardware, computing resources, applications and services on a per use model, which dramatically brings down the cost and simplifies the adoption of technology. Cloud provides many opportunities for business, education, and healthcare but will need to have the highest level of security in order to gain acceptance from the people or marketplace. In this paper the opportunities and challenges in clouding computing in various fields are discussed.

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# **Quality of Service in the Internet of Things (IoT) – A Survey**

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#### Abstract

Internet of Things (IoT) is an emerging technology that collects information from the physical environment. The data from the physical environment are transferred in the form of packets. During this process a lot of challenges such as loss of packet, fake packet transformation, changes in packet etc. may be encountered. By overcoming these challenges the quality of service and security can be improved. In this paper, a survey has been made to identify the Quality of Service (QoS) parameters and has presented the taxonomy of layer wise QoS parameters for IoT. The paper also focuses on QoS metrics for IoT. Each metric plays a unique role in improving the quality of services in IoT.

# 1. Introduction

Internet of things is a predominant concept proposed by Kevin Ashton formulated in the year 1999. Twenty-two billion of IoT devices will be connected to the internet by 2021. Internet of Things is the network of physical objects that contain embedded technology to sense and establish the communication to the external or internal environment [9][10]. IoT comprises of a wide variety of devices and applications. Based on the application, architectures are proposed. The architecture of IoT may consist of three layers, four layers or five layers. The main aim of these architectures is to achieve efficient service and quality of service, where quality of service is considered as an important factor throughout the service process.

This paper describes about the IoT and Quality of services in IoT. This paper is organized as follows: Section 1 provides a brief introduction to IoT, Section 2 presents the state of art existing works, Section 3 elaborates the Quality of Service, Section 4 presents the taxonomy of layer-wise QoS parameters of IoT and Section 5 presents the summary.

# 2. Review of Literature

In IoT, quality is considered as an important factor to ensure the quality in service. Requirements of QoS will vary from application to application. Quality of Service in IoT is considered as the key factor in the service process while framing the application.

Ravi *et al.* [1] have explained about the importance of the QoS in IoT. The authors have highlighted the QoS Parameters and QoS metrics that have to be considered at each layer in brief. The authors have classified the existing literature on IoT according to various research topics such as standardization, system architecture and performance, QoS etc.

Arem Colakobic *et al.* [2] presented the state-of-the-art IoT enabling and emerging technologies along with their functional domains. The aim of the paper was to thoroughly analyze the QoS requirements of IoT and focus on the performance and QoS model as well as protocols discussed by the authors. The authors have pointed out that the QoS performance namely latency, reliability, packet loss and jitter have to be taken into consideration at all layers of the IoT architecture. They have suggested that optimization of resource allocation can lead to QoS enhancement. Furthermore, it is understood that latency sensitive IoT applications must be concentrated on the network performance issues such as delay, bandwidth, congestion and reliability since the edge devices like sensors will be transferring a huge amount of data to the cloud. They have also discussed the challenges and open research issues in each of these areas. From this survey, it could be inferred that network delay, throughput and reliability are the key issues.

Manisha Singh *et al.* [3] have designed a framework for IoT and elaborated the working principle. The framework contains three parts: Things implanted with sensor, communication which includes exchanging the information through gateway from the sensor to application and computing that involves processing the information between the gateways to application. Since things, computing and communication are the three major entities of IoT, the authors have identified and listed out the various QoS metrics that must be considered at each of the entities namely: i) QoS of Communication, ii) QoS of Things, and iii) QoS of Computing. They have suggested that these metrics must be satisfied to provide efficient service.

Yash *et al.* [4] have discussed the factors such as packet delivery ratio, number of packets dropped and end to delay. The authors have analyzed these factors as a function of the sensor reporting rate per second. The analysis of these factors has helped the authors to achieve more reliable form of WSNs. Moreover, the authors have pointed out that, by monitoring fault tolerance, scalability, topology, production costs, hardware constraints, transmission media and power consumption, more reliable protocols could be designed.

Mahendra *et al.* [5] discussed about IoT architecture, cross layer design in WSNs, problem faced in IoT and solution for overcoming the problems. In this paper, the authors described the architecture of IoT in the cross-layer approach. Overview of the applications like smart home, smart transport, smart health care, smart city was discussed.

In Nivek Nallur *et al.* [6] have proposed a QoS based approach of the IoT architecture. In this paper, the authors evaluated the QoS based approach for measuring the performance and have listed the factors that were taken into account.

Animesh Roy *et al.* [7] have identified the issues that influence QoS in Disruption Tolerant Networks (DTNs). The authors have done an analysis of the effects of these issues such as delivery ratio, packet drop, etc., and based on this the authors have proposed a QoS management solution for DTNs. The authors also identified some more issues like congestion, selfishness, fairness, queuing delay and jitter for QoS management in DTNs. The authors presented a systematic classification of various QoS management schemes available in the literature for DTNs.

Kamran *et al.* [8] have proposed a QoS-aware energy and jitter-efficient downlink predictive scheduler for heterogeneous traffic on LTE networks. The authors evaluated the downlink by observing the real time heterogeneous traffic. QoS requirement for this proposed cloud radio access network(C-Ray) and ray tracing based on scheduling approach to achieve optimal solution in terms of both EE and the packet delay. Four heuristic algorithms were proposed to solve the optimization problem. The results showed that there was massive improvement in the system through the proposed work.

From these reviews, it's clear that understanding the metrics that are used for enhancing the quality of services is important. In this paper, the metrics that must be considered at the network layer for enhancing the QoS are focused.

#### 3. Quality of Service in IoT

Quality of service refers to the effectiveness of a network to provide more suitable or appropriate service to the application. QoS is an important predominant factor to be considered in the services offered by an IoT application. Quality of service is determined from how much the user benefits from the service. By considering various aspects of QoS, the services can be constructed to offer efficient service.

# 3.1 Architecture of IoT

In IoT, Internet Protocol uses the Internet model with five-, four- and three-layer architecture. So far, there is no generalized architecture defined for IoT. The architecture of IoT may vary from application to application. We consider an IoT architecture that involves five layers as depicted in Figure 1 where, each layer plays individual role to achieve the same objective.

#### 3.1.1 Control Layer

The control layer is considered as an important layer in IoT. The actual work that has to be done by this layer will be defined by the developer. The overall process from the assortment layer to application layer are controlled by this layer.



Fig. 1: Architecture of IoT

# 3.1.2 Assortment Layer

In the assortment layer, the data are sensed from the sensor. The sensors collect the information from the physical environment. Then the data from the assortment layer are transferred to data processing layer through the electronic devices with the help of communication technologies. Communication technologies include Bluetooth, Zigbee and so on. This layer comprises smart objects. These smart objects help users to collect real time information from the physical environment. The Smart objects establish connection to the link, application and data processing layers.

# 3.1.3 Link Layer

The link layer is used to establish connection between the various layers. The data from the smart objects are transferred through this layer to the application and data processing layers. It acts as an intermediate between the application layer and data processing layer.

# 3.1.4 Application and Data Processing Layer

In application and data processing layer, two major functionalities namely storing and analysis are carried out. The information gathered from the smart devices are transferred through the link layer to the application layer where it is processed. Data are not stored in the cloud directly. Before storing, the data are analyzed and processed for the further action. This process helps to maintain the standard of the information. After evaluation, the collected data are stored according to the users' needs.

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### 4. QoS Parameters and Metrics

#### 4.1 Taxonomy of layer-wise QoS parameters of IoT

There is no standard architecture for IoT. The architectures of IoT are classified into three layer, four layer and five layer architectures. Depending on the application the architecture of IoT will vary. The Quality of Services of the IoT are classified into three types. They are: (i) QoS of Application layer, (ii) QoS of Network layer, and (iii) QoS of sensing layer. Each layer has its own QoS parameters. Based on these parameters the quality of services is determined in the services process. QoS parameters of the application layer are Service Time, Service Availability, Service Delay, Service Accuracy, Service Load, Service Priority, Information Accuracy, and Cost of Network Deployment. Figure 2 depicts the taxonomy of QoS parameters in IoT.

#### 4.2 QoS metrics for IoT:

#### **4.2.1** Throughput and Efficiency

Throughput is defined as the number of packets that are transferred from the source to destination within specific time period. Throughput is measured in bits per second.

#### 4.2.2 Bandwidth

Amount of packet that can be transferred from source to destination within the specific time period is known as bandwidth. The term bandwidth can be measured in megabits per second.

#### 4.2.3 Packet Loss Ratio

Packet loss is denoted as number of packets that are not delivered at the destination during transmission. It can be denoted by the total numbers of packets sent and total numbers of packets delivered.

## 4.2.4 Packet Delivery Ratio

The packet delivered ratio presents the ratio of the number of received packets and the number of sent packet of nodes

#### 4.2.5 Delay

Time taken to transfer the packet from source to destination than the actual time is known as delay.

$$D = AT - TT$$

where, D denotes delay, AT denotes Actual Time, TT denotes Time Taken to execute.

#### 4.2.6 Network Connection Time

Time taken by the server to process the request as network connection time. If the service request is not processed in the particular time period than the connection timeout error may occur.



Figure 2: Quality of Service parameters in IoT

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# 4.2.7 Jitter

Overall latency time for the execution time of the packet transformation from source to destination is known as jitter

# 4.2.8 Interoperability

When communication is established between two devices, which run on different platforms it is known as interoperability.

# 4.2.9 Reliability

When a communication begins from a source to destination with an accurate or reliable information and if A is a source node and D is the destination then, if node A transfers the packet from source without any packet loss and security rift then the service is known as reliable service.

# 4.2.10 Congestion

When a packet is transmitted, the packet delivery rate gets delayed in the execution process. This delay may be due to low bandwidth, too much of request that are sent in the same path. Due to this the packet will have to wait until the previous transmission has completed its execution. Thus, congestion in the path occurs.

# 5. Summary of IoT Layerwise QoS Parameters

Table-1, Summarizes the parameters of Quality of Service for each Layer in the Internet of things.

Layers	Parameters		
Assortment	Accuracy		
Layer/	Cost	Network Deployment Cost, Service Cost	
Physical Layer	Information		
	Service	Priority, Availability, Time, Delay, Load	
	Jitter		
	Interoperabil	ity	
	Bandwidth		
	Delay		
Tink Lower	Throughput		
LIIK Layer	Network Connection Time		
	Packet Delivery Time		
	Reliability		
	Congestion		
	Packet Loss Rate		
Application	Location / Mobility		
Layer & Data Processing	Sampling Parameter		
Layer	Time Synchr	Time Synchronization	

Table-1: Summary of IoT Layerwise QoS parameters

#### Conclusion

IoT is the growing technology which is experiencing vast amount of changes in order to offer better services to the society. In this survey paper, the architecture explains the functions of the layers in IoT and taxonomy shows the parameters of the quality of services. The metrics that are to be addressed to improve the quality of services were also given. In future, this can be extended by proposing new approaches, by addressing the problems like unstable link, traffic, node failure, packet loss, lifetime of node, congestion, etc. to enhance the Quality of Service in IoT. Only few metrics were discussed in this paper. Detailed description of the metrics can be given in future.

