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## *Research Papers*

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# MODELLING THE DRYING PROCESS OF COCOA POD HUSK AND DETERMINATION OF EFFECTIVE DIFFUSIVITY AND ACTIVATION ENERGY

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**ABSTRACT**
*One of the most important aspects of drying technology is the mathematical modelling of the drying processes. The objective is to allow design engineers to choose the most suitable operating conditions and then to size the drying equipment and drying chamber to meet the desired operating conditions. Drying experiment was carried out on fresh cocoa pod husk sliced into three different sizes (1/2, 1/4 and 1/8 pod sizes) and dried in three different drying systems thus, cabinet dryer (at 50°C, 60°C, 70°C, 80°C and 90°C drying air temperature), solar dryer and open sun drying. The change in moisture content of the cocoa pod husk was monitored at regular intervals of 30 mins until the moisture content of the sample became constant. The study evaluated the drying characteristics of cocoa pod husk as affected drying temperature and drying system. The moisture diffusivity values of the cocoa pod shows declining trend with decrease in the pod sizes and increase in drying air temperature and ranged between 5.814 × $10^{-10}$ and 24.852 × $10^{-10}$ $m^2/s$ with activation energy ranging between 25.12 and 31.85 kJ/mol. The Midili Kucuk ($0.989 \leq R^2 \leq 0.998$) and Hii et al ($0.983 \leq R^2 \leq 0.996$,) models were selected as the best model for predicting the drying characteristics of cocoa pod.*

*Keywords: Cocoa pod husk, Drying, Modelling, Effective Diffusivity, Activation Energy*

## 1 INTRODUCTION

Cocoa (*Theobroma cacao L.)* is claimed to be the only commercially cultivated and most prominent in the market among the 22 species of the *Theobroma genus*. The *Theobroma cacao* tree probably originated from divergent areas in Central and South America; the Upper Amazon region (10,000 – 15,000 years ago), the upper Orinoco region of North East Colombia and North West Venezuela, the Andean foothills of North West Colombia, Central America from southern Mexico (Chiapas-Usumacinta) to Guatemala (Young, 1994). **One of the** most important aspects of drying technology is the mathematical modelling of the drying processes. The objective is to allow design engineers to choose the most suitable operating conditions and then to size the drying equipment and drying chamber to meet the desired operating conditions (Hawlader *et al.,* 1997). **The principle of modelling is based on having a set of mathematical equations that can adequately characterize the system. In particular, the solution of these equations must allow the prediction of the process parameters as a function of time at any point in the dryer, based only on the initial conditions (Gunhan *et al.*, 2005).**

Over time, the models developed shown table 1 have been used in calculations involving the design and construction of new drying systems, optimization of the drying process, and the description of the entire drying behaviour including the combined macroscopic and microscopic medium of heat and mass transfer. Thus, it is important to understand the basic idea of modelling the drying kinetics of fruits and vegetables. The drying conditions, type of dryer, and the characteristics of the material to be dried all have an influence on drying kinetics. The drying kinetics models are therefore significant in deciding the ideal drying conditions, which are important parameters in terms of equipment design, optimization, and product quality improvement (Giri and Prasad, 2007). So, to analyse the drying behaviour of fruits and vegetables it is important to study the kinetics model of each particular product.

Before cocoa husk can be used to feed farm animals directly or as a component in the formulation of animal feeds, there is need to dry the cocoa husk to a safe moisture content level. After extraction of the beans having moisture content greater than the minimum for safe storage, there is a need for drying. It is therefore important to establish appropriate drying methods for cocoa husks and to evaluate their drying parameters. The objective of this work is to model drying process of cocoa pod and determine the effective diffusivity and activation energy.

## 2. MATERIALS AND METHODS

### 2.1 Materials

The fresh cocoa husks were cleaned and sorted. Approximately, the dimensions of these pod husks were 18 cm in length and 7 cm in width. They were sliced into three different sizes, half (1/2); one-quarter (1/4); and one eight (1/8)) of the cocoa husks with three replicates. The thickness of each sample was taken using a pair of

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vernier caliper. The initial and final moisture contents of each cocoa husk were noted before and after drying as $M_1$ and $M_2$. Three drying media were used in drying the cocoa husks which are electric cabinet dryer, $D_1$ (which was used to dry each sample at the different temperatures of 50, 60, 70, 80, and $90^0$C), solar cabinet dryer ($D_2$), and sun drying ($D_3$). The picture of the electric cabinet and solar cabinet dryers are shown in figure 1.

Solar cabinet dryer Electric cabinet dryer

Fig-1: The drying media used in drying the cocoa pod husks

### 2.2 Drying Trials

Three drying media were used in drying the cocoa husks which are electric cabinet dryer, solar dryer and open sun drying. The electric cabinet dryer was operated at five drying temperatures (50, 60, 70, 80 and $90^0$C). The change in moisture content of the cocoa pod husk was monitored at regular intervals of 30 min. until the moisture content of the sample became constant for all the drying systems used. All the experiments were replicated three times at each temperature and the average weight loss and moisture content were reported.

### 2.3 Determination of Initial Moisture Content

Moisture content of the fresh cocoa pod was determined by the standard oven drying method. At regular time intervals during the drying processes, samples were taken out for moisture content determination by standard oven method. Weighing was performed on a digital balance, and then moisture content (w.b.) was calculated using equation (1) and the measurements were made in triplicate.

$$MC = \frac{M_W - M_d}{M_W} X\ 100 \qquad 1$$

**Table-1: Some thin layer drying models.**

| Model Name | Model Equation | References |
|---|---|---|
| Newton | MR = exp (-kt) | Togrul and Pehlivan (2004) |
| Page | MR = exp ($-kt^n$) | Kaleemulla and Kailapan (2006) |
| Modified Page | MR = exp ($-(kt)^n$) | Goyal *et al.* (2007); Ceylan *et al.* (2007), Sogi *et al.* (2006); |
| Henederson and Pabis | MR = aexp(-kt) | Kashaninejad *et al.* (2007) and Saeed *et al.* (2008); |
| Logarithmic | MR = aexp(-kt) + c | Babalis *et al.* (2006); Celma *et al.* (2007); |
| Two-two | MR = aexp($-k_0t$) + bexp ($-k_1t$) | Lahsani *et al.* (2004); and Wang *et. al.* (2007). |
| Two-term exponential | MR = aexp(-kt) + (1 +a) exp(-kat) | Midili and Kucuk (2003); Sacilik *et al.* (2006); Tarigan *et al.* (2007) ; |
| Wang and Singh | MR = 1+ at +$bt^2$ | Wang and Singh (1978); |
| Approximation of diffusion | MR = aexp(-kt) + (1 - a) exp(-kbt) | Wang *et al.* (2007); |
| Modified Henderson and Pabis | MR = aexp(-kt) + bexp (-gt) + cexp (-bt) | Karathanos (1999); |
| Verma *et al.* | MR = aexp(-kt) + (1 +a) exp(-gt) | Doymaz (2005); |
| Midilli and Kucuk | MR = aexp ($-kt^n$ + bt) | Midilli *et al.* (2002) |

Where MR = moisture ratio (dimensionless); a, b, c, g, h, k, $k_1$, $k_2$ and n = drying constants; t = drying time (h).

### 2.4 Determination of Effective Diffusivity and Activation Energy

The effective moisture diffusivity of drying cocoa husks was calculated using Crank's equation (1975), assuming the shape of drying cocoa husks is a slab with negligible shrinkage and that moisture migration was

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due to diffusion with a constant temperature and diffusion coefficient (El-Beltagy *et al.*, 2007). The equation is given as

$$MR = \frac{6}{\pi^2}\sum_{n=1}^{\infty}\frac{1}{(2n-1)^2}e^{\left(\frac{(2n-1)^2\pi^2 D_{eff}\,t}{L^2}\right)} \quad (2)$$

where $D_{eff}$ is moisture diffusivity ($m^2/s$), L is the thickness of the slab in (m), and t is time (s). For long drying durations, the above Equation can be simplified to an equation in the form

$$\ln(MR) = \ln\left(\frac{6}{\pi^2}\right) - \frac{\pi^2 D_{eff}\,t}{L^2} \quad (3)$$

The activation energy was also calculated by using the Arrhenius relation as reported by Singh and Gupta (2007), which is presented as

$$D_{eff} = D_0 e^{-\left(\frac{Ea}{RT}\right)} \quad (4)$$

Where T is temperature (K); R is gas constant having a constant value of $8.314x10^{-3}$ kJ/mol $K^{-1}$; $D_0$ is Arrhenius constant; and Ea is activation energy (kJ/mol). Ea/R was obtained as the slope of the straight line of nature log of $D_{eff}$ vs. 1/T.

## 3. RESULT AND DISCUSSION

### 3.1 Moisture Diffusivity under Different Conditions of Drying

Variations in moisture ratio (MR) with drying time under different drying air temperature and drying system for $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{8}$ pod size of cocoa husk was used to determine the effective moisture diffusivity. The changes in ln (*MR*) with respect to time were found to be linear with a negative slope, as was expected. As the drying temperature was increased from 50 to 90$^{o}$C, the slope became steeper indicating that increase in drying temperature caused an increase in the drying rate and thus a faster depletion in moisture ratio. Moisture diffusivities were calculated from the slopes of these lines using equation 1 and the estimated values for different drying conditions are given in Table 2. Moisture diffusivity values of the cocoa pod husk under declining trend of moisture diffusivity was observed with decrease in the pod sizes. The one-dimensional moisture transport phenomenon for different drying conditions ranged between $7.791\times 10^{-10}$ and $24.852 \times 10^{-10}$ $m^2/s$ for cabinet dryer, $7.557\times 10^{-10}$ and $8.941 \times 10^{-10}$ $m^2/s$ for solar dryer and $5.814 \times 10^{-10}$ and $9.644 \times 10^{-10}$ $m^2/s$ for open sun drying and similar trend was observed for the activation energy (Ea) that ranges between 25.02kJ/mol and 31.85kJ/mol. Similar values of moisture diffusivities have been reported earlier for drying of various agricultural products like garlic (Madamba *et al.* 1996), potato products (Pinthus *et al.* 1997), and peach slices (Kingsly *et al.*, 2007).

Moisture diffusivity show an increasing trend with increase in drying air temperature in the cabinet dryer, which was attributed to increase in commodity temperature and vapor pressure that promoted mass transfer. Similarly, it can be seen that the effective moisture diffusivity values increases when the pod size was increased for constant drying air temperature. This is due to the increase in heat and mass transfer coefficients on the surface of the sample with decrease in the pod total surface area.

### 3.3 Mathematical Modeling of Drying Behavior

The results of statistical analyses undertaken on thirteen thin layer drying mathematical models for cabinet dryer operated at drying air temperatures of 50, 60, 70, 80 and 90 $^{O}$C are given in Tables 3 to 7 respectively. The models were evaluated based on the coefficient of determination value ($R^2$), chi-square ($\chi^2$) and root mean square error (RMSE) as reported by Ertekin and Yaldiz (2004) and Gunhan *et al.* (2005). These curve fitting criteria for the thirteen models were also shown in Table 3 to 7. For cabinet temperature of 50, 60 and 90 $^{O}$C, the Midili Kucuk model was the best descriptive model that accurately describes the drying behavior of the pod size of cocoa husk selected in this study as shown in Tables 3, 4 and 7 respectively. Generally, coefficient of determination value ($R^2$), chi-square ($\chi^2$) and root mean square (RMSE) values varied between 0.865 and 0.998, 0.015 and 0.123, and 0.000 and 0.017 respectively. From Tables 3, 4, and 7, it was obtained that the $R^2$, RMSE and $\chi^2$ for the best mathematical model (Midili Kucuk model) ranges from 0.989 - 0.998, 0.015-0.044, and 0.000 – 0.002. However, for cabinet dryer at temperature of 60 and 70 $^{O}$C, the Hii *et al.* model was the best descriptive model that accurately describes the drying behavior of the pod size of cocoa husk selected in this study as shown in Tables 5 and 6 respectively. From Tables 4 and 5, it was observed that the $R^2$, RMSE and $\chi^2$ for the best mathematical model (Hii *et al.* model) ranges from 0.983 - 0.996, 0.019-0.0711, and 0.000 – 0.004.

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Hence, the Midili Kucuk and Hii *et al.* gave better prediction than other models, and satisfactorily described drying characteristics of cocoa pod husk at forced convection mode in a cabinet dryer.

For natural convection mode under open sun and solar drying system, the Midilli Kucuk model was the best descriptive model as shown in Tables 8 and 9. From Table 8, it was determined that $R^2$, RMSE, and $\chi^2$ value of the best model for open sun drying system ranges between 0.9969 - 0.9980, 0.0148 -0.0175, and 0.0002 – 0.0076 for three different pod sizes used in this study, and from Table 9, it was gotten that $R^2$, RMSE, and $\chi^2$ value for the best model for the solar drying system model ranges between 0.9916 - 0.9980, 0.0155 -0.0318, and 0.0011 – 0.0176 for three different pod size of cocoa husk. The results have shown that the highest values of $R^2$ and the lowest values of $\chi^2$ and RMSE could be obtainable with the Midili Kucuk drying model. Thus, this model may be assumed to represent open sun drying and solar drying behaviour of cocoa husk in thin layers. Nevertheless, the validation of the best model was analysed by determination of the degree of linearity between the experimental data and the data gotten from the best thin layer drying mathematical model. The validation plot show a very high degree of linearity between the predicted and the observed data and therefore it can be used to effectively and efficiently predict the drying behavior of cocoa pod husk with degree of accuracy of about 99.75 and 99.52% in open sun drying and solar drying respectively, and 99.73, 99.60, 99.42, 99.00, and 99.54% for 50, 60, 70, 80 and 90 $^{O}$C respectively, in the cabinet dryer.

**Table-2: Effective moisture diffusivity and Activation energy**

| | **Drying system** | **Temperature** | **Pod size** | | |
|---|---|---|---|---|---|
| | | | **1/2** | **1/4** | **1/8** |
| $D_{eff}$ x $10^{-10}$ | Sun | | 9.644 | 8.446 | 5.814 |
| | Solar | | 8.941 | 7.557 | 7.842 |
| | Cabinet | 50 °C | 12.222 | 10.436 | 10.212 |
| | | 60 °C | 13.247 | 7.791 | 9.721 |
| | | 70 °C | 17.202 | 12.795 | 12.535 |
| | | 80 °C | 14.067 | 9.724 | 10.049 |
| | | 90 °C | 24.852 | 20.463 | 20.444 |
| Do | Sun | | 8.652 | 7.615 | 5.298 |
| | Solar | | 8.063 | 6.849 | 7.151 |
| | Cabinet | 50 °C | 11.376 | 9.744 | 9.539 |
| | | 60 °C | 12.499 | 7.405 | 9.214 |
| | | 70 °C | 16.332 | 12.197 | 11.952 |
| | | 80 °C | 13.499 | 9.364 | 9.674 |
| | | 90 °C | 23.817 | 19.655 | 19.637 |
| Ea | Sun | | 29.232 | 27.909 | 25.019 |
| | Solar | | 29.057 | 27.641 | 25.911 |
| | Cabinet | 50 °C | 29.795 | 28.504 | 28.330 |
| | | 60 °C | 28.965 | 25.295 | 26.698 |
| | | 70 °C | 30.205 | 27.862 | 27.705 |
| | | 80 °C | 27.374 | 25.107 | 25.288 |
| | | 90 °C | 31.845 | 30.152 | 30.143 |

**Table-3: Model constant and goodness of fit parameter for cabinet drying (50 °C)**

| **Pod size** | **Model** | **Model constant** | **$R^2$** | **RMSE** | **SEE** | **$X^2$** |
|---|---|---|---|---|---|---|
| ½ | Newton | k = 0.0646 | 0.9649 | 0.0929 | 0.0938 | 0.0088 |
| | Henderson and Pabis | k = 0.0762, a = 1.1647 | 0.9523 | 0.0718 | 0.0731 | 0.0000 |
| | Page | k = 0.0085, n = 1.7512 | 0.9961 | 0.0203 | 0.0207 | 0.0034 |
| | Logarithmic | k = 0.0309, a = 1.8522, c = -0.766 | 0.9826 | 0.0418 | 0.0429 | 0.0092 |
| | Two term model | k = 0.0763, g = 0.0763, a = 1.1362, c = 0.0295 | 0.9522 | 0.0718 | 0.0744 | 0.0070 |
| | Verma et al. | k = -0.0013, g = -0.0001, a = -30.6528 | 0.9686 | 0.0562 | 0.0577 | 0.0035 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| | Diffusion approach | k = 0.1476, g = 1.0589, a = 20.3334 | 0.9915 | 0.0298 | 0.0306 | 0.0097 |
| | Midili Kucuk | k = 0.0032, b = 0.0024, a = 0.9519, n = 2.1414 | 0.9964 | 0.0189 | 0.0196 | 0.0076 |
| | Wang and Smith | a = -0.0435, b = 0.0003 | 0.9803 | 0.0494 | 0.0503 | 0.0097 |
| | Hii *et al.* | k = 0.0073, g = 0.0057, a = 1.0259, c = -0.0413, n = 1.7947 | 0.9962 | 0.0195 | 0.0205 | 0.0056 |
| | Modified Henderson & Pabis | k = -0.4076, a = -0.0005, g = -0.4076, b = -0.0005, h = 1.8963, c = 0.0293 | 0.9826 | 0.0418 | 0.0441 | 0.0095 |
| | Modified Page I | k = 0.0657, n = 1.7507 | 0.9961 | 0.0203 | 0.0207 | 0.0069 |
| | Modified Page I | k = 0.9828, a = 0.0486, n = 1.8092, L = 2.8955 | 0.9963 | 0.0195 | 0.0202 | 0.0093 |
| ¼ | Newton | k = 0.0847 | 0.9694 | 0.0924 | 0.0932 | 0.0087 |
| | Henderson and Pabis | k = 0.0996, a = 1.1794 | 0.9578 | 0.0716 | 0.0729 | 0.0053 |
| | Page | k = 0.0115, n = 1.7858 | 0.9971 | 0.0199 | 0.0202 | 0.0004 |
| | Logarithmic | k = 0.0613, a = 1.3949, c = -0.2809 | 0.9773 | 0.0503 | 0.0517 | 0.0027 |
| | Two term | k = 0.0994, g = 0.0978, a = 1.1495, c = 0.0297 | 0.9580 | 0.0716 | 0.0743 | 0.0055 |
| | Verma et al. | k = -0.0007, g = 0.0426, a = -0.4931 | 0.9726 | 0.0612 | 0.0629 | 0.0040 |
| | Diffusion approach | k = 0.1885, g = 1.0476, a = 25.3676 | 0.9927 | 0.0291 | 0.0299 | 0.0009 |
| | Midili Kucuk | k = 0.0058, b = 0.0016, a = 0.9574, n = 2.0678 | 0.9979 | 0.0153 | 0.0159 | 0.0003 |
| | Wang and Smith | a = -0.0618, b = 0.0009 | 0.9809 | 0.0549 | 0.0559 | 0.0031 |
| | Hii *et al.* | k = 0.0126, g = 0.0279, a = 1.0838, c = -0.102, n = 1.7672 | 0.9971 | 0.0187 | 0.0196 | 0.0004 |
| | Modified Henderson & Pabis | k = -0.211, a = 0.0046, g = -0.211, b = 0.0046, h = 1.5216, c = 0.0543 | 0.9774 | 0.0501 | 0.0530 | 0.0028 |
| | Modified Page I | k = 0.0824, n = 1.7608 | 0.9969 | 0.0197 | 0.0200 | 0.0004 |
| | Modified Page I | k = 0.9758, a = 0.0409, n = 1.8467, L = 2.1947 | 0.9970 | 0.0190 | 0.0198 | 0.0004 |
| 1/8 | Newton | k = 0.1121 | 0.9665 | 0.0996 | 0.1005 | 0.0101 |
| | Henderson and Pabis | k = 2.1305, a = 0.1395 | 0.9515 | 0.0776 | 0.0790 | 0.0062 |
| | Page | k = 0.1286, n = 0.9412 | 0.9970 | 0.0189 | 0.0192 | 0.0004 |
| | Logarithmic | k = 0.1386, a = 1.0011, c = 0.0545 | 0.9859 | 0.0397 | 0.0408 | 0.0017 |
| | Two term | k = 0.1614, g = 0.0403, a = 0.8671, c = 0.1982 | 0.9514 | 0.0776 | 0.0805 | 0.0065 |
| | Verma et al. | k = 0.0237, g = 0.1344, a = 0.0974 | 0.9821 | 0.0495 | 0.0508 | 0.0026 |
| | Diffusion approach | k = 0.1121, g = 1, a = 3.0345 | 0.9902 | 0.0348 | 0.0357 | 0.0013 |
| | Midili Kucuk | k = 0.1266, b = 0.0016, a = 1.0457, n = 1.0047 | 0.9974 | 0.0171 | 0.0178 | 0.0003 |
| | Wang and Smith | a = -0.0776, b = 0.0015 | 0.9844 | 0.0481 | 0.0489 | 0.0024 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| | Hii *et al.* | k = 0.0575, g = 0.0046, a = 0.6804, c = 0.3086, n = 1.723 | 0.9971 | 0.0181 | 0.0190 | 0.0004 |
| | Modified Henderson & Pabis | k = 0.05, a = 0.0015, g = 0.05, b = 0.0015, h = 0.05, c = 0.1 | 0.9860 | 0.0395 | 0.0418 | 0.0017 |
| | Modified Page I | k = 0.0731, n = 1 | 0.9970 | 0.0189 | 0.0192 | 0.0004 |
| | Modified Page I | k = 1, a = 0.8, n = 0.9, L = 0.7 | 0.9974 | 0.0170 | 0.0177 | 0.0003 |

**Table-4: Model constant and goodness of fit parameter for cabinet drying (60 °C)**

| Pod size | Model | Model constant | $R^2$ | RMSE | SEE | $X^2$ |
|---|---|---|---|---|---|---|
| ½ | Newton | k = 0.0621 | 0.9356 | 0.1235 | 0.1246 | 0.0155 |
| | Henderson and Pabis | k = 0.0754, a = 1.1979 | 0.9168 | 0.1004 | 0.1022 | 0.0000 |
| | Page | k = 0.0019, n = 2.2767 | 0.9947 | 0.0302 | 0.0307 | 0.0050 |
| | Logarithmic | k = 0.0148, a = 3.3225, c = -2.2323 | 0.9660 | 0.0621 | 0.0638 | 0.0195 |
| | Two term model | k = 0.0754, g = 0.0753, a = 1.1689, c = 0.0295 | 0.9167 | 0.1004 | 0.1041 | 0.0120 |
| | Verma et al. | k = -0.0048, g = -0.0008, a = -8.8781 | 0.9580 | 0.0713 | 0.0732 | 0.0051 |
| | Diffusion approach | k = 0.152, g = 1.0708, a = 19.5082 | 0.9781 | 0.0513 | 0.0527 | 0.0108 |
| | Midili Kucuk | k = 0.0005, b = 0.0028, a = 0.9372, n = 2.8003 | 0.9964 | 0.0201 | 0.0208 | 0.0118 |
| | Wang and Smith | a = -0.036, b = -0.0001 | 0.9594 | 0.0709 | 0.0722 | 0.0171 |
| | Hii *et al.* | k = 0.0031, g = 0.0128, a = 1.104, c = -0.1482, n = 2.1387 | 0.9947 | 0.0257 | 0.0269 | 0.0106 |
| | Modified Henderson & Pabis | k = -0.9873, a = -0.0006, g = -0.9873, b = -0.0006, h = 3.0663, c = 0.0158 | 0.9660 | 0.0621 | 0.0656 | 0.0188 |
| | Modified Page I | k = 0.064, n = 2.1503 | 0.9937 | 0.0286 | 0.0291 | 0.0115 |
| | Modified Page I | k = 0.9707, a = 0.0376, n = 2.2844, L = 3.7781 | 0.9942 | 0.0263 | 0.0272 | 0.0173 |
| ¼ | Newton | k = 0.1024 | 0.9682 | 0.0646 | 0.0652 | 0.0043 |
| | Henderson and perbis | k = 0.1152, a = 1.1261 | 0.9698 | 0.0526 | 0.0536 | 0.0029 |
| | Page | k = 0.0141, n = 1.8533 | 0.9885 | 0.0599 | 0.0609 | 0.0037 |
| | Logarithmic | k = 0.1244, a = 1.1282, c = 0.0212 | 0.9688 | 0.0535 | 0.0550 | 0.0030 |
| | Two term model | k = 0.1163, g = 0.0914, a = 1.0976, c = 0.0299 | 0.9698 | 0.0526 | 0.0546 | 0.0030 |
| | Verma et al. | k = -0.0006, g = 0.0827, a = -0.0963 | 0.9581 | 0.0643 | 0.0660 | 0.0044 |
| | Diffusion approach | k = 0.2061, g = 1.0406, a = 23.9537 | 0.9848 | 0.0413 | 0.0424 | 0.0018 |
| | Midili Kucuk | k = 0.0067, b = 0.0034, a = 0.9216, n = 2.2177 | 0.9956 | 0.0239 | 0.0248 | 0.0006 |
| | Wang and Smith | a = -0.0823, b = 0.0018 | 0.9853 | 0.0437 | 0.0445 | 0.0020 |
| | Hii *et al.* | k = 0.0207, g = 0.0156, a = 1.028, c = -0.0674, n = 1.6531 | 0.9820 | 0.0504 | 0.0528 | 0.0028 |
| | Modified Henderson & Pabis | k = 0.0184, a = 0.005, g = 0.0184, b = 0.005, h = 1.1193, c = 0.1302 | 0.9673 | 0.0548 | 0.0579 | 0.0034 |
| | Modified Page I | k = 0.1017, n = 1.3505 | 0.9820 | 0.0446 | 0.0454 | 0.0021 |
| | Modified Page I | k = 1.0478, a = 0.0582, n = 1.2446, L = 0.9692 | 0.9807 | 0.0440 | 0.0456 | 0.0021 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| 1/8 | Newton | k = 0.1121 | 0.9712 | 0.0748 | 0.0755 | 0.0057 |
| | Henderson and Pabis | k = 2.1305, a = 0.1395 | 0.9655 | 0.0613 | 0.0624 | 0.0039 |
| | Page | k = 0.1286, n = 0.9412 | 0.9943 | 0.0264 | 0.0269 | 0.0007 |
| | Logarithmic | k = 0.1386, a = 1.0011, c = 0.0545 | 0.9732 | 0.0522 | 0.0536 | 0.0029 |
| | Two term model | k = 0.1614, g = 0.0403, a = 0.8671, c = 0.1982 | 0.9655 | 0.0613 | 0.0636 | 0.0040 |
| | Verma et al. | k = 0.0237, g = 0.1344, a = 0.0974 | 0.9716 | 0.0579 | 0.0594 | 0.0035 |
| | Diffusion approach | k = 0.1121, g = 1, a = 3.0345 | 0.9917 | 0.0294 | 0.0302 | 0.0009 |
| | Midili Kucuk | k = 0.1266, b = 0.0016, a = 1.0457, n = 1.0047 | 0.9959 | 0.0224 | 0.0233 | 0.0005 |
| | Wang and smith | a = -0.0776, b = 0.0015 | 0.9866 | 0.0436 | 0.0444 | 0.0020 |
| | Hii *et al.* | k = 0.0575, g = 0.0046, a = 0.6804, c = 0.3086, n = 1.723 | 0.9951 | 0.0247 | 0.0259 | 0.0007 |
| | Modified Henderson & Pabis | k = 0.05, a = 0.0015, g = 0.05, b = 0.0015, h = 0.05, c = 0.1 | 0.9735 | 0.0519 | 0.0548 | 0.0030 |
| | Modified Page I | k = 0.0961, n = 1 | 0.9943 | 0.0264 | 0.0269 | 0.0007 |
| | Modified Page I | k = 1, a = 0.8, n = 0.9, L = 0.7 | 0.9950 | 0.0247 | 0.0256 | 0.0007 |

**Table-4: Model constant and goodness of fit parameter for cabinet drying (60 °C)**

| Pod size | Model | Model constant | $R^2$ | RMSE | SEE | $X^2$ |
|---|---|---|---|---|---|---|
| ½ | Newton | k = 0.0621 | 0.9356 | 0.1235 | 0.1246 | 0.0155 |
| | Henderson and Pabis | k = 0.0754, a = 1.1979 | 0.9168 | 0.1004 | 0.1022 | 0.0000 |
| | Page | k = 0.0019, n = 2.2767 | 0.9947 | 0.0302 | 0.0307 | 0.0050 |
| | Logarithmic | k = 0.0148, a = 3.3225, c = -2.2323 | 0.9660 | 0.0621 | 0.0638 | 0.0195 |
| | Two term model | k = 0.0754, g = 0.0753, a = 1.1689, c = 0.0295 | 0.9167 | 0.1004 | 0.1041 | 0.0120 |
| | Verma et al. | k = -0.0048, g = -0.0008, a = -8.8781 | 0.9580 | 0.0713 | 0.0732 | 0.0051 |
| | Diffusion approach | k = 0.152, g = 1.0708, a = 19.5082 | 0.9781 | 0.0513 | 0.0527 | 0.0108 |
| | Midili Kucuk | k = 0.0005, b = 0.0028, a = 0.9372, n = 2.8003 | 0.9964 | 0.0201 | 0.0208 | 0.0118 |
| | Wang and Smith | a = -0.036, b = -0.0001 | 0.9594 | 0.0709 | 0.0722 | 0.0171 |
| | Hii *et al.* | k = 0.0031, g = 0.0128, a = 1.104, c = -0.1482, n = 2.1387 | 0.9947 | 0.0257 | 0.0269 | 0.0106 |
| | Modified Henderson & Pabis | k = -0.9873, a = -0.0006, g = -0.9873, b = -0.0006, h = 3.0663, c = 0.0158 | 0.9660 | 0.0621 | 0.0656 | 0.0188 |
| | Modified Page I | k = 0.064, n = 2.1503 | 0.9937 | 0.0286 | 0.0291 | 0.0115 |
| | Modified Page I | k = 0.9707, a = 0.0376, n = 2.2844, L = 3.7781 | 0.9942 | 0.0263 | 0.0272 | 0.0173 |
| ¼ | Newton | k = 0.1024 | 0.9682 | 0.0646 | 0.0652 | 0.0043 |
| | Henderson and Pabis | k = 0.1152, a = 1.1261 | 0.9698 | 0.0526 | 0.0536 | 0.0029 |
| | Page | k = 0.0141, n = 1.8533 | 0.9885 | 0.0599 | 0.0609 | 0.0037 |
| | Logarithmic | k = 0.1244, a = 1.1282, c = 0.0212 | 0.9688 | 0.0535 | 0.0550 | 0.0030 |
| | Two term model | k = 0.1163, g = 0.0914, a = 1.0976, c = 0.0299 | 0.9698 | 0.0526 | 0.0546 | 0.0030 |
| | Verma et al. | k = -0.0006, g = 0.0827, a = -0.0963 | 0.9581 | 0.0643 | 0.0660 | 0.0044 |

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|---|---|---|---|---|---|---|
| | Diffusion approach | k = 0.2061, g = 1.0406, a = 23.9537 | 0.9848 | 0.0413 | 0.0424 | 0.0018 |
| | Midili Kucuk | k = 0.0067, b = 0.0034, a = 0.9216, n = 2.2177 | 0.9956 | 0.0239 | 0.0248 | 0.0006 |
| | Wang and Smith | a = -0.0823, b = 0.0018 | 0.9853 | 0.0437 | 0.0445 | 0.0020 |
| | Hii *et al.* | k = 0.0207, g = 0.0156, a = 1.028, c = -0.0674, n = 1.6531 | 0.9820 | 0.0504 | 0.0528 | 0.0028 |
| | Modified Henderson & Pabis | k = 0.0184, a = 0.005, g = 0.0184, b = 0.005, h = 1.1193, c = 0.1302 | 0.9673 | 0.0548 | 0.0579 | 0.0034 |
| | Modified Page I | k = 0.1017, n = 1.3505 | 0.9820 | 0.0446 | 0.0454 | 0.0021 |
| | Modified Page I | k = 1.0478, a = 0.0582, n = 1.2446, L = 0.9692 | 0.9807 | 0.0440 | 0.0456 | 0.0021 |
| 1/8 | Newton | k = 0.1121 | 0.9712 | 0.0748 | 0.0755 | 0.0057 |
| | Henderson and Pabis | k = 2.1305, a = 0.1395 | 0.9655 | 0.0613 | 0.0624 | 0.0039 |
| | Page | k = 0.1286, n = 0.9412 | 0.9943 | 0.0264 | 0.0269 | 0.0007 |
| | Logarithmic | k = 0.1386, a = 1.0011, c = 0.0545 | 0.9732 | 0.0522 | 0.0536 | 0.0029 |
| | Two term model | k = 0.1614, g = 0.0403, a = 0.8671, c = 0.1982 | 0.9655 | 0.0613 | 0.0636 | 0.0040 |
| | Verma et al. | k = 0.0237, g = 0.1344, a = 0.0974 | 0.9716 | 0.0579 | 0.0594 | 0.0035 |
| | Diffusion approach | k = 0.1121, g = 1, a = 3.0345 | 0.9917 | 0.0294 | 0.0302 | 0.0009 |
| | Midili Kucuk | k = 0.1266, b = 0.0016, a = 1.0457, n = 1.0047 | 0.9959 | 0.0224 | 0.0233 | 0.0005 |
| | Wang and Smith | a = -0.0776, b = 0.0015 | 0.9866 | 0.0436 | 0.0444 | 0.0020 |
| | Hii *et al.* | k = 0.0575, g = 0.0046, a = 0.6804, c = 0.3086, n = 1.723 | 0.9951 | 0.0247 | 0.0259 | 0.0007 |
| | Modified Henderson & Pabis | k = 0.05, a = 0.0015, g = 0.05, b = 0.0015, h = 0.05, c = 0.1 | 0.9735 | 0.0519 | 0.0548 | 0.0030 |
| | Modified Page I | k = 0.0961, n = 1 | 0.9943 | 0.0264 | 0.0269 | 0.0007 |
| | Modified Page I | k = 1, a = 0.8, n = 0.9, L = 0.7 | 0.9950 | 0.0247 | 0.0256 | 0.0007 |

**Table-5: Model constant and goodness of fit parameter for cabinet drying (70 °C)**

| Pod size | Model | Model constant | $R^2$ | RMSE | SEE | $X^2$ |
|---|---|---|---|---|---|---|
| ½ | Newton | k = 0.0621 | 0.9356 | 0.1235 | 0.1246 | 0.0155 |
| | Henderson and Pabis | k = 0.0754, a = 1.1979 | 0.9168 | 0.1004 | 0.1022 | 0.0000 |
| | Page | k = 0.0019, n = 2.2767 | 0.9947 | 0.0302 | 0.0307 | 0.0050 |
| | Logarithmic | k = 0.0148, a = 3.3225, c = -2.2323 | 0.9660 | 0.0621 | 0.0638 | 0.0195 |
| | Two term model | k = 0.0754, g = 0.0753, a = 1.1689, c = 0.0295 | 0.9167 | 0.1004 | 0.1041 | 0.0120 |
| | Verma et al. | k = -0.0048, g = -0.0008, a = -8.8781 | 0.9580 | 0.0713 | 0.0732 | 0.0051 |
| | Diffusion approach | k = 0.152, g = 1.0708, a = 19.5082 | 0.9781 | 0.0513 | 0.0527 | 0.0108 |
| | Midili Kucuk | k = 0.0005, b = 0.0028, a = 0.9372, n = 2.8003 | 0.9964 | 0.0201 | 0.0208 | 0.0118 |
| | Wang and smith | a = -0.036, b = -0.0001 | 0.9594 | 0.0709 | 0.0722 | 0.0171 |
| | Hii *et al.* | k = 0.0031, g = 0.0128, a = 1.104, c = -0.1482, n = 2.1387 | 0.9947 | 0.0257 | 0.0269 | 0.0106 |
| | Modeified Henderson & Pabis | k = -0.9873, a = -0.0006, g = -0.9873, b = -0.0006, h = 3.0663, c = 0.0158 | 0.9660 | 0.0621 | 0.0656 | 0.0188 |

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|---|---|---|---|---|---|---|
| | Modified Page I | k = 0.064, n = 2.1503 | 0.9937 | 0.0286 | 0.0291 | 0.0115 |
| | Modified Page I | k = 0.9707, a = 0.0376, n = 2.2844, L = 3.7781 | 0.9942 | 0.0263 | 0.0272 | 0.0173 |
| ¼ | Newton | k = 0.1024 | 0.9682 | 0.0646 | 0.0652 | 0.0043 |
| | Henderson and Pabis | k = 0.1152, a = 1.1261 | 0.9698 | 0.0526 | 0.0536 | 0.0029 |
| | Page | k = 0.0141, n = 1.8533 | 0.9885 | 0.0599 | 0.0609 | 0.0037 |
| | Logarithmic | k = 0.1244, a = 1.1282, c = 0.0212 | 0.9688 | 0.0535 | 0.0550 | 0.0030 |
| | Two term model | k = 0.1163, g = 0.0914, a = 1.0976, c = 0.0299 | 0.9698 | 0.0526 | 0.0546 | 0.0030 |
| | Verma et al. | k = -0.0006, g = 0.0827, a = -0.0963 | 0.9581 | 0.0643 | 0.0660 | 0.0044 |
| | Diffusion approach | k = 0.2061, g = 1.0406, a = 23.9537 | 0.9848 | 0.0413 | 0.0424 | 0.0018 |
| | Midili Kucuk | k = 0.0067, b = 0.0034, a = 0.9216, n = 2.2177 | 0.9956 | 0.0239 | 0.0248 | 0.0006 |
| | Wang and Smith | a = -0.0823, b = 0.0018 | 0.9853 | 0.0437 | 0.0445 | 0.0020 |
| | Hii *et al.* | k = 0.0207, g = 0.0156, a = 1.028, c = -0.0674, n = 1.6531 | 0.9820 | 0.0504 | 0.0528 | 0.0028 |
| | Modified Henderson & Pabis | k = 0.0184, a = 0.005, g = 0.0184, b = 0.005, h = 1.1193, c = 0.1302 | 0.9673 | 0.0548 | 0.0579 | 0.0034 |
| | Modified Page I | k = 0.1017, n = 1.3505 | 0.9820 | 0.0446 | 0.0454 | 0.0021 |
| | Modified Page I | k = 1.0478, a = 0.0582, n = 1.2446, L = 0.9692 | 0.9807 | 0.0440 | 0.0456 | 0.0021 |
| 1/8 | Newton | k = 0.1121 | 0.9712 | 0.0748 | 0.0755 | 0.0057 |
| | Henderson and Pabis | k = 2.1305, a = 0.1395 | 0.9655 | 0.0613 | 0.0624 | 0.0039 |
| | Page | k = 0.1286, n = 0.9412 | 0.9943 | 0.0264 | 0.0269 | 0.0007 |
| | Logarithmic | k = 0.1386, a = 1.0011, c = 0.0545 | 0.9732 | 0.0522 | 0.0536 | 0.0029 |
| | Two term model | k = 0.1614, g = 0.0403, a = 0.8671, c = 0.1982 | 0.9655 | 0.0613 | 0.0636 | 0.0040 |
| | Verma et al. | k = 0.0237, g = 0.1344, a = 0.0974 | 0.9716 | 0.0579 | 0.0594 | 0.0035 |
| | Diffusion approach | k = 0.1121, g = 1, a = 3.0345 | 0.9917 | 0.0294 | 0.0302 | 0.0009 |
| | Midili Kucuk | k = 0.1266, b = 0.0016, a = 1.0457, n = 1.0047 | 0.9959 | 0.0224 | 0.0233 | 0.0005 |
| | Wang and Smith | a = -0.0776, b = 0.0015 | 0.9866 | 0.0436 | 0.0444 | 0.0020 |
| | Hii *et al.* | k = 0.0575, g = 0.0046, a = 0.6804, c = 0.3086, n = 1.723 | 0.9951 | 0.0247 | 0.0259 | 0.0007 |
| | Modified Henderson & Pabis | k = 0.05, a = 0.0015, g = 0.05, b = 0.0015, h = 0.05, c = 0.1 | 0.9735 | 0.0519 | 0.0548 | 0.0030 |
| | Modified Page I | k = 0.0961, n = 1 | 0.9943 | 0.0264 | 0.0269 | 0.0007 |
| | Modified Page I | k = 1, a = 0.8, n = 0.9, L = 0.7 | 0.9950 | 0.0247 | 0.0256 | 0.0007 |