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# Behavioural Factors of Investment and Saving Habits among Higher Secondary School Teachers in Kulithalai Town

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# Abstract

Teachers are an extremely important facet of any society for a number of reasons and their role in society is both significant and valuable. Teachers are the people who educate the youth of society who in turn become the leaders of the next generation of people. Teachers are the people who are teaching students and imparting knowledge upon them in their most impressionable years. What students learn from their teachers at a young age will most likely stay with them in some facet for the rest of their lives. Teachers play an extraordinary part in the lives of students for the formative years of their development and the importance of teachers is something that cannot be understated. They involve themselves in molding their students into responsible citizens of their country. Within a school, if teachers are well educated and if they are intellectually alive and take keen interest in their job, then only success is ensured. In our society teacher belongs as the important force, because of educating the future generations in developing countries like India. Awareness on investment is a part of financial literacy. The individual's life goals and objectives will be achieved financially by investment and financial literacy. As such teachers will belong as backbone of next generation not only in student's education also on their financial planning by their own financial literacy.

#### Introduction

According to Warren Buffett, "Beware the investment activity that produces applause; the great moves are usually greeted by yawns". India is a developing country where, there has been a consistent increase in the national saving rate after the independence period, though with considerable fluctuations from year to year. In international standpoint of view, India has a high saving rate compared to other developing countries. In the developed countries, the income is generated at a higher rate which encourages people to have more savings which opines to more investment leading to more capital formation. A teacher enjoys the privileged position of unleashing the human potential of students (learners) within the formal education system and thereby transforming the individuals, families, communities and society-at-large. The competency of the teacher is a major determinant of the quality of the education. The quality of one's life is closely tied to the level or standard of living maintained by that person. The presence or absence of certain material items, such as home, cars, and jewelers is commonly associated with standard of life. The ability to spend money for entertainment, health, education, variety in life, art, music and travel also contribute to the standard of life.

# **Research Problem**

Problem formulation is the first step in the research process. Problem formulation identified that for which research is to be carried out. In order to avoid waste in time and money, it is necessary to define the problem in specific terms through this we can arrive at a hypothesis or presumption and a refinement of the problem definition. A problem should neither be defined too broadly nor too narrowly. So the research problem is to identify the saving & investment pattern of higher secondary school teacher in Kulithalai Town.

#### Objectives

- 1. To identify the foremost savings and speculation patterns currently used by the teaching community.
- 2. To examine the insight of the teaching society in respect of their current savings and investment behavioral patterns.
- 3. To identify factors responsible for varying savings and investment patterns across different categories of teachers in the Kulithalai Town.
- 4. To identify the stage of alertness of teacherson investment patterns.

Investment Avenues	No. of Respondents	Percentage
Very High	23	38.3
High	18	28.3
Average	11	18.3
Low	05	08.3
Very Low	04	06.3
Total	60	100.0

# Table-1 Level of awareness about Savings Bank account-wise classification of the respondents

Source: Field Data

It could be ascertained from the Table-1, 23 respondent (38.3 per cent) opted choose your choice of investment avenue is very high, 18 respondent (28.3 per cent) opted choose your choice of investment avenue is high, 11 respondents (18.3 per cent)opted choose your choice of investment avenue is average with the statement. 5 respondents (8.3 per cent) opted to the investment avenue is low of

the statement, whereas 4 respondents (6.3 per cent) opted to the investment avenue is very low of the statement.

Hence it could be ascertained that the thought 23 respondents (38.3 per cent) opted very high level of awareness about savings bank account to the investment avenue is high.

<b>Investment Avenues</b>	No. of Respondents	Percentage
Very High	11	18.3
High	12	20.0
Average	21	35.0
Low	09	15.0
Very Low	07	11.6
Total	60	100.0

Table-2 Level of awareness about Post-Office deposit-wise classification of the respondents

Source: Field Data

It could be found from the Table-2,11 respondents (18.3 per cent) opted choose your choice of investment avenue is very high, 12 respondent (20 per cent) opted choose your choice of investment avenue is high, 21 respondents (35 per cent) opted choose your choice of investment avenue is average with the statement. 9 respondents (15 per cent) opted to the investment avenue is low of the statement, whereas 7 respondents (11.6 per cent) opted to the investment avenue is very low of the statement.

Hence it could be found that the thought 21 respondents (35 per cent) opted average level of awareness about post office deposits to the investment avenue.

Table-3 Higher return priorities while making investment choice-wise classification of the respondents

Investment Avenues	No. of Respondents	Percentage
Very High	16	26.6
High	12	20.0
Average	17	28.3
Low	07	11.6
Very Low	08	13.3
Total	60	100.0

Source: Field Data

It could be observed from the Table-3, 16 respondents (26.6 per cent) opted choose your choice of investment is very high, 12 respondents (20 per cent) opted choose your choice of investment is high, 17 respondents (28.3 per cent) opted choose your choice of investment is average with the statement. 7 respondents (11.6 per cent) opted to the investment is low of the statement, whereas 8 respondents (13.3 per cent) opted to the investment is very low of the statement. Hence it could be observed that the thought 17 respondents (28.3 per cent) opted average level return priorities while making investment choice.

Tax Benefits Priorities while making Investment Choice-wise Classification of the Respondents			
Investment Avenues No. of Respondents			
Very High	13	21.6	
High	09	15.0	

19

13

06

60

Table-4

Source: Field Data

Average

Very Low

Low

Total

It could be inferred from the Table-4, 13 respondents (21.6 per cent) opted choose your choice of investment is very high, 09 respondents (18.3 per cent) opted choose your choice of investment is high, 19 respondents (31.6 per cent) opted choose your choice of investment is average with the statement.11 respondents (18.3 per cent) opted to the investment is low of the statement, whereas 6 respondents (10 per cent) opted to the investment is very low of the statement.

Hence it could be inferred that the thought 19 respondents (31.6 per cent) opted average level tax benefits priorities while making investment choice.

Table-5

Availability of Income Priorities while making Inve	stment Choice-Wise		
classification of the Respondents			

<b>Investment Avenues</b>	No. of Respondents	Percentage
Very High	11	18.3
High	12	20.0
Average	14	23.3
Low	10	16.6
Very Low	13	21.6
Total	60	100.0

Source: Field Data

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31.6

21.6

10.0

100.0

It could be understood from the Table-5, 11 respondents (18.3 per cent) opted choose your choice of investment is very high, 12 respondents (20 per cent) opted choose your choice of investment is high, 14 respondents (23.3 per cent) opted choose your choice of investment is average with the statement. 10 respondents (16.6 per cent) opted to the investment is low of the statement, whereas 13 respondents (21.6 per cent) opted to the investment is very low of the statement. Hence it could be understood that the thought 14 respondents (23.3 per cent) opted average level availability of income priorities while making investment choice.

Table-6 Expected Rate of Return on your Investment-wise Classification of the Respondents

Investment	No. of Respondents	Percentage
Below 6%	12	20.0
7%-10%	20	33.3
11%-15%	10	16.6
Above 15%	18	30.0
Total	60	100.0

Source: Field Data

It could be ascertained from the Table-6, 12 respondents (20 per cent) opted to choice of expected return on investment is below 6%, 19 respondents (31.6 per cent) opted to choice of expected return on investment is 7%-10%,11 respondents (18.3 per cent) opted to choice of expected return on investment is 11%-15%,18 respondents (30 per cent) opted to choice of expected return on investment is above 15%. Hence it could be ascertained that the thought 20 respondents (33.3 per cent) opted rate of return on your investment is 7%-10%.

### Table-7 Source of getting information about investment-wise classification of the Investment

Investment	No. of Respondents	Percentage
Brokers	15	25.0
Financial institutions	08	13.3
Internet	07	11.6
Journal & Magazines	06	10.0
Advertisement in Medias	09	15.0
Word of Mouth	05	8.3
Financial Consultants	12	20.0
Total	60	100.0

Source: Field Data

It could be found from the Table-7, 15 respondents (25 per cent) opted to the source of getting information about investment is brokers, 8 respondents (13.3 per cent) opted to the source of getting information about investment is financial institutions, 7 respondents (11.6 per cent) opted to the source of getting information about investment is internet, 6 respondents (10 per cent) opted to the source of getting information about investment is journal magazines, 9 respondents (15 per cent) opted to the source of getting information about investment is advertisement in medias, 5 respondents (8.3 per cent) opted to the source of getting information about investment is word of mouth, 12 respondents (20 per cent) opted to the source of getting information about investment is financial consultants.

Hence it could be found that the thought 15 respondents (25 per cent) opted source of getting information about investment is brokers.

#### Table-8

Upto date information are available about the scheme attitude towards investment-wise classification of the respondents

Attitude	No. of Respondents	Percentage
Strongly Agree	11	18.3
Agree	18	30.0
Neither agree/Nor disagree	15	25.0
Disapprove	09	15.0
Strongly Oppose	07	11.6
Total	60	100.0

Source: Field Data

It could be observed from the Table-8, 11 respondent (18.3 per cent) opted choose your choice of attitude strongly agree, 18 respondent (30 per cent) opted choose your choice of attitude agree, 15 respondent (25 per cent) opted choose your choice of attitude Neither / agree / Nor disagree with the statement. 9 respondents (15 per cent) opted disapprove of the statement. Whereas 7 respondents (11.6 per cent) strongly oppose of the statement

Hence it could be observed that the thought 18 respondents (30 per cent) opted up to date information are available about the scheme attitude towards investment is agree.

It could be inferred from the Table-9, 14 respondent (23.3 per cent) opted choose your choice of attitude strongly agree, 16 respondent (26.6 per cent) opted choose your choice of attitude agree, 11 respondent (18.3 per cent) opted choose your choice of attitude Neither/agree/Nor disagree with the statement, 10 respondents (16.6 per cent) opted disapprove of the statement, whereas 9 respondents (15 per cent) strongly oppose of the statement

# Table 9

Very simple invest and monitor fund performance on a regular basis attitude towards investment-wise classification of the respondents

Attitude	No. of Respondents	Percentage
Strongly Agree	14	23.3
Agree	16	26.6
Neither agree/Nor disagree	11	18.3
Disapprove	10	16.6
Strongly Oppose	09	15.0
Total	60	100.0

Source: Field Data

Hence it could be inferred that the thought 16 respondents (26.6 per cent) opted very simple invest and monitor fund performance on a regular basis attitude towards investment is agree.

# Table 10Knowledge about their Investment Plan Attitude towards<br/>Investment-Wise Classification of the Respondents

Attitude	No. of Respondents	Percentage
Strongly Agree	24	40.0
Agree	12	20.0
Neither agree/Nor disagree	08	13.3
Disapprove	07	11.6
Strongly Oppose	09	15.0
Total	60	100.0

Source: Field Data

It could be understood from the Table-10. 24 respondents (40 per cent) opted choose your choice of attitude strongly agree, 12 respondents (20 per cent) opted choose your choice of attitude agree, 8 respondents (13.3 per cent) opted choose your choice of attitude neither / agree / nor disagree with the statement, 7 respondents (11.6 per cent) opted disapprove of the statement, whereas 9 respondents (15 per cent) strongly oppose of the statement

Hence it could be understood that the thought 24 respondents (40 per cent) opted knowledge about my investment plan attitude towards investment is strongly agree.

# Findings

• It could be ascertained that the thought 23 respondents (38.33 per cent) opted high level of awareness about savings bank account to the investment avenue.

- It could be found that the thought 21 respondents (35 per cent) opted average level of awareness about post office deposits to the investment avenue.
- It could be observed that the thought 17 respondents (28.3 per cent) opted average level of return priorities while making investment choice.
- It could be inferred that the thought 19 respondents (31.6 per cent) opted average level of tax benefits priorities while making investment choice.
- It could be understood that the thought 14 respondents (23.3 per cent) opted average level of availability of income priorities while making investment choice.
- It could be ascertained that the thought 19 respondents (31.6 per cent) opted expected rate of return on your investment is 7-10%.
- It could be found that the thought 15 respondents (25 per cent) opted source of getting information about investment is brokers.
- It could be observed that the thought 18 respondents (30 per cent) opted up to date information are available about the scheme attitude towards investment is agree.
- It could be inferred that the thought 16 respondents (26.6 per cent) opted very simple invest and monitor fund performance on a regular basis attitude towards investment is agree. It could be understood that the thought 24 respondents (40 per cent) opted knowledge about my investment plan attitude towards investment is strongly agree

#### Suggestions

The research suggests that there is a relationship between the determinants of saving and the pattern of savings and investment. It also suggests that the school teachers are unaware of stock market activities therefore their preference of investment is less in case of stock market. Most of the teachers are giving first preference to Bank deposits, Gold and post office schemes. Least preference is given to shares. This paper reveals that the primary and high school teachers are choosing low risk and low return investment alternative as they are not interested to undertake high risk. They are going for saving in bank deposits with low risk and low return.

#### Conclusion

The investment pattern of higher secondary school follows the traditional pattern of investments which have been used by them for years. Bank deposit is the favorite investment avenue of almost all respondents. 75% of the respondents have the saving habit 66% of them bank accounts. Most of the teachers are make investment of the influence by self and by family and relatives. The only drawback of the teachers is that they are reluctant to invest in modern investment schemes. And majority of them are afraid to take risk.

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# A Study on Micro Finance and its Implication for Economic Empowerment in Tiruchirappalli District

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#### Abstract

Though the SHGs were started in 1997 in Tamil Nadu, the concept penetrated down only in recent years. Now there is a greater amount of socio-economic emancipation among the members of the SHGs. Hence there is a need for evaluating the social and economic impact of the SHGs on their members. Among the various districts of Tamil Nadu, Tiruchirappalli District occupies a predominant position in the starting of SHGs. In Tiruchirappalli district the urban centers have more rural bias and the economic activities are more industrial and agro-based. It is true that the SHGs have been formed for meeting the needs of women involved in agricultural activities. As on 2018, there were 3.78 lakhs SHGs in Tamil Nadu with a membership of 60.63 lakhs and in Tiruchirappalli District there were 16,773 SHGs with a membership of 2, 69,014. The present study deals with the SHGs formed in Tiruchirappalli district. The empirical findings of this study would pave the way for taking certain policy decisions for strengthening the SHGs and hence the study has been undertaken in Tiruchirappalli district.

Key words: SHGs, Women involvement, Policy decisions

#### Introduction

India lives in her innumerable villages where poverty is common for families as there are only seasonal employments in unorganized sectors. The naturally created Micro Small and Medium Enterprises in villages support the economy of the villages. Poverty in India is widespread with the nation estimated to have a third of the world's poor. The credit needs and other financial services are provided to the rural masses in general and to the poor in particular through the rural financial markets comprising an unorganized sector consisting of commission agents, moneylenders, landlords, etc., and an organized sector consisting of pyramid type cooperative credit institution - broadly classified into urban credit cooperatives and rural credit cooperatives. As the formalities are more the rural masses fell comfortable to borrow from the money lenders who charge heavy interest for the borrowings.

In order to enlarge the flow of credit to the hard-core poor, NABARD launched a scheme of organizing them in self-help groups (SHGs) and linking the SHGs with banks, in 1992. The scheme is broadly on the pattern devised by Bangladesh

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Grameen Bank. Under the scheme, poor, preferably the women are organized in SHGs and banks financing these SHGs for on lending to poor are eligible for concessional refinance from NABARD. There are three distinct modes to route the credit to micro enterprises. While under the first mode, banks lend directly to the SHGs for lending to micro entrepreneurs. Under the second mode, banks provide loans to the NGOs for on lending to the SHGs and ultimately to micro entrepreneurs. Under the third mode, banks extend credit to the SHGs with the NGO as facilitator.

Though the SHGs were started in 1997 in Tamil Nadu, the concept penetrated down only in recent years. Now there is a greater amount of socio-economic emancipation among the members of the SHGs. Hence there is a need for evaluating the social and economic impact of the SHGs on their members. Among the various districts of Tamil Nadu, Tiruchirappalli District occupies a predominant position in the starting of SHGs. In Tiruchirappalli district the urban centers have more rural bias and the economic activities are more agro-based. Hence the SHGs have been formed for meeting the needs of women involved in agricultural activities. As on 2018, there were 3.78 lakhs SHGs in Tamil Nadu with a membership of 60.63 lakhs and in Tiruchirappalli District there were 16,773 SHGs with a membership of 2, 69,014. The present study deals with the SHGs formed in Tiruchirappalli district. The empirical findings of this study would pave the way for taking certain policy decisions for strengthening the SHGs and hence the study has been undertaken in Tiruchirappalli district.

#### **Statement of the Problem**

Poverty and unemployment are the twin problems faced by the developing countries. According to the Planning Commission more than one third of India's total population i.e. 320 million live below the poverty line. In India, the financial institutions have not been able to reach the poor households particularly women in the unorganised sector. Structural rigidities and overheads led to high cost in advancing small loans. Experience in implementing different anti-poverty and other welfare programmes has shown that the key to success lies in starting appropriate community-based organisations with participation at the grass-root level. Moreover, the group approach may be one of the effective ways to reduce the difficulties of small businessmen and agriculturists. Motivating individual farmers, artisans and entrepreneurs to form small groups to pool their resources to handle selected operations may lead to a great success.

Peoples' participation in credit delivery and recovery and linking of formal credit institutions to borrowers through the SHGs have been recognised as a supplementary mechanism for providing credit support to the rural poor. The SHGs are informal groups formed on a voluntary basis, for providing the necessary support to their members for their social and economic emancipation. These groups are distinct from co-operative societies, mainly in terms of their size, homogeneity and functions. Non-Governmental Organisations play an

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important role in preparing the members by changing their attitude to participate in-group activities.

The NABARD is a pioneer in conceptualizing and implementing the concept of the SHGs through the pilot project of linking SHGs with banks. In 1992 the project was commenced throughout the country through a set of well-defined guidelines with special reference to the objectives, criteria for selection of SHGs, size of group, assessment of credit needs, rate of interest, repayment period and security. Efforts were also made by NABARD to popularise the project among bankers and the NGOs by organising a series of workshops and seminars at different levels. The response from banks and the NGOs was encouraging and positive.

The distinguishing feature of the SHGs is creating social and economic awareness among the members. The social awareness enables the members to lead their life in a sound hygienic environment and pursue a better living. The woman members involve themselves more in taking decisions regarding the education of their children, the investment of the family, managing the economic assets of the family and bringing up cohesion among the members of the family and others for a better living. On the economic point of view both men and women work shoulder to shoulder to increase the income of the family. Every member of the SHGs has felt the need for more involvement in economic activities. The spirit for social and economic upliftment of members is the significant contribution of each and every SHG.

There is a general tendency to consider the SHGs as a panacea for all the ills of the rural community. This is evident from mushroom growth of self-help group in the states and also in Tiruchirappalli District. In Tiruchirappalli District, in the year 1998, the number of SHGs formed was 821. But in the year 2008 it was 16,773. In many cases it has been a blind replication of success models without considering the intricacies involved in group formation and sustainability. Hence the present study is undertaken to study the performance of SHG in Tiruchirappalli district. Further an attempt is also made to evaluate the social and economic benefits accruing to the members of the SHGs.

#### **Objectives of the Study**

- 1. To analyse the genesis and development of SHGs in Tiruchirappalli District
- 2. To evaluate the performance of the sample SHGs in Tiruchirappalli District selected for the study
- 3. To anlayse the changes in the social conditions of the members of the selfhelp groups
- 4. To measure the impact of the SHGs on the economic development of the members
- 5. To analyse the attitude of the members of the SHGs towards economic impact, social impact, psychological impact and political impact and
- 6. To offer suggestions to improve the working of the SHGs.

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#### Scope of the Study

The present study attempts to examine the socio-economic impact of the SHGs on the stakeholders particularly the beneficiaries. It examines how far the programme has helped in raising the incomes and levels of living of the rural poor women and in enabling them to cross the poverty line. The present study is from the standpoint of the SHGs and their members.

#### Hypotheses

The hypotheses framed are: there is no significant difference in the performance of SHGs and tenure of existence, literacy level of the leader and size of membership of the groups; there is no significant difference in the social and economic condition of the members before joining SHGs and afterwards; and there is no significant difference in the perception scores of the different groups of members and social factors and the attitude of the members.

# Methodology

The present study is based on both primary and secondary data. The primary data were collected through two interview schedules, one for SHGs and another for SHG's members. The secondary data were collected from books, journals, websites and records of Mahalir Thittam Office, Tiruchirappalli. The data were collected from 190 self-help groups and 570 members through interview schedule. The collected data were analysed by applying the statistical tools like Correlation, Kruskal Wallis test, Sen's poverty level index, Chi-square test and Kolmogorov- Simirnov test.