**Table-6: Model constant and goodness of fit parameter for cabinet drying (80 °C)**

| Pod size | Model | Model constant | $R^2$ | RMSE | SEE | $X^2$ |
|---|---|---|---|---|---|---|
| ½ | Newton | k = 0.1322 | 0.9366 | 0.0939 | 0.0948 | 0.0090 |
| | Henderson and Pabis | k = 0.1487, a = 1.1743 | 0.9402 | 0.0784 | 0.0800 | 0.0000 |
| | Page | k = 0.0027, n = 2.9681 | 0.9924 | 0.0807 | 0.0823 | 0.0027 |
| | Logarithmic | k = 0.122, a = 1.1775, c = -0.0598 | 0.9321 | 0.0835 | 0.0861 | 0.0222 |

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|---|---|---|---|---|---|---|
| | Two term model | k = 0.1512, g = 0.075, a = 1.1385, c = 0.0304 | 0.9399 | 0.0785 | 0.0819 | 0.0027 |
| | Verma et al. | k = 0.0018, g = 0.0036, a = -27.8937 | 0.7417 | 0.1915 | 0.1975 | 0.0026 |
| | Diffusion Approach | k = 0.297, g = 1.0544, a = 23.3539 | 0.9729 | 0.0602 | 0.0621 | 0.0293 |
| | Midili Kucuk | k = 0.0008, b = 0.0043, a = 0.9211, n = 3.5888 | 0.9891 | 0.0405 | 0.0422 | 0.0071 |
| | Wang and Smith | a = -0.1102, b = 0.0032 | 0.9536 | 0.0826 | 0.0843 | 0.0153 |
| | Hii *et al.* | k = 0.0077, g = 0.0066, a = 0.9876, c = -0.028, n = 2.378 | 0.9831 | 0.0711 | 0.0750 | 0.0039 |
| | Modeified Henderson Pabis | k = -0.0029, a = -0.0005, g = -0.0029, b = -0.0005, h = 1.1698, c = 0.1448 | 0.9397 | 0.0787 | 0.0839 | 0.0143 |
| | Modified Page I | k = 0.1314, n = 1.7194 | 0.9743 | 0.0666 | 0.0680 | 0.0026 |
| | Modified Page I | k = 1.0375, a = 0.0467, n = 1.572, L = 1.0757 | 0.9701 | 0.0656 | 0.0684 | 0.0075 |
| ¼ | Newton | k = 0.1621 | 0.9566 | 0.0738 | 0.0746 | 0.0056 |
| | Henderson and Pabis | k = 0.174, a = 1.1332 | 0.9593 | 0.0615 | 0.0627 | 0.0039 |
| | Page | k = 0.0145, n = 2.2781 | 0.9953 | 0.0594 | 0.0606 | 0.0037 |
| | Logarithmic | k = 0.2112, a = 1.1596, c = 0.0419 | 0.9564 | 0.0636 | 0.0656 | 0.0043 |
| | Two term model | k = 0.1836, g = 0.0786, a = 1.1142, c = 0.0373 | 0.9594 | 0.0614 | 0.0640 | 0.0041 |
| | Verma et al. | k = -0.0003, g = 0.1449, a = -0.0284 | 0.9491 | 0.0735 | 0.0758 | 0.0058 |
| | Diffusion Approach | k = 0.311, g = 1.0407, a = 24.3928 | 0.9787 | 0.0477 | 0.0492 | 0.0024 |
| | Midili Kucuk | k = 0.0073, b = 0.0035, a = 0.9162, n = 2.6488 | 0.9927 | 0.0283 | 0.0295 | 0.0009 |
| | Wang and Smith | a = -0.1127, b = 0.0032 | 0.9578 | 0.0633 | 0.0646 | 0.0042 |
| | Hii *et al.* | k = 0.0215, g = 0.0193, a = 1.0011, c = -0.042, n = 2.024 | 0.9899 | 0.0526 | 0.0554 | 0.0031 |
| | Modified Henderson & Pabis | k = 0.0109, a = 0.0061, g = 0.0109, b = 0.0061, h = 1.1386, c = 0.1896 | 0.9599 | 0.0610 | 0.0650 | 0.0042 |
| | Modified Page I | k = 0.1571, n = 1.6337 | 0.9884 | 0.0494 | 0.0504 | 0.0025 |
| | Modified Page I | k = 1.0592, a = 0.0522, n = 1.3322, L = 0.6804 | 0.9784 | 0.0502 | 0.0523 | 0.0027 |
| 1/8 | Newton | k = 0.1121 | 0.9483 | 0.0760 | 0.0768 | 0.0059 |
| | Henderson and Pabis | k = 2.1305, a = 0.1395 | 0.9551 | 0.0643 | 0.0656 | 0.0043 |
| | Page | k = 0.1286, n = 0.9412 | 0.9967 | 0.0511 | 0.0521 | 0.0027 |
| | Logarithmic | k = 0.1386, a = 1.0011, c = 0.0545 | 0.9552 | 0.0640 | 0.0660 | 0.0044 |
| | Two term model | k = 0.1614, g = 0.0403, a = 0.8671, c = 0.1982 | 0.9544 | 0.0646 | 0.0673 | 0.0045 |
| | Verma et al. | k = 0.0237, g = 0.1344, a = 0.0974 | 0.9333 | 0.0794 | 0.0819 | 0.0067 |
| | Diffusion Approach | k = 0.1121, g = 1, a = 3.0345 | 0.9482 | 0.0744 | 0.0767 | 0.0059 |
| | Midili Kucuk | k = 0.1266, b = 0.0016, a = 1.0457, n = 1.0047 | 0.9931 | 0.0487 | 0.0508 | 0.0026 |
| | Wang and Smith | a = -0.0776, b = 0.0015 | 0.9321 | 0.0789 | 0.0805 | 0.0065 |
| | Hii *et al.* | k = 0.0575, g = 0.0046, a = 0.6804, c = 0.3086, n = 1.723 | 0.9934 | 0.0455 | 0.0480 | 0.0023 |

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|---|---|---|---|---|---|---|
| | Modified Henderson & Pabis | k = 0.05, a = 0.0015, g = 0.05, b = 0.0015, h = 0.05, c = 0.1 | 0.9551 | 0.0640 | 0.0682 | 0.0047 |
| | Modified Page I | k = 0.1747, n = 1 | 0.9897 | 0.0444 | 0.0453 | 0.0021 |
| | Modified Page I | k = 1, a = 0.8, n = 0.9, L = 0.7 | 0.9915 | 0.0438 | 0.0457 | 0.0021 |

**Table-7: Model constant and goodness of fit parameter for cabinet drying (90 °C)**

| Pod size | Model | Model constant | $R^2$ | RMSE | SEE | $X^2$ |
|---|---|---|---|---|---|---|
| 1/2 | Newton | k = 0.1394 | 0.9443 | 0.1064 | 0.1086 | 0.0118 |
| | Henderson and Pabis | k = 0.1656, a = 1.1659 | 0.9322 | 0.0858 | 0.0895 | 0.0000 |
| | Page | k = 0.0281, n = 1.854 | 0.9849 | 0.0403 | 0.0420 | 0.0040 |
| | Logarithmic | k = 0.0661, a = 1.9266, c = -0.8286 | 0.9595 | 0.0649 | 0.0692 | 0.0117 |
| | Two term model | k = 0.1656, g = 0.1651, a = 1.1492, c = 0.0168 | 0.9322 | 0.0858 | 0.0936 | 0.0082 |
| | Verma et al. | k = -0.0022, g = 0.0003, a = -33.7617 | 0.9455 | 0.0763 | 0.0813 | 0.0042 |
| | Diffusion Approach | k = 0.3379, g = 1.0683, a = 19.1406 | 0.9827 | 0.0426 | 0.0454 | 0.0086 |
| | Midili Kucuk | k = 0.0082, b = 0.0121, a = 0.9478, n = 2.6504 | 0.9940 | 0.0250 | 0.0273 | 0.0108 |
| | Wang and Smith | a = -0.0945, b = 0.0012 | 0.9558 | 0.0735 | 0.0766 | 0.0134 |
| | Hii *et al.* | k = 0.0104, g = 0.0001, a = 0.8338, c = 0.1377, n = 2.5629 | 0.9946 | 0.0236 | 0.0264 | 0.0057 |
| | Modeified Henderson Pabis | k = -0.4052, a = -0.0006, g = -0.4052, b = -0.0006, h = 1.9081, c = 0.0665 | 0.9595 | 0.0649 | 0.0744 | 0.0144 |
| | Modified Page I | k = 0.1456, n = 1.8414 | 0.9848 | 0.0403 | 0.0421 | 0.0074 |
| | Modified Page I | k = 1.0031, a = 0.058, n = 1.8437, L = 1.4622 | 0.9849 | 0.0403 | 0.0440 | 0.0120 |
| 1/4 | Newton | k = 0.2285 | 0.9587 | 0.0876 | 0.0894 | 0.0080 |
| | Henderson and Pabis | k = 0.2625, a = 1.1585 | 0.9557 | 0.0709 | 0.0739 | 0.0055 |
| | Page | k = 0.08, n = 1.6904 | 0.9872 | 0.0431 | 0.0450 | 0.0020 |
| | Logarithmic | k = 0.2252, a = 1.2067, c = -0.0708 | 0.9587 | 0.0676 | 0.0721 | 0.0052 |
| | Two term model | k = 0.2627, g = 0.2342, a = 1.1515, c = 0.0068 | 0.9557 | 0.0709 | 0.0773 | 0.0060 |
| | Verma et al. | k = -0.0006, g = 0.174, a = -0.1453 | 0.9524 | 0.0797 | 0.0850 | 0.0072 |
| | Diffusion Approach | k = 0.1136, g = 0.9625, a = 20.1316 | 0.9546 | 0.0779 | 0.0830 | 0.0069 |
| | Midili Kucuk | k = 0.0524, b = 0.0077, a = 0.9859, n = 2.0746 | 0.9976 | 0.0164 | 0.0179 | 0.0003 |
| | Wang and Smith | a = -0.1802, b = 0.0086 | 0.9751 | 0.0641 | 0.0669 | 0.0045 |
| | Hii *et al.* | k = 0.0456, g = 0.0004, a = 0.8976, c = 0.0857, n = 2.2281 | 0.9979 | 0.0154 | 0.0172 | 0.0003 |
| | Modified Henderson & Pabis | k = -0.0388, a = 0.0055, g = -0.0388, b = 0.0055, h = 1.2131, c = 0.2238 | 0.9588 | 0.0675 | 0.0775 | 0.0060 |
| | Modified Page I | k = 0.2245, n = 1.6909 | 0.9872 | 0.0431 | 0.0450 | 0.0020 |
| | Modified Page I | k = 1.0228, a = 0.0624, n = 1.6225, L = 0.7933 | 0.9872 | 0.0426 | 0.0465 | 0.0022 |
| 1/8 | Newton | k = 0.1121 | 0.9636 | 0.0754 | 0.0770 | 0.0059 |
| | Henderson and Pabis | k = 2.1305, a = 0.1395 | 0.9631 | 0.0624 | 0.0650 | 0.0042 |
| | Page | k = 0.1286, n = 0.9412 | 0.9880 | 0.0417 | 0.0435 | 0.0019 |

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|---|---|---|---|---|---|---|
| | Logarithmic | k = 0.1386, a = 1.0011, c = 0.0545 | 0.9629 | 0.0627 | 0.0668 | 0.0045 |
| | Two term model | k = 0.1614, g = 0.0403, a = 0.8671, c = 0.1982 | 0.9630 | 0.0625 | 0.0682 | 0.0047 |
| | Verma et al. | k = 0.0237, g = 0.1344, a = 0.0974 | 0.9589 | 0.0715 | 0.0762 | 0.0058 |
| | Diffusion Approach | k = 0.1121, g = 1, a = 3.0345 | 0.9609 | 0.0698 | 0.0744 | 0.0055 |
| | Midili Kucuk | k = 0.1266, b = 0.0016, a = 1.0457, n = 1.0047 | 0.9892 | 0.0443 | 0.0484 | 0.0023 |
| | Wang and Smith | a = -0.0776, b = 0.0015 | 0.9775 | 0.0541 | 0.0564 | 0.0032 |
| | Hii *et al.* | k = 0.0575, g = 0.0046, a = 0.6804, c = 0.3086, n = 1.723 | 0.9882 | 0.0414 | 0.0463 | 0.0021 |
| | Modified Henderson & Pabis | k = 0.05, a = 0.0015, g = 0.05, b = 0.0015, h = 0.05, c = 0.1 | 0.9639 | 0.0614 | 0.0705 | 0.0050 |
| | Modified Page I | k = 0.2583, n = 1 | 0.9874 | 0.0417 | 0.0435 | 0.0019 |
| | Modified Page I | k = 1, a = 0.8, n = 0.9, L = 0.7 | 0.9878 | 0.0413 | 0.0451 | 0.0020 |

**Table-8: Model constant and goodness of fit parameter for open sun drying**

| Pod size | Model | Model constant | $R^2$ | RMSE | SEE | $X^2$ |
|---|---|---|---|---|---|---|
| 1/2 | Newton | k = 0.0646 | 0.9649 | 0.0929 | 0.0938 | 0.0088 |
| | Henderson and Pabis | k = 0.0763, a = 1.1655 | 0.9522 | 0.0718 | 0.0731 | 0.0000 |
| | Page | k = 0.0085, n = 1.7496 | 0.9961 | 0.0203 | 0.0207 | 0.0034 |
| | Logarithmic | k = 0.0291, a = 1.9262, c = -0.8442 | 0.9826 | 0.0417 | 0.0429 | 0.0091 |
| | Two term model | k = 0.0763, g = 0.0763, a = 1.1359, c = 0.0296 | 0.9522 | 0.0718 | 0.0744 | 0.0072 |
| | Verma et al. | k = -0.0017, g = 0.0147, a = -1.7446 | 0.9788 | 0.0501 | 0.0515 | 0.0035 |
| | Diffusion Approach | k = 0.1468, g = 1.0707, a = 17.131 | 0.9915 | 0.0298 | 0.0306 | 0.0058 |
| | Midili Kucuk | k = 0.005, b = 0.0016, a = 0.9693, n = 1.9658 | 0.9969 | 0.0175 | 0.0182 | 0.0076 |
| | Wang and Smith | a = -0.0435, b = 0.0003 | 0.9803 | 0.0494 | 0.0503 | 0.0089 |
| | Hii *et al.* | k = 0.0071, g = 0.0071, a = 1.1242, c = -0.1416, n = 1.8103 | 0.9963 | 0.0195 | 0.0204 | 0.0056 |
| | Modified Henderson & Pabis | k = -0.4047, a = -0.0005, g = -0.4047, b = -0.0005, h = 1.8914, c = 0.0294 | 0.9826 | 0.0417 | 0.0441 | 0.0096 |
| | Modified Page I | k = 0.0657, n = 1.7491 | 0.9961 | 0.0203 | 0.0207 | 0.0069 |
| | Modified Page II | k = 0.9826, a = 0.0399, n = 1.8103, L = 2.6014 | 0.9963 | 0.0195 | 0.0202 | 0.0093 |
| 1/4 | Newton | k = 0.0847 | 0.9694 | 0.0924 | 0.0932 | 0.0087 |
| | Henderson and Pabis | k = 0.0992, a = 1.1779 | 0.9581 | 0.0716 | 0.0729 | 0.0053 |
| | Page | k = 0.0125, n = 1.7546 | 0.9968 | 0.0197 | 0.0200 | 0.0004 |
| | Logarithmic | k = 0.0601, a = 1.405, c = -0.2941 | 0.9773 | 0.0503 | 0.0516 | 0.0027 |
| | Two term model | k = 0.0992, g = 0.0992, a = 1.148, c = 0.0299 | 0.9581 | 0.0716 | 0.0743 | 0.0055 |
| | Verma et al. | k = 0.0119, g = 0.0339, a = -1.321 | 0.9731 | 0.0604 | 0.0620 | 0.0038 |
| | Diffusion Approach | k = 0.1866, g = 1.0653, a = 18.737 | 0.9927 | 0.0291 | 0.0299 | 0.0009 |
| | Midili Kucuk | k = 0.0074, b = 0.0013, a = | 0.9980 | 0.0148 | 0.0153 | 0.0002 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| | | 0.9682, n = 1.9757 | | | | |
| | Wang and Smith | a = -0.0617, b = 0.0009 | 0.9808 | 0.0549 | 0.0559 | 0.0031 |
| | Hii *et al.* | k = 0.0104, g = 0.0105, a = 1.1529, c = -0.1711, n = 1.8163 | 0.9970 | 0.0189 | 0.0198 | 0.0004 |
| | Modified Henderson & Pabis | k = -0.1743, a = 0.0033, g = -0.1743, b = 0.0033, h = 1.4585, c = 0.0583 | 0.9775 | 0.0500 | 0.0529 | 0.0028 |
| | Modified Page I | k = 0.0822, n = 1.7539 | 0.9968 | 0.0197 | 0.0200 | 0.0004 |
| | Modified Page II | k = 0.9822, a = 0.0409, n = 1.8144, L = 2.1164 | 0.9970 | 0.0189 | 0.0196 | 0.0004 |
| 1/8 | Newton | k = 0.1121 | 0.9665 | 0.0996 | 0.1005 | 0.0101 |
| | Henderson and Pabis | k = 2.1305, a = 0.1395 | 0.9515 | 0.0776 | 0.0790 | 0.0062 |
| | Page | k = 0.1286, n = 0.9412 | 0.9969 | 0.0189 | 0.0193 | 0.0004 |
| | Logarithmic | k = 0.1386, a = 1.0011, c = 0.0545 | 0.9859 | 0.0397 | 0.0408 | 0.0017 |
| | Two term model | k = 0.1614, g = 0.0403, a = 0.8671, c = 0.1982 | 0.9515 | 0.0776 | 0.0805 | 0.0065 |
| | Verma et al. | k = 0.0237, g = 0.1344, a = 0.0974 | 0.9823 | 0.0495 | 0.0509 | 0.0026 |
| | Diffusion Approach | k = 0.1121, g = 1, a = 3.0345 | 0.9902 | 0.0348 | 0.0358 | 0.0013 |
| | Midili Kucuk | k = 0.1266, b = 0.0016, a = 1.0457, n = 1.0047 | 0.9974 | 0.0171 | 0.0177 | 0.0003 |
| | Wang and Smith | a = -0.0776, b = 0.0015 | 0.9843 | 0.0481 | 0.0489 | 0.0024 |
| | Hii *et al.* | k = 0.0575, g = 0.0046, a = 0.6804, c = 0.3086, n = 1.723 | 0.9975 | 0.0167 | 0.0174 | 0.0003 |
| | Modified Henderson & Pabis | k = 0.05, a = 0.0015, g = 0.05, b = 0.0015, h = 0.05, c = 0.1 | 0.9859 | 0.0396 | 0.0418 | 0.0018 |
| | Modified Page I | k = 0.0731, n = 1 | 0.9970 | 0.0189 | 0.0192 | 0.0004 |
| | Modified Page II | k = 1, a = 0.8, n = 0.9, L = 0.7 | 0.9974 | 0.0170 | 0.0177 | 0.0003 |

**Table-9: Model constant and goodness of fit parameter for solar drying**

| Pod size | Model | Model constant | $R^2$ | RMSE | SEE | $X^2$ |
|---|---|---|---|---|---|---|
| 1/2 | Newton | k = 0.054 | 0.9180 | 0.1481 | 0.1494 | 0.0223 |
| | Henderson and Pabis | k = 0.069, a = 1.2385 | 0.8929 | 0.1173 | 0.1194 | 0.0000 |
| | Page | k = 0.0007, n = 2.5614 | 0.9947 | 0.0271 | 0.0276 | 0.0077 |
| | Logarithmic | k = 0.0125, a = 3.9175, c = -2.7681 | 0.9580 | 0.0713 | 0.0732 | 0.0246 |
| | Two term model | k = 0.0691, g = 0.0693, a = 1.209, c = 0.0296 | 0.8928 | 0.1173 | 0.1216 | 0.0163 |
| | Verma et al. | k = -0.0061, g = -0.001, a = -6.5856 | 0.9585 | 0.0872 | 0.0896 | 0.0078 |
| | Diffusion Approach | k = 0.1467, g = 1.0834, a = 18.9079 | 0.9756 | 0.0561 | 0.0577 | 0.0088 |
| | Midili Kucuk | k = 0.0003, b = 0.0032, a = 0.9786, n = 2.9013 | 0.9980 | 0.0155 | 0.0160 | 0.0176 |
| | Wang and Smith | a = -0.0279, b = -0.0003 | 0.9543 | 0.0824 | 0.0839 | 0.0227 |
| | Hii *et al.* | k = 0.0025, g = 0.0121, a = 1.1565, c = -0.1604, n = 2.1696 | 0.9957 | 0.0234 | 0.0245 | 0.0129 |
| | Modified Henderson & Pabis | k = -1.1122, a = -0.0006, g = -1.1122, b = -0.0006, h = 3.3762, c = 0.0144 | 0.9574 | 0.0717 | 0.0758 | 0.0248 |
| | Modified Page I | k = 0.0591, n = 2.4719 | 0.9943 | 0.0269 | 0.0274 | 0.0155 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| | Modified Page I | k = 0.9988, a = 0.0346, n = 2.5254, L = 4.4713 | 0.9945 | 0.0269 | 0.0279 | 0.0232 |
| 1/4 | Newton | k = 0.0719 | 0.9523 | 0.1210 | 0.1221 | 0.0149 |
| | Henderson and Pabis | k = 0.0877, a = 1.2212 | 0.9343 | 0.0937 | 0.0954 | 0.0091 |
| | Page | k = 0.0045, n = 2.0519 | 0.9950 | 0.0249 | 0.0254 | 0.0006 |
| | Logarithmic | k = 0.0359, a = 1.8619, c = -0.7332 | 0.9705 | 0.0600 | 0.0616 | 0.0038 |
| | Two term model | k = 0.0877, g = 0.0878, a = 1.1913, c = 0.0299 | 0.9343 | 0.0937 | 0.0972 | 0.0094 |
| | Verma et al. | k = -0.0008, g = 0.0145, a = -2.0781 | 0.9631 | 0.0740 | 0.0761 | 0.0058 |
| | Diffusion Approach | k = 0.1759, g = 1.0554, a = 25.4014 | 0.9883 | 0.0392 | 0.0403 | 0.0016 |
| | Midili Kucuk | k = 0.0033, b = 0.0012, a = 0.9903, n = 2.1921 | 0.9957 | 0.0228 | 0.0237 | 0.0006 |
| | Wang and Smith | a = -0.0467, b = 0.0003 | 0.9651 | 0.0733 | 0.0746 | 0.0056 |
| | Hii *et al.* | k = 0.0079, g = 0.0318, a = 1.1294, c = -0.1351, n = 1.8829 | 0.9956 | 0.0235 | 0.0247 | 0.0006 |
| | Modified Henderson & Pabis | k = -0.4648, a = 0.0038, g = -0.4648, b = 0.0038, h = 2.06, c = 0.0343 | 0.9707 | 0.0598 | 0.0632 | 0.0040 |
| | Modified Page I | k = 0.0718, n = 2.0518 | 0.9950 | 0.0249 | 0.0254 | 0.0006 |
| | Modified Page I | k = 1.0007, a = 0.035, n = 2.0477, L = 2.707 | 0.9950 | 0.0249 | 0.0259 | 0.0007 |
| 1/8 | Newton | k = 0.1121 | 0.9485 | 0.1169 | 0.1179 | 0.0139 |
| | Henderson and Pabis | k = 2.1305, a = 0.1395 | 0.9317 | 0.0941 | 0.0958 | 0.0092 |
| | Page | k = 0.1286, n = 0.9412 | 0.9914 | 0.0326 | 0.0332 | 0.0011 |
| | Logarithmic | k = 0.1386, a = 1.0011, c = 0.0545 | 0.9679 | 0.0618 | 0.0635 | 0.0040 |
| | Two term model | k = 0.1614, g = 0.0403, a = 0.8671, c = 0.1982 | 0.9317 | 0.0941 | 0.0976 | 0.0095 |
| | Verma et al. | k = 0.0237, g = 0.1344, a = 0.0974 | 0.9627 | 0.0717 | 0.0737 | 0.0054 |
| | Diffusion Approach | k = 0.1121, g = 1, a = 3.0345 | 0.9828 | 0.0467 | 0.0480 | 0.0023 |
| | Midili Kucuk | k = 0.1266, b = 0.0016, a = 1.0457, n = 1.0047 | 0.9916 | 0.0318 | 0.0329 | 0.0011 |
| | Wang and Smith | a = -0.0776, b = 0.0015 | 0.9651 | 0.0708 | 0.0720 | 0.0052 |
| | Hii *et al.* | k = 0.0575, g = 0.0046, a = 0.6804, c = 0.3086, n = 1.723 | 0.9921 | 0.0308 | 0.0322 | 0.0010 |
| | Modified Henderson & Pabis | k = 0.05, a = 0.0015, g = 0.05, b = 0.0015, h = 0.05, c = 0.1 | 0.9680 | 0.0617 | 0.0652 | 0.0042 |
| | Modified Page I | k = 0.073, n = 1 | 0.9913 | 0.0326 | 0.0332 | 0.0011 |
| | Modified Page I | k = 1, a = 0.8, n = 0.9, L = 0.7 | 0.9916 | 0.0319 | 0.0331 | 0.0011 |

## 4 CONCLUSIONS

Investigation into the drying characteristics of cocoa pod husk as affected by the pod size ($\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{5}$ pod sizes), and drying temperature (50°C, 60°C, 70°C, 80°C and 90°C) and the effect of drying system (cabinet dryer, solar dryer and open sun drying) on the proximate, minerals and phytochemical composition of the dried cocoa husk pod, was conducted in the study, The Midili Kucuk ($0.989 \leq R^2 \leq 0.998$, $0.015 \leq RMSE \leq 0.044$, and $0.000 \leq \chi^2 \leq 0.002$) and Hii *et al* models ($0.983 \leq R^2 \leq 0.996$, $0.019 \leq RMSE \leq 0.0711$, and $0.000 \leq \chi^2 \leq 0.004$) were adjudged as the best models for predicting the drying characteristics of cocoa pod compared to others mathematical thin layer drying models. Moisture diffusivity shows an increasing trend with increase in

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drying air temperature in the cabinet dryer; and moisture diffusivity values of the cocoa pod shows declining trend with decrease in the pod sizes. The uni-dimensional moisture transport phenomenon for the different drying conditions ranged between $7.791\times 10^{-10}$ and $24.852 \times 10^{-10}$ $m^2/s$ for cabinet dryer, $7.557\times 10^{-10}$ and $8.941 \times 10^{-10}$ $m^2/s$ for solar dryer and $5.814 \times 10^{-10}$ and $9.644 \times 10^{-10}$ $m^2/s$ for open sun drying with activation energy ranging between 25.12 and 31.85 kJ/mol.

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# SOCIAL VARIABLES INFLUENCING ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) AMONG SECONDARY SCHOOL STUDENTS IN OBIO/AKPOR LGA OF RIVERS STATE

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## ABSTRACT
*The study investigated social variables influencing attention deficit hyperactivity disorder (ADHD) among secondary school students in Obio/Akpor LGA of Rivers State. The design for the study is ex-post-facto research design. A sample of 136 students who showed symptoms the disorder was drawn for the study using purposive sampling technique. An instrument titled; Attention Deficit Hyperactivity Disorder Diagnostic Questionnaire (ADHDDQ) was used to collect data. The Cronbach Alpha reliability was used to establish the internal consistency reliability coefficient 0.71 for the Attention Deficit Hyperactivity Disorder Diagnostic Questionnaire (ADHDDQ). The data collected were analyzed using of mean, standard deviation and independent t-test statistics. The findings of the study showed that, family type significantly influence ADHD while, socioeconomic status (SES) does not influence significantly to ADHD among secondary school students in Obio/Akpor LGA of Rivers State. Based on the findings, it was recommended among others that parents, school authorities, mental health professionals, and departments in the ministries of education and health should be aware of ADHD and work toward its early detection and management.*

*Keywords: Social Variables (Socioeconomic status and Family types) and Attention Deficit Hyperactivity Disorder (ADHD)*

## INTRODUCTION
Attention Deficit Hyperactivity Disorder (ADHD) is a complex neurobehavioural developmental disorder that is characterized by the inability to marshal and sustain attention, regulate activity levels, and moderate activities that require complicated co-ordination (Rappley, 2005). It is characterized by inattention, hyperactivity and impulsivity (Bakare, 2012). Attention-deficit hyperactivity disorder has been called many names: hyperactive child syndrome, hyper-kinesis, minimal brain damage, and minimal brain dysfunction (Gillberg, 2003). The diagnostic and Statistical Manual of Mental Disorders DSM-5 (2013) explained that the diagnosis of ADHD requires the presence of six or nine symptoms of inattention and hyperactivity which include being easily distracted and jumping from activity to activity, easily becoming bored with a task, difficulty focusing attention or completing a single task or activity, having trouble completing or turning in homework assignments, losing things such as school supplies or toys, not listening or paying attention when spoken to, daydreaming or wandering with lack of motivation, having difficulty processing information quickly and struggling to follow directions.

Attention Deficit Hyperactivity Disorder (ADHD) is a developmental disorder that is most commonly diagnosed in young people between ages 3–17 (American Academy of Pediatrics, 2011). Pedersen, Heath and Surbury (2007) maintained that children with ADHD are usually impatient, acting without regard for consequences, interrupting others, blurting things out, and experience difficulty taking turns as well as waiting or sharing. ADHD may be environmentally-based and genetic (American Psychiatric Association, 2013). Meyer, Eilertsen, Sundet, Tshifularo and Sagvolden (2004) maintained that if a woman smokes, takes drugs, drinks a lot of alcohol, or is much stressed while she is pregnant, it may affect the baby's brain and lead to the development of ADHD. Brain diseases, trauma during birth, head injury and passive smoking can also increase the chances of a child developing ADHD (Bakare, 2012). Adewuya and Famuyiwa (2007) observed that there is a high prevalence of ADHD among secondary school adolescents and it may be tied to a number of social factors such as the family and socioeconomic status. Racine, Majnemer, Shevell and Snider (2008) have also stressed that in diagnosing ADHD among adolescents, particular attention should be given to social factors such as family and socioeconomic status. Therein, this study will examine social variables influencing ADHD among secondary school adolescents.

One variable that may influence the development of ADHD is the socioeconomic status of parents. Socio-economic status is a way of looking at how individuals or families fit into society using economic and social measures that have been shown to impacts individuals' health and well-being. It is the grouping of people with similar occupational, educational and economic characteristics (Santrock, 2004). Studies have suggested that children and teens brought up in poverty stricken homes have a much greater chance of not only having ADHD in the first place but, carrying it forward into adulthood. Osarhemenen (2005) explained that low socio-

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economic households consist of parents who are either unemployed or underemployed and because of their financial conditions are unable to schedule regular medical checkups for either their children or, for themselves. Black and Devereux (2011) maintained that parents' socio-economic status may affect the behaviour and health of children both at home, school and other social setting. It affects overall human functioning: our physical and mental health, the neighbourhood in which we live, our daily activities, and our access to resources. Its effects can be observed across an individual's life span. Variance in socioeconomic status, such as disparities in the distribution of wealth, income, and access to resources, results in social and health problems which may involve the development of ADHD (Hawkins, 2010).

The family is another variable that may influence ADHD among secondary school adolescent. The family is the most important primary group in the society and immediate social environment to which a child is developed and exposed (Adhiambo, Odwar and Mildred, 2011). A family is a bio-social group which is primarily made up of father, mother and children (Adani, 2001). A child learns to adjust in various fields of life according to the values and virtues provided by his or her family. Children grow up in families which provide consistent and relatively permanent relationship which affects their adjustment level to a large extent (Dudley, 2012). They spend a great deal of time in the home with their families or family members. The family also provides support for children while they explore new situations and learn about new people especially in their late childhood commonly referred to as adolescent stage (Dhyani and Singh, 2013). Families could be nuclear, extended, single parent, and step families (Eke, 2000). In nuclear families, we have the father, mother and children. In extended families, there exists a much wider kinship network, of which the primary family is only a very small part. An extended family includes grandparents and grandchildren, aunts and uncles, nieces, nephews, cousins, and even more (Lewis, 2006). Berndth (2007) stated that, the single parent family has been one of the fastest growing type of family in most parts of the world. Single parent family has come into existence as a result of divorce, dissertation, death, separation and illegitimate births. He further explained that, children from such families may suffer from guilt and loneliness, feelings of anger and dejection. Young ones in single parent families' contend with intense emotions due to their parents' abrupt departure or death of one of their parent. For many adolescents, the absence of one of the parent seems to have profound negative effect on them resulting in the development of ADHD (Onyeji, 2001). According to Nkemdirim (2005), most children who come from the single parent homes hardly perform well in their academic work, they are easily distracted. He further explained that such children may be susceptible to developing ADHD.

Stepparent family comes into existence as a result of either a parent's divorce or death of a spouse. Adolescents in this type of family are found to experience psychological, social and behavioural problems (Ambuabunos, Ofovwe & Ibadin, 2011). Daley and Birchwood (2010) stressed that adolescents from stepparent families are susceptible to ADHD due to many family tumors, which in turn makes them perform poorly at school their relationship with their peers. Kashala, Tylleskar, Elgen, Kayembe and Sommerfelt (2005) also opined that adolescents tend to react negatively if one of their divorced parents remarries and they become part of a new family described as step family. They further explained that this feeling affects the child the psychologically and may increase the chances of the child developing ADHD.

Without doubt, ADHD is a serious problem among secondary school adolescents that produces symptoms of distractibility, hyperactivity, poor impulse control, and forgetfulness. Adolescents with ADHD are usually restless, agitated and inattentive. They often have difficulty following instruction in school, which leads to academic failure and underachievement. They are always in constant motion and frequently make excessive noise in class. They may be rude and aggressive resulting in fights and accidents. Adolescents with ADHD usually get into trouble because of boundless energy, impulsivity, and an inability to follow instruction. Therefore, this study examines the social variables influencing ADHD among secondary school adolescents in Rivers State.

**AIM AND OBJECTIVES OF THE STUDY**

The aim of the study is to examine social variables influencing ADHD among secondary school students in Obio/Akpor in Rivers State. In specific terms, the study intends to;

1. Determine the extent to which family type (single/stepparent) influence ADHD among secondary school students in Obio/Akpor in Rivers State.
2. Find out the extent to which socioeconomic status (high/low) influence ADHD among secondary school students in Obio/Akpor in Rivers State.

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**RESEARCH QUESTIONS**

1. To what extent does family type (single/stepparent) influence ADHD among secondary school students in Obio/Akpor in Rivers State?
2. To what extent does socioeconomic status (high/low) influence ADHD among secondary school students in Obio/Akpor in Rivers State?

**Hypotheses**

1. Family types (nuclear/extended) does not significantly influence ADHD among secondary school students in Obio/Akpor in Rivers State.
2. Socio-economic status (high/low) does not significantly influence ADHD among secondary school students in Obio/Akpor in Rivers State.

**RESEARCH METHODS AND PROCEDURES**

This study adopted the ex-post-facto research design. A sample of 300 students who showed symptoms the disorder was drawn for the study using purposive sampling technique. An instrument titled; Attention Deficit Hyperactivity Disorder Diagnostic Questionnaire (ADHDDQ) was used to collect data, while demographic inventory was used to obtain personal information about the socioeconomic status of participants. The instrument was designed on a four point Likert scale of Strongly Agree (SA) =4, Agree (A) =3, Disagree (D) =2, and Strongly Disagree (SD) =1. The Cronbach Alpha reliability was used to establish the internal consistency reliability coefficient 0.71 for the Attention Deficit Hyperactivity Disorder Diagnostic Questionnaire (ADHDDQ). The research questions were analyzed using of mean and standard deviation statistics while the hypotheses were tested using t-test associated statistics.

**DATA ANALYSIS**

**Research Question One:** To what extent does family type influence ADHD among secondary school students in Obio/Akpor in Rivers State?

**Hypothesis One:** Family types (single/stepparent) does not significantly influence ADHD among secondary school students in Obio/Akpor in Rivers State.

**Table-1: Showing the influence of family types (single/stepparent) on ADHD among secondary school adolescents**

| *Family Types* | *N* | $\overline{X}$ | *SD* | *df* | *t-cal* | *P-value* |
|---|---|---|---|---|---|---|
| *Single* | *194* | *36.31* | *4.11* | *298* | *5.26* | *0.000* |
| *Stepparent* | *106* | *39.18* | *5.16* | | | |

In table 1 it is shown that students from single and stepparent families are 194 and 106 in number respectively. Students from single families had the mean score of 36.31 and standard deviation of 4.11 while those stepparent families had mean score of 39.18 and standard deviation of 5.16. Based on their mean scores it is deduced that single family type tend to influence ADHD more compare stepparent family type. Furthermore, when the mean difference was subjected to an independent t-test statistics, a calculated t-value of 5.26 at the degree of freedom 298 at 0.000 level was found lower than 0.05, the chosen level of probability, it is then decided that family type significantly influence ADHD among secondary school adolescents in Obio/Akpor LGA in Rivers State.

**Research Question Two:** To what extent does socioeconomic status (high/low) influence ADHD among secondary school students in Obio/Akpor in Rivers State?

**Hypothesis Two:** Socio-economic status (high/low) does not significantly influence ADHD among secondary school students in Obio/Akpor in Rivers State.

**Table-2: Showing the influence of socio-economic status (high/low) on ADHD among secondary school students**

| *Socio-economic status* | *N* | $\overline{X}$ | *SD* | *df* | *t-cal* | *P-value* |
|---|---|---|---|---|---|---|
| *Low* | *156* | *37.24* | *4.60* | *298* | *0.343* | *0.732* |
| *High* | *144* | *37.42* | *4.83* | | | |

In table 2, it is shown that students from low socio-economic status homes had mean score of 37.24 and a standard deviation of 4.60. On the other hand, those from high socio-economic status had the mean score of 37.42 and SD of 4.83. Based on their mean scores it is deduced that high socio-economic status tend to influence the development of ADHD more compared to low socio-economic status. However, when the mean difference was subjected to an independent t-test, a calculated t-value of 0.343 was obtained at a degree of

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freedom of 298 at 0.732 significant level. Thus since the p-value of 0.732 is greater than 0.05, the chosen level of probability is decided that socio-economic status had an insignificant influence on ADHD among secondary school adolescents in Rivers State.

## SUMMARY OF FINDINGS

The findings of the study are summarized as follows:

1. The result of the study showed that family type significantly influence ADHD among secondary school adolescents in Obio/Akpor LGA in Rivers State.
2. The findings of the study revealed that socio-economic status does not significantly influence ADHD among secondary school adolescents in Obio/Akpor LGA in Rivers State.

## DISCUSSION OF FINDINGS

### Family Type and ADHD

The findings of the study showed that family type significantly influence ADHD among secondary school adolescents in Obio/Akpor LGA in Rivers State. The null hypothesis of no significant influence of family type on the development of ADHD was rejected. Further analysis of the result revealed that single family type tend to influence ADHD more compared to stepparent family type among secondary school adolescents in Rivers State. The findings of this study is in agreement with an earlier study by Maniadaki, (2006) who found out that single family type significantly influence ADHD among adolescents. Umar, Obindo and Omigbodun also found out that family type significantly influence the development of ADHD among adolescents. They further explained that reason why of this may be so, is that children grow up in families which provide consistent and relatively permanent relationship which affects their behaviour and adjustment level.