### **Major Findings**

An attempt is made to analyse the performance of SHGs in Tiruchirappalli district and the social and economic impact on members of SHGs.

1. In order to measure the performance of SHGs in Tiruchirappalli district, various factors such as homogeneity, regularity in conducting the meetings, regularity in attendance, role of NGOs in meetings, repayment performance, decision on financial transactions, utilisation of common fund, increased rate of savings, awareness of rules and regulations, and maintenance of accounts have been taken into account. It is found that 63 per cent of SHGs conducted meeting once in a week. There was more NGO participation. The performance of repayment is better in all groups. 80 per cent of the loan is utilised for productive purposes. The savings performances of SHGs are up to the mark. All the members of SHGs availed training facilities provided by the Mahalir Thittam. The books of accounts are properly maintained. Further it is found that there is significant difference in performance scores among the different groups in conduct of meeting, regularity in attendance, participation of NGOs in meeting, repayment performance, decision on financial transactions, utilisation of common fund and training. But there is no significant difference in the performance scores among the different

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groups obtained indicators such as homogeneity, share of production loan to total loan, increased rate savings, awareness of rules and regulations and maintenance of books of accounts. It is also found that there is no influence of the tenure of existence of the SHGs on performance. But the literacy level of leader and the size of the membership of the SHGs influence the performance of SHGs.

- 2. To assess the social impact of the SHGs on its members, first the socioeconomic factors of the members are studied. Then social issues like selfconfidence, awareness of social evils, behavioral changes, change in education level, access to amenities and political participation also discussed. It is found that association with SHGs encompasses a large cross section of people with self - confidence. Association with SHGs increases the helping tendency. The membership in SHGs gave importance to woman in family decision. It is also found that there is a significant shift in the level of communication, which might be due to association with the SHGs. SHGs create awareness among members on the social evils. The study also shows that there is a positive impact of SHGs on members in resisting social evils. It is interesting to note that all the members of SHGs avail all the social living amenities in the urban and rural areas to the fullest level possible. It is inferred that 96.1 per cent of members have shown their interest in contesting elections after joining the SHGs.
- 3. The economic impact of the SHGs on the members have been analysed in terms of their level of savings, amount of borrowings, creation of assets, employment generation, income generation, poverty level and expenditure pattern. It is found that after joining SHGs, the awareness level of savings increased. There is a paradigm shift from loans borrowed for consumption purposes to productive purposes after association with SHGs. It is found that the SHG programmes have positive effect on alleviation of poverty. The consumption expenditure of the members has increased after becoming members of SHGs. The Composite Index of standard of living shows that the impact of micro credit encompassing economic as well as social aspects was relatively more pronounced on the social aspects than on the economic aspects.
- 4 The perception of the sample respondents regarding the economic impact, social impact, psychological impact and political impact shaped by the SHGs has been analysed with the help of a scaling technique. It is found that the perception of the sample members on social impact occupies first place followed by psychological impact, economic impact and political impact. It is also found that the four categories of impact are equally important. Chi-square test was used to explore relationship between personal variables and the perception of impact. It is found that the age, occupational pattern, marital status and community influences the perception of members on the nature of

the impact. On the other hand, the level of literacy had no influence on perception of members of the impact of the SHGs.

# Suggestions

Based on the above findings, the following suggestions are made:

- 1. 144 (75.8 per cent) sample SHGs are purely depending upon the NGOs in financial decision-making process. In the inception period, the NGOs are forming and giving necessary training to SHGs. After some period, they have to give the freedom to think and work especially in decision making process. The financial decisions are to be taken by all the members unanimously. Hence, it is suggested that the necessary skills with regard to financial decision making may be inculcated to the members of SHGs. In this regard, a financial literacy and credit counseling centre may be opened in every district with suitable financial experts, bank officials etc. This credit counseling centre may give the suitable training to all the members of SHGs in the field of financial management.
- 2. The study shows that 62.1 per cent of SHGs are formed in rural panchayats, 18.11 per cent in town panchayats, 11.24 per cent in municipal areas and only 18.5 per cent in corporation areas. As the SHGs are playing a crucial role in alleviation of poverty, steps may be taken on war footing basis to form more number of SHGs not only in rural but also in municipal and corporation areas in Tiruchirappalli District. In this regard, the state Government may consider giving preference to uncovered areas for promoting the SHGs.
- 3. Mahalir Thittam Office, Tiruchirappalli has arranged more number of training for the members of SHGs to start their own economic activities. The training was given only on the conventional or traditional business activities. Apart from this, only half of the respondents have received training and orientation for capacity building. These training programmes were attended by some members only. Overall, the training programmes have not been useful to the participants. It is suggested that training on innovative economic activities by using the resources in and around the district may be given to the SHGs members. The training in the areas such as vermicelli making, beautician training, training on bakery unit may also be given. For this purpose, Entrepreneurship development cell in the district, resource persons from small scale sectors, private ventures may also be properly used. And chances should be given to all members by rotation to attend the training programmes. In this way the SHGs can able to know the innovative ideas for income generating activities and all the members can develop their skill.
- 4. Only 8 groups have recorded as poor repayment performance of loan in the district. It is suggested that incentives may be given for prompt repayment. This will catch the attention of the groups to repay the loan. Further, suitable advice may also be given the members of SHGs for prompt repayment of loan.

- 5. Among the sample only 35.78 per cent (68) of SHGs are increased their savings less than 20 per cent. Hence, it is suggested that motivational campaign may be conducted for inculcating saving habit in the minds of the members. The campaign should give the exposure of savings, its future benefits, how the savings of members are utilised for rotation among the members, how the amount of groups' savings form a base for getting government sponsored scheme for income generating activities and the benefits to the individual member.
- 6. It is found that among the sample 40 (21.05 per cent) SHGs are faced the problem of delay in sanctioning the loan. It is suggested that the bank should visit SHGs and grade them based on their quality. The grading system and format is already approved by NABARD. If needed, banks can outsource the task of grading the SHGs to third party to expedite the sanctioning of loan. Further, the loan applications of SHGs should not be delayed beyond 15 days. Banks can fix a day for transactions of SHGs. The formalities while opening the SHG accounts in banks and while advancing loan to them should be minimum and procedures should be simplified. There should be uniform format for account opening and loan applications across banks. It is also suggested that necessary instructions may be given to the authorities and bank officials to avoid the delay in sanctioning the loan and to respond the quarries of SHG members.
- 7. It is observed that 17.89 per cent (34) of SHGs were faced the problem of administrating the affairs of its business. It is suggested that suitable administrative training to all the members of SHGs should be given or at least the animators and representatives of the groups may be given administrative training initially, then the same may be given to the members gradually. Further, Extension participation programme may be arranged with extension agencies for the SHGs to visit their business houses to know the functions and its administration. And also this extension participation programme will create awareness and skills of the business.
- 8. It is also observed that 22 sample (11.57 per cent) SHGs were faced the problem of in adequate loan amount. Loan amount is one of the basic components to start an activity and also women can be financially sound when loan amount is given sufficiently. Loan amount should be increased to the extent that they can take up an income generating activity.
- 9. Majority (92.45 per cent) of the members said that they could sign after joining the SHGs. Only 2.63 per cent of the members are completed their XII standard. Education plays a crucial role in administering the affairs of the business. Hence, it is suggested that adult education system may also be adapted to the members of SHGs to upgrade their educational status.
- 10. The development of a nation is vested on the shoulders of both men and women. Now a days the women self-help groups are playing a predominant

role in the eradication of poverty among the rural poor. It is suggested that the SHG concept for men is not adopted in the study area. If this has been implemented, the youth especially unemployed can be benefitted and they can also involve themselves in the process of poverty eradication.

#### Conclusion

The new millennium has thrown many challenges subjecting many nations to undergo transformation cutting across their established tradition and culture. New issues have to be addressed to effect social and economic progress of our nation. The most important one is women's empowerment through Self-help groups. SHGs have undoubtedly begun to make a significant contribution in poverty alleviation and empowerment of poor, especially women in rural areas of our country. Women are the vital infrastructure and their empowerment would hasten the pace of social development. Investing in women's capabilities and empowering them to achieve their choices and opportunities is the definite way to contribute to economic growth and overall development. The empowerment of rural women leads to benefit not only to individual women and women groups, but also to the families and the community as a whole. The present study is an attempt to analyses the socio-economic development of members and the performance of SHGs in Tiruchirappalli district. The performance of SHGs was good. The greater percentage of women were impacted positively by being members of SHGs. Women's participation in SHGs enabled them to discover inner strength, gain self-confidence, social, economic, political and psychological empowerment and capacity building. If the aforesaid suggestions are carried out by the authorities concerned, the SHGs will improve in Tiruchirappalli District that ultimately lead to socio economic and cultural empowerment among the stakeholders particularly the women.

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# Women Empowerment - The Present Scenario

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#### Abstract

Women empowerment is the most discussed topic in the world and women are the essential and integral part of society and without women concept of society is not possible. Women empowerment is the way or a social action that is developed in the society on realizing the status of women in which women elaborate and recreate what it is to be in a circumstance that they previously were denied in family, society and other places that are common. Empowerment can be defined in many ways however, when talking about women's empowerment; the concept of empowerment means accepting and allowing women who are away from the decision-making process and participation in the socio economic and cultural activities in all spheres of life. This puts a strong emphasis on the participation of women in political structures and formal decision-making and, in the economic sphere, on the ability to obtain an income that enables participation in economic decision-making. Empowerment is the process that creates power in individuals over their own lives, society, and in their communities. This paper attempts to bring out women empowerment initiatives at the global level.

Key words: empowerment, decision making status of women.

#### Introduction

Women is a companion of man created by God with an assurance of making the world more effective in companion with each other in all through the generations. Women are considered to be delicate members of society but in reality, it is the opposite particularly in the present scenario of transformation and change that is taking place worldwide. Women empowerment is the most discussed topic in the world and women are the essential and integral part of society and without women concept of society is not possible. Every religion pours importance on the women's rights, besides religious, there are many other factors that has the potential to influence the empowerment of the women in society such as economic, political, and social spheres. It is the fact that treatment to the women is not up to the mark in various corners due to the patriarchal system of the society. According to scholars, women do not have the right to freedom and liberty in many areas because of the patriarchal bargain in the society. The Society is considered to be the conservative that does not give freedom and rights to its female population.

It is crucial to know that this claim is not properly false and it is not properly right because of the class difference in the society. Many women's right activists and liberals in the region have struggled a lot in recent decades so that they can attain

a space for women in the patriarchal and kinship society. It cannot be ignored that women are treated as commodities and showpieces that should be stationed in the homes (C & S, 2019). Women's empowerment is not easy to attain in the patriarchal society but it cannot be impossible. Women are treated as commodities in the society and the majority of the males have a mindset that women are of no use other than giving care services. Women hold the status of the first school of morality and ethics for any kid. Moreover, the mobility of women is also restricted because of the social constraints and family pressures. They are not allowed to travel long distances and avail of the facilities of the health, education, and employment (Sharoni, 1997). Today, women in many countries face the same atrocities and domestic violence, according to the women rights activists that it makes no difference who rule the country i.e., it may be authoritarian and democratic, the rights of the women are snubbed by the patriarchal mindset. Most alarming thing is that it is difficult to kill the mindset because it takes centuries to shape the mindset of the society and it is impossible to diminish it overnight. Women are considered to be fragile and weak so that their share is always snatched by the hostile men of society (REDDY, 2012).

#### Women empowerment

Women empowerment is the way or a social action that is developed in the society on realizing the status of women in which women elaborate and recreate what it is to be in a circumstance that they previously were denied in family, society and other places that are common. Empowerment can be defined in many ways however, when talking about women's empowerment, the concept of empowerment means accepting and allowing women who are away from the decision-making process and participation in the socio economic and cultural activities in all spheres of life. This puts a strong emphasis on the participation of women in political structures and formal decision-making and, in the economic sphere, on the ability to obtain an income that enables participation in economic decision-making. Empowerment is the process that creates power in individuals over their own lives, society, and in their communities. The society feels that People are empowered when they are able to access the opportunities available to them without any setbacks and restrictions in education, profession and lifestyle. Feeling entitled to make your own decisions creates a sense of empowerment. Empowerment includes the action of raising the status of women through education, raising awareness, literacy, and training to face the challenging situations easily and comfortably. Thus the empowerment of Women in the society and family is all about equipping and allowing women to make lifedetermining decisions through the different problems in society and in family on par with their counterparts.

There are several principles defining women's empowerment such as, for one to be empowered, they must come from a position of disempowerment and a situation of oppression. Furthermore, one must acquire empowerment themselves rather than have it given to them by an external party. Studies have found that

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empowerment definitions necessitate people have the capability to make important decisions in their lives while also being able to act on them.

Women empowerment has become a significant topic of discussion in development and economics. It can also point to the approaches regarding other trivialized genders in a particular political or social context. Women's economic empowerment refers to the ability for women to enjoy their right to control and benefit from the resources, assets, income and their own time, as well as the ability to manage risk and improve their economic status and well-being. Entire nations, businesses, communities and groups can benefit from the implementation of programs and policies that adopt the notion of women empowerment. Empowerment of women is necessity for the development of a society, since it enhances both the quality and the quantity of human resources available for development. Empowerment is one of the main procedural concerns when addressing human rights and development. Women empowerment and achieving gender equality is essential for our society to ensure the sustainable development of the country. Many world leaders and scholars have argued that sustainable development is impossible without gender equality and women empowerment. Sustainable development accepts environmental protection, social and economic development, and without women empowerment, women wouldn't feel equally important to the process of development as men. Therefore, scholars agree that women empowerment plays a huge role in development and is one of the significant contributions of development. Without the equal inclusion of women in development, women would not be able to benefit or contribute to the development of the country.

#### **Economic empowerment**

Economic empowerment increases women's agency, access to formal government programs, mobility outside the home, economic independence, and purchasing power. Policy makers are suggested to support job training to aid in entrance in the formal markets. One recommendation is to provide more formal education opportunities for women that would allow for higher bargaining power in the home. They would have more access to higher wages outside the home; and as a result, make it easier for women to get a job in the market.

Strengthening women's access to property inheritance and land rights is another method used to economically empower women. This would allow them better means of asset accumulation, capital, and bargaining power needed to address gender inequalities. Often, women in developing countries are legally restricted from their land on the sole basis of gender. Having a right to their land gives women a sort of bargaining power that they would not normally have; in turn, they gain more opportunities for economic independence and formal financial institutions. Many scholars suggest that when we discuss women's empowerment, discussing the different barriers that underprivileged women face, which makes it more difficult for them to obtain empowerment in society.

Another popular methodology for women's economic empowerment also includes microcredit. Microfinance institutions that aim to empower women in their community by giving them access to loans that have low interest rates without the requirement of collateral. More specifically, the microfinance institutions aim give microcredit to women who want to be entrepreneurs. The success and efficiency of microcredit and microloans is controversial and constantly debated as it has not been successful to the expected level. Some critiques claim that microcredit alone doesn't guarantee women have control over the way the loan is used. Microfinance institutions don't address cultural barriers that allow men to still control household finances; as a result, microcredit may simply be transferred to the husband. Microcredit doesn't relieve women of household obligations, and even if women have credit, they don't have the time to be as active in the market as men.

#### **Political empowerment**

Political empowerment supports creating policies that would best support gender equality and agency for women in both the public and private spheres. Popular methods that have been suggested are to create affirmative action policies that have a quota for the number of women in policy making and parliament positions. As of 2017, the global average of women whom hold lower and single house parliament positions is 23.6 percent. Further recommendations have been to increase women's rights to vote, voice opinions, and the ability to run for office with a fair chance of being elected. Because women are typically associated with child care and domestic responsibilities in the home, they have less time dedicated to entering the labour market and running their business. However, participation is not limited to the realm of politics. It can include participation in the household, in schools, and the ability to make choices for oneself. Some theorists believe that bargaining power and agency in the household must be achieved before one can move onto broader political participation.

#### Socio cultural Empowerment

The growing access of the web in the late 20th century has allowed women to empower themselves by using various tools on the Internet. With the introduction of the World Wide Web, women have begun to use social networking sites like Facebook and Twitter for online activism. Through online activism, women are able to empower themselves by organizing campaigns and voicing their opinions for equality rights without feeling oppressed by members of society. For example, on May 29, 2013, an online campaign started by 100 female advocates forced the leading social networking website, Facebook, to take down various pages that spread hatred about women.

In recent years, blogging has also become a powerful tool for the educational empowerment of women. According to a study done by the University of California, Los Angeles, medical patients who read and write about their disease are often in a much happier mood and more knowledgeable than those who do

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not. By reading others' experiences, patients can better educate themselves and apply strategies that their fellow bloggers suggest.

With the easy accessibility and affordability of e-learning (electronic learning), women can now study from the comfort of their homes. By empowering themselves educationally through new technologies like e-learning, women are also learning new skills that will come in handy in today's advancing globalized world.

The UN came out with a set of goals called the Sustainable Development Goals, or SDGs, to help make the world a better place. Of the 17, the fourth goal works to allow access to education for all people alike. A large effort has been made to include women in schools to better their education. Similarly, the fifth goal focuses on empowering women and girls to achieve gender equality through equal access to various types of opportunities (health care, education, work, etc.).

There are also some prominent non-profits that help empower women:

- She Should Run
- Girls Not Brides
- The Malala Fund
- Women in Defense
- Women for Women International
- Every Mother Counts

#### **Measurements and Assessments**

Women empowerment can be measured through the Gender Empowerment Measure (GEM), which shows women's participation in a given nation, both politically and economically. GEM is calculated by tracking "the share of seats in parliament held by women; of female legislators, senior officials and managers; and of female profession and technical workers; and the gender disparity in earned income, reflecting economic independence". It then ranks countries given this information. Other measures that take into account the importance of female participation and equality include: the Gender Parity Index or the Gender-related Development Index (GDI). Some critiques of GEM are that it is not concerned with factors regarding society, such as gender, religion, cultural context, legal context, and violations of women's rights. Gender empowerment measure attempts to makes a consistent standardized approach to measure women's empowerment; in doing so, it has been critiqued that the GEM doesn't account for variation in historical factors, female autonomy, gender segregation, and women's right to vote.

The Gender-related Development Index (GDI) is a way in which the United Nations Development Programme (UNDP) measures the inequality between genders within a country. Some critique of this measurement is that, because GDI calculations rely solely on the achievement distribution between males and

females of a population, GDI doesn't measure gender inequality; rather, it measures absolute levels on income, education and health.

A more qualitative form of assessing women's empowerment is to identify constraints to action. This allows for the identification of power relations between genders. Because this is a participatory process, it facilitates conversation on gender discrimination. Comparing constraints on women at a later time also allows for any changes or expansion to be better identified. The evaluation of the development of women's agency allows for an evaluation of actions taken. These assessments must also be based on the action taken by women, and not external groups. External groups can help facilitate women's empowerment, but cannot bestow it on them.

Recent studies also show that women face more barriers in the workplace than do men. Gender-related barriers involve sexual harassment; unfair hiring practices, career progression, and unequal pay where women are paid less than men are for performing the same job. When taking the median earnings of men and women who worked full-time, year-round, government data from 2014 showed that women made \$0.79 for every dollar a man earned. The average earnings for working mothers came out to even less-\$0.71 for every dollar a father made, according to a 2014 study conducted by the National Partnership for Women and Children. While much of the public discussion of the "wage gap" has focused around women getting equal pay for the same work as their male peers, many women struggle with what is called the "pregnancy penalty". The main problem is that it is difficult to measure, but some experts say that the possibility of having a baby can be enough for employers to push women back from their line. Therefore, women are put in a position where they need to make the decision of whether to maintain in the workforce or have children. This problem has sparked the debate over maternity leave in the United States and many other countries in the world.

Despite significant improvements in recent decades, education is not universally available and gender inequalities persist. A major concern in many countries is not only the limited numbers of girls going to school but also the limited educational pathways for those that step into the classroom. More specifically, there should be more efforts to address the lower participation and learning achievement of girls in science, technology, engineering and mathematics education.

#### Conclusion

Women's empowerment is not easy to attain in the patriarchal society but it cannot be impossible. The society is indeed conservative but authorities have done a lot of work in favor of the women just to cope with the pace of the world's development. This is an age of information and the rise of globalization takes place, now it is not possible to snub the rights of the women because many international bodies compelled the authoritarian rules to polite their policies in

the favour of the women. The efforts and initiatives at the global level will certainly be a source of strength to women empowerment that ultimately make the world a transformed one with equality and just treatment for human being without any gender bias.

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# **M. Julias Ceasar**

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# Introduction

HRM means Human Resource Management that speaks about managing the human resource in an organization be it small or big, it is important for the organizations to ensure that the human resource is managed and maintained as it is one of the most valuable assets. It relates to the collection of people and their unique characteristics for the benefit of the organization.