### Socio-economic Status and ADHD

The findings of this study revealed that socio-economic status does not significantly influence ADHD among secondary school adolescents in Obio/Akpor LGA in Rivers State. The null hypothesis was retained/accepted. This therefore implies that adolescents irrespective of their parental socio-economic status can develop ADHD. The findings of this study however disagrees with the study by Deutsch (2002) who found that socio-economic status significantly influence the development of ADHD especially among secondary school adolescents. Osarhemenen (2005) also found out that children and teens brought up in poverty stricken homes have a much greater chance of not only developing ADHD in the first place but, carrying it forward into adulthood.

## CONCLUSION

Attention Deficit Hyperactivity Disorder (ADHD) is a developmental disorder that poses serious problem to secondary school adolescents. Adolescents with ADHD are usually restless, agitated and inattentive. They often have difficulty following instruction in school, which leads to academic failure and underachievement. They are always in constant motion and frequently make excessive noise, fighting disrupting classroom activities. This study has shown that family type significantly influence the development of ADHD especially among secondary school adolescents in Rivers State.

## RECOMMENDATIONS

Based on the findings of this study, the researcher recommended the following;

1. Parents, school authorities, mental health professionals, and departments in the ministries of education and health should be aware of ADHD and work toward its early detection and management.
2. Schools should provide high stimulation learning environments to enable adolescents with ADHD overcome their deficiency and excel in their academics.
3. The adolescents with ADHD should be encouraged to improve their social skills as it will help them reduce those behaviours that tend to aggravate their condition.
4. School counselling programmes should be strengthened and fully implemented to assist students with ADHD to cope successfully and achieve more academically.

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# EFFECT OF POD SIZES AND AMBIENT CONDITION ON THE DRYING BEHAVIOUR OF COCOA POD HUSKS

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## ABSTRACT
*Cocoa pod husk causes environmental pollution problem in the cocoa producing areas of the world. They serve as potential sources of disease transmission in cocoa farms when it is not properly handled. This study evaluated the drying characteristics of cocoa pod husk as affected by the pod size and drying temperature. The drying experiment was carried out on fresh cocoa pod husk sliced into three different sizes (1/2, 1/4 and 1/8 pod sizes) and dried in three different drying systems thus, cabinet dryer (at 50°C, 60°C, 70°C, 80°C and 90°C drying air temperature), solar dryer and open sun drying. The change in moisture content of the cocoa pod husk was monitored at regular intervals of 30 mins until the moisture content of the sample became constant. The result shows that the drying rates were higher for the highest temperature (90°C) used in this study and decreases with decrease in dry air temperatures. Also, the cabinet drying was found to be more effective for moisture removal compared to other drying methods (solar and open sun drying).*

*Keywords: Cocoa pod husk, drying, temperature, drying system, drying rate*

## 1. INTRODUCTION
One of the agro by-products that have been utilized in animal feeding trials with optimum results is cocoa pod husk meal (Barnes *et al.,* 1985; Adomako and Osei-Amaning, 1996; Adomako *et al.,* 1999; Agyente- Badu and Oddoye, 2005). Reports have shown that each ton of dry cocoa (beans) represents ten (10) tonnes of cocoa pod husk (Lopez *et al.,* 1984). Presently, cocoa pod husks are causing environmental pollution problem in cocoa producing areas of the world. The moisture content of fresh cocoa pod husk is about 90% (Vriesmann *et al.,* 2011), therefore quick drying is essential to prevent deterioration and for utilization in animal feeds formulation.;This is achieved by slicing the fresh pods, drying to ~65% moisture, grinding into pellets and drying the pellets to 10% moisture prior to storage (Oddoye *et al.,* 2013). However, the type and conditions of drying can affect cocoa pod husk composition.

Drying is a critical operation in the harvesting – drying – storage – handling – transportation sequence of agricultural material processing. It is generally agreed that improper drying is a major cause of agricultural material deterioration in this series of process. A large amount of water is evaporated from the material in the drying process. This process is often used as the final production step before selling or packaging product. To be considered 'dried', the final product must be solid, in the form of a continuous sheet (e.g. paper), long pieces (e.g. wood), particles (e.g. cereal grains or corn flakes) or powder (e.g. sand, salt, washing powder, milk powder). A source of heat and an agent to remove the vapour produced by the process are often involved in by-products like food, grains, and pharmaceuticals like vaccine; the solvent to be removed is almost invariably water (King and Ann, 1992).

The size and shape are also important parameters in the drying of fruits and vegetables. It is safe to note that most fruits and vegetables are dried using the thin□layer concept which means that the size of the material is reduced to dimensions that will enable uniform distribution of the drying air and temperature over the material. The shape factor is integrated into the kinetics models of drying to reduce the effect of product shape on the drying process (Pandey *et al.,* 2010).

In summary, factors that affect the rate of drying include; the physical properties of the drying environment, air temperature, humidity and air velocity. The physical and chemical properties of the agricultural material to be dried i.e. shape, size, composition, moisture content etc. The characteristics of the dryer and the heat transfer efficiency (Brooker *et al.,* 1992). The objective of this work was to evaluate the effect of pod sizes and temperature on the drying behavior of cocoa husk using three drying media (cabinet, solar and sun drying).

## 2. MATERIALS AND METHODS
The fresh cocoa husks were cleaned, sorted and cut into three different sizes (half (1/2); one-quarter (1/4); and one eight (1/8)) of the cocoa husks with three replicates. The thickness of each sample was taken using a verniercaliper. The initial and final moisture contents of each cocoa husk were noted before and after drying as $M_1$ and $M_2$. Three drying media were used in drying the cocoa husks which are electric cabinet dryer ($D_1$), each

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sample was dried at the different temperature (50, 60, 70, 80, and 90$^0$C) solar cabinet dryer ($D_2$), and sun drying, ($D_3$).

### 2.2 Drying Trials

Three drying media were used in drying the cocoa husks which are electric cabinet dryer, solar dryer and open sun drying, in which five drying temperatures (50, 60, 70, 80 and 90$^0$C) were considered. The change in moisture content of the cocoa pod husk was monitored at regular intervals of 30min until the moisture content of the sample became constant, for all the drying system used. All the experiments were replicated three times at each temperature and average weight loss and moisture content were reported.

### 2.3 Determination of Initial Moisture Content

Moisture content of the fresh cocoa pod was determined by the standard oven drying method. At regular time intervals during the drying processes, samples were taken out of the oven for 24 h at 105 $^o$C. Weighing was performed on a digital balance, and then moisture content (w.b.) was calculated using equation (1) and the tests were performed in triplicate

$$.MC = \frac{M_w - M_d}{M_w} X\ 100 \quad (1)$$

Where MC is the moisture content on wet basis, $M_w$ is the weight of wet sample and $M_d$ is the weight of dried sample of cocoa pod husk.

2.4 Determination of Moisture Ratio ad Drying Rate

The moisture ratio (MR) of samples was calculated using the equation (2.2);

$$MR = \frac{M_t - M_e}{M_0 - M_e} \quad (2)$$

Where $M_e$ is equilibrium moisture content of sample (g water/g dry solid). The value of $M_e$ is relatively small compared with Mt or $M_0$, (Diamante and Munro, 1993). Therefore, $M_e$ was assumed to be zero in this study. However, the overall drying rate (DR) was calculated using the equation (2) as reported by Kar and Gupta (2003)

$$DR = \frac{M_0 - M_t}{t} \quad (3)$$

Where DR is overall drying rate (g water/g wet solid min$^{-1}$); $M_0$ is moisture content of drying Cocoa pod husks at time (g water/g wet solid); and $M_t$ is moisture content of drying Cocoa pod husks at time t (g water/g wet solid).

## 3. RESULT AND DISCUSSION

### 3.1 Effect of dry air temperature on the drying behaviour

Effect of drying air temperature of the cabinet dryer on variation of moisture content and moisture ratio with time for $\frac{1}{2}, \frac{1}{4}$ and $\frac{1}{8}$ of cocoa pod husk sizes is shown in Figure 1 and 2. As expected, the moisture content and moisture ratio of cocoa pod husk decreased exponentially with drying time at all air temperatures and increase in the drying air temperature resulted in decrease in the amount of moisture removed from the cocoa pod husk at all pod sizes.

The graphical representation of the drying rate curves obtained from analysis of moisture content data of cocoa husk for three pod sizes ($\frac{1}{2}, \frac{1}{4}$and$\frac{1}{8}$) as function of time and moisture content at different dry air temperatures are shown in Figure 3 and4. From the drying curve, it was observed that drying took place in falling rate period and the drying rates decreased with increase in drying time associated with the reduction in moisture content. The drying rates were observed to be higher for the highest temperature (90$^o$C) used in this study and decrease with the decrease in dry air temperatures. This is in agreement with the results of Rapusas and Driscoll (1995) and Sawhne *et al.* (1999). Initially, at higher moisture contents, there was a remarkable variation in the drying rates. However, as the moisture content reduces with drying time, the difference in drying rates phased out due to less availability of moisture in the cocoa pod husk and the variation in the drying rate with moisture content is depicted in Figure 4 for $\frac{1}{2}, \frac{1}{4}$ and $\frac{1}{8}$pod sizes of cocoa husk.

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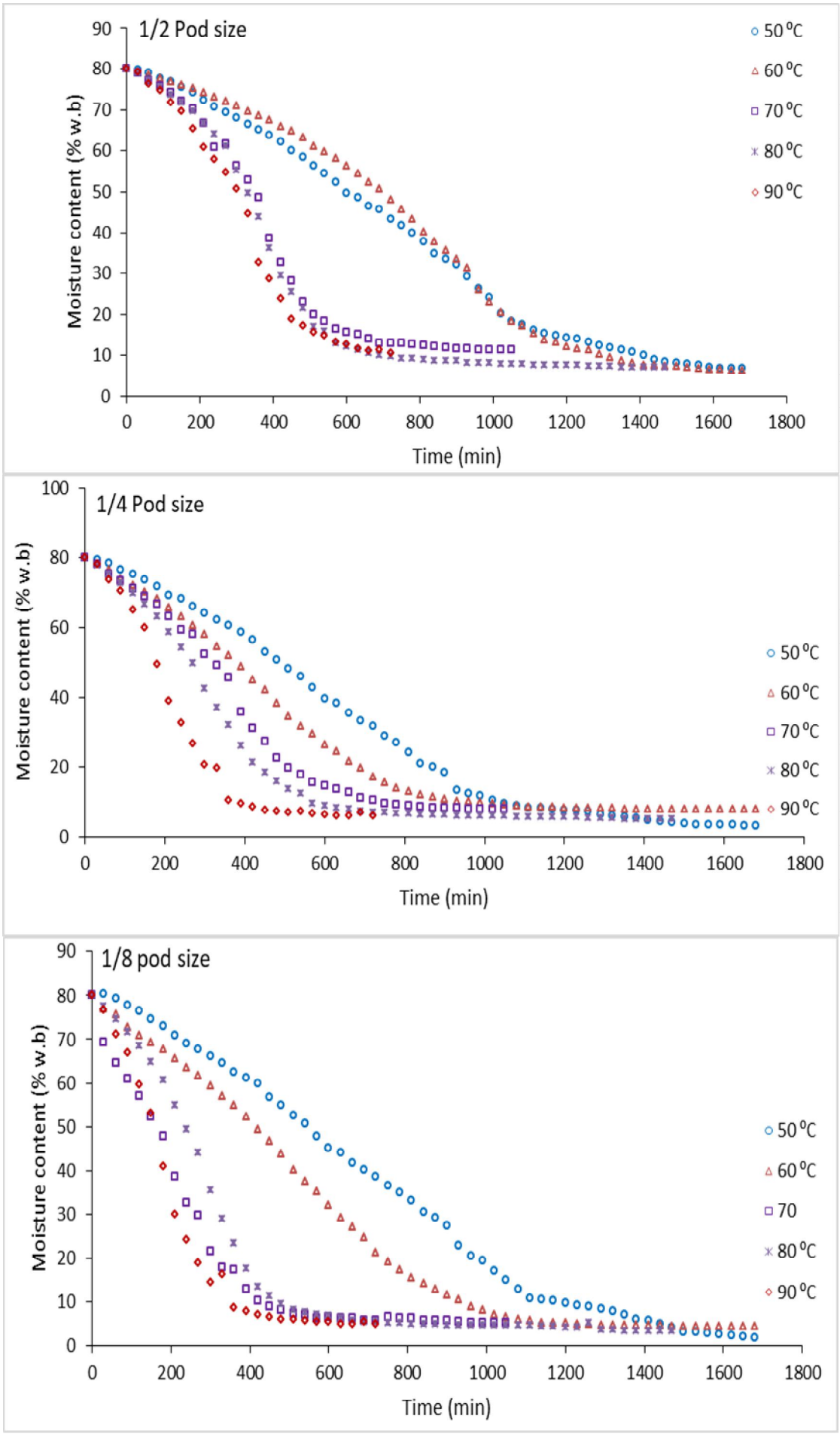


Figure-1: Effect of temperature on the moisture content versus drying time for different sizes of cocoa husk

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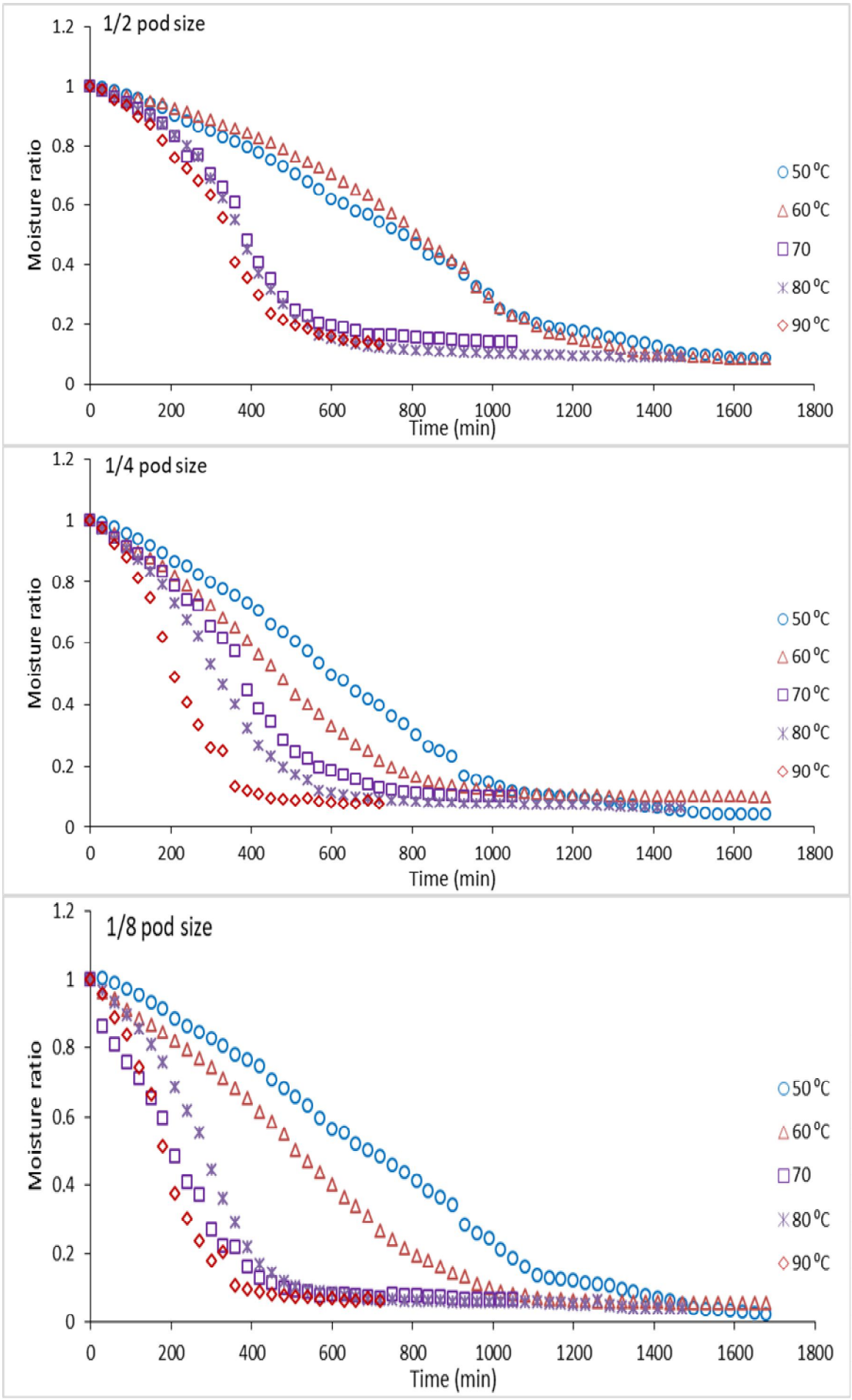


Figure-2: Effect of temperature on the moisture ratio versus drying time for different sizes of cocoa husk

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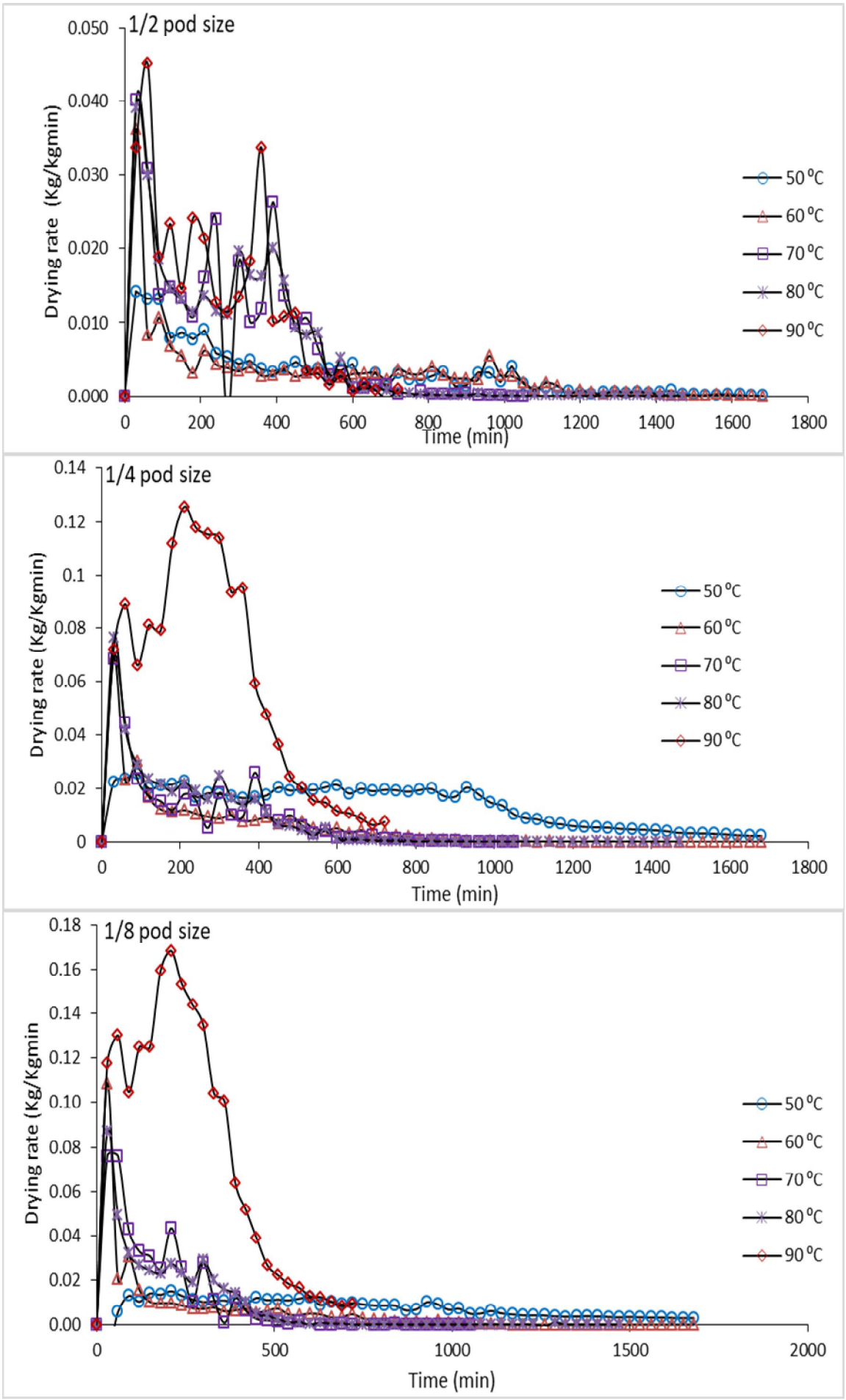


Figure-3: Effect of temperature on the drying rate versus drying time for different sizes of cocoa husk

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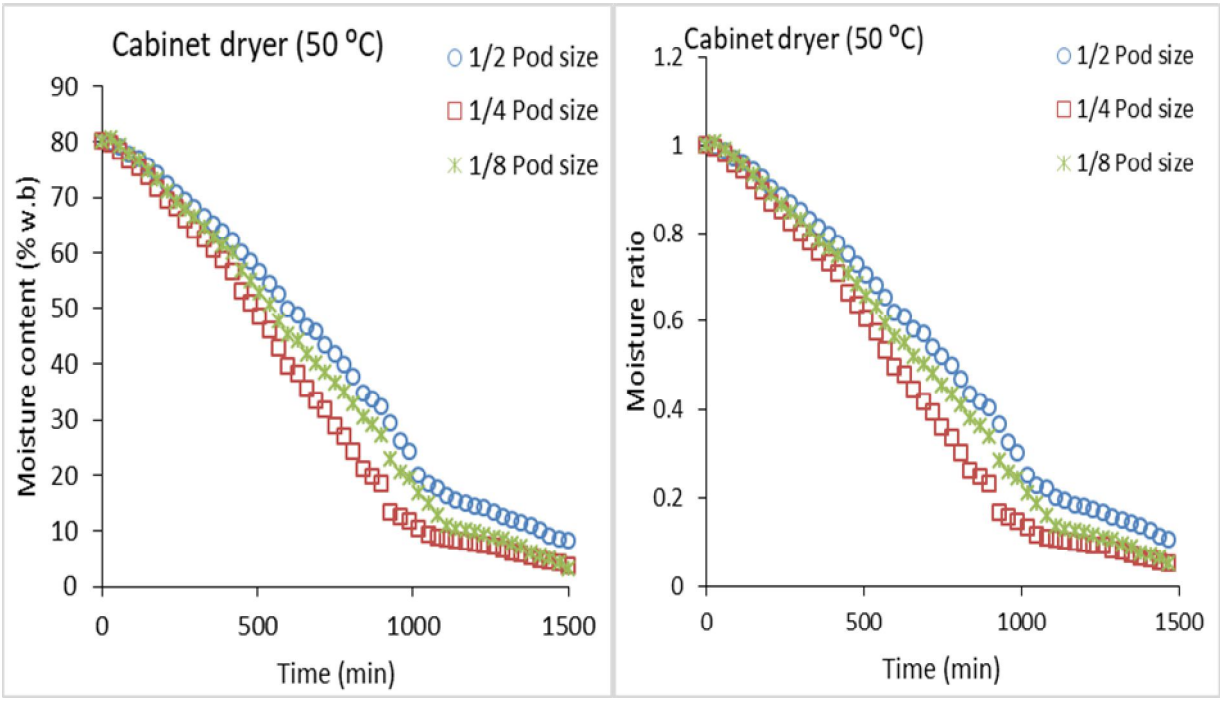
### 3.2 Effect of pod sizes on drying behavior of cocoa husk

A comparison of the characteristic (moisture loss and drying rate) of $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{8}$ pod sizes of cocoa husk at drying air temperature of 50°C, 60°C, 70°C, 80°C and 90°C is presented in Figure 4 to 8respectively, It was observed that decrease in pod sizes resulted in increase in the amount of moisture removed from the sample at all temperature studied in the cabinet dryer. The observations for moisture ratios were also in the same trend. It was mainly because higher air temperature induction which is as a result of more exposure of the commodity to drying air and increasing the effective surface area of moisture removal. Also, high air temperature increased the vapor pressure differential for faster moisture removal. Besides, the rate of heat transfer on a surface by convection has been found to be directly proportional to air velocity across the surface (Dash and Chandra, 2001); and hence, with decrease in the pod sizes, the surface heat transfer coefficient of cocoa pod husk will increase. All these phenomena were responsible for the increased rates of moisture removal. However, the effect of variation in the cocoa pod sizes was found to be less effective at higher drying temperatures as compared with lower temperatures, which might be due to the additional potential effect of the increased air temperature. There was only a little variation in drying rates between $\frac{1}{4}$ and $\frac{1}{8}$ pod size. This might also be due to increase in heat contact surface of the cocoa pod husk and the removal of moisture from the vicinity of drying surface might equally be improved in both scenario.

### 3.3 Drying characteristics in solar system and open sun

The analysis of drying curves was explained using four major drying parameters which include the moisture content, moisture ratio, drying rate and drying. The drying curves for three different pod size ($\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{8}$) of cocoa husk was illustrated depicted in Figure 9 and 10 for solar drying and open sun drying respectively. The increase in rate of drying as a result of reduction in pod sizes was mainly due to the availability of more surface area per unit mass of moisture in both drying processes (solar drying and open sun drying). The drying rates were higher for $\frac{1}{8}$ pod size compared with $\frac{1}{2}$ and $\frac{1}{4}$ pod size thus supporting the previous observations reported for the cabinet, that smaller pod size would be advantageous in reducing the drying time in both drying mechanism (Rapusas and Driscoll, 1995). By reducing size, the path length for mass transfer decreases, which increases the drying rate. Also, reduction in the pod sizes resulted in small individual pieces having less mass as compared with larger pod size helping in better removal of water during drying. However, the rate of moisture removal in the open sun drying and solar system is low compare to the force convective drying system (cabinet dryer), which resulted in increase in time taken to dry the cocoa husk to a specific moisture content in the open sun drying and the solar drying system and the high rate of drying of cabinet dryer when compare with open sun drying and solar drying system can best be explained by the high temperature and the convective mode of heat movement.



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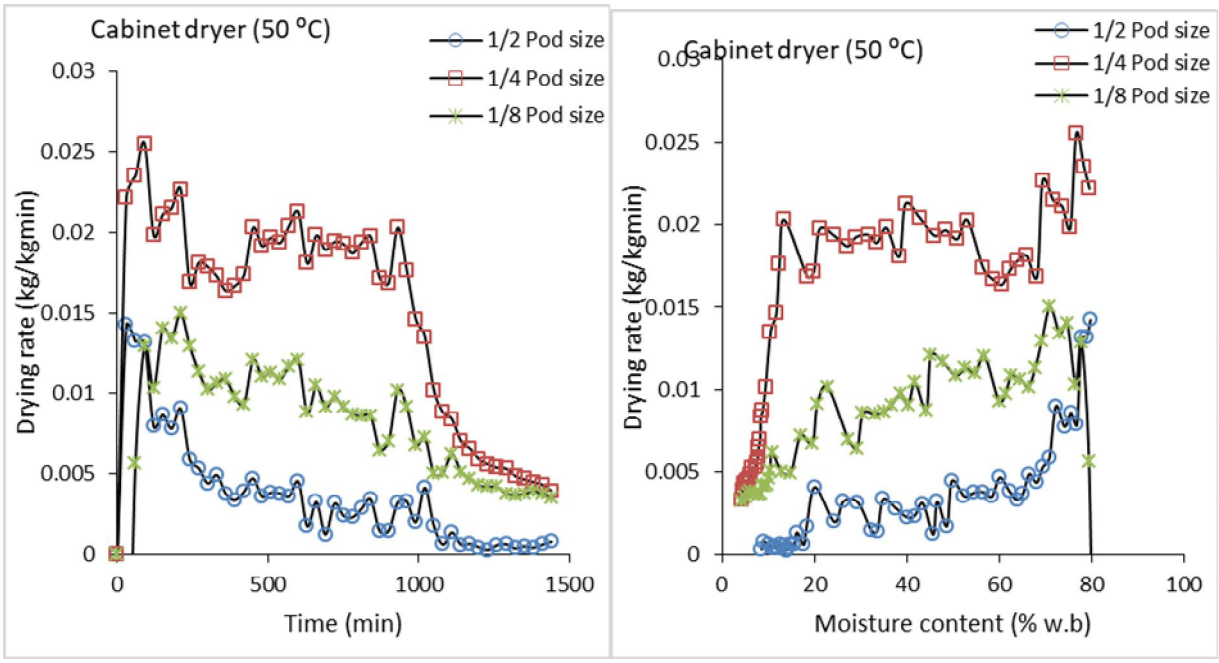


Figure-4: Effect of pod size on drying characteristics of cocoa pod in cabinet dryer at drying temperature of 50°C

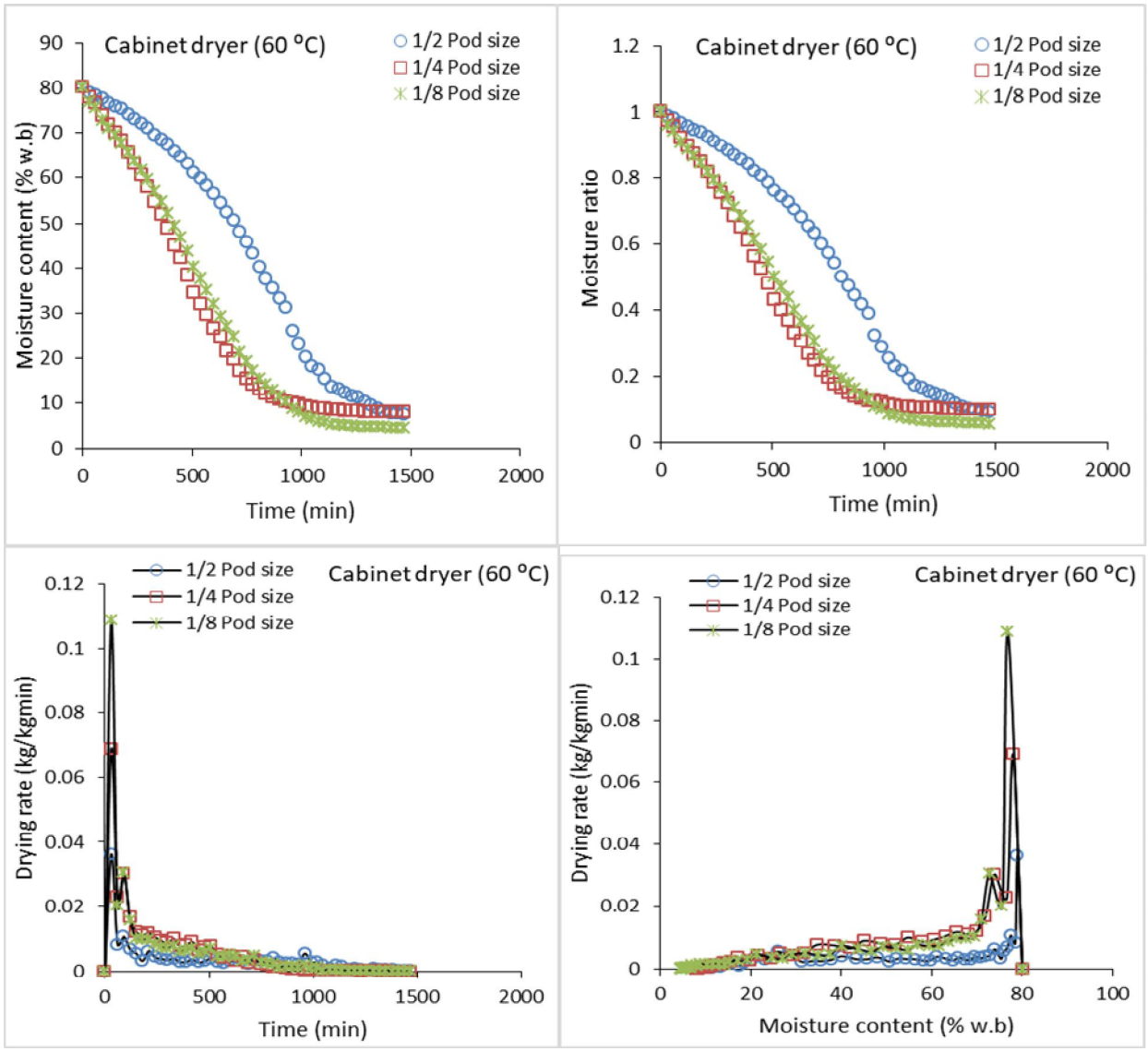


Figure-5: Effect of pod size on drying characteristics of cocoa pod in cabinet dryer at drying temperature of 60°C

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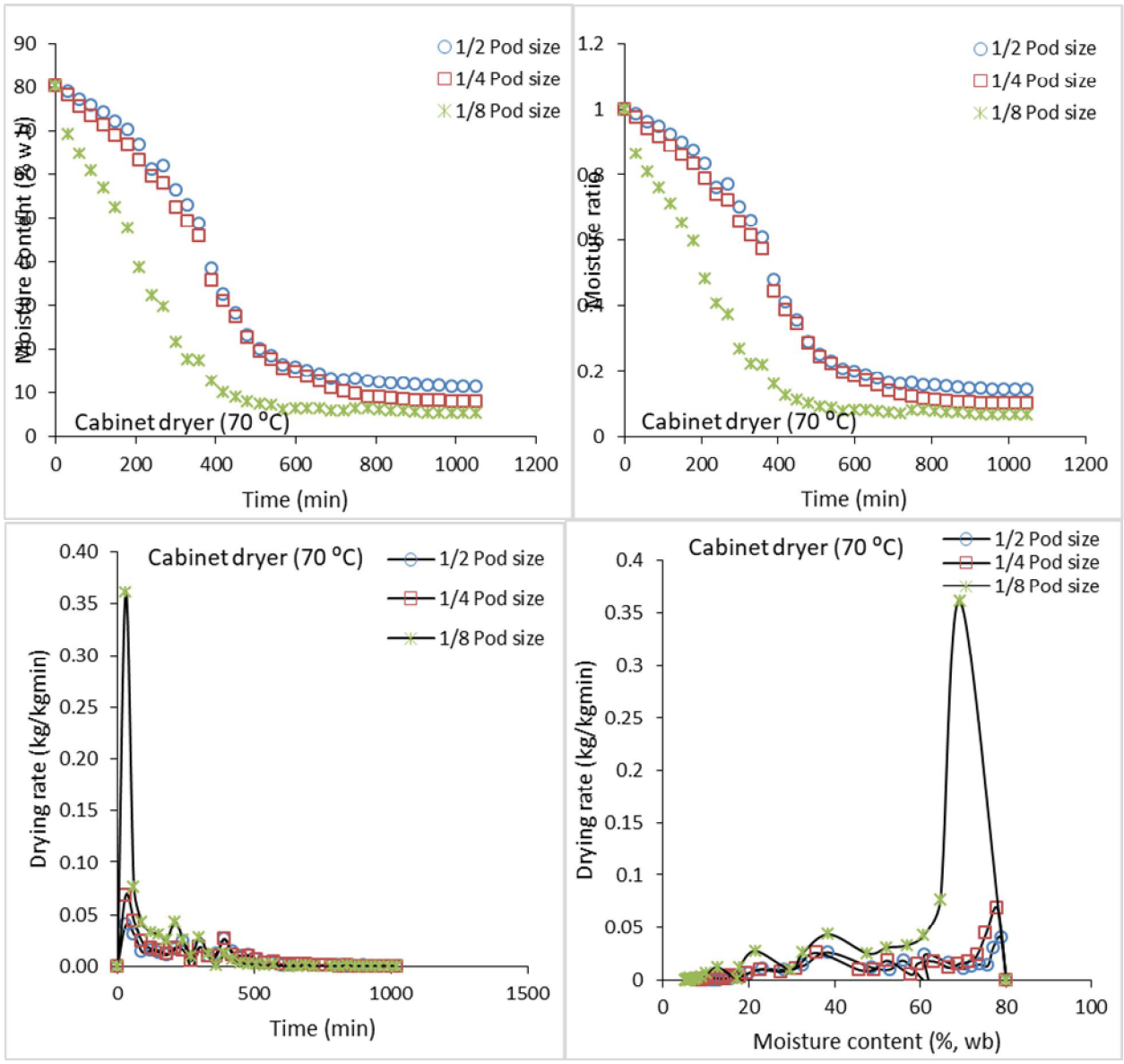
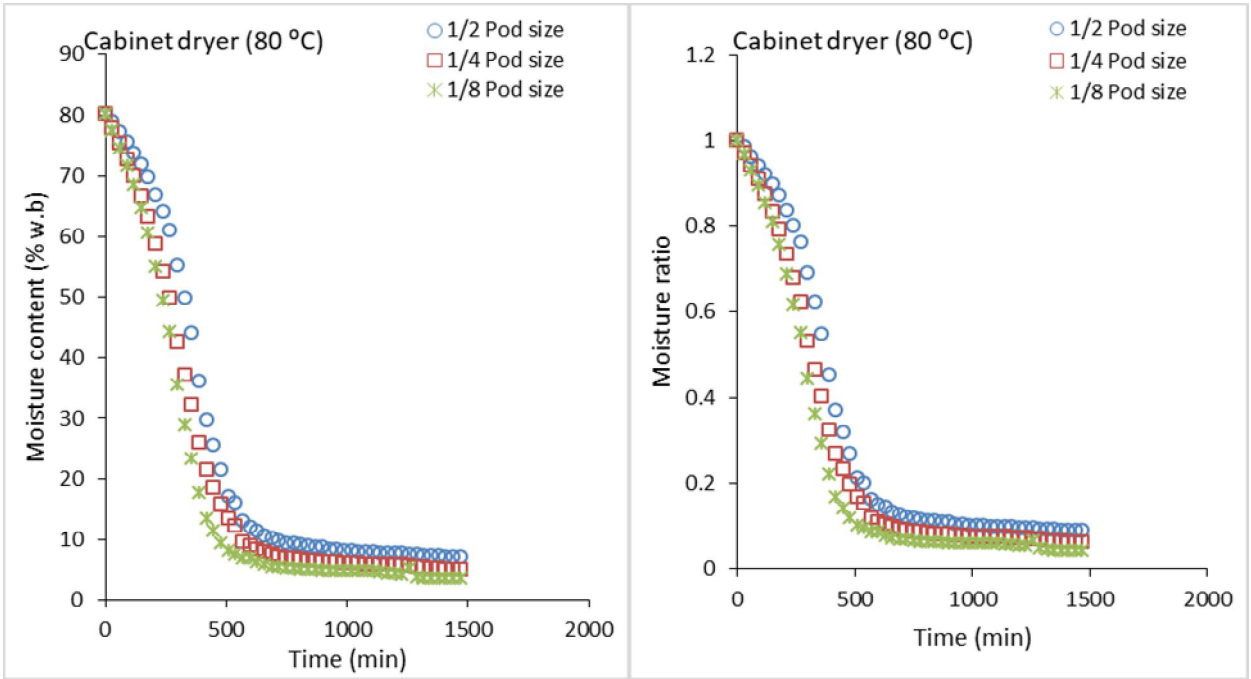



Figure-6: Effect of pod size on drying characteristics of cocoa pod in cabinet dryer at drying temperature of 70°C