- HRM: Activities of the organization carries to utilize its HR effectively
- HR: Responsible for People, Culture, Incentives / control, process and Structure
- **Select employees**: Skills to perform job effectively, Best people, Quality focus, Work ethics, Initiative, Commitment, Dedication and hard work
- **Global managers**: Exposure / wide knowledge, Global mind set, Global challenges Knowledge on global business, Healthy and Critical
- **Training and development**: Job fit, Accommodating, Cultural training, Language training, Practical training

# Unique features

- 1. **Increase in quality over a period of time (appreciating asset)** as years pass by the employees get experienced to master himself / herself in their chosen field of specialization and perform better that ultimately benefits the organization.
- 2. Can produce larger output than the input the acquired skills are converted to productive ventures to produce increased volume of output.
- 3. Creative skills leading to innovation human resource has a unique skill called creativity that makes one to innovate a better way of doing things.
- 4. Can direct the organization in a right path a committed work force can direct the organization in a right direction of success, achievement and better performance.
- 5. **Greater foresight** work force has greater foresight as it performs his / her job everyday with their acquired skills and ability which lead to have new outlook in completing the tasks.
- 6. **Skill, ability and effectiveness in performance** the human resource alone has these qualities that make the work easy to them.

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7. **Productive spirit** – organizations does not recruit lazy people, they appoint people with work culture, commitment and dedication that lead the organization to be successful.

# Objectives

The primary focus of HRM is to connect the workforce with work and management and hence the HRM aims at the following important aspects;

- 1. Liaison between top management and employees there should be someone who designs models to connect the management and work that is performed by the workforce. This role is effectively done by the HRM, which lead the management and the workforce to a comfortable work atmosphere that mutually benefits.
- 2. Arrange and maintain adequate workforce it is the major role of the human resource manager or the department to arrange and maintain adequate workforce to meet the demand and requirements of the organization with ideal strength.
- 3. **Ensure smooth functioning of the organization** when everything is alright the organization functions smoothly. The HRM contributes to the smooth functioning of all the components that make the organization to grow.
- 4. **Training to enhance skill and productivity** the work force need to be productive and to that regular training programmes need to be conducted to make the work force a quality one.
- 5. **Increasing the performance of the work force and the organization** if the organization focuses on quality work and quality performance it will lead to increase in the performance of the work force that benefits the organization to build its identity.
- 6. Motivate employees to perform better at all levels employees are to be motivated to perform that assigned job in a better way. Motivation should be something that benefits the employee to work better by being satisfied of all that he / she needs.
- 7. **Quality work life** quality work life is the major area of concern for HRM, any organization must have a focus on quality in all spheres of their functioning.
- 8. Keep-up ethical values and behavior among employees HRM aims at creating value for the organization and this value is measured by the ethical values and behavior of the employees both inside and outside the organization.

#### **Major Components of HRM**

1. **Organization** - it relates to organization structure, initiatives towards centralization and decentralization, the planning and designing of jobs and communicating with the organization.

- 2. **Resourcing** responding to labour market, planning the use of people, recruitment, selection, legislative frame work, ending the contract.
- 3. **Performance** organizational performance, managing the performance of individuals and group / team, appraisal and getting the most from the diverse work force.
- 4. **Development** developing the core value of the organization, organizational and individual competencies, industrial and organizational learning, management development and career development.
- 5. **Employee relations** negotiation and consultation with trade unions, handling employee grievances, manage disciplinary process, health / safety / welfare and employment legislations
- 6. **Pay** basic, other holiday / special allowances, subsidized canteen, company care, pay related performance and pension.

### **Future HR Requirements**

In the Future, an Effective HR Professional Must:

- 1. **Understand and manage people**: No one suggests changing the name from "human" resources. People finding them, motivating them, keeping them, and exiting them when necessary are still central to what we know and do. We have to think about employees and how to nurture and develop them.
- 2. **Invest in the next generation of HR professionalism**: HR professionals must continue to learn and grow, within the profession and within the firms.
- 3. Learn to master and play new roles: HR roles determine what HR professionals know and do. There are emerging roles that HR professionals must master given the world we work in.
- 4. **Discern, create, and adapt culture to business conditions**: Organizations have a personality known as its culture. This culture shapes what people come into the company and how people react when in the company. Culture is like a firm brand, or identity. It is what HR professionals deliver.
- 5. **Rethink the organization as capabilities, not structures**: Organization is not a structure, but a set of capabilities and then talks about the duality inherent in focusing on capability
- 6. See HR as a decision science and bring discipline to it: HR is not a random set of events, but a disciplined set of choices. Making those choices clear and explicit helps bring HR from an art to a science that shows how the rigors of HR research change what we do and how we think about HR.
- 7. **Create mutually collaborative ventures**: Collaboration and cooperation become hallmarks for the future organization. This means that HR must help the whole be greater than the parts and help different units work together.
- 8. **Respond to social expectations and public policy**: Organizations and HR actions in organizations are increasingly under scrutiny. Media attention for
corporate malfeasance requires that HR step forward to monitor and govern work.

Live globally, act locally: Globalization is inevitable. It affects everything we
do and HR professionals are not immune, its focus is on the choices for
making global and (not vs) local decisions.

#### Conclusion

HRM has become a global concept of making ready the human resource to fit in to the jobs across the globe. It means, the human resource is the most powerful resource in any organization that needs to be nurtured and handled in a proper manner. If the human resources are handled properly they can contribute to the growth and development of the organization in an effective manner that lifts the performance with quality products, unique identity, customer value and sustainability of the company in the midst of competition and challenges.

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## Women Agriperineurs: An Initiative for Sustainable Development

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#### Abstract

Women contribute to 65-70% of the labour in agriculture, construction industry and in other areas. Most of them are illiterate and unable to attend formal training courses leaving their domestic responsibilities, rural women trail in adopting new technologies and in taking advantage of modern scientific and information technologies. Furthermore, introduction of any new programme for promoting livelihood will further add to their burden, as they are already suffering from drudgery, ill health, suppression and deprivation of their basic rights and status in the society and in families. The farming activities stand in good stud as there are plenty of avenues like Crop production, Forestry, sericulture, Agro-service Centers, Processing of food and forest products. The Production of Agricultural inputs are also considered as one of the most important area for women developmental initiatives such as Bio-fertilizers, Bio-pesticides, Vermicompost, Mushroom spawn production, Seeds and plants and the production of Cattle feeds. It is important that the women segment need to be aware of the changes taking place in the process of farming either in agro-based or in non agro based and prove them to be agriperineurs.

Key words: Women, Suppression, Deprivation.

#### Introduction

India is a country with over 35-40 per cent of the rural population living in utter poverty where there is no scope for them to have their basic requirements met as they are deprived of basic amenities and food security. They are unemployed or underemployed and this is the primary cause of poverty. Most of them are illiterate, suffer from ill-health, suppressed by vested interests and are deprived of their due share and rights in the development due to poor governance. They are often addicted to alcohol, narcotics and other unwanted habits, which further de-motivate them from involving themselves in sustainable livelihood activities.

#### Status of women

Women too are affected by these gestures both directly and indirectly due to the prevalence of these affective / influential aspects. Women contribute to 65-70% of the labour in agriculture, construction industry and in other areas. Most of them are illiterate and unable to attend formal training courses leaving their domestic

responsibilities, rural women trail in adopting new technologies and in taking advantage of modern scientific and information technologies. Furthermore, introduction of any new programme for promoting livelihood will further add to their burden, as they are already suffering from drudgery, ill health, suppression and deprivation of their basic rights and status in the society and in families.

Women empowerment should be an important and integral component of the sustainable livelihood programme in rural India. Poverty has a direct influence on food security and the rural poor and women in particular suffer the most during such scarcities and calamities. Thus, ensuring food security through women empowerment should be the primary goal of sustainable rural livelihood. Over 85 per cent of the rural families are dependent on agriculture for their livelihood. However, due to denudation of natural resources, sub-division of their land holdings and fluctuations in climatic conditions, the income from agriculture has been dwindling steadily. Furthermore, introduction of new technologies and farming practices have given tremendous benefits to resourceful and educated farmers on the one hand, while depriving the small land holders of such benefits on the other hand.

#### **Women Empowerment**

In rural areas, particularly among weaker sections of the society, women are illiterate and suppressed, the women empowerment should focus on the following aspects.

Promotion of Rural Livelihood through Women Self Help Groups: Promotion and development of micro-enterprises and various income generation activities is an important aspect of women empowerment. Although it is extremely difficult to find remunerative self-employment, there are enormous untapped opportunities in the rural sector. These include both on-farm and off-farm opportunities.

#### **Advantages of Agro-Based Activities**

- 1. Women are required to annex themselves with agro-product cultivation as it has easy access to inputs and less skill sets.
- 2. There is no problem of marketing, as most of the outputs are locally consumed as food.
- 3. The market outlets for even cash crops have been well established and instant cash is assured for all the produces in the local market.
- 4. As over 75-85% of the rural families own land and livestock, income generation activities can be initiated immediately without heavy capital investment.
- 5. Risk of failure due to improper technology, poor quality, low demand and poor price recovery are very low. Hence, the chances of success are high.
- 6. Infrastructure required for promotion of on-farm activities has been very well established.

Hence, the entrepreneurs can progress even in backward regions, which are deprived of regular power supply and electronic information connectivity.

#### **Opportunities for Rural Micro-enterprises through Women SHGs**

#### **On-farm activities:**

The farming activities stand in good stud as there are plenty of avenues like Crop production, Forestry, sericulture, Agro service Centers, Processing of food and forest products, The Production of Agricultural inputs are also considered as one of the most important area for women developmental initiatives such as Bio-fertilizers, Bio-pesticides, Vermi compost, Mushroom spawn production, Seeds and plants and the production of Cattle feeds.

#### **Off-farm activities:**

There is also good scope for the development of off farm activities through the establishment of Cottage industries: in the areas of Pottery, smithy, carpentry, Textile and production of building materials.

#### Services:

Automobiles hire and repairs, Electrical works, civil construction and consumer stores.

#### Support Needed for Promotion Micro-enterprises

It is important to find ways and means to support the women in the process of developing the said micro enterprises, they are:

- 1. Motivation of the target communities, particularly women
- 2. Formation of Self-Help Groups and their Federations
- 3. Introduction of drudgery reduction activities
- 4. Gender sensitization
- 5. Training and capacity building
- 6. Micro-finance . provision of credit facilities and linkage with banks
- 7. Development of infrastructure, particularly through the SHG Federations to provide necessary support services and marketing
- 8. Trade networking and establishment of market outlets
- 9. Village level Information Centre / e-Chaupal for dissemination of useful information
- 10. Multimedia- a new recipe for enabling Farm women

#### Agripreneurs

Gone are the days when women were recognized as subtle and submissive in all aspects. It is the "Era of Women Empowerment" empowering them not only with credit access but also enabling them to be better entrepreneurs. Women are now playing a pivotal role in all fields including agriculture as managers, decision

makers and skilled farm workers. It is estimated that women are responsible for 70% of actual farm work and constitute up to 60% of farming population. They are considered to be 'Agripreneurs' as they manage, organize and assure responsibilities for running both their farm.