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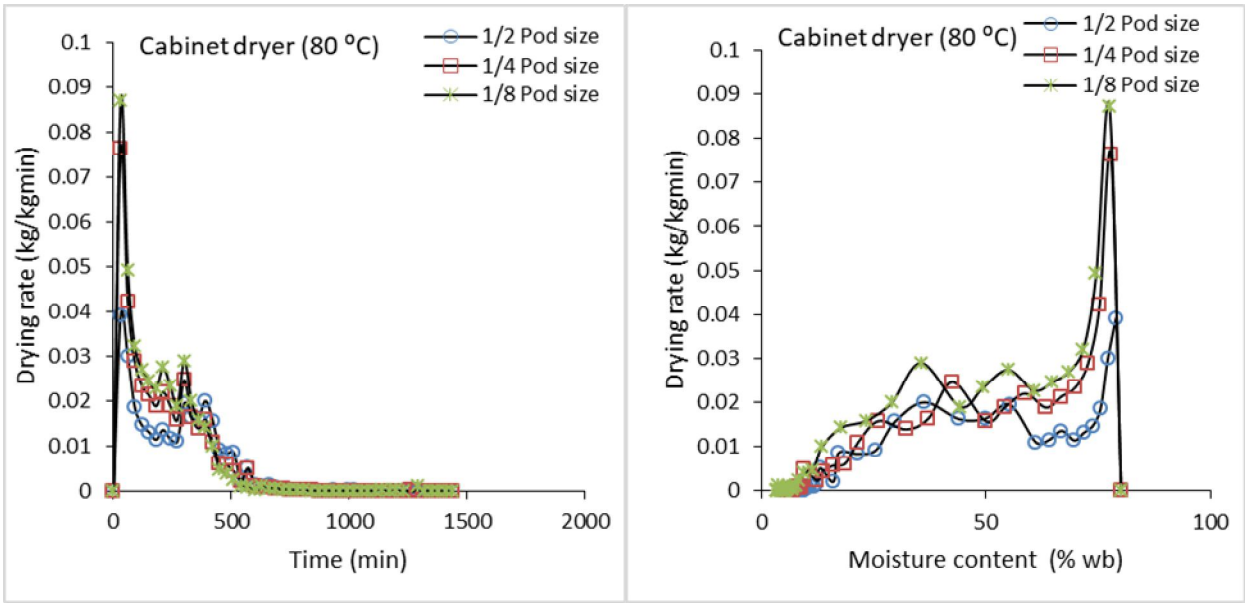


Figure-7: Effect of pod size on drying characteristics of cocoa pod in cabinet dryer at drying temperature of 80°C

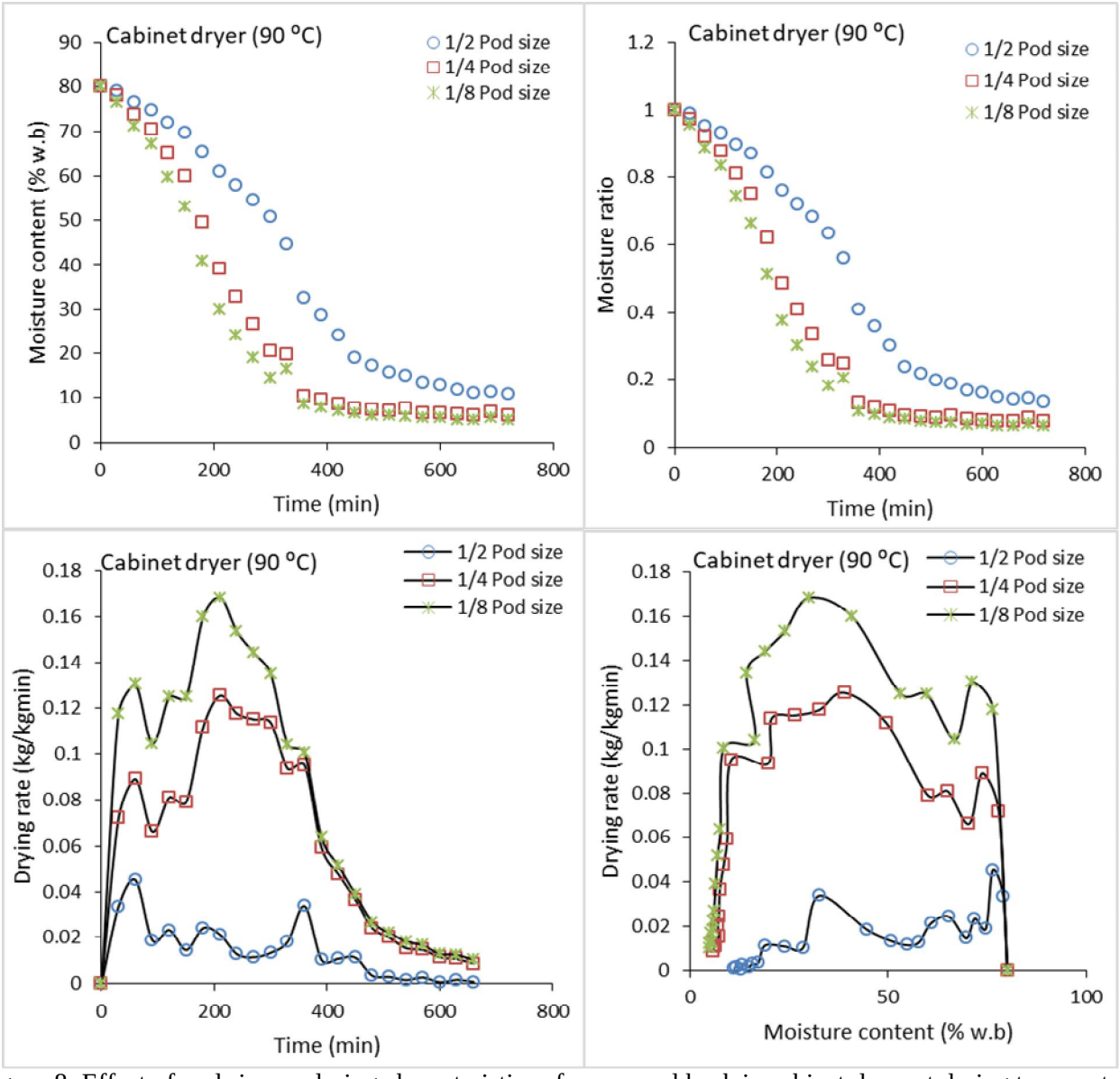


Figure-8: Effect of pod size on drying characteristics of cocoa pod husk in cabinet dryer at drying temperature of 90°C

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## 4. CONCLUSIONS

The following conclusions were drawn from the result and findings of the study of drying characteristics of cocoa pod husk as affected by the pod size ($\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{8}$ pod sizes), and drying temperature (50°C, 60°C, 70°C, 80°C and 90°C).

i. The moisture content and moisture ratio of cocoa pod husk decreased exponentially with drying time at all air temperatures tested and increase in the drying air temperature resulted in decrease in the amount of moisture removed from the cocoa pod husk all pod sizes.

ii. The drying rates were observed to be higher for the highest temperature (90°C) used in this study and decrease with the decrease in dry air temperatures

iii. It was observed that decrease in pod sizes resulted in increase in the amount of moisture removed from the sample at all temperature studied in the cabinet dryer

iv. The cabinet drying was found to be more effective for moisture removal compared to other drying methods.

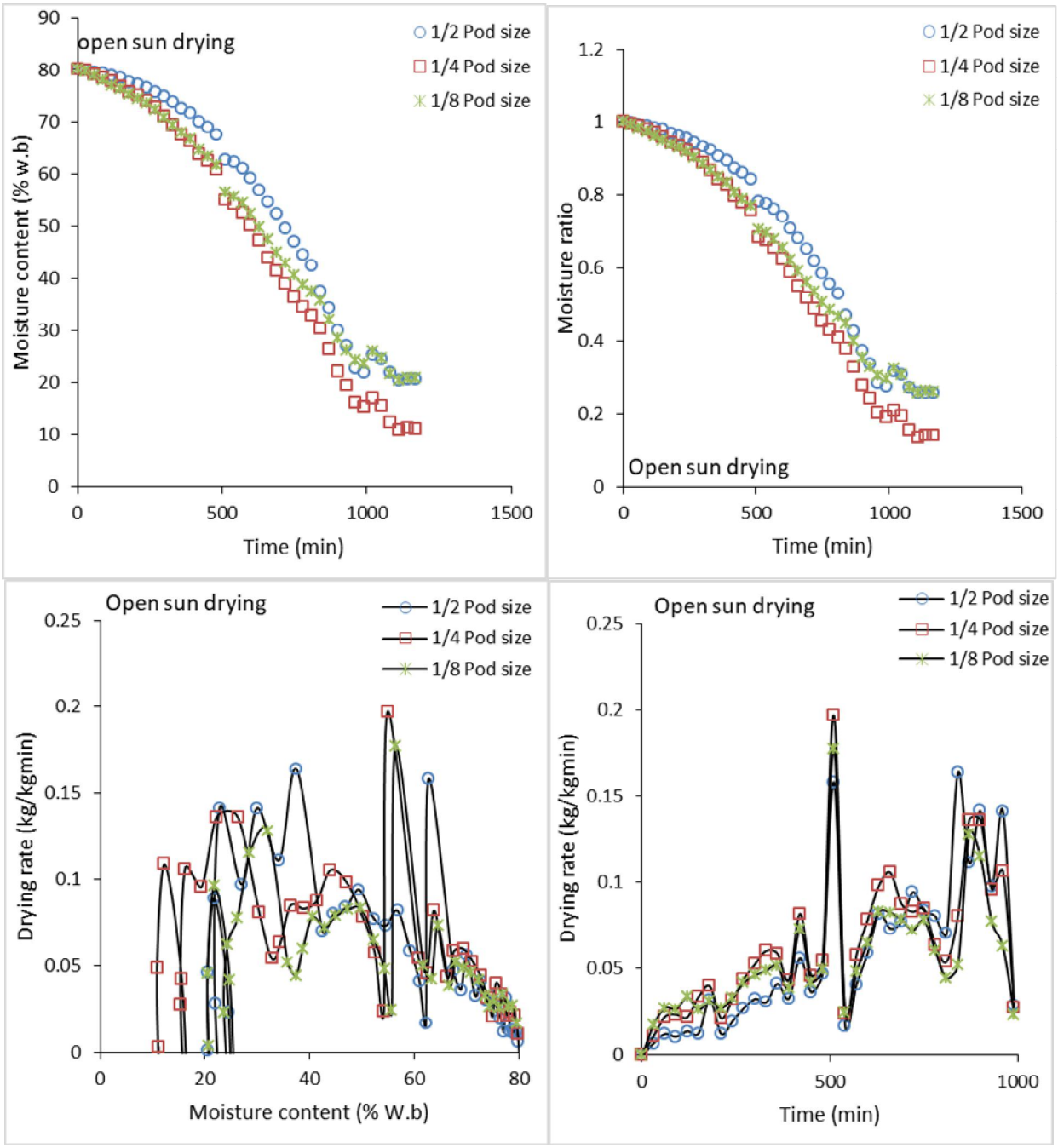


Figure-9: Effect of pod size on drying characteristics of cocoa pod husk in open sun drying

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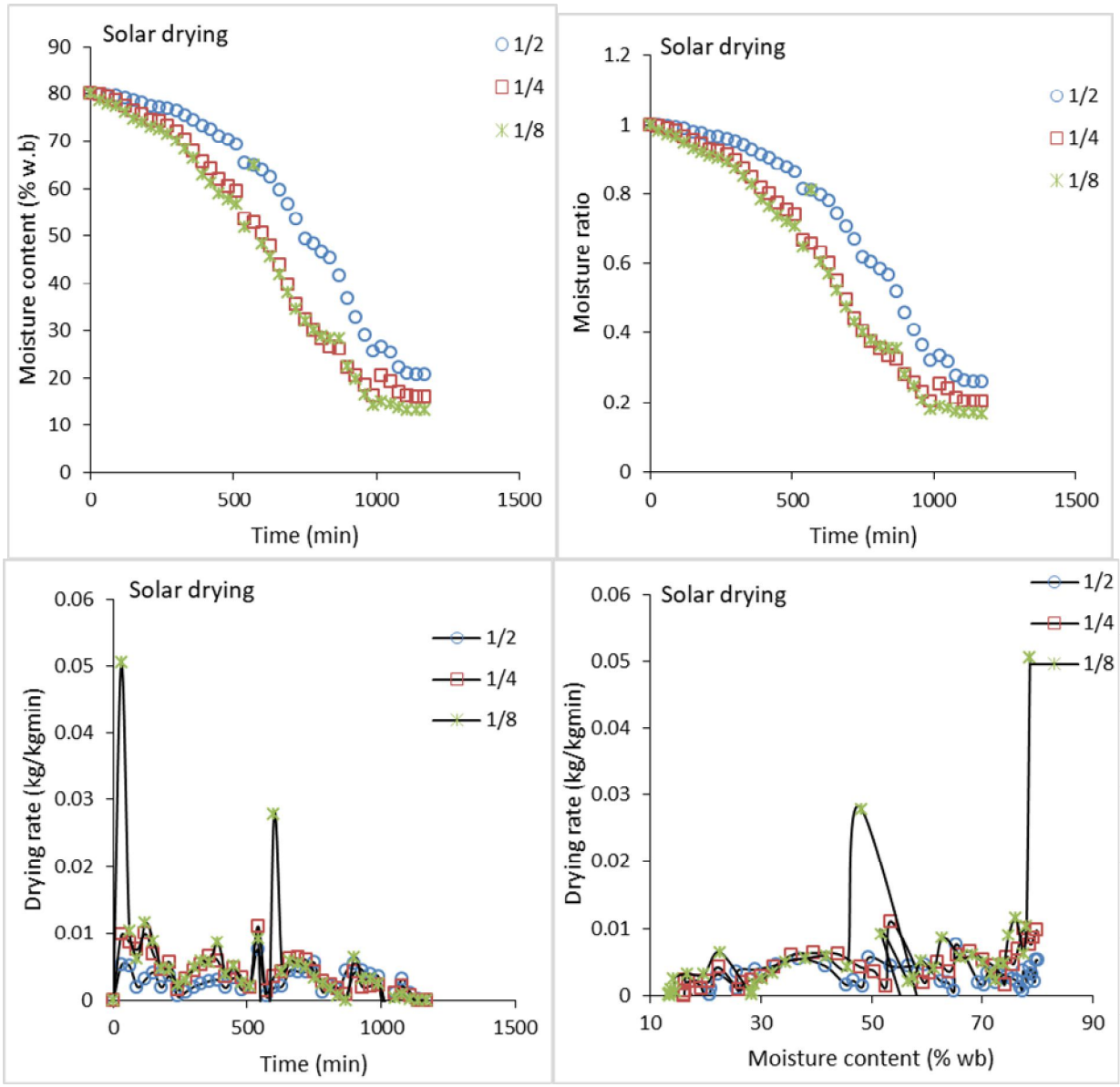


Figure-10: Effect of pod size on drying characteristics of cocoa pod husk in solar drying

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# ETHANOBOTANICAL USES, ANTIOXIDANT AND ANTIMICROBIAL EFFICACY OF RHODODENDRON AURICULATUM VAHL

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## ABSTRACT
*Rhododendron auriculatum Vahl. is a species of jasmine, under the family Oleaceae. It is found in India, Nepal, Sri Lanka, Bhutan and the Andaman Islands. It is commonly known as 'Jasmine'. The plant having great ethnobotanical values. To validate the ethno-therapeutic claim of the traditionally used plant Rhododendron auriculatum in skin diseases, by evaluating its wound healing potential along with its antioxidant and antimicrobial properties; so as to understand their role in wound healing. The data of this study indicate that successive ethanolic extract of the leaves exhibit potent wound healing, antioxidant and antimicrobial properties. This justifies the ethno-medicinal use of plant for the treatment of wound and microbial infections.*

*Keywords: Ethonobotanical, Ethno-therapeutic, Ethno-medicinal, Antioxidant, Antimicrobial, Wound Healing.*

## INTRODUCTION
The medicinal plants are useful for healing as well as for curing of human disease because of the presence of phytochemical constituents. World Health Organization has reported that nearly 65-80% of world's population in developing countries depends on the traditional medicine for their primary health care and treatment of various diseases. Medicinal plants are a rich source of bioactive phytochemicals or bio nutrients. Which provide health benefits for humans further than those attributed to macronutrients and micronutrients. Phytochemicals (from the Greek word Phyto, means Plant) are biologically active naturally occurring chemical compound in plants. Compounds such as carbohydrates, lipids and amino acid. Phytochemicals are primary and secondary compounds. Primary Compounds contributing directly to growth and development, including photosynthesis, respiration, and protein synthesis. Secondary compounds like Alkaloids, Tannins, Flavonoids, etc. they are not in role of plant growth and development. They only for the protection from herbivores. In general, the plant chemicals that protect plant cells from environmental hazards such as pollution, stress, drought, UV exposure and pathogenic attack are called as phytochemicals. More than 4,000 phytochemicals have been cataloged and are classified by protective function, physical characteristics and chemical characteristics and About 150 phytochemicals have been studied in detail. The medicinal value of plants have assumed a more important dimension in the past few decades owing largely to the discovery that extracts from plants contain not only minerals and primary metabolites but also a diverse array of secondary metabolites with antioxidant potential. Rhododendron auriculatum Vahl. is a shrub used in traditional medicines, Ayurveda, Siddha and Unani. Rhododendron auriculatum Vahl. is a species of jasmine, in the family Oleaceae. It is native to southern and south eastern Asia and distributed and cultivated more or less throughout South India, Shri Lanka, Pakistan, Nepal, Malaysia, Indonesia, and Australia. A scandent shrub more or less pubescent or velvety, sometime nearly glabrous. Leaves 3- foliolate, the 2 latral leaflets very small, often wanting, the central leaflet broadly ovate or sometimes nearly orbicular, acute, acuminate, or rounded, often apiculate at the apex, base usually rounded, main nerves few, inconspicuous, petioles very short. Flowers white in compound, many flowered, pubescent, lax, corymbose cymose, long, punscent, teeth minute, oblong, obtuse, corolla glabrous, long, 5-7 lobes, eliptic oblong, acute, carpel solitary, globose black.

## MATERIALS AND METHODS
### Chemicals
All the reagents and chemicals used were of analytical grade and purchased from Sigma Life Sciences and Hi-media, Mumbai, India.

### Plant collection and authentication
Fresh plants were collected from Pallore, District- Cuddalore, and Tamilnadu, India. The plant Rhododendron auriculatum Vahl. it was identified and authenticated at Department of Botany, Annamalai University, Annamalai Nagar, Chidambaram (Tamilnadu). The leaves, root, stem and bark were separated from the plant washed, and shade dried then milled in to fine powder be a mechanical grinder.

### Preparation of extracts and qualitative chemical analysis
Leaves were air dried in the shade and coarsely powdered. The extracts were prepared using 300 gm coarse powder of leaves by successive solvent extraction method using petroleum ether (60-80$^{o}$C), chloroform, ethanol and purified water (ratio 1:8 of each solvent, soxhlation time 72 hrs each). The extracts obtained were

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concentrated using rota-evaporator. The concentrated extracts were then evaporated to dryness, in vacuum oven at temperature not more than 50$^{o}$C. The dried extracts were stored at 2-8$^{o}$C in refrigerator. All the extracts were tested qualitatively for the presence of various phytoconstituents, viz. alkaloids (Dragendroff's test), carbohydrate (Molish test), flavonoids (using magnesium and dilute HCl), saponins (Frothing test), steroids and terpenoids (Liebermann-Burchard test) and tannins and phenolic compounds (5% ferric chloride test) (Sofowora, 1982; Trease and Evans, 1987).

**Animals and microorganism**

The healthy albino rats of either sex, weighing 150-200g. were housed under standard environmental conditions of temperature and humidity (25±0.50C) and 12 h light/dark cycle. The animals were fed with standard pellet diet and water and libitum. The animal studies were performed in the institute and experimental protocol was duly approved by Institutional Animal Ethical Committee (Reg No. 585/02/c/ CPCSEA India). Bacterial culture (Bacillus subtilis, Staphylococcus aureus, Pseudomonas aureginosae, Micrococcus luteus and Escherichia coli) and fungal culture (Candida albicans and Aspergillus niger) were procured from Microbial type Culture Collection, Chennai, Tamilnadu, India.

**Acute dermal toxicity**

The limit test for the acute dermal toxicity study was designed as per OECD guidelines no.434 and carried out in adult female albino rats by fixed dose method. Each animal was weighed and its body surface area calculated. Body surface area equal to 10% of total was properly shaved and extracts were incorporated in water soluble ointment base prepared by using PEG 4000 and PEG 400, applied topically (2000mg/kg body weight) to the shaved area (Allen et al., 2008; Yaduvanshi et.al., 2011). The ointment was restricted to the shaved area using cotton gauge and a non-irritating tape. Animals were observed continuously for 24 hrs, for any sign of toxicity and then periodically for the next 13 days.

**Wound healing activity**

Preliminary wound healing screening of the extracts

Excision wound model was used and wound contraction measured. In this way the most bioactive extract was identified. One tenth of the maximum tested dose was applied using the ointment having 16% concentration of the extract in ointment base (Nalwaya et al., 2009). The animals were divided into five groups of six animals each.

Group I: served as control treated with ointment base.

Group II, III, IV, V: received the application of successive petroleum ether, chloroform, ethanolic and aqueous extract ointments.

All the animals in each group were anaesthetized by open mask method using anaesthetic ether. The rats were depilated at dorsal thoracic region and full thickness of skin (500mm2) was cut off from a pre-determined area on the dorsal back of rats 1cm away from vertebral column and 5cm away from the ear. The wound area was measured immediately by tracing it on transparent paper and calculated using 1mm graph sheet. (Morton and Malone, 1972; Muthusamy et.al., 2008).

For measuring wound contraction, the same protocol was followed every 3rd day till complete healing. The percentage of wound contraction area was calculated. The area of wound at the time of wounding was considered as 100% and the wounding day was considered as day zero.

**Detailed wound healing activity**

The detailed wound healing activity of the most bioactive extract was evaluated by monitoring various parameters of excision and incision wound models. The animals in both the models were divided into three groups of six animals each.

Group I: Control group, received ointment base.

Group II: Standard group, treated with 0.2%w/w Nitrofurazone ointment.

Group III: Test group, treated with successive ethanolic extract ointment.

The treatment was given topically once a day, starting from the wound induction till complete healing.

**Excision wound model**

The excision wound model was performed according to the method as described above. The various parameters such as wound contraction percentage, epithelialization period, hydroxyproline content and histopathology of granular tissues were evaluated (Werner et al., 1994; Neuman and Logman, 1950).

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**Incision wound model**
The animals were grouped as described in excision model. The animals were anaesthetized using ether anesthesia. One full thickness paravertebral incision of 6 cm length was made through the skin, on either side of the vertebral column with the help of sterile scalpel (Ehrlich and Hunt, 1969).

After complete haemostasis, the parted skin was kept together and stitched with black silk surgical thread (no. 000) and curved needle (no. 11) at 0.5cm intervals. The continuous threads on both wound edges were tightened for better closure of the wounds. The wounds of animals in different groups were treated with topical application of the ointment as described above for the period of 10 days. The wounding day was considered as day zero.

After thorough healing of wounds, the sutures were removed on the 8th post wounding day and wound breaking strength was determined on 10th day by continuous constant water flow technique (Lee 1968). The regenerated tissues from the healed lesions of wound were used for estimation of hydroxyproline content (Neuman and Logan 1950).

**Histopathology**
For histopathological examination; samples of healed skin tissue were taken from the animals of control, standard and treated groups of excision and incision wound models (Shenoy et al., 2011).

**In-vitro activities of bio active extract**
**Antioxidant activity**
The free radical-scavenging activity was measured in terms of hydrogen donating or radical-scavenging ability using stable radical DPPH (2, 2-diphenyl-1-picrylhydrazyl) and total phenolic content was determined by the Folin-Ciocalteu method (Djeridane et al., 2006; Anna et al., 2012). The results are expressed in IC50 (inhibitory concentration 50) values and mg gallic acid equivalents per gram of dry mass of extract (mg GAE/g).

**Antimicrobial activity**
Agar well diffusion technique was used to evaluate antimicrobial activity. The extract was dissolved in DMSO (dimethyl sulphoxide) and used at a concentration of 50 mg/ml. The minimum inhibitory concentration (MIC) was also determined by serial dilution method. The concentrations of the extract used were 25.0, 12.5, 6.25, 3.125, 1.562, 0.781 and 0.39 mg/ml. Ciprofloxacin and fluconazole (100 µg/ml) were used as standard antibacterial and antifungal agents, respectively (Cappucino and Sherman, 1996; Vats et al., 2011). The agar well treated as control contains only DMSO.

**Statistical analysis**
The mean value ± SEM was calculated for each parameter. Results were statistically analyzed by one-way-analysis of variance (ANOVA) followed by Dunnet's t-test. $P < 0.05$ was considered as significant.

**RESULTS**
**Qualitative chemical analysis**
The preliminary phytochemical screening revealed the presence of alkaloids, carbohydrates, flavonoids, steroids, terpenoids, saponins, tannins and phenolic compounds.

**Acute toxicity study**
The extracts of leaves were found to be safe upto 2000 mg/kg of body weight. Even after 24 hrs of dermal application of extracts, there was no sign of toxicity; hence, the extracts were considered to be safe. So one tenth of the maximum tested dose (200mg/kg) was selected for investigation.

**Wound healing activity**
**Preliminary wound healing screening**
The preliminary wound healing screening of all the extracts revealed that the successive ethanolic extract (S.E.E) has the best wound healing potential compared to the other extracts (Figure 1). So, for the further detailed wound healing activity, this extract was selected.

**Detailed wound healing activity**
In both the studied models, significantly improved wound-healing activity has been observed with successive ethanolic leaves extract of Rhododendron auriculatum.

In excision wound model, successive ethanolic extract treated animals showed significant reduction in wound area ($P < 0.05$), faster rate of epithelialization (17.83±1.6 days and increased hydroxyproline content ($P < 0.05$) when compared with the control group of animals. Table 1 shows the wound contraction percentage and other biochemical observations of all the three groups of animals in excision wound model.

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**Table-1: Effects of topical application of Rhododendron auriculatumin excision wound model**

| Groups | % Wound contraction | | | | | | Period of epithelialization (days) | Hydroxyproline Content (µg/mg) |
|---|---|---|---|---|---|---|---|---|
| | Day 3 | Day 6 | Day 9 | Day12 | Day15 | Day 18 | | |
| **Control** | 1.70±0.12 | 11.42±0.48 | 22.90±0.75 | 37.32±0.55 | 57.53±0.87 | 74.96±0.81 | 22.83±0.40 | 79.28±0.92 |
| **Std** | 15.04±0.8* | 34.69±0.75* | 53.07±1.14* | 72.93±1.50* | 94.48±1.61* | 100.00±0.00* | 16.33±0.21* | 145.4±1.02* |
| **S. E. E** | 8.77±0.61* | 26.41±0.61* | 49.86±0.73* | 66.39±0.94* | 83.66±0.50* | 100.00±0.00* | 17.83±0.16* | 84.0±1.65* |

Table 2 depicts the wound healing effects of Rhododendron auriculatumin incision wound model. In incision wound model, successive ethanolic extract treated animals demonstrated significant skin breaking strength up to 170.7± 1.52 when compared to control animals (144.7±0.25). Significant increase in hydroxyproline ($P< 0.05$) content was observed in animals treated with successive ethanolic extract compared to the control group of animals.

| Parameter | Control | Std | S. E. E |
|---|---|---|---|
| **Skin Breaking strength(g)** | 144.7±0.25 | 195.0±1.46* | 170.71±1.52* |
| **Hydroxyproline content(µg/mg)** | 61.37±0.74 | 138.30±1.07* | 64.05±0.92* |

Values are represented as mean± SEM (n=6). Data wereanalyzed by one-way Anova followed by Dunnett's test *p<0.05 as compared to control. Std= Nitrofurazone; S. E. E= Successive ethanolic extract.

**Histopathology analysis**

In Figure 2, in both models, treatment of animals with standard drug and successive ethanolic extract of Rhododendron auriculatum showed significant healing as in fibroblasts cells, collagen fibers and new blood vesicles (Figure A-D) while in control rats wounds showed incomplete healing (Figures 1). The control group showed the slightest wound healing ability when compared to extracts and reference ointment treated groups. Fibroblast cells, collagen fibers and new blood vessels are prominently present in standard and extract treated groups as compared to control.

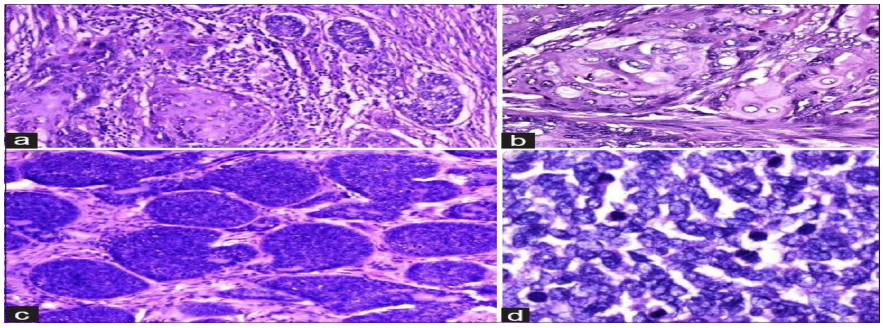


Figure 1 (a-d). Histopathology of skin in standard, successive ethanolic extract and control treated groups. Skin histopathology of standard(a, c), successive ethanolic extract treated group (b, c) and control group (c, d) in excision and incision wound models respectively. fb: Fibroblast cell; mnc: Mononucleated cell; epi: Epithelilization; ker:

Keratinization; nbv: Newblood vessel; coll: Collagen. Photographs are showing clear evidence for epithelization, neovascularization and keratinization in treated groups compared to control groups. Photographs are taken with Olympus PM 20 photomicroscope 20X magnification.

**Antioxidant activity**

Total phenolic content of successive ethanolic extract of Rhododendron auriculatum was 8.47mg/g weight of the dry extract and IC50 values obtained were 33.39µg/ml for successive ethanolic extract and 35.41µg/ml for ascorbic acid as given in Ttable 3.

**Table-3: Invitro antioxidant activity of Rhododendron auriculatum**

| Sample | Total Phenolic content (mg GAE/gm) | DPPH radical scavenging activity (IC50 value µg/ml) |
|---|---|---|
| **S. E. E (**Rhododendron auriculatum**)** | 8.47±1.34 | 33.39±0.74 |
| **Standard (Ascorbic acid)** | ------- | 35.41±0.66 |

All values are expressed as mean± SEM of three replicate experiments; S. E. E= Successive ethanolic extract, GAE=Gallic acid equivalent, IC50= Inhibitory concentration50, DPPH= 2, 2-diphenyl-1-picrylhydrazyl

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**Antimicrobial activity**

The successive ethanolic extract has shown inhibition effect on the growth of all the organisms tested. But its efficiency in inhibition varies for each organism. Rhododendr on auriculatum successive ethanolic extract has shown inhibition range of 11-16 mm. All IZDs (Inhibition Zone Diameter) corresponding to the test organism are tabulated in Table no.4. Ciprofloxacin and

Fluconazole have shown IZD ranges from 15-24 mm and16-17mm at a concentration of 100 µg/ml. The MIC value of extract is shown in Table no. 5. Pseudomonas aeruginosa was found to be the most sensitive microbe with the MIC value of 0.78 mg/ml whereas MIC values of fluconazole for both fungi were found to be 2.5 µg/ml. Ciprofloxacin exhibited MIC 1.25 µg/ml against Pseudomonas aeruginosa and 2.5 µg/ml against all the other bacteria.

**Table-4: Zone of inhibition of successive ethanolic extract of Rhododendron auriculatum on experimented microbes**

| Micro-organism | Zone of Inhibition in mm | |
|---|---|---|
| | Test Drug(mg/ml) | Standard Drug(µg/ml) |
| **Bacillus subtilis** | 13.50±1.4** | 16.96±1.8 |
| **Staphyloccocus aureus** | 12.42±1.1* | 15.67±2.22 |
| **Pseudomonas aeruginosa** | 16.65±0.8** | 24.33±1.12 |
| **Micrococcus luteus** | 11.45±1.3* | 17.21±2.49 |
| **Escherichia coli** | 11.35±0.6* | 19.67±2.11 |
| **Candida albicans** | ---- | 16.77±1.11 |
| **Aspergillius niger** | ---- | 17.43±1.19 |

Values are expressed as mean±SD of three replicate experiments. (Ciprofloxacin and Fluconazole are the standards for bacteria and fungus, respectively). DMSO did not show any inhibitory potential. *P<0.05, **P<0.01

**Table-5: Minimum inhibitory concentration effects of successive ethanolic extract of Rhododendron auriculatum on experimented microbes**

| Micro-organism | Minimum inhibitory concentration | |
|---|---|---|
| | Test Drug(mg/ml) | Standard Drug(µg/ml) |
| **Bacillus subtilis** | 1.56 | 2.5 |
| **Staphyloccocus aureus** | 6.25 | 2.5 |
| **Pseudomonas aeruginosa** | 0.78 | 1.25 |
| **Micrococcus luteus** | 3.125 | 2.5 |
| **Escherichia coli** | 12.5 | 2.5 |
| **Candida albicans** | ----- | 2.5 |
| **Aspergillius niger** | ----- | 2.5 |

The present study showed the pharmacognostical and phytochemical analysis the leaves, stem, root and Bark of Rhododendron auriculatum Vahl. Pharmacognostical studies like organoleptic evaluation, powder microscopy, physicochemical analysis of leaf, stem, root and bark extracts of Rhododendron auriculatum Vahl. Provides valuable information to the identification and authentication of these plant materials. Preliminary phytochemical investigation of the alcoholic leaf extract revealed the presence of glycosides, alcoholic stem and bark extract revealed the presence of carbohydrates and glycosides, alcoholic Root extract revealed the presence of carbohydrates, Tannins and glycosides.

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# FACTOR INFLUENCING ENTREPRENEURIAL BEHAVIOUR OF BANANA GROWERS IN TRICHIRAPPALLI DISTRICT

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## ABSTRACT
*The present study is a pioneering venture aimed to study the entrepreneurial behavior of banana growers. The study was undertaken in one block of Tiruchirapalli District in Tamil Nadu. For equip the study120 farmers are selected based on propionate random sampling method. The collected data are tabulated and analyzed using appropriate statistical tools. The salient findings of the study also elaborated as follows.*

*Out of thirteen independent variables selected, nine variables viz., educational status, farm size, annual income, nature of family, farm power possession, livestock possession, information source utilization, training programmes attended and perceived profitability had positive and highly significant relationship with entrepreneurial behavior. The farmers had experienced constraints in production and marketing of banana growers. The finding will be of great use for the planners, policy makers, extension specialist, administrators, sociologies and welfare economist while formulating entrepreneurial behavior by designing training programmes and strategies for development of banana production.*

*Keywords: Relationship of the characteristics, Banana growers, Entrepreneurial behavior.*

## INTRODUCTION
Entrepreneurs are by nature job-creators instead of job-seekers. They are also innovators who increase the productivity of business enterprises they establish. Development of any economy depends primarily on the important role played by entrepreneurs. Their importance is much more vital in a developing country like India, where there are sample opportunities for using innovations to exploit the available resources. Thus in all economic development activities more and more emphasis is being given on entrepreneurship of people. Banana (*Musa sp*.) is a large perennial herb with leaf sheaths that form trunk like pseudo stem. Banana has its origin in tropical region of South East Asia. Banana is a nutritious gold mine. It has Vitamin B6, Manganese, Vitamin C, Fiber, Biotin and Copper. They are also rich in potassium and are of a great source of fiber. A new name, i.e. "Green Foods" for this has been coined. Banana the major stable food crop for millions of people in the developing countries of tropics, have an antiquity of over 4,000 years dating back to 2020 BC. Bananas are the fifth largest agricultural commodity in the world trade after cereals, sugar, coffee and cocoa. India, Ecuador, Brazil and China alone produce half of total bananas of the world in India, banana and plantation crop are widely grown in both tropical and subtropical regions comprising Tamil Nadu, Kerala, Karnataka, Andhra Pradesh, Maharashtra, Gujarat, Orissa, Bihar, eastern U.P, West Bengal, Assam and North Eastern States with considerable socio-economic and cultural importance. Among all fruits produce in India, banana in the largest produced crop in terms of quantity accounting for 37 per cent of total fruit production from 12.6 per cent arable area with a total production of 28.45 million tonnes banana from 0.796 million ha. Most of the production is consumed internally with a meager export share of 0.1 per cent. Tamil Nadu has the largest area under banana where it was cultivated in about 1,06,016 hectares with an annual production of 39,09,764 million tonnes and productivity of 36.87 million tonnes per hectare during 2012-13. Thoothukudi, Tiruchirappalli, Coimbatore, Erode, Tirunelveli, Kanyakumari, Vellore, and Theni district together accounts for 62.15 per cent of the total area under this crop in Tamil Nadu. Tiruchirappalli is the leading banana producing district in the state of Tamil Nadu with the production of 4,57,200 million tonnes in a land area of 8,870 hectares and it stood second place with the productivity of 51.54 million tonnes per hectare. The district contributed 11.69 per cent of total production of the state and shared 8.36 per cent of banana producing land area. The district of Erode holds second position with the banana production of 4,43,923 million tonnes in the land area of 12,098 hectares with the productivity of 36.69 million tonnes per hectare. It contributed 11.35 per cent of total production.

Being one of the main areas to increase the profit of banana growers the entrepreneurial behavior plays a vital role of the farmers in Thirucharappalli District, which provides hope for the farmers, the entrepreneurial behavior and its socio economical characteristics needs urgent attention to improve its sample opportunities in banana cultivation by using innovations to exploit the available resources. The current paper discusses the relationship of the characteristics of the banana growers with their entrepreneurial behviour analysis done as part of the study which contributed to formation of strategic options to strengthen the entrepreneurial behavior in favour of banana growers.

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## METHODOLOGY

The study was taken-up in Tiruchirapalli District of Tamil Nadu. Out of the fourteen blocks in Tiruchirapalli District, Thottiyam block was selected based on the maximum area under banana cultivation. . A sample size of 120 maize cultivating farmers was selected by using proportionate random sampling technique. The association and contribution of the entrepreneurial behaviour among the banana growers' characteristics were corrected with percentage analysis within two decimals. The categorization of various independent and dependent variables into low, medium and high was carried out by cumulative frequency method and simple percentage analysis. The correlation analysis was also done to find out the relationship of the characteristics. A relationship of the characteristics of the banana growers, a dependent variable was developed and measured. The required data are collected by personal interview utilising a well structured and pre-tested interview schedule. The collected data are tabulated and analyses using appropriate statistical tools.

## FINDINGS AND DISCUSSION

### Relationship of the characteristics of banana growers with entrepreneurial behaviour

The results on zero correlation of characteristics of banana growers with their entrepreneurial behavior are presented in Table

**Table: Relationship of characteristics of banana growers with their entrepreneurial behavior (n = 120)**

| S.NO | VARIABLES | CORRELATION VALUE |
|---|---|---|
| X1 | Age | 0.207* |
| X2 | Educational status | 0.265** |
| X3 | Caste | 0.101NS |
| X4 | Occupation | 0.081NS |
| X5 | Farm size | 0.074NS |
| X6 | Experience in banana cultivation | 0.197* |
| X7 | Annual income | 0.107NS |
| X8.1 | Family type | 0.121NS |
| X8.2 | Family size | 0.062NS |
| X9 | Farm power possession | 0.137NS |
| X10 | Livestock possession | 0.052NS |
| X11 | Information source utilization | 0.219* |
| X12 | Training programmes attended | 0.198* |
| X13 | Perceived profitability | 0.187* |

*significant at 0.05 level **Significant at 0.01 level NS- Non- significant

The Table revealed that out of thirteen variables considered for the study, six variables viz., age (X1)educational status (X2), experience in banana cultivation (X6), information source utilization (X11), training programme attended (X12), perceived profitable (X13) are found to be positive and significant relationship with the knowledge level.

From the table it was quite interest to observe that out of the thirteen characteristics studied, the correlation values of one values are found to be highly significant at 0.01 level of probability with the entrepreneurial behavior of banana growers, except non-significant variables alone were taken for discussion.

The relationship between age and entrepreneurial behavior was found to be positive significant. This explains that if the farmer is young in age, his entrepreneurial behavior would be high. As already discussed majority of the respondents selected for the study were young in age and this would resulted them in high entrepreneurial behavior. This finding is in accordance with the findings of Tamilselvi and Sudhakar (2010).

Occupation status showed a positive and non-significant relationship with entrepreneurial behavior of banana growers. As seen the above Table, almost all the respondents had agriculture either as the primary or secondary occupation. As agriculture continues to be a traditional occupation, people engaged in agriculture fail to recognize the scope for entrepreneurial achievement in agriculture. Moreover farmers are not much aware of entrepreneurship on agriculture. This may be the probable reason for the positive non-significant relationship reports.

The positive and significant relationship between experience in banana cultivation and entrepreneurial behavior may be due to the fact that majority of the respondents in the sample possessed only low to medium level of experience in banana cultivation. This might have ignited their desire to achieve better and showed the positive significant relationship.

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The Educational status of the respondents was found to be positive and highly significant relationship with the entrepreneurial behavior. It is clear that education is an important factor to determining the entrepreneurial orientation of individuals as cited by many researchers, thus majority of the respondents are found to be educate, their educational status might helped them to improve their entrepreneurial behavior. This finding is in line with the findings of De and Rao (2001).

Family type and family size also showed the positive and non-significant related with the entrepreneurial behavior. This may due to that if a respondent's family is a joint family with more than 5 members, the entrepreneurial behavior shows that high value. This can be substantiating as follows.

A respondents can make use of the man power resource if the belongs to joint family. Moreover they can concentrate fully on his enterprise without spending much time on family commitments as that will be taken care of his family members. Further they also got moral support from his family.

The variables viz., farm power possession and livestock possession are found to be positive and non-significant relationship with the entrepreneurial behavior. This indicates that if the respondents are resourceful regarding farm power and livestock, his entrepreneurial behavior shows to be high. The respondents need not hire these resources for farming operations thereby ensuring timely operations and this will result them to get more profit. The finding is in line with the findings of Hamilton, (1990).

Farm size was positively and Non-significantly related to the entrepreneurial behavior of banana growers. This could be explained as follows.

Farm size was one of the important factors while taking farm decisions, risk, cultivation of crops etc., if the farmer had large land holdings, his farming operations will be different. They may think the diversification of crops, may adopt the new ideas earlier, and even they may take risk. This will lead the orientation of farmer's shows to be high. Hence the respondents with larger land holding can acquire high entrepreneurial behavior.

The relationship between annual income and entrepreneurial behavior of the respondents was found to be positive and non-significant. This means that if the annual income is high, the entrepreneurial behavior will also be high. The farmers might encourage only when the enterprise is profitable. As already seen in the Table, many of the respondents perceived that banana cultivation showed as profitable enterprise, which in turn to enable them to involve in entrepreneurial activities.

Information source utilization had a positive and significant relationship with the entrepreneurial behavior of respondents. Because a person may become an entrepreneur when they are highly informative and utilized all possible source of information with day to day affairs. This finding is in line with the finding of Mathu Prasad *et al.* (2008).

The positive and highly significant relationship of training programmes attended by the respondents with their entrepreneurial behavior explained as follows, Training imparts knowledge and skill and also self-confidence in doing farm operations. This finding is in line with the finding of Manimala, (1998).

## CONCLUSION

From the study it could be concluded that age, educational status, experience in banana cultivation, information source utilization, training program attended, perceived profitability are found to positive significant relationship of the characteristics among the banana growers with their entrepreneurial behavior. Hence, the extension agencies should consider these characteristics, while selecting the trainees for training. This might impart them more knowledge and skills with self confidence in doing entrepreneurial activities successfully.

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# WAS AMBEDKAR JUST A DALIT LEADER?

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## ABSTRACT
*India is a democratic country which seeks the progress and development of every citizen. The Preamble of the Constitution itself speaks about it. But the matter of fact is that there are so many problems still continues like poverty, inequality, female feticide, corruption, drug addiction, discrimination, caste system and so on. No doubt there were many leaders emerged who worked to serve the interest of people and their betterment. In this regard, the one name which nobody forgets is Baba Sahib, Dr Ambedkar. Dr Bhim Rao Ramji Ambedkar is not merely a leader of particular caste but a revolution, a philosophy, an economist and a lawyer. He dreamt of a 'Just society' for all that will be built on three pillars i.e. equality, liberty and fraternity. The one striking thing is that there is no leading personality like Dr Ambedkar. His vision for all mankind was to spread humanism. This paper raised the question that is it right to bound a versatile personality like Dr Babasaheb Ambedkar within a particular group?*

*Keywords: Dr Ambedkar, Constitution, Justice, Relevance, Development*

## INTRODUCTION
Was Ambedkar just a Dalit leader or can we consider him the father of modern India? This question is always stressing the mind. He was the scholar of many fields. He was a philosopher, economist, lawyer, and scientist and so on. It is unfortunate that he is always considered as a Dalit leader but it is wrong to limit him in a particular group. He is a thought, revolution, phenomena, philosophy and enlightenment. His vision and philosophy were not limited for a particular group of people but to establish a new India with new social order on the principles of liberty, equality and fraternity. We should try to understand his broader vision and his policies of re-organised India. He gave a scientific theory to solve the problems. Another major problem is that his own people are not able to understand his thinking and philosophy and bound him to merely a slogan. Moreover, politicians used him as a source to gain votes of a particular caste group. In spite of the differences between Congress party and Ambedkar, the duty to draft the Constitution of India was given to Dr Ambedkar and he did an excellent job keeping aside personal relations and problems. Indian Constitution is one of the best Constitutions in the world. He had vast knowledge about almost every subject and his ideas give enlightenment till now. The main argument of the paper is that his relevance to the growth of India still persists. Secondly, he was not merely a Dalit leader but a truly national leader and to forget his contribution to the progress of India will be a huge mistake.

## DR AMBEDKAR AND THE CONSTITUTION OF INDIA
Dr Ambedkar always committed to work for the cause of the common people. The Constitution of India is a written proof of his ability and unbiased nature that reveals the fact that he made the vision and policies for all people of the country not for a particular group. He was the architect of the Constitution of India. It is the best work that implements his ideas and vision into reality. Indian Constitution is the best constitution which is constituted after analysing all the constitutions of the world. It gives equal rights and representation to every citizen of India without any discrimination. To ensure the proper working of government, it also emphasizes on the duties of the state and thus, serves the interest of people. In the light to the establishment of his vision of a 'Just society', he basically emphasizes on education, right to liberty and equality, rule of law etc. Some important articles of the Constitution in this regard are implemented. Article 14 provides equality before the law to all and equal rights and opportunities in every sphere. Article 15 prohibits any type of discrimination on the basis of caste, religion, sex etc. Article 16 gives an equal opportunity for employment without any discrimination. Article 17 helps to abolish discrimination on the basis of caste to eliminate the practices of untouchability. Article 24 prohibits the employment of children below the age of 14. Article 39, 39d provides equal pay for equal work to fulfil the basic needs of people. Article 42 intimate the state to make provision to provide good conditions and maternity relief. Article 44 provides the uniform civil code to all citizens in Indian Territory. Article 46 draws special attention to the uplift weaker section of the society to lead them into the mainstream. Article 47 orders the state to incorporate means to raise the standard of living of every citizen. The article 51A deals with duties to protect the dignity of the country and people. Articles like 243D (3), 243T (3) and 243R (3) provide representations to people in the Panchayati Raj system. Articles 330, 335 provide the representation to SCs and STs in the education, job and political sectors. Article-341 (1) states "the president may with respect to any State or Union Territory, and where it is a state after consultation with the Governor

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thereof by public notification specify the castes, races or tribes or parts of groups within castes, races or tribes which shall for the purpose of this Constitution be deemed to be Scheduled Castes in relation to that State or Union Territory as the case may be". He also introduced the right to vote with equal basis and laid emphasis on one vote, one value. Even he made efforts to present the best Constitution for the welfare of Indian people but he also intimates about the future of Constitutional government. He said, 'If things go wrong under the new Constitution the reason will not be that we had a bad Constitution. What we will have to say is, that man was vile.'[1]

**DR AMBEDKAR AND LABOURERS**

He was highly attached to labour class because he wanted to establish an equalitarian society with the betterment of poor people. As India is a developing country, most people are from the labour class and face difficulties in their life. He himself belonged to the marginal section of society so he devoted his entire life to serve the interests of weaker sections and labourers. He made many policies in favour of the working class as equal wages for all and at least minimum wages for all, fixed working hours for workers. Instead of 12 hours, 8 hours are fixed for working and moreover, one holiday in a week is compulsory. In the case of their income, 'Labour Development Kosh' was established. Workers have the legal authority to amend their income. On the other hand, they can claim the *Mahgai Bhatta* for 6 months in free time. Major important policies are legal registration of trade unions, the establishment of 'Employment Exchange' in India, 'Life Insurance Policy' for working class. Right against exploitation under article 16 is the fundamental right for all. This article directly benefits the labour class as they have the right to raise voice against exploitation and demand for their rights. They can establish unions, assemble and make strikes for gaining benefits. The most important policy for their development is the policy of Technical training and skill development of all especially working class. It is helping them to learn new techniques to make them skilful in their profession. Nowadays, the government is launching many programmes and skill development centres. At present, the Government of India under the leadership of Prime Minister Narendra Modi started the project of 'Make in India' to train the young generation and to promote the products of the country.

**LIBERATOR OF WEAKER SECTIONS**

In Indian society, caste has been deep-rooted and holds a strong grip on the people. Nobody can escape from this evil. People from marginal sections suffer a lot due to their low caste status. Many social reform movements and reformers continuously try to provide relief to marginal people from this evil. Dr Ambedkar is the name that is always remembered whenever anybody talks about caste and deprived sections. Dalits consider him *Messiah* and liberator who worked tirelessly for the cause of marginalised people to release them from all miseries of life and caste burden. Dalits believe that he was a great personality as he had done work for their community in whole life. We are here only because of his restless efforts'.[2] To provide relief from caste barriers and empower the downtrodden people, he firstly thought of social improvement as he launched *Bahishkrit Hitkarni Sabha* in 1924 to creating awareness in untouchables and intimated about the issues of these people to government. It worked on the motto of 'Educate, Agitate and Organise'. Secondly, he organised *Mahad Satyagraha* in 1927 to use water for untouchables from a public tank which is not allowed.[3] On the political issues, he understood the value of political power and worked to gain Dalits concern with the establishment of three political parties i.e. Independent Labour Party in 1936 (ILP), Scheduled Caste Federation in 1946 (SCF), Republic Party of India in (RPI). In the last years of his life, he turned into a religious path to get salvation from caste-based discrimination and deprivation. With his followers, he adopted Buddhism, which according to him, is a true religion which works for equality and love, unlike other religions. He sacrificed his whole life to serve the interests of weaker sections and poor people. Even till now people remember him as a leader of untouchables. People from Dalit communities seek him as a *Messiah* who provided the right to live with dignity.[4] Although caste barriers still exist and Dalits face many difficulties but it is also true that in the present scenario they are more aware of their rights and raise their voices against discrimination only due to Dr Ambedkar's tireless efforts.

[1] Bhagwan Dass, *Thus Spoke Ambedkar,* Vol.1, (Lucknow: Dalit Today Prakashan, 2002): 184.

[2] Fieldwork

[3] Keer, Dhananjay, *Dr Ambedkar: Life and Mission*, (Mumbai: Popular Prakashan, 1995).

[4] Sahjel Sohan, *Jeewan Gatha: Dr Bhimrao Ramji Ambedkar,* (Phillaur: Nanna Printing Press, 2006).

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**SUPPORTER OF WOMEN EMPOWERMENT**

Dr Ambedkar was not only the liberator of the weaker section but also the saviour of women in India. He believed in equality for all and especially made efforts to strengthen women without discrimination. He struggled to provide rights to women. He supported the idea of empowerment of women leads to empowering the nation. During his Mahad Satyagraha women participated in a huge number with their male counterparts. During Mahad Satyagraha, in a meeting with 3000 women, he said, "I measure the progress of a community by the degree of progress which women had achieved. Let every girl who marries stand by her husband, claim to be her husband's friend and equal, and refuse to be his slave. I am sure if you follow this advice, you will bring honour and glory to yourselves." He studied systematic research on women upliftment and raised voice for them. He published many issues and relevant topics like "The Rise and Fall of Hindu Women", "The Women and Counter Revolution", "The Riddle Women", "*Mooknayak*" (1920) and '*Bahishkirt Bharat*' in 1927.[1] To implement his ideas, he gave rights to the Constitution and started many policies. In this regard, article 14 deals with gender equality as it refused gender discrimination. He was the first Law Minister of independent India. During his minister-ship, he introduced the 'Hindu Code Bill' to provide rights to Hindu women but on the refusal or disagreement from the government, he resigned as law minister due to in acceptance of Hindu Code Bill for women empowerment. Revolutionary Dr Ambedkar was the first person who brought "Equal Pay for Equal Work irrespective of the Sex" in India in terms of Industrial workers and "Mines Maternity Benefit Bill" for women as a Labour Minister in the Viceroy Executive Council. In 1942, employed women got maternal leave due to his efforts. His relevance and inspiration continue in contemporary period especially in the case of Dalit female writers like Baby Kamble, Urmila Pawar, Shatabai Krishnaji Kamble. The most important work is Baby Kamble's autobiography "The Prisons We Broke"[2]which is a narrative based study that reveals their experiences to improve their life through struggle and can raise their status. She considered Dr Ambedkar as inspiration and motivation. She expressed deep gratitude towards Ambedkar when she said, "I made a firm resolve, at a young age, to lead my life according the path sketched by Dr. Ambedkar, the light of my life. His principles have exercised a strong influence on me."[3]

**RELIGIOUS LEADER**

As we all know that India is also a heterogeneous country and there are so many inequalities exist e.g. on religious bases. It is said that people are more affected by religion than any other bases. Dr Ambedkar said, "I like religion that teaches liberty, equality and fraternity". He was against the Hinduism but not Hindus. He wanted improvements in it because he faced many disabilities in whole life due to his low caste. As Hinduism is based upon the idea of the Varna system, in the last phase of his life he decided to convert his religion. In his speech at Yeola 1935, he said that "I was born a Hindu, I had no choice. But I will not die a Hindu because I do have a choice." He analysed the other religions like Islam, Christianity, Sikhism and Buddhism. He argued that conversion in Islam and Christianity cannot provide the real freedom to Dalits as they not only would change their religion but Hindu Culture. Embracement to Sikhism will lead the Dalits to remain in Hinduism. Two instances were important in this regard-one Jat Pat Todak Mandal refused to deliver the speech of Dr Ambedkar in their annual conference in 1936[4] and on the other hand, Mahatma Gandhi and some Brahmins convince Master Tara Singh to not allow Ambedkar, a Dalit, to emerge as the leader of Sikhs by converting to Sikhism.[5] Then Dr Ambedkar decided to convert to Buddhism as a rational religion as compared to other ones. On 14 October 1956, he adopted Buddhism with his followers. Through Buddhism, he gave a solution for creating true humanism. According to him, Buddhism teaches the three principles to get true salvation- *Prajna* (understanding) as against superstition, *Karuna* (love) and *Samata* (equality) and it is the basic necessity of downtrodden people.[6]

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[1] Jasbir Kaur, Women: Understanding Dr Ambedkar's Vision and its Relevance in Contemporary Feminist Discourse, (Ed) in Emanual Nahar, *Dr B.R. Ambedkar's Philosophy in Contemporary India,* (Delhi: Kalpaz Publications, 2017).

[2] Kamble Baby, *The Prisons We Broke, Trans. Maya Pandit,* (New Delhi: Orient Blackswan Private Limited, 2009).

[3] Ibid, Kamble Baby, 125

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[6] In May 1956, his speech was broadcasted by British Broadcasting Corporation.

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## CONCLUDING REMARKS

With the above following discussion, we can conclude that Dr Ambedkar fought for the interest of every section of society without any discrimination. He has a broader vision and deep thinking for India to make it a successful democratic country which can lead the world as a whole. He was a true nationalist with exceptional intelligence who gave the solution to almost every problem. But it is ironic that people cannot understand his vision and always limited him with narrow thinking. He was a true supporter of humanism which gives equal respect and dignifies life to all human beings. Moreover, as a Buddhist, he always wanted to establish a just and unbiased society. Nowadays, although people of his native country denied or not accepted his ideas and used his name as merely for vote bank politics but the world has recognised him and recently the UNO has celebrated his 125th birth anniversary as 'International Equality Day'. In a survey organized by TV18 and CNNIBN declared Dr B.R. Ambedkar the 'Greatest Indian'. So it is the need of the hour that we should understand Dr Ambedkar to make India a new modern India.

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# A STUDY OF CUSTOMER AWARENESS AND SATISFACTION TOWARDS RELIANCE JIO WITH SPECIAL REFERENCE TO PALANPUR CITY

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## ABSTRACT
*India is currently the world's second-largest telecommunications market with a subscriber base of 1.17 billion and has registered strong growth in the past decade and half. The Indian mobile economy is growing rapidly and will contribute substantially to India's Gross Domestic Product (GDP), according to report prepared by GSM Association (GSMA) in collaboration with the Boston Consulting Group (BCG). App downloads in the country grew approximately 215 per cent between 2015 and 2017.*

*Reliance Industries Ltd's (RIL) telecom unit starts offering free services from 5 th September 2016 to 31 Dec 2016; again the commercial launch free services extend next three month from 31 Mar 2017 onwards.*

*The present study is focused on Reliance Jio services in India. The primary goal of the study is to understand the satisfaction level of customers towards jio services as well as awareness level and current status.*

*Keywords: Reliance Jio, Customer Satisfaction, Awareness and Palanpur city.*

## INTRODUCTION
India is currently the world's second-largest telecommunications market with a subscriber base of 1.17 billion and has registered strong growth in the past decade and half. The Indian mobile economy is growing rapidly and will contribute substantially to India's Gross Domestic Product (GDP), according to report prepared by GSM Association (GSMA) in collaboration with the Boston Consulting Group (BCG). App downloads in the country grew approximately 215 per cent between 2015 and 2017.

In the year 1851 the British first introduced telecommunication services in India through operational land lines near Kolkata. Dr. William O"Shaughnessy who pioneered telegraph and telephone in India belonged to the Public Works Department all through the experimental stage. Electronic telegraph made its appearance in India as early as in 1854. A regular separate department was opened around 1854 when telegraph facilities were thrown open to the public. Being a British Colony, both telegraph and telephones were introduced into Growth and Development of Telecom Sector in India – An Overview www.iosrjournals.org 26 | Page India almost contemporaneously with United Kingdom.

Reliance Industries Ltd's (RIL) telecom unit starts offering free services from 5 th September 2016 to 31 Dec 2016; again the commercial launch free services extend next three month from 31 Mar 2017 onwards.

Reliance communications owns and operates the world's largest next generation IP enabled connectivity infrastructure which comprises 2,80,000 kilometers of fiber optic cable systems in India, USA, Europe, Middle East and the Asia Pacific region. Reliance Group ranks among India's top private sector business houses in terms of net worth. The company has a good customer base and it covers over 21000 cities and towns and over 400000 villages of India.

The present study is focused on Reliance Jio services in India. The primary goal of the study is to understand the satisfaction level of customers towards jio services as well as awareness level and current status.

## REVIEW OF LITERATURE
Aman Banchhor et al.,(2015), state in their study that Jio is the only company who is using fourth generation (4G) LTE services and which is operating its network on 1800 MHz and 2300

MHz bands in Mumbai. Jio facilitate the normal download speed of 15-20 mbps. Lowest international call tariff in the world. 4G handset with free connection for starting at as less as Rs.2999. No surge pricing on public holidays, festivals and newyear. Reliance Jio manipulate some marketing strategies of competitive pricing and tariff plans, jio is offering special operating own apps like Jioplay, Jiomoney, Jiosecurity etc., Jio is going to charge 1/10th of standard in telecommunication charge, Focusing on calls, text and data respectively without any roaming charges throughout India and Student gets an additional 25% data usage if they registered their sim card on a student ID.

Rajan Drmlami(2015), expresses in the study that providing customer satisfaction is the most crucial step of the company as they are to be satisfied and provides internet access on the move such as wide network coverage

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and technology advanced stuff required by almost everybody in today's environment. From the details it can be concluded that 80% of Reliance Jio users preferred to remain with Reliance Jio and fully satisfied. Also good number of customers who are living to switch from their respective subscribers showed interest in Relaince Jio is capturing the wide area of Indian markets increasingly day by day. Hence, these statistics imply a bright future for the company. It can be said that in near future, the company will be booming in the telecom industry.

S. Nemat Sheereen [3] studied on customer satisfaction of BSNL services in Kerala. It has been stated that BSNL is one of the leading telecommunication service providers in Kerala. Most of the studies conducted in this area indicate the exploring development of services provided by number telecommunication providers which opened new world to the customer around the world. This paper analyses the customer satisfaction of BSNL services provided in Kerala. Quality of service and maximum network coverage are the most important factor which satisfy the customers in relation to telecommunication.

PL. Senthil and S. Mohammed Safi [8] analyzed the behavior of Mobile Phone users in Tiruchirappalli District. The consumer behavior is the act of individuals directly involve in obtaining and using economic goods and services. It includes the decision processes that precede and determine this act. Cell phone has been developed in 1979 and in India it was introduced in 1994. But it became familiar only in the beginning of year 2000. Now cell phone users are scattered all over the world. One fifth of Indians are using cell phone now. It is a very fast development in the field of communication. It helps one to send and receive information anytime and anywhere. The effective and efficient usage of cell phone largely depends upon the attitude of cell phone users and growth of this communication sector depends on the cell phone service providers. Cell phone users meet many problems. Problems pertaining to buying a cell phone, choosing an activation card, tower problem, variety of schemes, recharge coupons, roaming and optimum use of cell phone facilities are some of the vital issues of the cell phone users. So the researcher has made sincere attempt to analyze the consumer behavior of mobile phones in the study area.

C. Boobalan et al (2017) in their study on, "customer's satisfaction towards Reliance JIO sim with special reference to Dharmapuri District" made an attempt to know the satisfaction level of multi customers. Most of the customers are selectiong Reliance JIO is comes under for sim cards are free and most of the customers for understanding the income and satisfaction level of JIO services is comes under between (10001- 20000). Finally conclude that most of the customers are satisfied with the current JIO services. K. R. Mahalaxmi and N. Suresh Kumar (2017) in this article titled, "A study on service quality and its impact on customer's preference and satisfaction towards Reliance JIO in trichy region" focus on to the service quality and satisfaction level of Reliance JIO. This study reveals that peoples with age group up to 35 were 78 per cent users of Reliance JIO. The advertisement has motivates most of the customers to prefer this network. Dr. Gowthamichintala et al (2017) in this article entitled, "customers satisfaction towards telecommunication service provider-A study on Reliance JIO" is to know the satisfaction level of the customers. The gender wise analysis of the customers satisfaction is conclude that there is no difference in the opinion of male and female respondents on the satisfaction level towards the service provided by the JIO services

## OBJECTIVES OF THE STUDY

- To understand the awareness level of the customer towards Reliance Jio
- To evaluate the customer satisfaction level towards Reliance Jio
- To identify the reason to buy the Reliance Jio

## RESEARCH METHODOLOGY OF THE STUDY

The current study is conducted to evaluate the result of customer awareness and satisfaction level towards Reliance Jio. Researcher has used structured questionnaire for the collection of primary data for this study. Reliance jio is very famous and provided fastest network services to customers so it is important to understand the service network of reliance jio. In this research, total 80 respondents collected for the study.

## METHODOLOGY

The current research study is purely based on primary data collection. The answers given by the respondents were recorded and used for analysis purpose.

### Sample Size

The total sample size of the present study is 80.

### Tools used for Analysis

In this study, researcher has applied chi square and calculate frequency.

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**TIME PERIOD OF STUDY**
The present study is completed within three to four months.

**AREA OF STUDY**
The present study is conducted in Palanpur city.

**LIMITATIONS OF THE STUDY**
1. Limited time period.
2. Language problems.
3. Time and cost constraints.

**DATA ANALYSIS AND INTERPRETATION**

**Table-1.1: Respondents Profile**

| Demographics | Variables | Frequency | Percentage |
|---|---|---|---|
| Gender | Male | 50 | 62.5 |
| | Female | 30 | 37.5 |
| Age | Below 20 | 10 | 12.5 |
| | 21 – 30 | 20 | 25 |
| | 31 – 40 | 25 | 31.25 |
| | Above 41 | 25 | 31.25 |
| Education | Undergraduate | 20 | 25 |
| | Post graduate | 10 | 12.5 |
| | Professional | 30 | 37.5 |
| | Others | 20 | 25 |
| Occupation | Student | 25 | 31.25 |
| | Business man | 25 | 31.25 |
| | Employee | 20 | 25 |
| | Farmers | 10 | 12.5 |
| Monthly income | Below Rs.10000 | 10 | 12.5 |
| | Rs.10001- 20000 | 20 | 25 |
| | Rs.20001- 30000 | 20 | 25 |
| | Above 30001 | 30 | 37.5 |

**Interpretation**
From the above table, it is disclosed that out of 80 respondents 50 are male and 30 are female. Out of 80 respondents 10 are from below 20 years age criteria, 20 are between 21-30, 25 are from 31 to 40 and remaining are from above 41.

Researcher has also collected the education wise data. Out of 80 respondents 20 have undergraduate degrees, 10 are post graduate, 30 are professional and 20 are other. Out of 80 respondents, 25 are students, 25 are businessman, 20 are employees and only 10 are farmers. Income wise, 10 respondents have below 10000 incomes, 20 respondents have between 10000 to 20000, and 30 respondents had above 30000.

**Table-1.2: Source of Information**

| Particulars | No. of Respondent | Percentage (%) |
|---|---|---|
| Friends | 10 | 12.5 |
| Advertisement | 20 | 25 |
| Magazine | 20 | 25 |
| Websites | 30 | 37.5 |
| **TOTAL** | **80** | **100** |

**Interpretation**
Above table revealed the information about the source of information. Out of 80 respondents majority of the respondents have collected the information from websites. 20 respondents have collected the information through advertisement and magazine. Only 10 respondents have collected the information from friends.

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**Table-1.3: Level of awareness of respondents**

| Particulars | No. of Respondent | Percentage (%) |
|---|---|---|
| Fully aware | 20 | 25 |
| Aware | 50 | 62.5 |
| Neutral | 05 | 6.25 |
| Not aware | 05 | 6.25 |
| Fully not aware | 10 | 12.5 |
| **TOTAL** | **80** | **100** |

**Interpretation**

Above table revealed the information about the source of information. Out of 80 respondents majority of the respondents have collected the information from websites. 20 respondents have collected the information through advertisement and magazine. Only 10 respondents have collected the information from friends.

**Table-1.4: Satisfaction level of customers**

| Particulars | No. of Respondent | Percentage (%) |
|---|---|---|
| Highly satisfied | 60 | 75 |
| Satisfied | 10 | 12.5 |
| Neutral | 05 | 6.25 |
| Dissatisfied | 05 | 6.25 |
| **TOTAL** | **80** | **100** |

**Interpretation**

Above table revealed the information about the source of information. Out of 80 respondents majority of the respondents have collected the information from websites. 20 respondents have collected the information through advertisement and magazine. Only 10 respondents have collected the information from friends.

## CONCLUSION

In this current research study, researcher has tried to analyses the satisfaction level of customers towards reliance 4G. Today, most of the youngsters and collegian students are uses 4G services of Reliance Company because our study found that they provided best services to customers in affordable price.

Researcher has also collected the education wise data. Out of 80 respondents 20 have undergraduate degrees, 10 are post graduate, 30 are professional and 20 are other. Out of 80 respondents, 25 are students, 25 are businessman, 20 are employees and only 10 are farmers. Out of 80 respondents majority of the respondents have collected the information from websites. 20 respondents have collected the information through advertisement and magazine. Only 10 respondents have collected the information from friends. Out of 80 respondents majority of the respondents have collected the information from websites. 20 respondents have collected the information through advertisement and magazine. Out of 80 respondents majority of the respondents have collected the information from websites. 20 respondents have collected the information through advertisement and magazine.

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# A STUDY ON DEVELOPMENTS OF COMMERCIAL BANKING IN INDIA

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## ABSTRACT
*The first bank in India was set up in 1770 and named as Bank of Hindustan. The initial attempt to establish a Central Bank was in 1773. By independence, India had a fairly well developed commercial banking system in existence. In 1951, there were 566 private commercial banks in India with 4151 branches, the majority of which were in large towns and cities. The Reserve Bank of India (the Central Bank of the Country) was established in 1935 and became a state owned institution from January 1, 1949. It was only in this year that the Banking Regulation Act was enacted to provide a framework for regulation and supervision of commercial banking system. In July 1969, 14 biggest commercial banks were nationalised as a major step to ensure adequate credit flow into genuine productive areas according to plan priorities. In April 1980, 6 more commercial banks were further nationalised, thus, extending the domain of public sector over the banking system. There were many reforms and the objective of reform was also to create an environment where existing banks could respond to changing situation and compete with new domestic private and foreign institutions that were permitted to operate. After 1993, Competition has been infused into the financial system by allowing the participation of new private banks foreign banks which have increased their share in the financial system and have improved the efficiency of the system. An effort has been made in this article to study the types of banks with special focus on commercial banks and importantly the developments of commercial banking like: Nationalisation of Banks, Regulation of Banks by the RBI, Liquidation and Amalgamation of Banks, Branch Expansion, Lead Bank Scheme, The New Strategy of Banking and Area Development, Deposit Growth, Changes in the Composition of Deposits and Bank Staff, Productivity and Profits.*

## INTRODUCTION
The first bank in India was set up in 1770 and named as Bank of Hindustan. The earliest attempt to establish a Central Bank was in 1773. By independence, India had a fairly well developed commercial banking system in existence. In 1951, there were 566 private commercial banks in India with 4151 branches, the majority of which were confined to large towns and cities. The Reserve Bank of India (the Central Bank of the

Country) was established in 1935 as a shareholders institution like the Bank of England. The Reserve Bank of India became a state owned institution from January 1, 1949. It was only in this year that the Banking Regulation Act was enacted to provide a framework for regulation and supervision of commercial banking system. In July 1969, 14 biggest commercial banks were nationalised as a major step to ensure adequate credit flow into genuine productive areas in conformity with plan priorities. In April 1980, 6 more commercial banks were further nationalised, thus, extending the domain of public sector over the banking system. The objective of reform was also to create an environment where existing banks could respond to changing circumstances and compete with new domestic private and foreign institutions that were permitted to operate. Competition has been infused into the financial system by licensing new private banks since 1993. Foreign banks have also been given more liberal entry. The presences of these banks have increased their share in the financial system and have improved the efficiency of the system.

## OBJECTIVES OF THE STUDY
- To understand the classification of banks in India with special reference to commercial banks.
- To study the developments of commercial banking in India
- To emphasis on commercial banking and its overall developments in India

## SCOPE OF STUDY
- This study is useful to reader in understanding the basic major classifications of banks particularly in India
- This study is useful to reader in understanding the importance banking in India.
- This study puts special emphasis on developments of commercial banks so readers will gain important information about overall development of commercial banking in India

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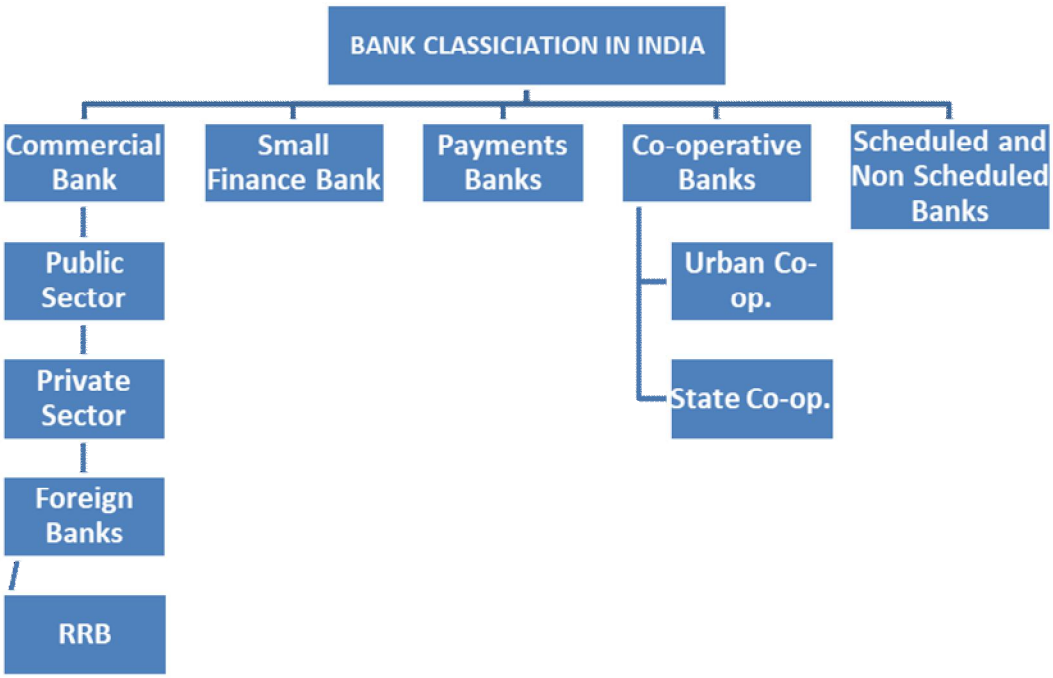
## METHODOLOGY

The study is a descriptive type in nature. Secondary data has been used for the study. Secondary data is collected from library, reference books, text books, and journals, articles from news papers and from relevant websites of companies available on internet. By using that information I am trying to come up with some assumptions and recommendations.

## BANKING

The banking industry handles finances in a country including cash and credit. Banks are the institutional bodies that accept deposits and grant credit to the entities and play a major role in maintaining the economic stature of a country. In most of the country banks are under strict regulations. In India, the Reserve Bank of India (RBI) is the apex bank that regulates the monetary policy in the country. Commercial Banks can be further classified into public sector banks, private sector banks, foreign banks and Regional Rural Banks (RRB). On the other hand, cooperative banks are classified into urban and rural. Apart from these, a fairly new addition to the structure is payments bank.

Major classification of banks can be understood with the help of following chart:




**[1]. Commercial Banks:** Commercial Banks are regulated under the Banking Regulation Act, 1949 and they are designed to make profit. Their primary function is to accept deposits and grant loans to the general public, corporate and government. They mobilize small savings and promote the growth of trade and commerce. Generally, commercial banks lend money for a short period only. They only provide working capital to the organizations. But in recent times commercial banks are providing long-term capital also to the organizations. Commercial banks can be divided into: (1). Public sector banks (2) Private sector banks (3) Foreign banks and (4) RRB

**(1). Public sector banks:** These are the nationalised banks and account for more than 75 % of the total banking business in the country. Majority of stakes in these banks are held by the government. In terms of volume, SBI is the largest public sector bank in India and after its merger with its 5 associate banks (as on 1st April 2017) it has got a position among the top 50 banks of the world. Nationalised Banks in the country are listed below:

| Bank Name | Held by Government (In %) | Established | Headquarter | Tagline |
|---|---|---|---|---|
| **Allahabad Bank** | 60 | 24th April 1865 | Kolkata, West Bengal | A tradition of trust |
| **Andhra Bank** | 61 | 20th November 1923 | Hyderabad, Telangana | Where India Banks |
| **Bank of Baroda** | 63.7 | 20th July 1908 | Vadodara, Gujarat | India's International Bank |
| **Bank of India** | 64.4 | 7th September | Mumbai, Maharashtra | Relationships |

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| | | | | |
|---|---|---|---|---|
| | | 1906 | | beyond banking |
| **Bank of Maharashtra** | 81.61 | 16th September 1935 | Pune, Maharashtra | One Family one bank |
| **Canara Bank** | 64.5 | 1st July 1906 | Mangalore, Karnataka | Together we can |
| **Central Bank of India** | 81.5 | 21st December 1911 | Mumbai, Maharashtra | Central to you since 1911 |
| **Corporation Bank** | 100 | 12th March 1906 | Mangalore, Karnataka | A premier public-sector bank |
| **Indian Bank** | 81.51 | 15th August 1907 | Chennai, Tamil Nadu | Your Tech friendly Bank |
| **Indian Overseas Bank** | 89.90 | 10th February 1937 | Chennai, Tamil Nadu | Good people to grow with |
| **Oriental Bank of Commerce** | 77.23 | 19th February 1943 | Gurgaon, Haryana | Where every individual is committed |
| **Punjab & Sind Bank** | 79.62 | 24th June 1908 | New Delhi | Where service is a way of life |
| **Punjab National Bank** | 60 | 19th May 1894 | New Delhi | The bank you can bank upon |
| **State Bank of India** | 59 | 2nd June 1806 | Mumbai, Maharashtra | With you all the way, Pure banking Nothing else, The nation banks on us |
| **Syndicate Bank** | 66.17 | 1925 | Bengaluru, Karnataka | Your Faithful And Friendly Financial Partner |
| **UCO Bank** | 84.23 | 6th January 1943 | Kolkata, West Bengal | Honors your trust |
| **Union Bank of India** | 63.44 | 11th November 1919 | Mumbai, Maharashtra | Good People to Bank with |
| **United Bank of India** | 85.91 | 1950 | Kolkata, West Bengal | The Bank that begins with 'U' |

**(2). Private Sector Banks**: Private sector banks include in which major stake or equity is held by private shareholders. These banks are registered as companies with limited liability. All the banking rules and regulations laid down by the RBI will be applicable on private sector banks as well. Private-sector banks in India are listed below:

| S. No | Bank Name | Established | Headquarters | Tagline |
|---|---|---|---|---|
| **1.** | AXIS Bank | Dec. 1993 | Mumbai | Badhti Ka Naam Zindagi |
| **2.** | Citi Union Bank | 31st Oct. 1904 | Tamilnadu | Trust and Excellene since 1904 |
| **3.** | Catholic Syrian Bank | 26th Nov. 1920 | Thrissur | Support all the way |
| **4.** | Dhanlaxmi Bank | 14th Nov. 1927 | Thrissur,Kerela | Tann. Mann. Dhan |
| **5.** | DCB Bank | 1930s | Mumbai | We Value You |
| **6.** | Federal Bank | 23rd April 1930 | Kerala | Your perfect banking partner |
| **7.** | HDFC Bank | August 1994 | Mumbai | We understand your world |
| **8.** | ICICI Bank | 1955 | Mumbai | Khayaal Apka |
| **9.** | IDFC Bank | 30th Jan. 1997 | Mumbai | Banking Hatke |
| **10.** | IndusInd Bank | 1994 | Mumbai | We make money simple |
| **11.** | Jammu and Kashmir Bank | 1st Oct. 1938 | Srinagar | Serving to Empower |
| **12.** | Karnataka Bank | 18th Feb. 1924 | Mangalore | Your family bank across India |
| **13.** | Kotak Mahindra Bank | Feb. 2003 | Mumbai | Let's make money simple |
| **14.** | Karur Vysya Bank | 25th July 1917 | Tamilnadu | Smart way to bank |

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| | | | | |
|---|---|---|---|---|
| **15.** | Lakshmi Vilas Bank | 3rd Nov. 1926 | Tamilnadu | The Changing Face of prosperity |
| **16.** | Nainital Bank | 1922 | Nainital | Banking with personal touch |
| **17.** | RBL Bank | 14th June 1943 | Maharashtra | Apno ka Bank |
| **18.** | South Indian Bank | June 1993 | Kerala | Experience next generation banking |
| **19.** | Tamilnad Mercantile Bank Limited | 1921 | Tamil Nadu | – |
| **20.** | Yes Bank | 21st Nov. 2003 | Mumbai | Experience our expertise |
| **21.** | Equitas Small Finance Bank | 2007 | Chennai | Its Fun Banking |

**(3). Foreign Banks**: A foreign bank is one that has its headquarters in a foreign country but operates in India as a private entity. These banks are under the obligation to follow the regulations of its home country as well as the country in which they are operating. Foreign banks in India are listed below:

| **Foreign Banks** | | | |
|---|---|---|---|
| **S.N.** | **Bank** | **S.N.** | **Bank** |
| **1** | Abu Dhabi Commercial Bank Ltd. | 23 | Industrial & Commercial Bank of China |
| **2** | American Express Banking Corp. | 24 | JP Morgan Chase Bank N.A. |
| **3** | Arab Bangladesh Bank Ltd. | 25 | JSC VTB Bank |
| **4** | Australia & New Zealand Banking Group Ltd. | 26 | Krung Thai Bank Plc |
| **5** | Antwerp Diamond Bank NV | 27 | Mizuho Bank Ltd. |
| **6** | Bank Internasional Indonesia | 28 | Mashreqbank |
| **7** | Bank of America | 29 | National Australia Bank |
| **8** | Bank of Bahrain and Kuwait B.S.C. | 30 | Oman International Bank SAOG |
| **9** | Bank of Ceylon | 31 | Rabobank International |
| **10** | Bank of Nova Scotia | 32 | Shinhan Bank |
| **11** | Bank of Tokyo Mitsubishi -UFJ Ltd. | 33 | Societe Generale |
| **12** | Barclays Bank Plc. | 34 | Sonali Bank |
| **13** | BNP Paribas | 35 | Standard Chartered Bank |
| **14** | Citibank N.A. | 36 | SBM Bank (Mauritius) Ltd |
| **15** | Credit Agricole Corporate & Investment Bank | 37 | Sberbank |
| **16** | Chinatrust Commercial Bank | 38 | Sumitomo Mitsui Banking Corporation |
| **17** | Credit Suisse A.G | 39 | The Royal Bank of Scotland N.V. |
| **18** | Commonwealth Bank of Australia | 40 | UBS AG |
| **19** | DBS Bank Ltd. | 41 | United Overseas Bank Ltd |
| **20** | Deutsche Bank | 42 | Westpac Banking Corporation |
| **21** | First Rand Bank Ltd | 43 | Woori Bank |
| **22** | Hong Kong and Shanghai Banking Corporation Ltd. | | |

**(4). RRB (Regional Rural Banks)**: Regional Rural Banks (RRB's) were established under the provisions of an Ordinance promulgated on the 26th September 1975 and the RRB Act, 1976 with an objective to ensure sufficient institutional credit for agriculture and other rural sectors. RRBs are Indian Scheduled Commercial Banks (Government Banks) operating at regional level in different states of India. On 31 March 2016, there were 56 RRBs (post merger) covering 525 districts with a network of 14494 branches. All RRBs were originally conceived as low cost institutions having a rural ethos, local feel and pro poor focus.