#### Challenges

In spite of all these efforts, it is most unfortunate to note that involvement and participation of farm women in Transfer of Technology (TOT) has been neglected so far. Hence it it's the need of the hour to empower farm women in technology dissemination programmes to achieve a holistic empowerment of the society. One cannot reject the fact that we are in the Information and Communication Technology (ICT) world depending much on computer and allied modern electronic gadgets for execution our day to day activities. This scenario warranted the use of ICT to build a knowledge enriched rural society and to ensure reaching the hitherto un-reached. This paves way for enhancing agricultural production and to achieve faster growth of the sector.

The speed of diffusion of novel agricultural technologies could only be achieved through active involvement and participation of farm women with the help of computer-based user friendly Interactive Multimedia Compact Disc (IMCD). IMCD is a modern electronic gadget which demonstrates complex farm technologies in simpler terms using text, graphics, audio and video. User friendly IMCD is a device encompassing labeled instructions helping the user to learn the contents, structure and information using the mouse without depending on the help of facilitator to learn its contents.

#### Conclusion

Farming is the traditional activity and has moved little ahead with changes due to innovations and creative spirit. It is important that the women segment need to be aware of the changes taking place in the process of farming either in agrobased or in non-agro-based. The active involvement and participation of women in farming is to be supported and strengthened to ensure a sustainable livelihood in all areas that will ultimately make them empowered.

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# **Competitiveness in Entrepreneurship as a Key Factor in Structural Transformation**

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#### Abstract

Competitiveness and competitive spirit is the order of the day for any type of initiatives in the social system worldwide. At one side new and innovative business units emerge and on the other side there are challenges faced by the business organizations due to daily update and development leading to competition. Thus, the productive activity arrangement in an economy and its different allocations provide consistent shift in the economic sectoral compositions. There are significant similarities and complementarities that connect the competitiveness approach with the new work on structural transformation. Many of these approaches share a sector-specific perspective on microeconomic structures, moving beyond macroeconomic, economy- wide or microeconomic explanations of prosperity and development. The enduring challenge is how to enable structural change in situations where the market process does not seem to be working fast enough. This is an issue for developing and emerging economies. There is a move towards a mixed approach that combines upgrading in existing clusters with the systematic exploration of opportunities in related fields, as well as efforts to encourage more generally entrepreneurship and innovation.

Keywords: transformation, entrepreneurship, competitiveness

#### Introduction

Competitiveness and competitive spirit is the order of the day for any type of initiatives in the social system worldwide. At one side new and innovative business units emerge and on the other side there are challenges faced by the business organizations due to daily update and development leading to competition. Thus, the productive activity arrangement in an economy and its different allocations provide consistent shift in the economic sectoral compositions. It is measured by share of output and employment, continuous structural transformation is responsible for improved economic growth.

#### Structural change

The parameters of an entity could be changed due to structural changes which may have a long-term impact this may result in a shift in primary production to sophisticated technology driven entrepreneurial activities. Due to urbanization labour intensive activities in relation to entrepreneurship which may grow faster.

The capital accumulation will pave the way to grow more sophisticated technology intensive sector. Sustained economic growth was experienced by Latin American countries till 1980. In Asia Japan was the pioneer in the new entrepreneurship through structural changes. In the last twenty years China remains to be largest beneficiary of entrepreneurship through structural changes

#### **Opportunities**

Identification of opportunities through entrepreneurship has become very progressive today. The entrepreneurship is a major source of drive to the development of economy. To large extent new innovations paves the way for progressive development of entrepreneurship, thereby structural transformation is possible. Skilled labour force will be the driving force in entrepreneurship through structural transformation, the bargaining power of larger concerns also influences the structural formation of the entrepreneurship, new innovations stimulate the service sector to thrive well in structural transformation of entrepreneurship. This study focuses on identification of the sectors which could help regional economic development. Allocation and identifications of sectors are considered to be very significant in this study.

There are significant similarities and complementarities that connect the competitiveness approach with the new work on structural transformation. Many of these approaches share a sector-specific perspective on microeconomic structures, moving beyond macroeconomic, economy- wide or microeconomic explanations of prosperity and development.

#### **Transformational focus**

The focus of structural transformation is sectoral composition as a basic driver of development, with emphasis on the set of industries a location which could attract to achieve prosperity growth. The structural transformation my push the development of industries found in economies that are similar but already more advanced, using industry-specific improvements in competitiveness fundamentals. It is focused on identifying those sectors which could achieve higher levels of prosperity. It sees the choice and implementation of policy instruments as they are largely operational. The structural transformation has the poor track record of firm- and sector-specific policies as being more related to poor sectoral choices. In spite of these differences, there has been a visible convergence in the views on policy. structural transformation-based approaches have to find policy instruments to enable the emergence of more productive activities

#### Factors responsible for structural change to trigger productivity growth:

- 1. Economies with revealed comparative advantage in primary products are at disadvantage .
- 2. Countries with competitive or undervalued exchange rate experience enhancing structural transformation.

3. Countries with more dynamic labour market experience greater growth enhancing structural transformation.

Policies that lead to higher productivity are also positive for growing exports. But there are policies like devaluation and lowering wages that support higher exports, which do not raise productivity, but could reduce e prosperity. It is this difference in policy recommendations that has ignited the controversial term competitiveness

The competitive frame work we could find Micro as well as macroeconomic factors:

- a) Quality of business environment, state of cluster development, and sophisticated company operation strategy are come under micro competitiveness.
- b) Sound monetary and fiscal policies, and Human development and effective public institutions are come under macro competitiveness.

The contribution of competitiveness led to progressive development of economy through three stages, they are:

- a) Factor Driven economy,
- b) Investment driven economy, and
- c) Innovator driven economy

**Under factor driven economy**: There will be political, fiscal and legal stability the cost of doing business used to be lower Human capital development will be concentrated.

**Under Investment driven economy**: There will be incentive to improve productivity, Advanced infra structure would be adopted

**Under innovation driven economy**: Innovations and discoveries will be encouraged Advanced technology would be adopted There will be growth in the scientific and advanced technological institutions tend to grow competitiveness framework provides a structure to describe and analyze economic development, which are largely seen as the result of specific policy choices and actions.

# Upgrading of policies on competitiveness and its influence on structural transformation:

Competitiveness policy reveals a strong focus on clarifying the goals and motivations for economic policy: government should take action where there are market failures that policy is able to effectively and efficiently address. The competitiveness framework sees clusters as key elements of a location's economic structure that emerge naturally in market processes, while government policies have a significant influence on cluster evolution Government should instead focus on providing information about cluster presence, convening cluster groups, and investing in cluster-specific is seems to be very important.

The benefits of improving one dimension of competitiveness, the level of workforce skills, depend on the quality of many other aspects of competitiveness Location-specific diagnostics need to drive the selection of priority policies The policy-oriented work on competitiveness has placed significant emphasis on how to effectively implement policies

#### Competitiveness to be the key element of structural transformation

Structural transformation as an endogenous process in response to factor accumulation, increasing wealth, and sector-specific properties of demand and production functions. Subsequent studies have emphasized that development is associated, not only with a shift into different activities, but also with diversification into a broader set of activities

#### Conclusion

The discussion of the competitiveness framework and its relationship to the entrepreneurship on structural transformation has revealed differences, but also a significant degree of conceptual affinity. What is emerging can be described as an integrated view that captures both the role of competitiveness fundamentals and industrial composition in driving productivity and prosperity outcomes. The enduring challenge is how to enable structural change in situations where the market process does not seem to be working fast enough. This is an issue for developing and emerging economies. There is a move towards a mixed approach that combines upgrading in existing clusters with the systematic exploration of opportunities in related fields, as well as efforts to encourage more generally entrepreneurship and innovation.

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## **Economic Development and Income Generation through Micro Finance: A Women SHGs Perspective in Tirunelveli District**

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&

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#### Abstract

The economic development of any country aims at bringing out changes in society at the grass root level rather than modernization initiated by the reform process in the country. The concept of inclusive growth is the major driving force that aims at inclusion of all segments of the people in the process of growth and development. Micro finance as a strategy with a broad range of financial services, such as loans, deposits, payment services, remittances, pension and insurance to poor and low-income households more particularly the women flock in rural areas. This study aims at understanding the role that micro finance which plays a major role in elevation of women entrepreneurship. A sample study has been conducted on the self-help groups in Tirunelveli District of Tamil Nadu. This study covers SHGs with a sample size of 174 members. A field survey method has been adopted to collect the data and the result shows that irrespective of age, marital status, family size and number of members, the SHG members are able to venture any business and earn the income.

Keywords: Empowerment, Development, Self-Help Group, Social Awareness

#### Introduction

Entrepreneurship as a distinct factor of production contributes to the economic development of an economy. The wide range of significant contributions that entrepreneurship makes to the economic development include promotion of capital formation, creation of immediate large-scale employment, promotion of balanced regional development, effective mobilization of capital and skill, induction of backward and forward linkages and the like. The overall role of entrepreneurship in economic development of an economy is put as "an economy is the effect for which entrepreneurship is the cause." India being one of the largest countries though bestowed with adequate natural resources and human potentials, its development is lopsided. The twin causes, that is, wide inequality between urban and rural on one hand and under utilization of human resources on another hand, attributes to such imbalanced economic development. These

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have made the lives of Indian citizens, humanly impossible, as they have to cater to day-to-day needs of the family that are essential for their survival.

The central theme of the Millennium Development Goals is the reduction of poverty in all its forms. These goals emphasize human development indicators, especially those relating to women and children, to enable people to live a life of dignity. India is described as an over-banked but underserviced economy. India has commercial banks in the Public Sector and the Private Sector, Regional Rural Banks and a large number of Co-operative Banks all catering to the different needs of the people. Despite this, many of the people remain outside the purview of the banking system.

#### **Financial inclusion**

Financial exclusion becomes more concern in the community when it applies to lower income consumers and/or that in financial hardship. There is a large overlap between poverty and permanent financial exclusion. Both poverty and financial exclusion result in a reduction of choices which affects social interaction and leads to reduced participation in society. Financial inclusion can also be defined as the ability of individuals to access appropriate financial services. The barriers to access the formal banking system have been identified as related to culture, education (especially financial literacy), gender, income and assets, proof of identity, remoteness of residence and so on. Efforts are being made by the authorities- especially banking regulators to improve access to affordable financial services through financial education, leveraging technology and generating awareness.