**[2] Small Finance Banks:** This is a niche banking segment in the country and is aimed to provide financial inclusion to sections of the society that are not served by other banks. The main customers of small finance banks include micro industries, small and marginal farmers, unorganized sector entities and small business units. These are licensed under Section 22 of the Banking Regulation Act, 1949 and are governed by the provisions of RBI Act, 1934 and FEMA. Small Finance Banks in India are listed below:

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| | |
|---|---|
| **1** | **Au Small Finance Bank Ltd.** |
| **2** | Capital Small Finance Bank Ltd |
| **3** | Fincare Small Finance Bank Ltd. |
| **4** | Equitas Small Finance Bank Ltd |
| **5** | ESAF Small Finance Bank Ltd. |
| **6** | Suryoday Small Finance Bank Ltd. |
| **7** | Ujjivan Small Finance Bank Ltd. |
| **8** | Utkarsh Small Finance Bank Ltd. |
| **9** | North East Small finance Bank Ltd |
| **10** | Jana Small Finance Bank Ltd |

**[3] Payment Banks:** This is a relatively new model of bank in the Indian Banking industry. It was conceptualised by the RBI and is allowed to accept a restricted deposit. The amount is currently limited to Rs. 1 Lakh per customer. These banks cannot issue loans and credit cards. Both current account and savings accounts can be operated by such banks. They also offer services like ATM cards, debit cards, net-banking and mobile-banking. Payment banks in India are listed below:

| **List of Payments Banks (PB)** | |
|---|---|
| **1** | Airtel Payments Bank Ltd |
| **2** | India Post Payments Bank Ltd |
| **3** | FINO Payments Bank Ltd |
| **4** | Paytm Payments Bank Ltd |
| **5** | Aditya Birla Idea Payments Bank Ltd. |
| **6** | Jio Payments Bank Ltd |
| **7** | NSDL Payments Bank Limited |

**[4] Co-operative Banks:** Co-operative banks are registered under the Cooperative Societies Act, 1912 and they are run by an elected managing committee. These work on no-profit no-loss basis and mainly serve entrepreneurs, small businesses, industries and self-employment in urban areas. In rural areas, they mainly finance agriculture-based activities like farming, livestock and hatcheries. They are further classified into:

**(I). Urban Co-operative Banks:** Urban Co-operative Banks refer to the primary cooperative banks located in urban and semi-urban areas. These banks essentially lent to small borrowers and businesses centred around communities, localities work place groups.

According to the RBI, on 31st March, 2003 there were 2,104 Urban Co-operative Banks of which 56 were scheduled banks. About 79% of these are located in five states, – Andhra Pradesh, Gujarat, Karnataka, Maharashtra and Tamil Nadu.

**(II). State Co-operative Banks:** A State Cooperative Bank is a federation of the central cooperative bank which acts as custodian of the cooperative banking structure in the State.

**[5] Scheduled and Non-scheduled Banks:** Banks can also be classified on the basis of Scheduled and Non-Scheduled Banks. It is essential for every individual to check if they are holding their savings or deposit account with a Scheduled Bank or Non-Scheduled Bank. Scheduled Banks are also covered under the depositor insurance program of Deposit Insurance and Credit Guarantee Corporation (DICGC), which is beneficial for all the account holders holding a savings and fixed / recurring deposit account. Under DICGC, bank deposits of up to Rs 1 lakh, including the fixed, savings, current and recurring deposits, per depositor per bank in the event of bank failure are insured.

**(I) Scheduled Banks:** Scheduled banks are covered under the 2nd Schedule of the Reserve Bank of India Act, 1934. To qualify as a scheduled bank, the bank should conform to the following conditions:

- A bank that has a paid-up capital of Rs. 5 Lakh and above qualifies for the schedule bank category
- A bank requires to satisfy the central bank that its affairs are not carried out in a way that causes harm to the interest of the depositors
- A bank should be a corporation rather than a sole-proprietorship or partnership firm

(II) Non-scheduled Banks: Non-scheduled banks refer to the local area banks which are not listed in the Second Schedule of Reserve Bank of India. Non-Scheduled Banks are also required to keep the cash reserve requirement, not with the RBI, but with them.

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❖ **Developments in Commercial Banking in India**

After India got independence in 1947, several important developments have taken place in commercial banking, transforming it drastically. These developments in commercial banking after independence are:

- Nationalisation of Banks
- Regulation of Banks by the RBI
- Liquidation and Amalgamation of Banks
- Branch Expansion
- Lead Bank Scheme, The New Strategy of Banking and Area Development
- Deposit Growth
- Changes in the Composition of Deposits and
- Bank Staff, Productivity and Profits

➢ **Nationalisation of Banks**

The role of the public sector in commercial banking has been greatly improved through progressive nationalisation of banks. RBI, the country's central bank, was nationalised from 1 January 1949. Then came the takeover of the Imperial Bank of India and its conversion into the State Bank of India in July 1955, the conversion of eight major state-associated banks into subsidiary tanks of the SBI in 1959, merger of two such banks into one from the beginning of 1963, thus reducing the number of the associate banks to seven, nationalisation of 14 other major Indian scheduled banks in July 1969 and of 6 more in April 1980.

The regional rural banks from their inception are being set up in the public sector. As a result, the public-sector banks occupy a dominant position in commercial banking in India. Among the public-sector banks, the SBI group of banks is the largest chain of commercial banks in the country, controlling more than a quarter of total bank deposits.

Two main tasks were set before the public-sector banks, are:

(a) Mobilisation of deposits through a massive programme of branch expansion, especially in unbanked rural and semi-urban areas, and

(b) Diversification of bank credit to ensure flow of financial assistance to the neglected sectors and sections of the economy in an increasing measure.

➢ **Regulation of Banks by the RBI**

The RBI has come to play an increasingly important role in the regulation, control, and development of banking in all its aspects. Through the Banking Regulation Act (formerly called the Banking Companies Act), 1949 and its several amendments from time to time. Under the Act, the RBI has been vested with extensive powers of supervision and control over banks.

These powers cover all important aspects of banking from the licensing of banks to their liquidation. The RBI has made good use of these powers and several of the features discussed below are, to a large extent, the result of the systematic exercise of these powers.

➢ **Liquidation and Amalgamation of Banks**

The number of commercial banks has gone down considerably from 566 at the end of 1951 to 271 (including 188 RRBs) at the end of 1990. This is a result of a deliberate policy of the RBI of systematic weeding out of substandard non-viable banks through de-licensing and amalgamations and liquidations. Moreover, the P.J. Nayak Committee had also suggested that state-run banks should either be merged or privatized. Indeed, according to Indian Banking Association data, there have been at least 49 mergers since 1985. Here's a quick look at few important of them:

**Bank Mergers in Post reforms period**

| Year of Merger | Target Bank | Acquirer |
|---|---|---|
| **1993-94** | New Bank of India | Panjab National Bank |
| **1993-94** | Bank of Karad Ltd. | Bank of India |
| **1995-96** | Kashinath Seth Bank | State Bank of India |
| **1997** | Panjab Co-operative Bank Ltd | Oriental Bank of Commerce |

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| | | |
|---|---|---|
| **1997** | Bari Doab Bank Ltd. | Oriental Bank of Commerce |
| **1999** | Bareill Bank Ltd. | Bank of Baroda |
| **1999** | 20th Centry Finance Corporation Ltd. | Centurion Bank |
| **1999** | British Bank of Middle East | HSBC |
| **1999-2000** | Sikkim Bank Limited | United Bank of India |
| **1999-2000** | Times Bank Ltd. | HDFC Bank Ltd. |
| **2001** | Bank of Madura | ICICI Bank |
| **2002** | Benaras State Bank Ltd. | Bank of Baroda |
| **2003** | Nedungal Bank Ltd. | Punjab National Bank |
| **2004** | South Gujarat Local Area Bank | Bank of Baroda |
| **2004** | Bank Muscat SAOG | Centurion Bank |
| **2004** | Global Trust Bank Ltd. | Oriental Bank of Commerce |
| **2004** | IDBI Bank | IDBI Bank Ltd. |
| **2006** | Bank of Punjab | Centurion Bank |
| **2006** | Ganesh Bank of Kuranwad | Federal Bank |
| **2006** | UFJ Bank Ltd. | Bank of Tokyo Mitsubishi Ltd. |
| **2007** | United Western Bank | IDBI Bank Ltd. |
| **2007** | Lord Krishna Bank | Centurion Bank of Punjab |
| **2007** | Sangli Bank | ICICI Bank |
| **2007** | Bharat Overseas Bank | Indian Overseas Bank |
| **2008** | Centurion Bank of Punjab | HDFC |
| **2008** | American Express Bank Ltd. | Standard Chartered Bank |
| **2008** | State Bank of Saurashtra | State Bank of India |
| **2008** | South India Co-operative Bank Ltd. | The Saraswat Co-operative Bank Ltd. |
| **2009** | State Bank of Indore | State Bank of India |
| **2017** | five associates and the Bharatiya Mahila Bank | State Bank of India |
| **1st April 2019** | Dena Bank and Vijya Bank | Bank of Baroda |

Source: Indian Banking year book 2009, IBA

➢ **Branch Expansion**

The geographical coverage of banking facilities has improved markedly, especially after the nationalisation of 14 major banks in July 1969. Till 1956 the RBI was very cautious in giving licenses for new branches. Its major effort was devoted to the consolidation and strengthening of the banking system, and not to expansion. The picture becomes much more impressive when we look at the striking increase in the number of bank-offices in rural areas from a mere 1860 in July 1969 to more than 47,000 in June 1995. Taking rural and semi-urban centres together, the number of bank-offices increased from about 4,200 in July 1969 to more than 47,000 in June 1994, whereas the number of bank-offices in urban and metropolitan and port towns increased from 3,100 in July 1969 to 8,300 in June 1994. Following table may give further insight into it:

| **Year** | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** | **2012** | **2013** |
|---|---|---|---|---|---|---|---|---|---|
| **Numbers of Branches** | 70373 | 72070 | 74653 | 78787 | 82897 | 88203 | 94019 | 102377 | 109811 |

➢ **Lead Bank Scheme: The New Strategy of Banking and Area Development**

The branch expansion programme of banks in the post- nationalisation phase was supposed to be interwoven with the Lead Bank Scheme of the RBI, adopted in December 1969. The Scheme was recommended by a Study Group (known as the Gadgil Group) of the National Credit Council. The Group was of the view that because of the diversity of conditions all over the country, an area approach was essential for appropriate credit arrangements on the basis of local conditions.

Accordingly, it suggested making major scheduled banks responsible for providing integrated and all-round banking facilities under their leadership in all the districts of the country in a well-planned and phased manner. It was hoped that through the instrumentality of credit, these banks would act as catalysts of local development.

Under the Scheme, as adopted, all the 398 districts in the country have been distributed among major scheduled banks (in the public sector). They were supposed to play the lead role in the expansion of banking facilities and to act as consortium leaders for coordinating the activities of co-operative, commercial banking and other financial institutions in their respective districts.

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Each lead bank is expected to survey the district, identify unbanked centres, and set up branches in a phased manner. It is also expected to identify and study local problems, evolve an integrated credit plan for the supply of inputs and processing, storage and marketing facilities and other services, which may be locally needed and provide for participation among financing and development agencies operating in the district.

- **Deposit Growth**

Total bank deposits have grown rapidly after 1961, more so after 1969. What is the growth of bank deposits in real terms due to what is the relative importance of different factors? How reliable is the estimated contribution of each factor? The questions can be answered with the help of monetary theory and econometric analysis of the data. But we are not prepared to undertake such a study.

We only note heuristically that the growth of bank deposits in real terms is due to the growth of real income, the spread of banking facilities, the spread of banking habits, strengthening of the banking system, and the increase in the rate of interest on bank deposits.

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|
| **Aggregate Deposits** | ₹ 17,002 billion (US$250 billion) | ₹ 21,090 billion (US$310 billion) | ₹ 26,119 billion (US$380 billion) | ₹ 31,969 billion (US$460 billion) | ₹ 38,341 billion (US$550 billion) | ₹ 44,928 billion (US$650 billion) | ₹ 52,078 billion (US$750 billion) | ₹ 59,091 billion (US$850 billion) | ₹ 67,504 .54 billion (US$980 billion) |
| **Bank Credit** | ₹ 11,004 billion (US$160 billion) | ₹ 15,071 billion (US$220 billion) | ₹ 19,312 billion (US$280 billion) | ₹ 23,619 billion (US$340 billion) | ₹ 27,755 billion (US$400 billion) | ₹ 32,448 billion (US$470 billion) | ₹ 39,421 billion (US$570 billion) | ₹ 46,119 billion (US$670 billion) | ₹ 52,605 billion (US$760 billion) |
| **Deposit as percentage to GNP (at factor cost)** | 62% | 64% | 69% | 73% | 77% | 78% | 78% | 78% | 79% |

- **Changes in the Composition of Deposits**

The relative proportions of demand and time deposits have undergone significant changes over the period, the share of time deposits in total deposits has shot up from 33% to 82%. The rise in this ratio has been relatively more spectacular over the last 20 years.

The recorded shift in the composition of deposits is due to several factors, such as changes in the composition of bank depositors in favour of households in place of firms, spread of banking facilities in the country, liberalisation of withdrawal conditions in respect of savings deposits, increases in the rates of interest paid on fixed and savings accounts, ban on the payment of interest on current deposits after 1961, and change in the 'division of savings deposits between demand and time deposits favouring the latter since 1978.

- **Bank Staff, Productivity and Profits**

With the expansion of banking offices and banking operations, the number of bank employees has increased several-fold from 79,000 in 1958 to 10 lakh in 1990. According to RBI march 2012 reports total number of employees only in scheduled commercial banks were 208,944 in rural area, 264,999 in semi urban area and around 701,206 in urban/metropolitan. The productivity of their services and the quality of customer service is said to have gone down.

This is a genuine cause for concern for the public as well as authorities. It has affected adversely, among other things, the profitability of banks per rupee of their total earnings. The decline in this profitability (in the short-run) can also be attributed partly to rapid branch expansion.

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# OPERATIONAL CHALLENGES FACED BY FOOD AND BEVERAGE SERVICE EMPLOYEES IN FIVE STAR HOTELS OF PUNE AND MUMBAI CITY

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## ABSTRACT
*A study to understand the operational challenges which are faced by F&B service employees in five star Hotels of Pune and Mumbai. The research is specifically for the Food and Beverage service department staff, this particular section of staff face tremendous work pressure during the service operations as they are the mediators between the chef and the guest, their stress level is high. In this situation if they are facing challenges while serving then it has to be resolved. So it is responsibility of management to provide proper infrastructure for the operations. Also the operational staff should be motivated to actively participate and help management in overcoming the challenging situations incase while anything happens.*

*The study is suggesting that the department staff of star category hotels do face challenges and have responded that operational training will help staff in dealing with the challenges.*

*Keywords: Challenges: Something that needs great mental or physical effort in order to be done successfully and therefore tests a person's ability*

*Source: Cambridge Dictionary.*

*Infrastructure: The basic structure of an organization or system which is necessary for its operation.*

*Source: Cambridge Dictionary.*

## INTRODUCTION
Food and beverage service department is one of the core departments of Hotel. In five star hotels the food and beverage service department comprises of many outlets like specialty restaurants, bar operations, room service, banquets etc.

The department of Food and beverage should maintain high standards and maintain quality of service. Recently the main shortfall in the department is of skilled staff. It's a major problem in the industry and can cause effects standards of service .It is required that the industry concentrates more on the talent, on staff who wants to continue work and is enjoying doing the work without compromising in the quality standards. The staff working in this department either work in restaurants, coffee shops, banquets, bars etc. The department of F&B Service also hires part time employees during peak seasons.

Food and beverage servers' responsibilities and duties vary considerably from one organization to another also from one outlet to another, some work behind counters and use computerized systems to take orders and tabulate bills. In bars and lounges drinks are mainly served with music whereas in restaurants and coffee shops food is primarily served. In formal dining establishments, they carefully observe established rules of service and etiquette, and pace the meal according to customer preference. Some of the duties of food and beverage servers are:

- Make table arrangements for service
- Maintain par stock of supplies
- Serve customers
- Record orders and coordinate with bar and kitchen
- Ensure customers enjoying food and beverage and served well
- Do suggestive and upselling
- Present bills.

**Some attributes needed by servers**
- Serve customer courteously and efficiently.
- Must be good in multi-tasking skills

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- good health & good grooming
- Ability to work as part of a team
- Ability to work with little supervision
- Good verbal communication skills and sensitivity to customer needs
- Ability to work calmly under pressure.

Other requirements depend on the policy of the hotels wherever the servers works. The servers in the department have very crucial job to perform which is tough too. They are responsible to coordinate orders between guest and chefs which is challenging. Hence the organization management can make sure that the servers get favorable work environment in order to give efficient service to the guest. The staff needs to be briefed by supervisors about the operations, also team work in department will create better work culture and motivate staff for the success of organization.

This paper investigates the operating issues in food service industry and challenges in current and future of Pune and Mumbai five star hotels F&B Service department The study identifies the challenges of F&B service staff, future challenges to be faced by the restaurant operators to stay competitive and to provide better services to the guest in the present geographical conditions. Keywords: Challenges, Issues, Restaurant and Food Outlet, services

**OBJECTIVE**

- To find if F&B service staff face operational challenges
- To find what are the challenges which are faced by F&B service staff
- To find if operational training can overcome these challenges.

**LITERATURE REVIEW**

1. **(Miculan Bradley, Doris & Elenis, Tony & Hoyer, Gary & Martin, David & Waller, James. 2017)** In this paper the author mentioned that in conference Board of Canada there is assumption of a shortfall of close to 1 million workers in the Canadian economy by 2020.The clear shortfall of manpower is predicted .So it is important to retain the talent and nurture them for future. This paper aims to establish reasons for the shortage and curate a number of strategies to improve the situation. Various solutions are evaluated, prioritized, and categorized .The paper suggests that there are strategies that can be implemented in both the short and long-term that can increase the draw for potential employees to join this industry. Although the specific data is a prediction, the trend is clear: there are not enough people seeking employment in the food and beverage industry to fill the jobs needed to sustain the industry[1].

2.**( Jayawardena, Chandana & Lawlor, Fred & Charles Grieco, J & Savard, Michel & Tarnowski, Michael.2013)** The research paper aims to analyses the main challenges which are faced by Canadian hotels, and to suggest appropriate innovative solutions to make hotel operations in Canada more successful. This paper gives valuable information about the management and operations of a hotel, and outlines innovative solutions to key challenges they face. The paper highlights effective approaches to managing hotel operations. The researcher propose department related, tailor-made training sessions for the diverse workforce of today[2].

3. **(Jayawardena, Chandana.2017)** The aim for the study was to provide practical solutions to the research question on the hospitality industry in Canada and what are the challenges and their solutions.[3]

4. **(Adeola, Ogechi & Ezenwafor, Kennedy.2016)** This paper is based on the Nigerian hospitality sector. It suggests a partnership amongst private and public agencies hospitality colleges and hospitality businesses. A

[1] Miculan Bradley, Doris & Elenis, Tony & Hoyer, Gary & Martin, David & Waller, James. (2017) Human capital challenges in the food and beverage service industry of Canada: Finding innovative solutions , Worldwide Hospitality and Tourism Themes 9(1)

[2] Jayawardena, Chandana & Lawlor, Fred & Charles Grieco, J & Savard, Michel & Tarnowski, Michael (2013)Challenges and innovations in hotel operations in Canada, Worldwide Hospitality and Tourism Themes 5(2)

[3] **J**ayawardena, Chandana(2017) The hospitality and tourism industry in Canada: innovative solutions for the future ,Worldwide Hospitality and Tourism Themes 9(4)

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well planned partnership between business schools and hospitality sector will rope in better future for the industry in Nigeria.[1].

5. **(Lee, Sanghyeop & Lee, Kai-Sean & Chua, Bee-Lia & Han, Heesup. 2019)** The restaurants of a Hotel are of great importance in hotels, and the factors for this have so far been considerably understudied. This study investigated the challenges and critical success factors (CSFs) of restaurants owned and operated by five-star luxury hotels in Klang Valley, Malaysia.

It was revealed that the immense competition of Klang Valley's restaurant industry leads the frontline of hotel restaurants' challenges. As per study identified challenges are - Growing competition of Klang Valley's restaurants , Staffing issues due to high competition and poor working conditions , Unrealistic employee demands , Hospitality graduates' reluctance to join the industry , Costly food safety procedures , Seasonality of the hotel rooms division , Inconspicuous location of hotel restaurants , Difficulty in attracting non-hotel guests , Guests' high expectations on five-star hotels , Strict policies and extensive organization hierarchy , Limited resource allocation to hotel restaurant marketing , Large communication gap between hotel restaurants and other departments , Dependence on imported items[2].

## RESEARCH METHODOLOGY

**1. Data collection:** The primary data which was required for this research was collected using the following technique:

**Questionnaire**: A questionnaire with straight forward and relevant questions was drafted and sent over to the sample to obtain their response.

**2. Sample technique**

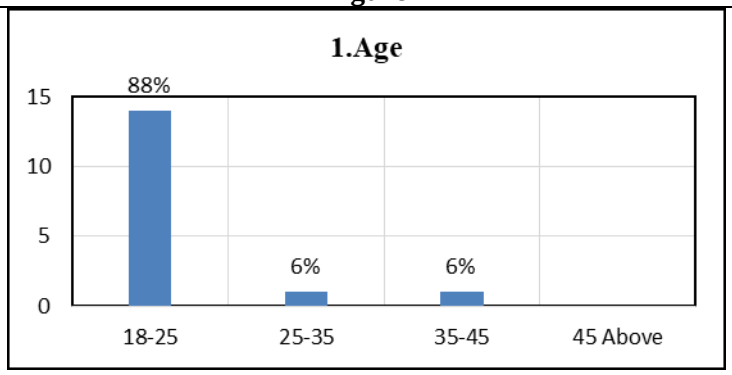
The population for the research was Food and beverage service operational staff from five star Hotels of Pune and Mumbai city. In all 3 Five star Hotels of Pune and 2 Five star Hotels of Mumbai were selected. The data was collected from operational F&B Service employees working in various outlets. Apart from the above mentioned other secondary data was collected from various journals books and internet.

## OBSERVATIONS AND DISCUSSION

The Food and beverage service department is facing operational challenges. There are difficulties which are encountered by the operational level staff which are as follows:

Manpower shortage , long duty hours ,Growing customer expectation, Poor equipment's inventory in the department ,Lot of physical work ,Limited recreation duty breaks ,Lack of coordination amongst F&B service team ,Frequent transfer in the department, Briefing issues , lack of clarity with supervisor ,Gender bias, Lack of proper menu knowledge amongst staff . The challenges faced by service staff needs to be resolved by the management by providing proper infrastructure and effective operational training.

## DATA ANALYSIS AND FINDINGS

| Figure | Data Analysis |
|---|---|
|   **Figure: 1** | 1. As shown in the bar chart the age group of 18-25 has 88% employees and 25-35 6% whereas 35-45 are 6% and no one above 45 years of age in F&B Service department working as operation staff. |

[1] Adeola, Ogechi & Ezenwafor, Kennedy (2016) The hospitality business in Nigeria: issues, challenges and opportunities. Worldwide Hospitality and Tourism Themes 8(2)

[2] Lee, Sanghyeop & Lee, Kai-Sean & Chua, Bee-Lia & Han, Heesup. (2019). Hotel restaurants' challenges and critical success factors in Klang Valley, Malaysia: the inseparable roles of support centers and revenue streams. Journal of Quality Assurance in Hospitality & Tourism. 20. 16–43.

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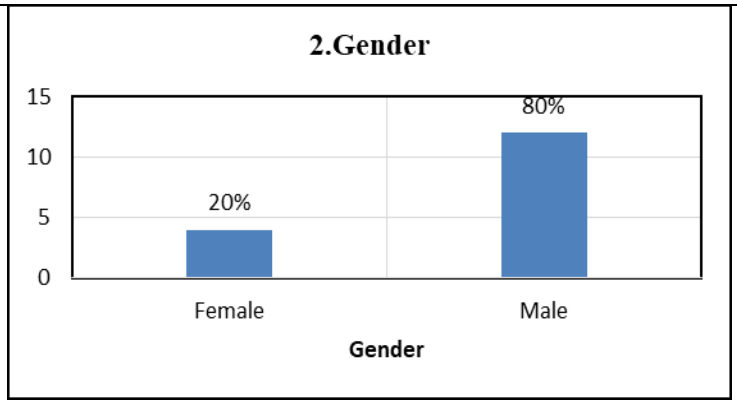


**Figure-2**

2. The bar chart shows %age of male employees as 80%age and of female staff as 20%age in F&B Service department of five star hotels.

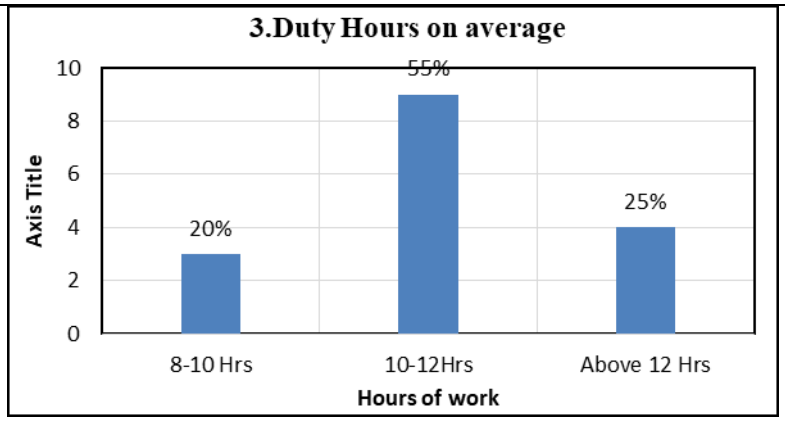


**Figure-3**

3. The above bar chart represents the duty hours on an average done by F&B Service operation staff. Wherein 10-12 hrs are done by 55 %age, above 12 hrs done by 25%age and 8-10hrs by 20 %age staff.

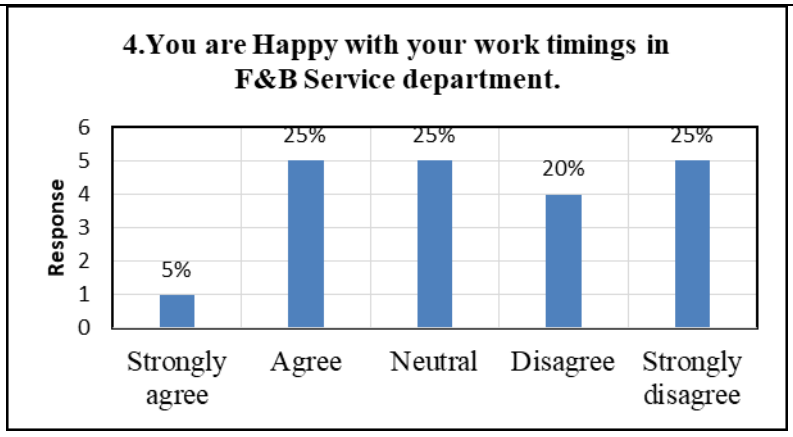


**Figure-4**

4. The data is suggestive of mixed response for parameter happy with work timings. 5%age strongly agree 20%age disagree and 25%age said neutral, agree, and strongly disagree.

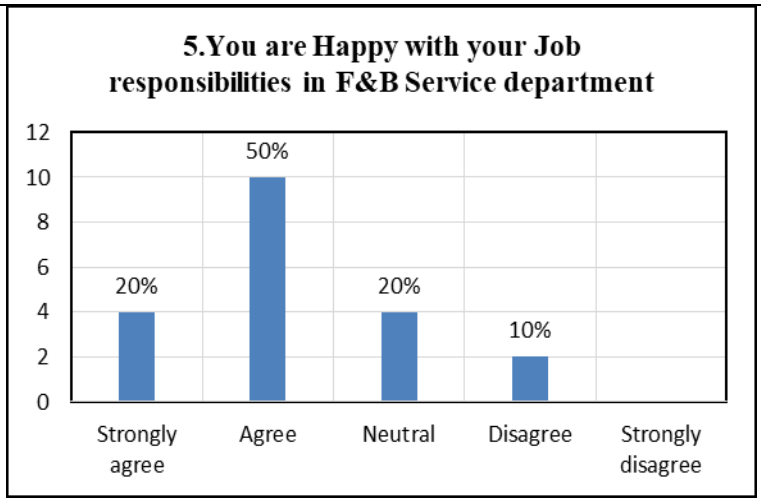


**Figure-5**

5.Whether operational staff is happy with job responsibilities to this 50%age agree , 20%age are neutral20%age strongly agree and 10%age disagree.

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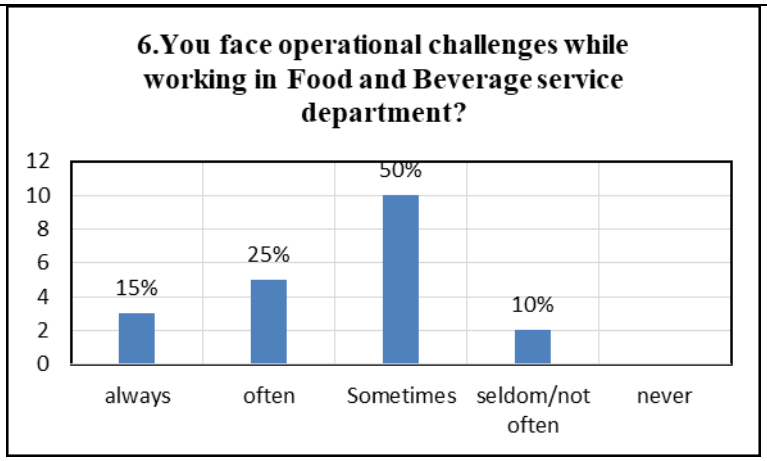


**Figure-6**

6. Response for operational challenges faced while working in F&B service department 50%age said sometimes, 25%age said often, 15%age said always and 10%age said seldom.


**Figure-7**

7. If operational training will help to overcome challenges, to this 45%age agree, 40%age strongly agree, 10%age disagree and 5%age are neutral.

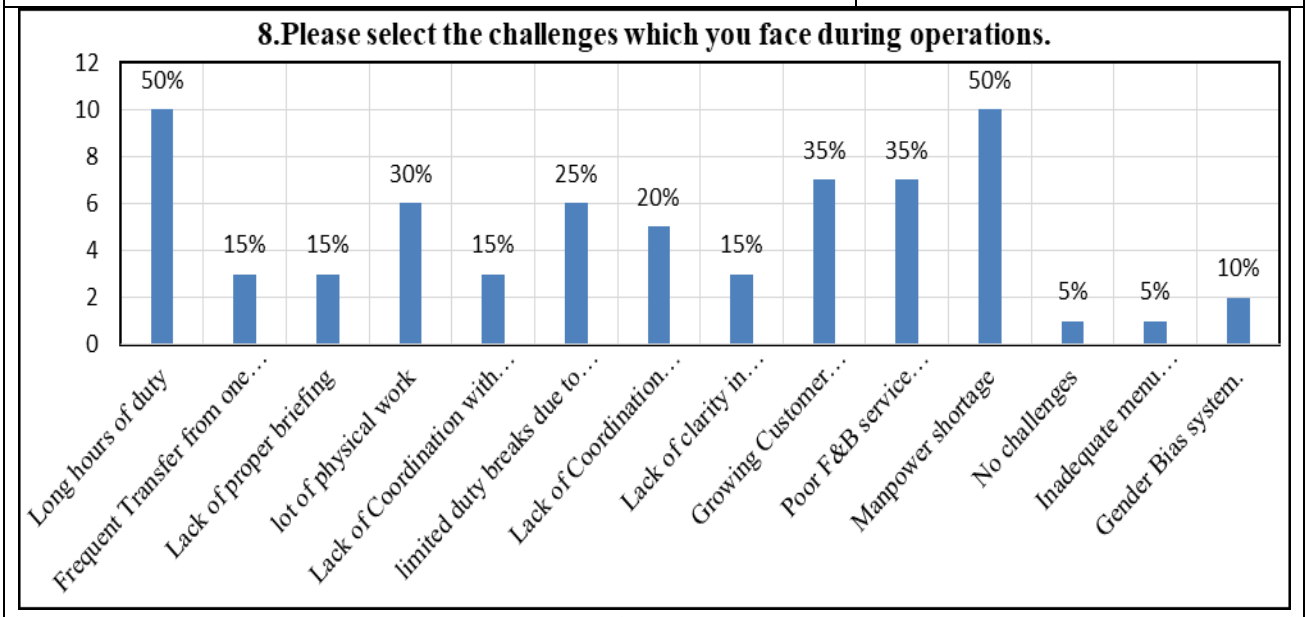


**Figure-8**

8. As per survey top challenges faced by F&B service staff are as follows:
Manpower shortage and long duty hours- 50% have rated for this challenge.
Growing customer expectation, Poor equipment's –35% staff rated for this challenge.
Lot of physical work – 30% staff rated for it.
Limited duty breaks, – 25% staff rated.
Lack of coordination among F&B – 20% staff rated.
Frequent transfer, Briefing, lack of clarity with supervisor – 15% staff rated.
Gender bias – 10% staff rated this challenge, Lack of proper menu knowledge – 5% staff rated.

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## FINDINGS

**1. To find if F&B service staff face operational challenges:** The findings are suggestive of some operational challenges which are faced by F&B Service staff working at operational level. The F&B Service department is a major contributor in the total revenue of the hotel. There are many outlets in the department which have different style of operations as well as the staff has different skill requirements as per the outlet. Hence this department deals with uncommon situations in all outlets, making it challenging to the staff. The department staff also does lot of physical work and are working in vague shifts, this usually causes manpower shortage which is a big challenge.

**2. To find what are the challenges which are faced by F&B service staff:** It has been observed that the staff working in F&B Service department does face challenges during operations. As per their response major challenges which are faced are as follows:

- Manpower shortage and long duty hours – Due to manpower shortage the other staff who are working end up doing long shift hours.
- Growing customer expectation – Customers are well aware about hotel setups and are well-travelled. Which makes the customer more demanding.
- Lot of physical work, limited duty breaks, and Poor equipment's – Department has jobs like lifting tables, chairs, and equipment's for service. Hence staff does lot of physical work. Limited duty breaks are either because of manpower shortage or due to customer rush.
- Lack of coordination among F&B team – If staff is changing every month and not stable for long tenures they lack bonding hence creating coordination issues. Also if not briefed well there can be coordination issues.
- Frequent transfer- Reason for this is skilled manpower shortage.
- Gender bias – If less female staff are working in the department then sometimes gender bias is felt by other staff.
- Lack of proper menu knowledge, Briefing, lack of clarity with supervisor- Operational training will make a change in this kind of challenge.

**3. To find if operational training can overcome these challenges:** There has been positive response on the research question whether operational training can overcome F&B Service challenges. The F&B Service operational staff believes that operational training will help them deal with day to day department challenges. The operational training will also improve skill sets of employees making them more efficient in their work.

## CONCLUSION

The study is indicating that the F&B staff working in five star hotels do come across some operational challenges. These are majorly related to skilled manpower crunch. The staff feels that proper operational training programs can make staff capable of handling challenging situations.

## SUGGESTION

- Operational training to be conducted on regular basis and with trendy or innovative training methods.
- Staff motivation by appreciations can help in retaining them this will also reduce manpower shortage issues.
- Quality circle group formation and staff suggestions to be considered seriously as they are in contact with the guest and deal with challenges.
- Additional assistance to staff to attend various certificate courses related to the skill requirements in their jobs.

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# LEARNING ORGANIZATION TO LEARNING SOCIETY THROUGH EFFECTIVE TRAINING EVALUATION SYSTEM

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## ABSTRACT
*Many consultants and organizations have recognized the commercial significance of organizational learning – and the notion of the 'learning organization' has been a central orienting point in this. We could argue that organizational learning is the 'activity and the process by which organizations eventually reach the ideal of a learning organization' (Finger & Brand, 1999). A learning society regards the actual process of learning as an 'activity, not a place', that is, it takes place outside of regular educational institutions, and is thus also decentralized and deregulated, a tenet of globalization theory (Cisco, 2010). An effective training evaluation system, whose foundations are laid in the process of training, which adds to the 'organizational learning', will help in building the institution of 'training' in the organization. The current research, which is descriptive in nature, discusses various models of training evaluation in general, and suggests a new approach of evaluating the training programmes, based on "process" (and not the 'outcome') of training. The new model is advantageous over the traditional ones in developing a well designed training system leading to a 'learning organization'. This 'learning organization' is then helpful in transforming the age old conventional society in to a 'learning society'.*

*Keywords: Evaluation, Learning, Organization, Training, Society.*

## THE LEARNING ORGANIZATION
According to **Senge (1990)** learning organizations are organizations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to see the whole together.

**Pedler *et. al.* (1991)** explains that the learning company is a vision of what might be possible. It is not brought about simply by training individuals; it can only happen as a result of learning at the whole organization level. A learning company is an organization that facilitates the learning of all its members and continuously transforms itself.

**Watkins & Marsick (1992)** adds that the learning organizations are characterized by total employee involvement in a process of collaboratively conducted, collectively accountable change directed towards shared values or principles.

As **Rifkin (1995)** has noted, the very nature of jobs is changing. People no longer work for the same organization for their entire career. As often as not, employees telecommute or use technology to communicate regularly with people around the world. Knowledge bases outgrow themselves in extremely short time frames, and people find their expertise rapidly challenged. The learning organization is one response to these changes.

As **Gephart *et al* (1997)** and **Marsick & Watkins (1998)** explains that the learning organizations emphasize continuous learning at the systems level, knowledge generation and sharing, systemic thinking capacity, greater participation and accountability by a larger percentage of employees, culture and structure of rapid communication and learning,

Writers have sought to identify templates, or ideal forms, 'which real organizations could attempt to emulate' **(Easterby & Araujo, 1999).** In this sense the learning organization is an ideal, 'towards which organizations have to evolve in order to be able to respond to the various pressures they face **(Finger & Brand, 1999).** It is characterized by recognition that 'individual and collective learning are key' **(*op. cit.*).**

Although theorists of learning organizations have often drawn on ideas from organizational learning, there has been little traffic in the reverse direction. Moreover, since the central concerns have been somewhat different, the two literatures have developed along divergent tracks. The literature on *organizational learning* has concentrated on the detached collection and analysis of the processes involved in individual and collective learning inside organizations; whereas the *learning organizations* literature has an action orientation, and is geared toward using specific diagnostic and evaluative methodological tools which can help to identify, promote and evaluate the quality of learning processes inside organizations. **(Tsang, 1997; Easterby & Araujo, 1999).**

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However, as **Kerka (1995)** remarked that 'there is not… a consensus on the definition of a learning organization'. Indeed, little has changed since. **Garvin (2000)** recently observed that a clear definition of the learning organization has proved to be elusive.

People have found the idea of learning organization to be very inspiring, yet difficult to implement. It frequently involves deep change in the mind sets of people as well as the culture of organizations and societies. Such change does not occur overnight. Yet, the fortunes of company rise and fall; people hold jobs for increasingly shorter periods of time; and leaders are expected to make their mark within quarterly reporting periods. **(Marsick et al, 2000).**

Two important things result from this. First, while there has been a lot of talk about learning organizations it is very difficult to identify real-life examples. This might be because the vision is 'too ideal' or because it isn't relevant to the requirements and dynamics of organizations. Second, the focus on creating a template and upon the need to present it in a form that is commercially attractive to the consultants and writers has led to a significant under-powering of the theoretical framework for the learning organization. Here there is a distinct contrast with the study of organizational learning.

We can see much that is shared in these definitions – and some contrasts. To start with the last first: some writers (such as **Pedler *et. al.*)** appear to approach learning organizations as something that are initiated and developed by senior management – they involve a top-down, managerial imposed, vision **(Hughes & Tight, 1998).** This can be contrasted with more 'bottom-up' or democratic approaches such as that hinted at by **Watkins & Marsick (1992; 1993).** Some writers have looked to the learning company, but most have proceeded on the assumption that any type of organization can be a learning organization. A further crucial distinction has been reproduced from the use of theories from organizational learning. This is the distinction made between technical and social variants **(Easterby & Araujo, 1999).** The technical variant has looked to interventions based on measure such as the 'learning curve' (in which historical data on production costs is plotted against the cumulative output of a particular product) **(*op. cit.*).** There is a tendency in such approaches to focus on outcomes rather than the processes of learning. **The social view of the learning organization looks to interaction and process – and it is this orientation that has come to dominate the popular literature.** Here, we come to the proposition that it is the 'process' (and not the 'outcome') of learning and hence, training which is more important and should be taken into consideration. If the training is institutionalized in the organization, it will add to the concept of learning organization.

**COMPONENTS OF LEARNING ORGANIZATION**

The dimension that distinguishes learning from more traditional organizations is the mastery of certain basic disciplines or 'component technologies'. The five that **Peter Senge (1990)** identifies, are said to be converging to innovate learning organizations. They are:

1. Systems thinking
2. Personal mastery
3. Mental models
4. Building shared vision
5. Team learning

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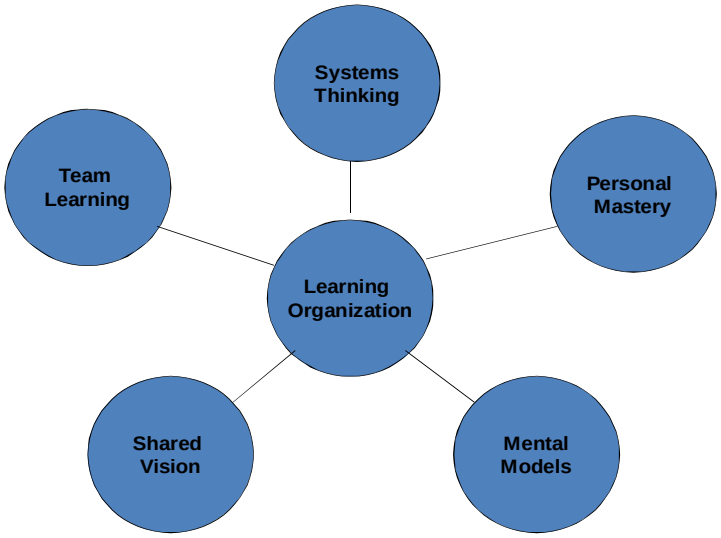
**Figure-1: The Components of Learning Organization**




**Systems thinking,** the cornerstone of the learning organization, explains that the organization is considered as a system, consisting of sub-systems, which are inter-related and inter-dependent on each other. **Personal mastery** is seen as a special kind of proficiency. It is not about dominance, but rather about calling. **Mental models** are 'deeply ingrained assumptions, generalizations, or even pictures and images that influence how we understand the world and how we take action. **Building shared vision** is the capacity to hold a share picture of the future we seek to create'. **Team learning** is viewed as 'the process of aligning and developing the capacities of a team to create the results its members truly desire'.

For an ordinary organization, in order to become a learning organization, an effective training evaluation system is required to be in place (Figure-2), which can ensure the effective learning of each employee.

**Figure-2: From Ordinary Organization to Learning Organization**


**THE LEARNING SOCIETY**

The history of the concept of the learning society can be traced through the chronological development of its theoretical framework. As the framework has developed overtime, so has the sophistication of the idea of the learning society as it applies to an inter-connected 21st-century model, particularly in relation to the shift from state-based educational institutions to more decentralized organizations.

Notions of the learning society gained considerable currency in policy debates in a number of countries since the appearance of *Learning to Be :* If learning involves all of one's life, in the sense of both time-span and diversity, and all of society, including its social and economic as well as its educational resources, then we must go even further than the necessary overhaul of 'educational systems' until we reach the stage of a learning society **(Faure et al, 1972).**

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**Schön (1973)** developed the idea that change is constant in a modern state ('loss of the stable state') and thus to adapt to this change, there must be a constant state of learning within the society of that state. Further, **Hutchins (1970)** also argued that given the ever-changing nature of states, particularly in business organisations, it wasn't possible for educational institutions to keep up, or even be expected to. Later, **Husén (1986)** and **Ranson (1998)** emphasize that learning has a certain 'fluidity' (with no start or end points) that exists outside of formal systems and this seems to reflect a liberalized market model of free movements of knowledge as required by organisations and systems **(Spring, 2009).**

The notion has subsequently been wrapped up with the emergence of so called 'post-industrial' or 'post-Fordist' societies and linked to other notions such as lifelong learning and 'the learning organization' (see, in particular, the seminal work of **Argyris & Schon, 1978**). It is an extra-ordinarily elastic term that provides politicians and policymakers with something that can seem profound, but on close inspection is largely vacuous. All societies need to be characterized by learning or else they will die!

The 'learning society' is an educational philosophy as advocated by the **OECD (2000)** and UNESCO that positions education as the key to a nation's economic development, and believes that education should extend beyond formal learning (based in traditional educational institutions – schools, universities etc.) into informal learning centers to support a knowledge economy (known as a "world education culture") **(Spring, 2009).**

A learning society regards the actual process of learning as an 'activity, not a place' – that is, it takes place outside of regular educational institutions, and is thus also decentralized and deregulated, a tenet of globalization theory **(Cisco, 2010).** Learning Societies are broader in context, drawing on elements of systems to facilitate the ability for lifelong learning in the individual. If lifelong learning is about the ability of the individual, then this is enabled through a Learning Society.

It is the 'socialization' **(McClellan, 2010)** of individual lifelong learning, and is currently aided through technologies and the increasing focus on social networking, by using the shared learning experiences of individuals as a basis for a larger network of education that exists formally and informally (schools, universities, job-training, support, collaboration, feedback etc.).

**ELEMENTS OF A LEARNING SOCIETY**

While the notion of the learning society can be sometimes difficult to grasp (relying as it does on concepts such as 'fluidity' and 'informality', and moving outside of traditional educative boundaries such as schools & universities), some scholars believe that a learning society can be identified as having 4 main attributes **(Jarvis, 2000).** These are:

**Futuristic** attribute is described as the tendency of the learning society to have a dependency on technological advances. **Societal** attribute is part of the broader conscious acknowledgement that is made by states and institutions that lifelong learning (as part of the learning society) exists specifically to contribute to the economic growth of a country and increase the democratic engagement of its citizens. **Reflexive** attribute requires learning societies to recognize not just the role of lifelong learning within the broader community, but also to enable it to be adaptable to changes, and flexible to specific individual needs. **The Market** attribute of a learning society requires that, like many products on a global market, education becomes a commodity and that students or **participants in the learning process become consumers, able to pick and choose the types of education that they would like**, to suit their own personal preferences. This would be facilitated through **technological advances that allow students to access learning resources (and qualifications) globally.** Under this attribute, education would then become tailored towards providing "customer satisfaction" to become economically justifiable.

**FROM LEARNING ORGANIZATION TO LEARNING SOCIETY**

According to **Senge (1990),** there are two types of learning : Adaptive as well as Generative learning. While adaptive learning merely involves adaptation to environmental changes, the generative learning embraces creativity and innovation and also relates to anticipation of change. Further he says learning organization are known by: A shared vision which can stem from varied places but is nurtured by top management ; Formulation and implementation of ideas at different levels of organization; An understanding of one's own job as the way it is influenced by those of others; Resolution of conflicts through collaborative learning and the assimilation of varied viewpoint; and, use of empowerment and charismatic leadership to build a shared vision, empower people, generate commitment and stimulate effective decision making throughout the organization.

In the opinion of **Drucker (1992)** "the learning society is taking over." A learning organization refers to an organization, which facilitates the learning of all its participants and constantly changes itself. It is also defined

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as the one, which is "Skilled at creating, acquiring and transferring knowledge and at modifying its behavior to reflect new knowledge and insights." The learning organizations are capable of systematic problem solving, experimentation, learning from past experience, learning from others and transferring knowledge quickly from system.

**According to Luthans (1997),** there are four types of organizations: knowing, understanding, thinking and learning. The "knowing" organization are single loop or adaptive in nature which learn without significant changes in their basic assumptions. The "understanding" and "thinking" organizations are mild range learning organizations. The fourth type, i.e. "learning" organizations represents the true, double loop generative learning organizations which learn how to learn and change their culture. In these organizations, change it and learning from the change form part of cultural values and structure. While the adaptive learning organizations are associated with employee's reacting to environmental changes with routine standard response leading to short run solution, the generative learning organization stress constant experimentation and feedback and teach their employees how to examine the impact of their decisions and change their behavior accordingly

The learning organizations can be actualized through: Becoming receptive to new ideas and overcoming the desire to closely control operations; Developing systematic thinking; Developing creativity; Developing a way of personal efficacy; and, instilling a sense of empathy and sensitivity.

**Figure-3: From learning organizations to learning society**


**EXISTING MODELS OF TRAINING EVALUATION**

Several models of evaluation of training have been evolved by various scholars / authors from time to time. However, many are currently struggling to develop a valid, reliable, and operationally viable model to measure and evaluate the effectiveness of training and development programmes. **(Phillips, 1997, 1999; Taylor & Associates, 1993; Lawson, 1993, 1994).** Following are few prominent models given in brief.

**Kirkpatrick's Model (1959)** identifies four levels of outcomes of training. He argues that trainees' efforts can be evaluated according to four criteria : reaction, learning, job behaviour, and results.

**CIPP Model (Stufflebeam, 1966),** basically talks about four levels – context evaluation, input evaluation, process evaluation and the product evaluation.

**TVS Approach (Fitz-Enz, 1994),** which stands for Training Validation System, is also a four level model emphasizing on the '**Situation',** '**Intervention',** '**Impact',** and '**Value'.**

**CRITICAL APPRAISAL OF EXISTING MODELS**

Research suggests that it is easy to measure training programmes related to technical and functional areas at level-3 and level-4. It is not easy to do this with behavioral skills programmes. Last 10 years have seen a sudden growth of the service industries across the world. And in the competitive era of today, it is very difficult to keep one employee tied with one job for more than 6 months or one year. In this regard, evaluation at Level-3 or Level-4 becomes irrelevant. I have been working on evaluation of training programmes for a couple of years and is closely associated with designing a new model for service industry.

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**Pareek & Rao (1981)** have specified that in all the discussions of training evaluation the most neglected aspect has been the training process which can not be covered by training inputs. The climate of the training organization, the relationship between participants and trainers, the general attitudes and approaches of the trainers, training methods, etc., are very important aspects determining the effectiveness of training. Evaluation of training process, therefore, should constitute an important element.

**Phillips (1991)** writes that the goal based models (such as Kirkpatrick's four levels) may help practitioners think about the purposes of evaluation, ranging from purely technical to covertly political purpose. However, these models do not define the steps necessary to achieve purposes and do not address the ways to utilize results to improve training.

**Bernthal (1995)** clearly states that the difficulty for HRD professionals or practitioners following such models is in selecting and implementing appropriate evaluation methods (quantitative, qualitative, or mixed). Because of their apparent simplicity, "trainers jump feet first into using (such) model (s) without taking the time to assess their needs and resources or to determine how they will apply the model and the results. Naturally, many organizations do not use the entire model, and training ends up being evaluated only at the reaction, or at best, at the learning level. As the level of evaluation goes up, the complexities involved increases. This may explain why only levels 1 and 2 are used.

**Stone & Watson (1999)** writes that Kirkpatrick model is now nearly 45 years old. Its elegant simplicity has caused it to be the most widely used methods of evaluation training programs. ASTD's (American Society for Training Development) survey, which reports feedback from almost 300 Human Resource executives and managers, revealed that 67% of organizations that conduct evaluations use the Kirkpatrick model. Though, the model is widely respected and provides an appropriate and useable framework for analysis, it becomes increasingly difficult to measure the effectiveness of the training programmes as one moves from Level – 1 to Level – 4.

## NEED FOR AN ALTERNATE APPROACH TO TRAINING EVALUATION

Whether it is the Kirkpatrick's model or Stufflebeam's model, the lacunae exists in all the approaches. Most of these models are "outcome" oriented. Whereas, the learning organization's need a process based approach, in order to institutionalize learning in the organization. Therefore, there is a need for less complicated and more exhaustive model, especially enabling the organizations to turn in to **learning organizations**, thereby, paving the way for **"learning societies".**

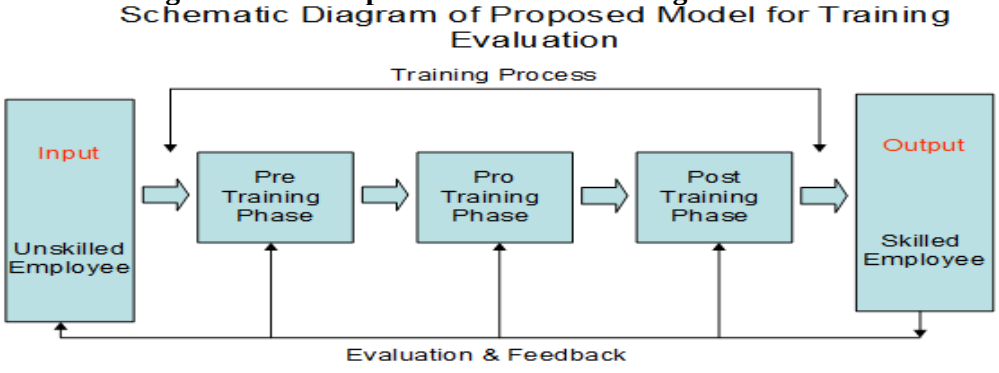
The problem of evaluation of training is so vast and prevailing in almost all the organization that the training function itself has become arbitrary or a burden to the organizations. Therefore, an honest approach to resolve this issue is earnestly needed.

## PROPOSED MODEL FOR TRAINING EVALUATION

The proposed model of training evaluation (Figure-4) can be called as the **"P3 Model"**, since it relies on the evaluation of the three different phases of training, i.e. **"P**re-training phase", **"P**ro-training phase" and the **"P**ost-training phase" (i.e. all the three words starting from **"P"**).

In this model, we have divided the "process of training" in to 3 different phases, namely, **"Pre-training phase", "Pro-training phase" and the "Post-training phase";** each phase is then sub-divided into number of factors, namely, **"Pre-training factors", "Pro-training factors"** and the **"Post-training factors", which, if ensured, will lead to the effectiveness of training programmes.** Therefore, we have to measure the effectiveness of these factors in the 3 different phases of training, in order to conclude that the training programme was effective.

**Figure-4: The Proposed Model for Training Evaluation**



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The **pre-training factors** are defined here as the **"conditions, which should be ensured by the organization for its effectiveness, before sending the concerned employee for the training programme."** It is in fact, the learning ability of the trainee, which is to be ascertained by the organization well before the concerned employee is selected / nominated for the training programme **(Saxena & Vyas, 2011).**

The **pro-training factors** are defined here as the **"conditions, which should be ensured by the organization for its effectiveness during the ongoing training programme."** It is in fact, the efficacy of trainer and training center, which is to be ascertained by the organization before or during the ongoing training programme **(Saxena & Vyas, 2010).**

The **post –training factors** are defined here as, **"the conditions which should prevail in the organization at the time of (or well before it) arrival of the employee after learning a new skill, in a recently concluded training programme.**" It is in fact, the organization's ability to provide a learning climate to the employees, which should prevail at all times **(Saxena & Vyas, 2009).**

In the diagram above **(Figure - 4)**, it is clearly visible that the input is unskilled employee and the output is skilled employee. In between the input and output, there is the complete process of training which is divided into three parts, namely, pre-training phase, pro-training phase, and the post-training phase. The pre-training phase will ensure the learning ability of the employee; pro-training phase will ensure the efficacy of trainer and training centre; and finally, the post-training phase will ensure the organization's ability to provide a learning climate. The three phases will then be evaluated for its effectiveness with the help of skilled employees who have recently undergone the training programme and feedback will be given to all the stages to improve its effectiveness for future use.

**ADVANTAGES OF THE NEW MODEL**

Following **advantages** are expected from the **new model** for measuring the effectiveness of the training programmes:

- It is simple to understand and administer.
- Since it is emphasizing on the **"process"** rather than the "outcome" of the training programme, the monitoring, controlling and reviewing of the whole training programme is well within the purview of the organization.
- Evaluation of **"process"** is also a pre-requisite to build a learning organization, paving the way for creating a learning society.
- Evaluation of **"process"** is also advantageous in saving the resources, over the evaluation of the "outcome" which results in the wastage of various resources.
- It can be used in any type of organization (viz. manufacturing, service etc.), since all the phases and its associated factors exist in all types of organizations.
- Similarly, it can be used for any type of training programme (viz. on-the-job, or off-the-job etc.), since all the phases and its associated factors exist in all types of training programmes.
- It is authentic, since the feed back comes from the trainees, i.e. the internal customers in TQM parlance.
- It is less time consuming, since the structured questionnaire is close ended and needs, not more than 30 minutes to answer all the questions.
- With the individual variable analysis, we can easily understand the weakness of a particular segment of the training and improve upon it later.
- In just one questionnaire, we can evaluate the learning ability of the trainee, efficacy of the trainer and training centre, and finally the organization's ability to provide the right climate for efficient working.
- In the long run, the use of this model proves to be a **'preventive approach'** for the organization, whereby, the constant feedback from the different phases of training can be used to improve the design of the training programmes, resulting in its better effectiveness.

**DISCUSSIONS AND DIRECTIONS FOR FUTURE RESEARCH**

In the current era of globalization, it is necessary to have a sound training system, which can be only realized through an effective training evaluation system. This will enable the "learning" to be institutionalized in the organization. When the learning is instituted in the organization, it will pave the way for building a learning

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society. The authors have not only suggested a new and effective model of training evaluation, but tested it in Indian context too. The primary results have authenticated the formation of an effective model for training evaluation. However, the avenues are still open for in depth research.

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# MATRIX KEY BOARD SELECTOR IN MODERN VARIAC USING ISOLATING TRANSFORMER

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## ABSTRACT
*Voltage selection is the major problem now-a-days. By selecting a proper AC voltage we can obtain the better working capacity. Generally auto transformers are used for this purpose. By turning a shaft one can get desired voltage.*

*Here we are proposing a circuit incorporated with a matrix keyboard and transformer with 230V primary and ten individual windings for secondary. The secondary windings are wound for 1V, 2V, 4V, 8V, 10V, 20V, 40V, 80V, 100V and 200V. The voltages can be selected by connecting these windings individually or in series with other windings.*

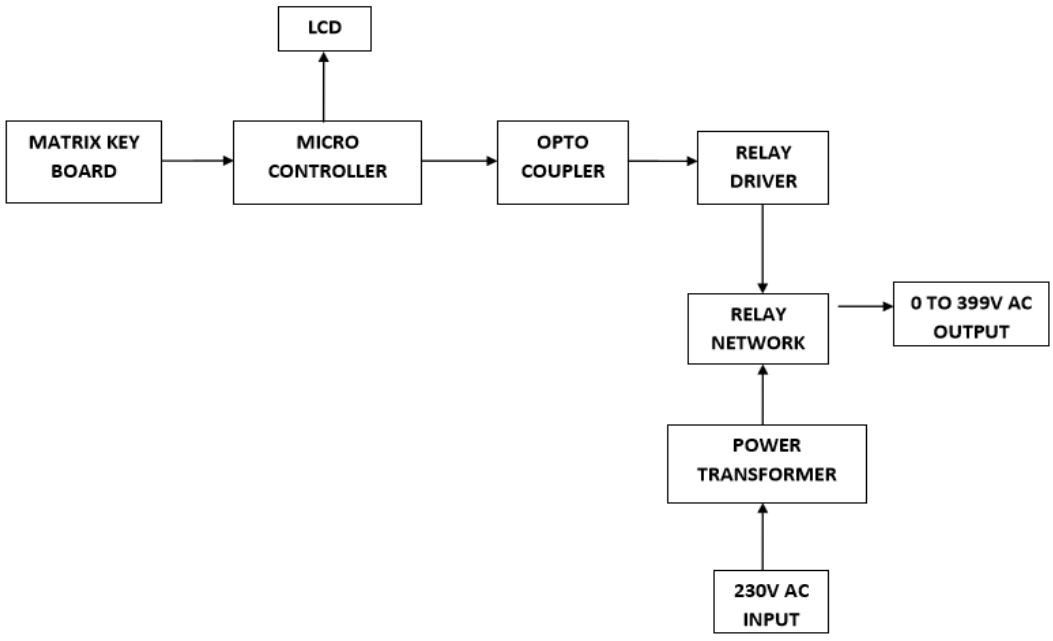
*The value of the voltage for which the respective relay is activated can be displayed by using LCD display interfacing with the micro controller. Here we are using ATMEGA-16 micro controller. The opto-coupler used is to provide isolation between the microcontrollers to the relay circuits.*

## INTRODUCTION
Voltage selection is the major problem now days. By selecting a proper AC voltage we can obtain the better working capacity. Generally autotransformers are used for this purpose. By turning a shaft one can get desired voltage.

Here we are proposing a circuit incorporated with a matrix keyboard and transformer with 230V primary and ten individual windings for secondary. The secondary windings are wound for 1V, 2V, 4V, 8V, 10V, 20V, 40V, 80V, 100V and 200V. The voltages can be selected by connecting these windings individually or in series with other windings.

## OBJECTIVE
The objective of this project to get accurate voltage from a isolating transformer for laboratory purpose using microcontroller

## BLOCK DIAGRAM




Blockdiagram

## BLOCK DIAGRAM DESCRIPTION

### *MATRIX KEY BOARD*
The key board circu it is nothing but a 4*3 matrix key board. So the key is using for required voltage selection purpose.

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***MICRO CONTROLLER***

The Atmel/avr -16 controller is using in this project. In this controller is High-performance, Low-power Atmel®AVR® 8-bit Microcontroller Advanced RISC Architecture 130 Powerful Instructions – Most Single-clock Cycle Execution 32 × 8 General Purpose Working Registers and– 8Kbytes of In-System Self-programmable Flash program memory

***LIQUID CRYSTAL DISPLAY***

LCDs have become very popular over recent years for information display in many 'smart' appliances. LCDs come in many shapes and sizes but the most common is the 16 character x 2 line display with no back light. It requires only 11 connections –eight bits for data (which only used two here). It runs off a 5V Dc supply and only needs about 1mA of current.

***OPTO COUPLER***

Opto-coupler separates the high voltage relay side and the microcontroller but also prevents damage to the microcontroller due to the line noises. It also reduce the effects of electrical noise common in industrial environments , which cause erratic operation of the microcontroller. Here we are using IC MCT2E type opto coupler circuit.

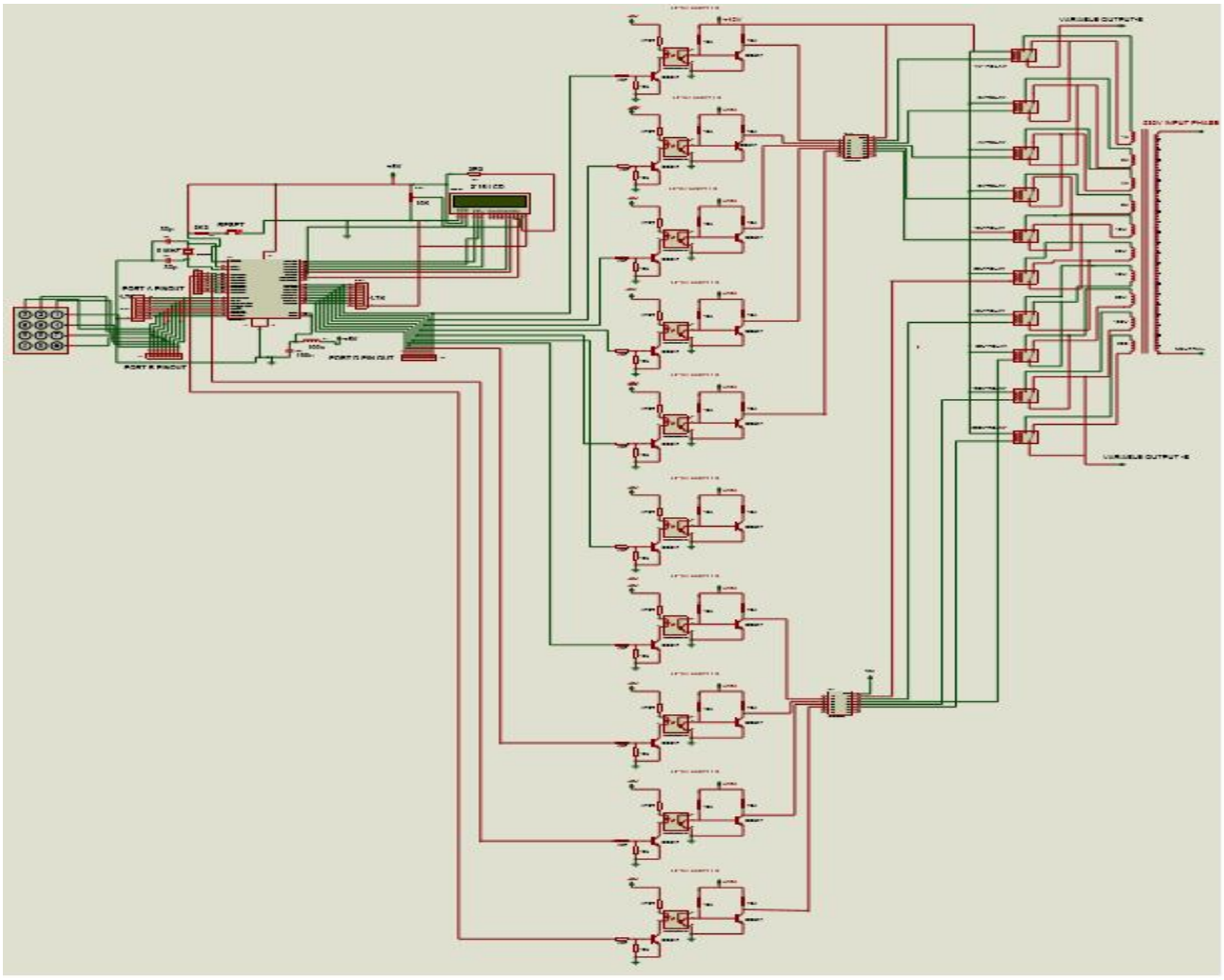
***RELAY DRIVER CIRCUIT***

Here we are using IC ULN 2003 based relay driver. The relay driver manage the relay coil current .

***RELAY SETUP***

The relay section contains relays and drivers. This block consists of 12V/750W relay. It is nothing but electromechanical switch. It makes and breaks electrical circuit by magnetic force. The coil is operated at 12V by the contacts are potential free contact, so we can control any type of signal. Here relay is using series with the one winding to another winding; due to the microcontroller command.

**CIRCUIT DIAGRAM**



Circuit diagram

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**MATRIX KEY BOARD DETAILS**

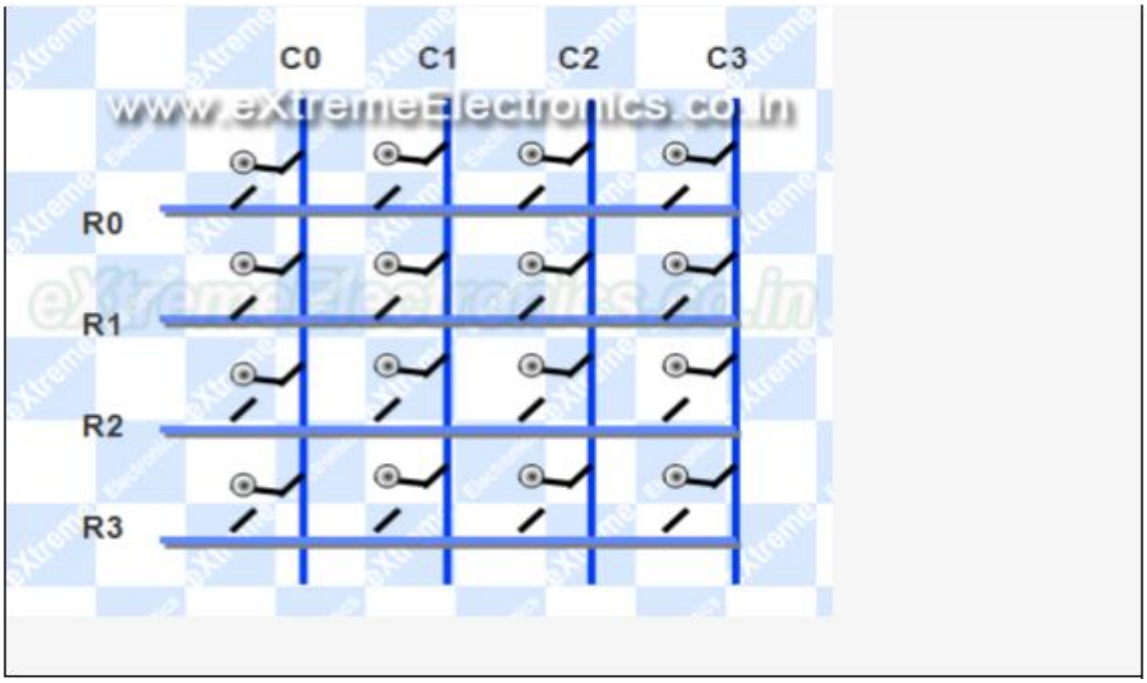
Many application requires large number of keys connected to a computing system. Example includes a PC keyboard, Cell Phone keypad and Calculators. If we connect a single key to MCU, we just connect it directly to I/O line. But we cannot connect, say 10 or 100 keys directly MCUs I/O.

Because :-

- It will eat up precious I/O line.
- MCU to Keypad interface will contain lots of wires.


4*3 Matrix Keyboard

We want to avoid all these troubles so we use some clever technique. The technique is called multiplexed matrix keypad. In this technique keys are connected in a matrix (row/column) style as shown below.




Matrix Keyboard Basic Connection

The rows R0 to R3 are connected to Input lines of Microcontroller.

The I/O pins where they are connected are made Input. This is done by setting the proper DDR Register in AVR and TRIS Register in PIC. The column C0 to C3 are also connected to MCUs I/O line.

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Column 0 Selected

One by One we make each Column LOW (from high Z state) and read state of R0 to R3 As you can see in the image above C0 is made LOW while all other Columns are in HIGH Z State. We can read the Value of R0 to R3 to get their pressed status. If they are high the button is NOT pressed. As we have enabled internal pullups on them, these pullups keep their value high when they are floating. But when a key is pressed it is connected to LOW line from the column thus making it LOW. After that we make the C0 High Z again and make C1 LOW. And read R0 to R3 again. This gives us status of the second column of keys. Similarly we scan all columns.


Column 1 Selected

How to Do it All with AVRs

For example port A has

PORTA Port Driver – when any bit is set to 1 it appears as HIGH i.e.5v .

But this is the case only if that bit is OUTPUT.

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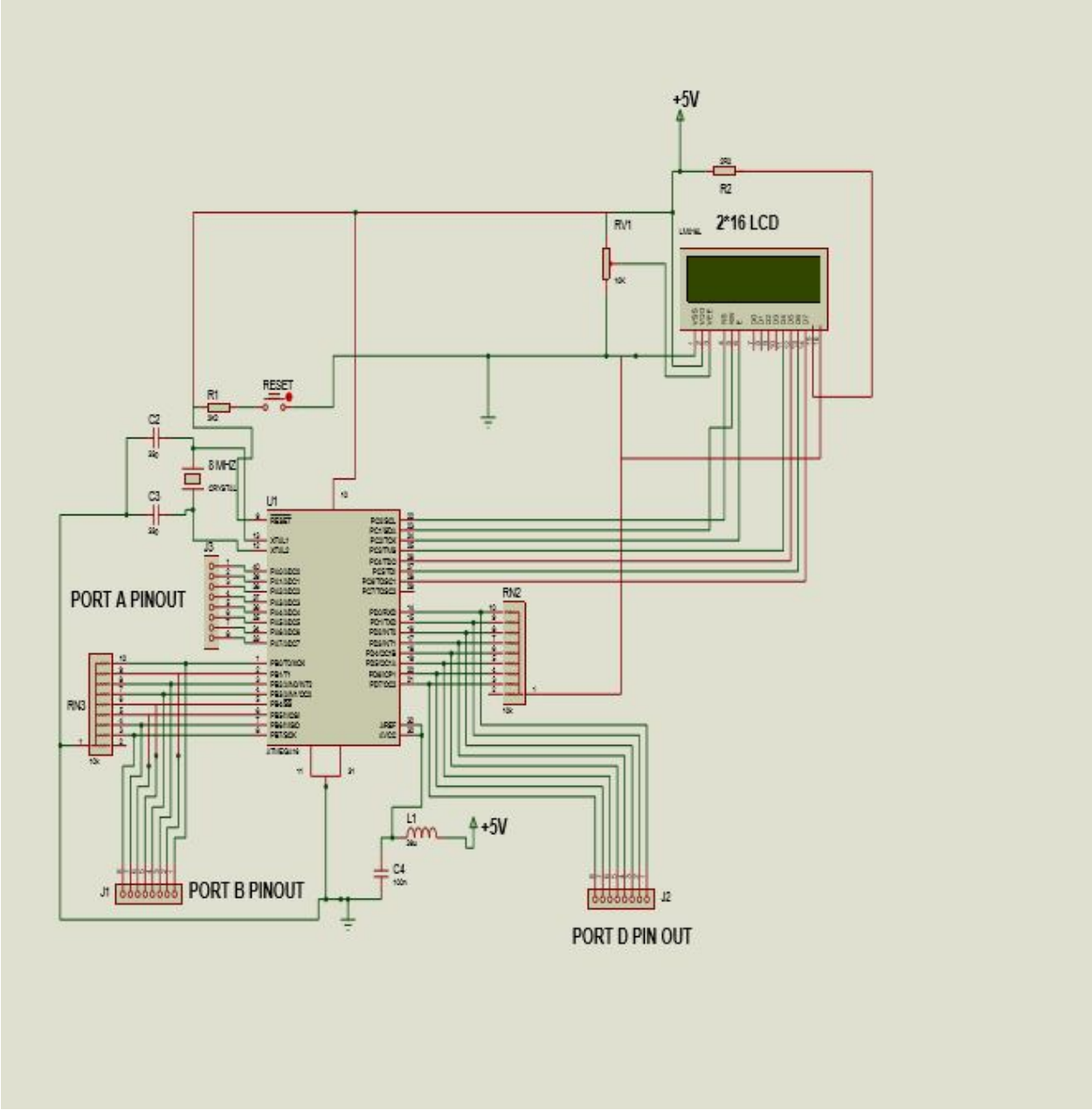
DDRA DATA DIRECTION REGISTER – Make any pin on than port as IN or OUT. When bit is 1 it represents Output. When bit is 0 it represents Input.

PINA – Read it to get the level (HIGH or LOW) at the actual I/O pin. It is read when the pin is made input.

**MICRO CONTROLLER DETAILS**




Microcontroller diagram

**INTRODUCTION**

This circuit consists of an opto-coupler (IC) MCT2E (6 pins), resistors and transistors (BC547) as shown in figure. If the output from the fault detector output is high, then the LED in (IC) MCT-2E emits the light energy, so the transistor conducts (ie. Within the chip).

Then, the transistor BC547 conducts and the output signal is LOW. If the output signal from the comparator is low, then the LED in (IC) MCT2E does not emit light and not conducts. Due to this, the transistor BC547 does not conduct and so, the output signal given to micro-controller is high.

Typical isolating opto coupler applications include low voltage to high voltage (or vice versa) signal coupling; interfacing of a computer output signal to external electronic circuiting (or) electric motors etc. Interfacing of ground referenced low voltage circuitry to floating high voltage circuitry driven directly from the mains AC power lines etc. Opto couplers can also be used to replace low power relays & pulse transformers in many applications.