#### **Micro-finance**

Micro finance as a strategy involves the provision of a broad range of financial services, such as loans, deposits, payment services, remittances, pension and insurance to poor and low-income households. It aims at providing affordable financial services namely, access to payments/ remittance facilities, savings, loans and insurance services to the un-banked, social and economic inclusion of un-banked/counseling and creating opportunities for the poor by offering them choices and encouraging Self Esteem.

Micro finance through the self-help groups has a lot of role to play in the social entrepreneurship as well as women empowerment. Economically poor individual gains strength as part of a group. Besides, financing through SHGs reduces transaction costs for both lenders and borrowers. While lenders have to handle only a single SHG account instead of a large number of small-sized individual accounts, borrowers as a part of a SHG cut down expenses on travel (to and from the branch and other places) for completing paper work and on the loss of workdays in canvassing for loans. A Non-Governmental Organization (NGO) is a voluntary organization established to undertake social intermediation like organizing SHGs of micro entrepreneurs and entrusting them to banks for credit

linkage of financial intermediation like borrowing bulk funds from banks for onlending to SHGs.

A study on Indonesia (Drioadisuryo and Cloud, 1999) suggests that when agencies, Government and non Government, in a developing country make credit available to low income women, they can reduce the costs of delivery, greatly increase repayment rates and substantially improve the well-being of poor families. Hiatt and Woodworth (2006), in their study on Central America found that microfinance clients' socio- economic levels had increased due to their continued participation. Micro credit appears to improve the lives of those who are poor by increasing their buying and investing capability, this lifting them onto a higher economic plane. Accordingly, these small loans seem to positively affect poverty by creating entrepreneurship and greater self-reliance among the poor. SHGs now constitute the gross roots level institutions developed for social / economic and financial intermediation with a focus on the poor. The SBLP is "overwhelmingly based on the principle of financial services being related to the cash flows of the low-income client groups and thus aim to facilitate relatively frequent and very small or micro-loan and saving transactions" (Sinha, 2003).

#### **SHG Models for Growth**

In the financial year 2007-08, Microfinance in India through its two major channels- Self-Help Group Bank Linkage Programme (SBLP) and MFIs served over 33 million Indians, up by 9 million over the previous year. 4 out of 5 microfinance clients in India are women. As per data available on 31st March 2008, the outstanding micro-credit portfolio on India Microfinance was about Rs.22, 000 Crore. 75 per cent are accounted for by SBLP, 20 per cent by large MFIs and 5 per cent by medium and small MFIs. SBLP reports that over Rs.3,500 Crore savings of SHG members in the year 2006-07. MFIs are prohibited from accepting savings; however one third of the clients are served under the SHG model and thus encouraged to save among them and / or open savings accounts with banks. The successful Models of financing for SHG's which are being used worldwide include:

**Model I:** An Intermediate Model that works on banking principles with focus on both savings and credit activities and where banking services are provided to the clients either directly or through SHGs.

**Model II:** A Wholesale banking Model, where the clients comprise of NGOs, Micro Finance Institutions (MFIs) and SHG Federations. This Model involves a unique package of providing both loans and capacity building support to its partners.

**Model III:** An Individual Banking-based Model that has its clients as individuals or joint liability groups. While programme management and client appraisal in this Model may be a challenge, it is best suited to lending to enterprises.

Keeping these validated models for delivery of credit to the poor and the unorganized sector in view, Reserve Bank of India is moving towards a systems perspective for providing effective policy support not only because a number of different institutions, Viz, banks, MFIs, NGOs and SHGs are involved, but also because these institutions have very different institutional goals. With this in view, a series of initiatives is being planned for putting in place a more vibrant microfinance dispensation environment in the country where complementary and competitive models of microfinance delivery would be encouraged to co-exist. Of these models under the Self-Help Group Bank Linkage Programme (SBLP), the Model II Viz, SHGs promoted by NGOs/ Government agencies and financed by banks has emerged as the most dominant model in case of India.

#### Status of women

The rural women have heavy work load with dual responsibility for both farm and household activities. Taking the economy as a whole, women perform twothirds of the work but earn only one tenth of the income. If the goal of the economic development includes improved standards of living, removal of poverty, access to dignified employment and reduction in inequality, through proper utilization of available resources, then it is quite natural to start with women. Women are the leaders, bankers, savers and also tiny depositors. Women have built up social networks and facilitate the creation of social capital. On this basis empowering women folk become inevitable.

Empowering women begins only a stage when they become economically independent. To make them economically independent, it is essential that they should be employed either by seeking employment or generating their own income. And hence, initiating self-employment has become a necessity rather than an option to focus on balanced economic development, which has given birth to the formulation of self-help groups for emancipating rural women.

Self-help groups are usually informal groups whose members have a common perception of need and importance towards collective action. These groups promote savings among members and use the pooled resources for multi dimensional development. The number of members in SHGs is normally ranges from 10 to 20, it is expected that within the group, there should be true democratic culture in which all the members must participate actively in the decision making process. Becoming a member in SHG ensures women to become socially and politically empowered. The concept of SHG generally rejuvenate the rural women as it helps in breaking the vicious circle of poverty among women, thereby to become economically viable.

#### **Objectives of the study**

The study has been conducted keeping in mind the role of micro finance in women SHG's.

The specific objectives of the study include:

- 1. To get an insight about conceptual / functional framework of micro finance and operational model of Self-Help Groups.
- 2. To study the impact of micro finance in empowering the socio-economic status of members of SHGs resulting in development of entrepreneurship.

#### **Research Methodology**

This study ventures to understand and assess the role of SHGs situated in Tirunelveli District which is covered by agricultural occupation with both urban and rural areas. This study covers a sample size of 174 SHG members. Field survey method was followed to collect the data by administering an interview schedule. The primary data has been collected by way of administering an interview schedule.

#### Statistical Tools

Standard deviation, Percentage analysis, ANOVA were the major research tools used in the study.

#### **Results and Analysis**

- \*\* The maximum number of members are limited to 20, while 12 is fixed as the minimum. These groups promote savings among its members by fixing certain amount as a minimum savings which varies from group to group, the frequency of which ranges between weekly to monthly, according to the convenience of the member of the respective group. Of the 10 groups, 6 groups meet once in a week and 4 groups meet once in a month to discuss about the working of the group.
- \*\* 70 per cent of the respondent groups have more than 17 persons and less than 20. The mean equals 16.6. Standard deviation is 2.65. Number of members in a group on an average is 17 members and there are 2.65 deviations from the mean from all the groups. Hence there exists a large variation in the number of members in the group. The average age of the respondents (calculated by mean) is 31.12 years. And standard deviation is 9.32. This shows that the average age of the members is 31 years and there is a deviation of 9.32 from the mean. Hence there exists a large variation in the age of members in the group.
- \*\* Marital status have a greater influence on the decision making power of a women in a country like India. The participation of married women is more than the unmarried, as the married are determined in improving their socio-economic status. At the same time, SHGs also empower widows by providing regular thrift and credit. 50 per cent of the members are from a family size of three to six members. This leads to the necessity of earning income for medium and large size families. The members earning in the family other than the respondent shows that 86.21 per cent have only one and almost no earning members in the family. This shows the initiative taken by the members and the degree of interest in participating as a member in a group for the efficient

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conduct of the group. The major proportion of the married women participating in SHGs has made the study to find out as to the source of motivation to join SHGs.

- \* A woman may become a member of SHG either on her own initiative or motivated by friends or by influenced by other agencies. As far as the duration of membership is concerned, it could be seen that 8.62 per cent of the respondents have been the members for a period of less than one year, 21.27 per cent and 25.86 per cent have been the members for one year and one to two years respectively. It could also be inferred that only 44.25 per cent are holding membership for more than two years. The consistency in the period of membership is lower because of less popularity. Friends and NGOs play a vital role in inspiring the individuals to join SHGs. Other sources like bank officials and employment exchanges also influence them to become the members in SHGs.
- \* Among various types of business, mate making ranks the first place, Agarpathi preparation the second place and brick manufacturing as the third place. As far the increase in income after joining SHGs is concerned only 13.80 per cent of the respondents get an increase of Rs.300-500 and 86.20 per cent earn an increased amount of Rs.100-200 per day.
- \*\* This increase in income level has resulted in better standard of living and the inculcating social awareness in the minds of the members. The social awareness includes sanitary, family and public dimensions. Sanitary awareness means using of toilets, drinking of safe water, using of eco-friendly paper bags and paper cups and understanding of environment problems. Family awareness includes imparting of education to children, awareness of taking family decision regarding expansion and abolition of child marriages. Public awareness includes implementation of useful programmes to the general public like abolition of liquor, adult education, creation of awareness of property rights and the like.
- \* The impact of demographic variables namely, age, marital status, family size and number of earning members on the type of ventures started is studied by framing a hypothesis:" Demographic factors do not have an influence on the ventures started by the SHG members" and the hypothesis is tested with the help of ANOVA (Single factor). It is evident that the calculated values (F value) are lesser than the table values (F critical) and it implies that there is no relationship between the demographic factors and the type of ventures.
- \* Irrespective of the age, marital status, family size and number of earning members, the SHG members engage in the various types of ventures. The impact of demographic variables namely, age, marital status, family size and number of earning members on the increase in income is studied by framing a hypothesis: "Demographic factors do not have an influence on the increase

in income of the SHG members" and the hypothesis is tested with the help of ANOVA (Single factor).

- Irrespective of the age, marital status, family size and number of earning members, the SHG members earn income. This shows that irrespective of the demographic factors, they are able to start any business and earn an income up to Rs.500 per day. The economic status of members is elevated through the participating in SHGs. Micro credit leads to an increase in household income. The use of loans and deposits services can result in diversification of income sources or enterprise growth.
- \* Access to financial services enables members to build and change their mix of assets. Micro credit can be used for land acquisition, house construction or improvements or purchase of animals and consumer durables. Members can also use loans to make important investments in human assets such as health and education. For woman money management, greater control over resources and access to knowledge leads to greater choices and a voice in family and community matters. Economic empowerment is accompanied by growth in self-esteem, self-confidence and new opportunities. Micro finance members tend to have greater levels of savings than non-members, which is very important for building assets.

#### Conclusion

Research outcome states that SHGs have exhibited good results by empowering women to have self-confidence through economic independence. Women especially in rural areas have started playing a vital role through mobilizing savings and build the capital resources of the country through SHG. The economic status of the members is increased through venturing a business, thereby increasing the income. An emancipation of women in society will ensure to develop social network among the people and build socially, economically and technologically a strong nation. Government can contribute most effectively by setting sound macroeconomic policy that provides stability and low inflation which will be a means of rebuilding India.

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