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**APPLICATIONS**

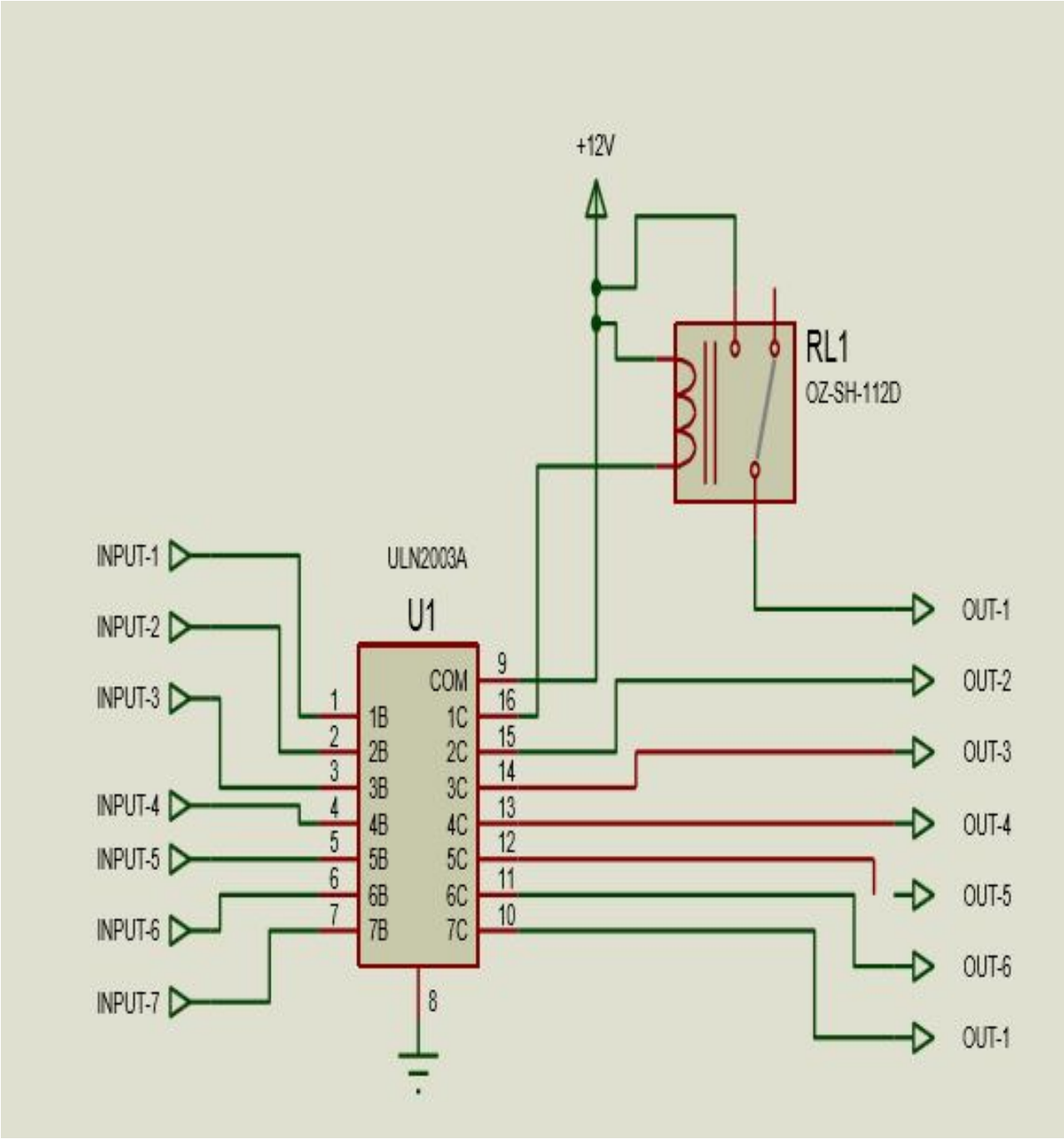
- Utility /economy isolator
- AC line / digital logic isolator
- Digital logic /digital logic isolator
- Telephone/telegraph line receiver
- Twisted pair line receiver \

**NEED FOR AN OPTOCOUPLER**

Opto coupler not only separates the high voltage input side and the microcontroller but also prevents damage to the microcontroller due to the line voltage transistor. It also reduces the effects of electrical noise common in industrial environments, which cause erratic operation of the microcontroller.

**RELAY**

**REALY DRIVER WITH RELAY CIRCUIT**




Relay driver with relay circuit diagram

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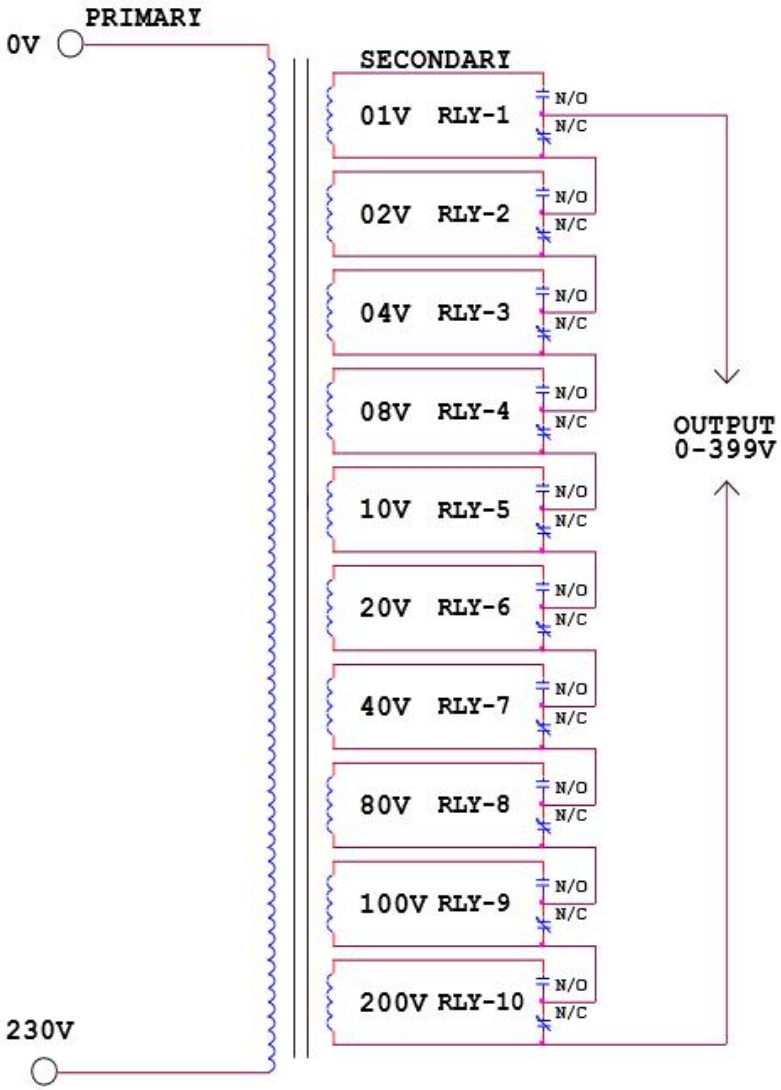
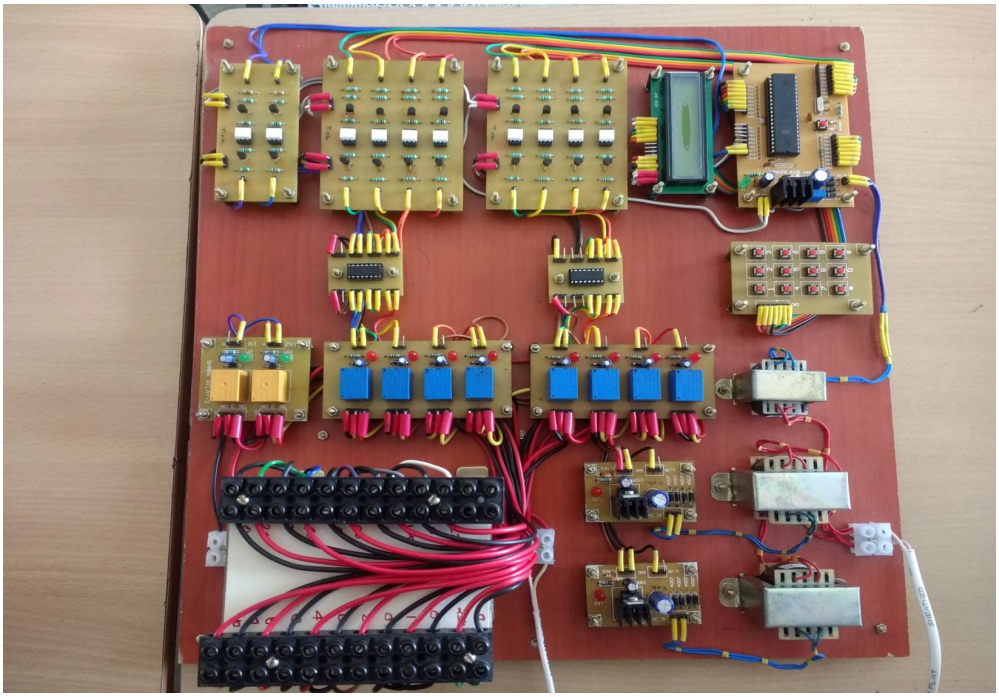
**WIRING DIAGRAM**

MAIN TRANSFORMER WITH RELAY CONNECTION




Wiring diagram



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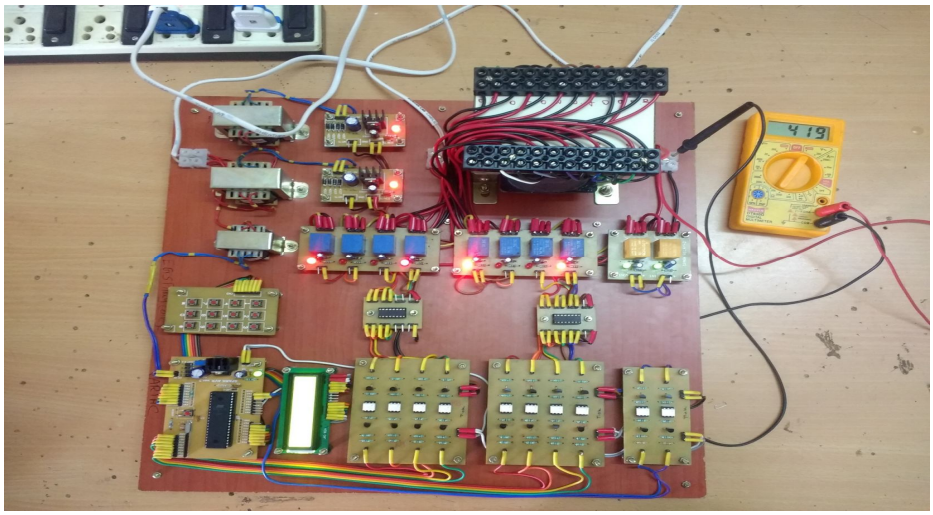

## ADVANTAGES AND APPLICATIONS

### ADVANTAGES

Isolation between primary and secondary is good and safety is assured, thereby it is highly reliable because it has no moving parts like auto transformer.

### APPLICATIONS

- It is very much useful for all industries where it needs variable A.C. Voltages.
- It is also very much useful for all educational institutions laboratory.

## CONCLUSION

The project on **MODERN VARIAC** is working fine, getting the parameter envisaged during the conceptual stage.

During the design, as well as during the construction, greater care has been put into avoid hiccups at the final stage. The PCB layouts were prepared with utmost care to incorporate the circuits in a modular manner. The circuit is made as simple as to our knowledge. Also components were selected keeping in mind their availability and cost.

It was a very interesting process of developing the prototype, stage by stage and testing the same. We have to go through fairly large pages of data related to the components etc. It was a useful and fulfilling assignment to get the project completed in time. This gave us a sense of satisfaction and accomplishment.

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# LONELINESS, DEPRESSION AND PSYCHOLOGICAL WELL-BEING AMONG EMPTY -NEST ELDERLY MALES AND FEMALES

**Rupika Yadav**

## ABSTRACT

*The purpose of the study was to study the level of loneliness, depression and psychological well-being among empty nest elderly (55-80 years) and to establish the prevalence of its relationship with the empty nest elderly.*

*Sample of the study were 30 empty-nest elderly female and 30 empty nest elderly males making it a total of 60 empty nest elderly of age group 55 – 80 years. Beck depressive inventory, Ryff's psychological well-being scale and UCLA loneliness scale were utilised in the study to measure the variables.*

*The results show a significant relationship between depression and psychological well-being among empty nest elderly females*

*It was uncovered from the study that psychological well-being plays an important role in loneliness and depression aspects of empty nest elderly males and females*

## INTRODUCTION

With the quickly getting older population in India, many older human beings are taken into consideration to have an "empty nest". The empty nest households imply that aged do not longer stay with their kids or do not have a toddler. In reality, one-child coverage in China was taken into consideration one of the principal catalysts contributing to the big range of empty nest elders. Since 2016, China cancelled its one-toddler policy and completely carried out the policy of permitting every couple to have two kids as a lively response to the getting older populace. Nevertheless, most of the new era might not be capable of have every other toddler even if they desired to due to their disadvantaged positions within the more and more competitive job marketplace and the improved prices of raising a toddler. Some demographers have expected that the 'two-child' coverage will now not cause a baby boom.

In the conventional Indian circle of relative's sample, whilst dad and mom cannot contend with themselves, they can stay with their kids and get hold of assistance. Recently, the "Data Analysis of the Sampling Survey of the Aged Population in Urban/Rural china 2010" file, published by using Chinese National Committee on Aging, indicated that the share of aged people residing alone changed into rising. More importantly, empty nest elders accounted for forty-nine. Three% of the entire older populace, including 54.4% of urban empty nest elders and 45.6% of rural empty nest elders. Compared with city areas, the empty nest phenomenon has end up increasingly extreme in rural areas. Urbanization is now a global phenomenon and will necessarily affect the dwelling patterns of the elderly in rural China. Based at the National New Type Urbanization Planning (2014–2020) file, there are about 100 million rural those who will move into cities from the country's farming regions. If this trend keeps, the traditional family family members of being supported by kids will actually be challenged.

Whether there was a causal relationship between empty nest and Indian elders' health is a crucial problem that is properly worth studying. Although there have been several researches on this topic, the findings have been equivocal and even conflicting, and the mechanisms between the two have remained doubtful. Some research has found that an empty nest has a protective impact on elders' fitness and that residing on my own provides a remarkable possibility for elders to enjoy their amusement time. However, other studies have supported the hypothesis of a strong negative relationship among empty nest and elders' health, specifically regarding mortality risk and adjustments in self-rated health. Despite these divergent findings, there is robust proof that vacant nest is associated with elders' fitness.

To greater very well verify mental nicely-being, loneliness and depression have been adopted as indicators of health on this look at. Some researchers have shown that see the results of empty nest on elderly health, empty nest elders have a higher health condition than elders who live with their youngsters. In contrast, a few studies have discovered that an empty nest has a good-sized destructive effect on elders' fitness. A observe from China confirmed that vacant nest elders had worse self-care potential and decrease mental fitness ratings. In addition, the prevalence of decay in physical characteristic of the aged has been associated with low earnings, single status, poor dwelling situations, variety of persistent diseases and negative own family functional situations. Some studies have indicated that an empty nest is negatively related with elders' cognitive capacity, especially for female, aged, rural, single elders and elders without medical health insurance. In widespread, whilst kids

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pass out in their houses, vintage parents could be extra frustrated, depressed and irritating. If these signs can't be removed in time, they can weaken elders' immunity and, greater severely, in addition boom their threat of cognitive incapacity and Alzheimer's disorder. The relation among empty nests and the mental fitness of older human beings has attracted the eye of medical researchers in current years. Some Chinese research also located that empty nest elders had greater soreness, anxiety, and despair. However, any other look at counseled that vacant nest elders may want to enjoy greater freedom while their children lived far from them and they had greater time to experience existence, make pals and entertain.

Other research has explored the indirect relationship between empty nests and aged health. Living assets, availability of clinical remedy and social activities were recognized as the three main capacity mediating variables of this relationship. Empty nest elders were in worse condition due to the fact they did now not have a sufficient pension (as farmers did no longer formerly acquire a pension in China) to support themselves; this example led elders in impoverished mountainous regions in India to depend upon their kids. When children live some distance away from their parents, they will now not have the possibility to offer enough cloth goods and help for their parents. Living sources, a determining issue of health, have appeared to be extensively related to an empty nest. Empty nest elders from low-profits households have shown a bent in the direction of non-touring and non-hospitalization after adjusting for need and predisposing elements. Concurrently, preceding studies have shown that younger age has sturdy institutions with greater social activities, which could prevent depression. For the aged, depressive signs and symptoms can spontaneously appear when social guide supplied by way of work disappears and their youngsters are unable to provide aid for them in time.

Previous studies had a few limitations. First, the endogenous problem become now not safely solved by means of the researchers who did discover the causality among an empty nest and elders' fitness. Previous research commonly analysed the outcomes of baseline dwelling fame on these elders' fitness, after controlling for baseline health conditions, but neglected that the elderly should circulate in with their children if they felt sick. Second, these researches have dedicated greater attention to the bodily feature of the aged, although incorporated studies on bodily fitness, cognitive potential and psychological fitness have now not been properly performed, particularly in growing international locations along with India. Third, the outcomes of an empty nest at the fitness of the aged can be heterogenous, which may additionally have induced the deviation in earlier expertise of the needs of aged care offerings. For example, city elders and rural elders have extraordinary thoughts, life environments and own family systems, and the relationship could truly be biased someplace. Finally, nearly no studies have examined the mechanism between empty nests and standard elderly health. Therefore, this have a look at hypothesized that an empty nest had a negative impact on elders' health in India, aimed to investigate the connection between an empty nest amongst elderly parents and the general mental properly-being, melancholy and loneliness, and explored the mechanisms in the back of how an empty nest impacts the fitness of the elderly dad and mom.

Archana Singh1, Nishi Misra2 Loneliness, despair and sociability in antique age (2009) This research become finished on fifty-five elderly individuals (the 2 humans). The devices applied were Beck Depression Inventory, UCLA Loneliness Scale and Sociability Scale through Eysenck. Results: Results uncovered a big connection amongst unhappiness and dejection. They reasoned that the greater part of the aged individuals had been discovered to be everyday within the dimension of friendliness and desired staying inquisitive about social cooperation's. The ramifications of the research are tested in the article.

Cheng PJin YSun H et al. (2015) The objective of the prevailing investigation became to decide the aberrations in pervasiveness and chance factors of forlornness among rustic void domestic and non-void home greater installed grown-united states in Chizhou, China. An instance of 730 contributors (381 void home more installed grown-U.S. And 349 non-void home extra pro grown-ups) were overviewed making use of the University of California at Los Angeles-Loneliness Scale, the 30-thing Geriatric Depression Scale (GDS-30), the Pittsburgh Sleep Quality Index, the Social Support Rate Scale, the Perceived Social Support from Family Scale and the World Health Organization Quality of Life survey curtailed version. The present examination confirmed that the imply level of dejection did altogether assessment between void domestic greater mounted grown-united states and non-void home more seasoned grown-ups (41.52 ± 6. Ninety-eight as opposed to 39. Forty-six ± 7.38). Void nesters had altogether higher GDS scores; by using differentiate, they got bring down target, abstract and own family bolster. Family bolster, goal guide and social connection had been related basically with forlornness, which changed into greater articulated in void domestic greater established grown-ups, barring summary assist and mental area. The GDS rankings ($\beta = 0.237$, $P < 0.001$) and age ($\beta = - 0.114$, P = zero.002) tested more grounded large dating with despair in void home more seasoned adults. The don't forget presumed that Loneliness surely wins amongst void home more mounted grown-us than non-void domestic more installed

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grown-ups. Depressive side results proven a more grounded threat of void domestic extra installed grown-U.S. Being desolate. Family bolster changed into proposed as a shielding issue for forlornness within the gatherings. These discoveries have to be considered whilst growing mediation techniques to diminish dejection. Geriatr Gerontol Int 2014

Chalise et al. (2004) announced "the social help, emotional prosperity (SWB), and forlornness are troubles of focal importance in inquire approximately concerned approximately the non-public pleasure (QOL) of elderly individuals in the 21 St century. Be that as it could, practically nothing is thought about the situation in low-profits countries, for instance, in Nepal. The cause of this paper is to understand the connections essential in social assist (got (SSR) and gave (SSP)) and have a look at their institutions with melancholy and SWB. The topics, not experiencing dementia, have been 60 years or greater living in Kathmandu metropolis. The data turned into tested utilising strategic relapse with a few bewildering factors managed. The results show that dejection is excessive and SWB is low amongst Nepalese more set up grown-ups. SSR from youngsters residing respectively and SSP to mate, kids residing respectively and partners and buddies reduce depression. SSP to kids living separated expands SWB-life achievement. SSR from children residing respectively and SSP to children (residing respectively and separated) increment SWB-existence dependability. Be that as it may, SSP to spouse and children decreases SWB-lifestyles achievement and SSR from relatives decreases SWB lifestyles solidness in Nepalese greater set up grown-up.

Cacioppo et al. (2006) unique "The degree to which forlornness is a one in all a type danger factor for depressive manifestations become resolved in population based totally examinations of fairly aged to extra mounted grown-ups, and the plausible causal impacts among dejection what is more, depressive side results had been analyzed longitudinally inside the second investigation. In Study I, a broadly agent test of people matured 54 and more mounted completed a telephone meet as a function of an investigation of well being and maturing. More expanded quantities of dejection had been related with more depressive manifestations, net of the impacts of age, sexual orientation, ethnicity, schooling, pay, conjugal reputation, social help, and saw push. In Study 2, point by means of point proportions of dejection, social assist, noticed pressure, hostile vibe, and statistic characteristics had been collected over a three-year time body from a populace based totally example of grown-united states of americaages 50-67 years from Cook County, Illinois. Dejection and Health-Related Quality of Life 13 Dejection was again linked with more depressive symptoms, internet of statistic covariates, conjugal fame, social assist, opposed vibe, and noticed pressure".

Deci et al. (2006) distinct "The volume of aged individuals inside the Czech population is expanding. Seniority is regularly related with dejection, which essentially prompts a therapeutic systematization. Notwithstanding that, despondency, dementia, and liquor misuse can also manifest accordingly and purpose for advance disintegration. We depictaninstance of a lady who has spent widespread piece of the latest five years of her life being hospitalized at divisions of psychiatry, fearful gadget science, and internal pharmaceutical personally. Social elements assumed an imperative job in this advancement. The infinite loop of forlornness, gloom, and standardization of aged people is probably defeated in a few exclusive approaches, e.g. Via a high-quality physical, intellectual, and social motion, self-training, psychotherapy, outpatients nursing care, and an early diagnostics and remedy of despondency".

Fahrenberg (2006) "inspected the across the board thoughts at the impact of children' takeoff from home. A few examinations painting this situation as one among actual job misfortune for the mom who responds with sentiments of dejection and melancholy: the alleged "feeling of emptiness after the remaining child left home". Thirty examinations were dissected. He said, there are no statistics which allow a hypothesis of such suspicions: the revel in of confronting the unfilled home is individualistic for each female due to her personal genuine to existence what is more, actual factors of existence putting. Sentiments run from misfortune and pity to help and possibility. Additionally, vacant home studies have to symbolize the expression "void domestic" more absolutely, such as various factors approximately mothers' and kids' existence situations. Formative guiding for fairly aged women cannot exist in well-known programs with equal goes for all contributors, but needs anyhow man or woman and situational determinants of every girl".

Guo YZhang CHuang H et al. (2016) carried out a research on “Mental fitness and related influencing factors many of the empty-nest aged and the non-empty-nest aged in Taiyuan, China: a move-sectional look at “elderly make up a tremendous extent of the majority, but their psychological nicely-being is often unnoticed. The factor of this exam is to reflect on consideration on psychological wellbeing and associated affecting components most of the vacant domestic and the non-void domestic aged, and gain the motivation in the back of improving their personal pleasure. Study configuration Cross-sectional overview. Strategies A go-sectional overview became

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led among 488 elderly people matured 60– ninety-two years in six locales of Taiyuan, China. A statistic survey and SCL-ninety-R were utilized to gather statistic elements and examine emotional wellbeing, one at a time.

Various relapse investigation turned into accomplished to assess factors recognized with emotional properly-being of the aged. Results The vacant home aged have been for the maximum component male, wedded, superior training stage, higher wage and living in city areas. The scores of SCL-90-R most of the vacant domestic elderly have been lower than the ones of the non-void domestic elderly aside from psychoticism. Contrasting and ratings of country wide standards, a few sizes of SCL-90-R had factually big contrasts. Numerous relapse research proven that the number one chance factors of the unfilled home aged were intercourse and pay, even though the essential chance element of the non-void domestic aged turned into perpetual ailments. End The emotional well-being fame of the vacant domestic aged was advanced to that of the non-void domestic aged. By and big emotional well-being of the investigation population was at a bizarre kingdom contrasted and countrywide standards. The elderly who had been male, with extra youthful age, having better pay, and without interminable illnesses could be clever to emotional wellbeing status.

Jamuna D(2003) investigated on “Issues of elder care and elder abuse inside the Indian context" they stated With 7% of the number of inhabitants in India being elderly, two thirds of whom live in towns and almost a half of them in negative conditions, the consideration of the aged is a difficult difficulty to be treated. The lessening of the joint family, the ascent of double profession households, a achievable flow in obedient devotion esteems, the expanding destiny with more noteworthy odds of a drawn out maturity described by way of neediness, degeneration, extra unfilled home years, and reliance, have all extra to the reality of the issue and made the aged greater powerless than any other time in recent memory to damaging remedy.

This paper seems at these troubles and in addition the difficulty of senior maltreatment in light of reachable facts and recommends a few structures to satisfy the issue. Likewise pointed out are the issues, stresses, and traces of parental figures of the aged. A greater noteworthy process is imagined for Non-Governmental Organizations (NGOs) than the nation being looked after with the aid of the elderly, mainly in imparting help administrations to family guardians.

Joshi K. Et al. (2003) Developed a HRQOL degree (scale) and attempted the equal a number of the Indian aged loads (>60 years) concerning one of a kind sociodemographic factors and in opposition to the standard approval received through parameters on wellbeing scale and dismalness repute. They determined "A go sectional assessment picked through a bunch trying out approach comprising of two hundred aged topics (a hundred each from us of a and concrete regions) completed inside the city and provincial areas of Chandigarh metropolis.

The mean HRQOL rating most of the examination population become 70.1 ±14.1. Very almost 62 percent of the elderly had HRQOL score over a centre of 69. A larger element (fifty-two%) of the topics ordered as afflicted with the aid of the plain health inventory (PHI) scale had been likewise destined as bad with the aid of HRQOL device created for the motive. Mental prosperity (zero.85) handicap (zero.82) and social help (zero.71) were located to have surprisingly indistinguishable impact on HRQOL score. The dating of HRQOL with dreariness rating (relegated by means of a physician following medical examination Dejection and Health-Related Quality of Life eleven of the elderly) became r=0.62, df – 198, p<0 0. In unvented investigation, an among HRQOL became seen among the ones within the lower age gathering, literates, city occupants give up those with excessive near home pay and dwelling in expansive circle of relative’s units. In multivariate examination, HRQOL turned into determined altogether connected with time of (b esteem – zero.22), at ninety-five% fact intervening time zero.003 =0.51), intercourse (b-esteem 0.22), at 95% fact interim 1.32 – 11. Forty six) and phrase related reputation (b esteem – 1. Sixty eight, 95% certainty meantime (1.06 – 2.31). The reproducibility and approval of the degree changed into observed to be attractive. The HRQOL degree created right here may be beneficial for those locked in in making approach and program strategies for reinforcing the non-public satisfaction among elderly population".

Jakobsson and Hallberg (2005) indicated "forlornness and dread have been each extra every occasionally revealed with the aid of girls than guys. Depression was essentially related with sexual orientation, conjugal repute, residing in unique convenience, dread, and need of assistance with physical activities of each day residing (lADL). Dread became fundamentallyconnected with sexual orientation, wide variety oyoungsters, having someone to consider, forlornness, and wanting assistance with IADL. The people who revealed forlornness or potentially worry had fundamentally deliver down well-being Forlornness and Health-Related Quality of Life 12 associated personal pleasure than the people who did no longer. A enormous lot of the aged dreaded viciousness/ wrongdoing, yet only a couple have been presented to savagery/wrongdoing. Forlornness

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and dread are fundamental amongst elderly individuals. The factors seem like recognized with one another and had been both located to be "risks"to a respectable lire in maturity.

Be that as it is able to, to restrict these "risks" and maybe decorate these individuals' private delight, circulate can be made inside the consideration for elderly individuals, for instance, such as the interpersonal corporation and lowering the want of help with IADL". As indicated via Jylha (2004) "more seasoned age is related with expanding dejection in people matured 60 and over. Information originated from Tam ELSA, a populace primarily based impending longitudinal investigation in Tampere, Finland.

The next time become 20 a long time. Forlornness turned into envisioned by using a solitary inquiry "Do you experience desolate?" with the manageable solutions frequently, in some instances, or never. Cross-sectional research tested that the level of subjects feeling desolate multiplied towards greater pro age gatherings, but in a multivariate exam, simply own family unit shape and social hobby were autonomously connected with forlornness. Longitudinal exam tested that forlornness extended with better age. Over a ten-yr time body, dejection expanded maximum inside the people who, at pattern, have been hitched and residing alone with their life partner. In willpower, only a minority omore pro individuals continuously enjoy the ill consequences of dejection. Forlornness increases with age, not because of age essentially, but instead because of expanding handicap and diminishing social mix".

Jakobsson U. (2006)8 directed research on personal pride amongst greater seasoned grown-united states of americawith joint ache (n=168) had extra torment utilitarian constraints and decrease personal pride (physicalcomponent than the ones without osteoarthritis (n=246) .No massive contrasts among the gatherings were discovered identified with discouraged state of thoughts and intellectual components of private pride. Personal pleasure was related with torment, utilitarian constraints and discouraged thoughts-set inside the two gatherings.

Liu L,Guo Q.(2008)conducted a semi-organized poll inclusive of socio-statistic attributes, physical well being, and the Life Satisfaction Index (LSI), UCLA Loneliness Scale (UCLA-LS), and Geriatric Depression Scale (GDS) become regulated to 275 void home and 315 now not-vacant home u . S . A . Elderly in a Chinese place. Direct relapse investigation turned into utilized to look at the signs of LSI rating.The void domestic elderly had deliver down existence achievement, deliver down pay, poorer associations with kids, less social help, better pervasiveness of consistent sicknesses, and extra sentiments of despondency and dejection contrasted with the no longer-unfilled domestic aged. "Void domestic reputation" turned into contrarily related with life success. Wretchedness became the maximum grounded indicator of existence fulfillment in the gatherings. The second most grounded indicator become despair a number of the vacant domestic accumulating, at the same time as it was endless maladies among the no longer-unfilled domestic amassing. Conjugal status and pay were connected with existence fulfillment just some of the unfilled home aged.The think about inferred that empty home aged were probably going to have psychological well-being troubles and to experience unhappy with their existence. These discoveries additionally strain the importance of emotional nicely-being as the determinant of existence success most of the unfilled domestic elderly

Liang YWu W (2014) conducted a research on"Exploratory evaluation of fitness-associated great of life among the empty-nest aged in rural China: An empirical study in three economically developed cities in jap China"Alongside short economic advancement, the maturing method in China is bit by bit quickening. The living states of void domestic rustic elderly are troubling. As a greater powerless collecting, void home aged are confronting more urgent scientific troubles. This research investigates the health related personal satisfaction (HRQOL) of void domestic aged in provincial China and intends to excite greater social worry for their HRQOL Research topics have been unfilled home rustic aged from three city groups: Nanjing, Suzhou, and Wenzhou (a long time $\geq 60$, $n = 967$). This examination applied the 5-dimensional European nature of wellness scale (EQ-5D) and the 12-element Short Form Health Survey (SF-12) to gauge the HRQOL of the respondents. Spearman connection coefficient, generalization calculated relapse, requested probit relapse and multinomial strategic relapse, and Structural situation show (SEM) techniques are utilized to ponder the relationship. (1) The Spearman connection coefficient demonstrates that the relationships of comparative spaces among the SF-12 and the EQ-5D scales are reasonably solid. (2) Men's scores are higher than that of women' via and huge well being (GH) and anxiety/wretchedness (AD) fashions. (3) The ratings of bodily section synopsis (PCS), bodily working (PF), psychological health (MH), and ordinary sporting events (UA) decrease with age. (4) Apart from PCS, essentialness (VT), and task passionate (RE) as needy factors, the education finishes all of the centrality assessments. The better the practise is, the better the ratings of physical or mental well being are. (5) The ratings of PCS and actual torment (BP) of void home aged are separated or higher in other conjugal reputation. (6) In SEM investigation, the impact of vital facts of void domestic aged on SF-12 scale is extra widespread.Itbwas

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presumed that First, the recurrence histograms of EQ-5D demonstrate that the ratings of void home elderly in usa China are by way of and large low. Second, in all SF-12 matters, the HRQOL is low. Third, men's rankings are higher than that of women's. The elderly with superior education specific higher ratings than people with deliver down preparation. Fourth, the effect of socio-statistic elements of the rustic Chinese void home aged on SF-12 scores is greater big, although the impact on EQ-5D ratings is less noteworthy

Liu et al. (2000) "In spite of sick wellbeing and an elevated need to touch a physician, void nesters have been more improbable than non-void nesters to counsel a physician and greater willing to document being no longer able get required consideration. Our effects likewise demonstrated that the difference in medicinal services usage among the two gatherings changed into associated with a difference in pay and social assist.

The unfilled domestic collecting had carry down wage and much less social help than the non void domestic gathering.Besides, despite the fact that alternate of obstructions to thoughts has customarily focused on monetary factors, our effects advise that distinctive factors, as an example, now not having the capacity to discover anyone to take them to the supplier's office and now not having the ability to triumph over at the phone are likewise crucial stumbling blocks that can be all of the more directly destroyed. Conceivable measures for making sure get admission to to human offerings and improving the physical and intellectual well being amongst rustic void nesters contain increasing protection inclusion, fabricating a network wellbeing awareness, and checking out senior courting in country regions".

Nguyen H. What's extra, Zimmerman (2006)nine led an research uncovers the connection between the age perspectives and despondency. Results display a practical stage of security amongst grown-usaunder 70 years vintage .However there had been essential age-related increments in enormous indicators and absence of prosperity after round 70 years vintage Where as side results identified with discouraged affect the relational troubles and stayed solid. The enlargement of co horrible bodily sickness to the research did no longer decrease the relationship among age and depressive symptoms.

Obvious Stein S. E. (2005)14 expressed that the construct of youth and full-size gloom amongst seniors in long haul private attention and found that twenty six percentage of the patients had actual sadness ,twenty six percentage had mild dejection and forty eight percentage had been now not discouraged.

Paul et al. (1996) targeted "with the improvement in the quantity of more mounted people, a ramification of mental well-being issues may be ordinary. Diminishing the degree of tolerating and reliance because of negative psychological nicely-being in seniority is a need requiring a first rate comprehension of the determinants of mental hassle. The locations were: (a) to gauge the pervasiveness of mental ache and forlornness in old human beings, dwelling inside the network, (b) to solve the relationship among mental hassle, well being and other logical factors and (c) to decide connection among melancholy and mental trouble. We played out a crosssectional research of 999 people matured sixty five+. The elements considered had been mental trouble (GHQ-12) and self-introduced for lornness. The predominance of mental Depression and Health-Related Quality of Life 10 trouble became 20%. Disease and disability are recognized with intellectual ache in vintage age; the sentiment of despair is the absolute most imperative indicator of mental trouble, and not understanding associates expands the likelihood of gloom.

Endeavors to beautify vicinity and administration of mental hassle in wiped out more hooked up individuals, inside the folks who seem segregated and specific for lornness need to be assessed".

Radha Krishnan, (2006)10 surveyed dejection among geriatric out sufferers going to chosen healing facilities at Belgaum, Karnataka reasoned that 63% of the geriatric out patients had mild to direct wretchedness &17% of them had intense despondency as consistent with GDs 15 and there may be noteworthy dating between the level of sorrow and lack of life companion.

Routasalo et al. (2006) completed up "In excess of 33% of the respondents (39.4%) skilled dejection. Feeling of dejection was now not relate with the recurrence of contacts with kids and partners but instead with dreams and achievement of those contacts. The most floor-breaking signs of for lornness were living on my own, dejection, skilled negative comprehension with the aid of the nearest, and unfulfilled Dejection and Health-Related Quality of Life 14 goals for contacts with companions. Our discoveries bolster the view that enthusiastic forlornness is a exclusive concept from social disconnection. This has tips for hone. Intercessions going for assuaging dejection should be targeted around empowering a person to mirror her very own desires and inner sentiments of depression". Bhatia SPS, et al. (2007) Found "Out of the aggregate 361 matured humans of Chandigarh, 311 (86.1%) people announced at least one health associated grievances, with a everyday of illnesses. The disease was higher a number of the ladies (59.5%) when contrasted with men (40.Five%). The

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essential health related problems were clutters of the circulatory framework (51.2%), musculoskeletal framework and connective tissue (forty five.7%)

It turned into likewise discovered that depression turned into not unusual extra in females (seventy two.8%) as contrasted with guys (sixty five.6%). Dejection changed into greater commonplace amongst individuals who lived on my own (ninety two.2%) whilst contrasted with the folks who lived with their companions (fifty eight.Nine%) or every time a couple lived with the own family (61.Four%). It was higher among the dowagers (eighty five.2%) and widowers (seventy five.8%) who lived with the family while contrasted with the matured who stay with the lifestyles associate (58.9%) and the matured a couple who lived with the own family (sixty one.Four%)".

Sherina M. S et. Al., (2006)thirteen the pervasiveness of depression amongst aged in a tertiary consideration cognizance in Wilayah Persekutan.The outcomes verified that 54 percent of the aged respondents were located to have depressive facet consequences age ,sex, ethnicity, sensible incapacities in showering, prepping, dressing, utilizing the latrine, replacing from bed to seat and back, versatility and hiking seats had been altogether discovered to be essentially connected with despondency a few of the aged respondents.

**METHODOLOGY**

AIM: To study the possible association between loneliness, depression and psychological well-being among empty nest elderly.

**OBJECTIVE**

- To study the level of loneliness among empty nest elderly males and females
- To study the level of depression among empty nest elderly male and females
- To assess the level of psychological well-being among empty nest elderly males and females
- To find out the relationship between loneliness and depression among empty nest elderly male and females
- To study the relationship between loneliness and psychological well-being among empty nest elderly males and females
- To find the relationship between depression and psychological well-being among empty nest elderly males and females

**HYPOTHESIS**

- There will be a significance difference on the level of loneliness among empty nest elderly males and females
- There will be a significant difference on the level of depression among empty nest elderly males and females
- There will be a significance difference on the level of psychological well-being among empty nest elderly males and females
- There will be a significant relationship between loneliness and depression among empty nest elderly males.
- There will be a signifivnat relationship between loneliness and psychological well- being among empty nest elderly males.
- There will a significant relationship between between depression and psychological well-being among empty nest elderly males
- There will be a significant relationship between loneliness and depression among empty nest elderly females
- There will be a significant relationship between loneliness and psychological well being among empty nest elderly females
- There will be a significant relationship between depression and psychological well-being among empty nest elderly females

**LOCALE OF THE STUDY**

The data was collected from male and female empty nest elderly in DELHI/NCR.

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**SAMPLE AND ITS SELECTION**

- 30 empty- nest elderly females.
- 30 empty nest elderly males .
- The sample were selected in the age range of 60-80 years.

**DESCRIPTION OF THE TOOLS**

**Beck Depression Inventory (BDI)** is a 21-item, self-file rating stock that measures feature attitudes and symptoms of despair (Beck, et al., 1961). The BDI takes about 10 minutes to complete, although clients require a fifth – 6th grade analyzing degree to competently apprehend the questions (Grohman, 1990).Internal consistency for the BDI ranges from .73 to. Ninety-two with a median of .86. (Beck, Steer, & Garbin, 1988). Similar reliabilities have been observed for the 13-object quick form (Grohman, 1990). The BDI demonstrates high internal consistency, with alpha coefficients of .86 and .Eighty one for psychiatric and non-psychiatric populations respectively (Beck et al., 1988). depression inventory by **Aaron T. Beck**

**Ucla loneliness scale** by Russell, D., Peplau, L.A., and Ferguson, M.L It is a commonly used degree of loneliness. Its name derives from its having been advanced on the University of California, Los Angeles (UCLA). Russell, D., Peplau, L.A., and Ferguson, M.L., first published it in 1978, and it turned into revised in 1980 and 1996. "

**Ryff's psychological well-being scale** by The Six-factor Model of Psychological Well-being is a concept advanced through Carol Ryff which determines six elements which make a contribution to an person's mental nicely-being, contentment, and happiness. Psychological nicely-being includes high-quality relationships with others, personal mastery, autonomy, a sense of cause and which means in life, and personal increase and development. Psychological properly-being is attained by means of reaching a nation of stability suffering from each difficult and worthwhile existence activities

**PROCEDURE**

Initially the participant were personally contacted and rapport was established with them. The participant completed the questionnaire given to them. Standard instructions were written on top of each questionnaire and the participant were asked to rate themselves under the options they felt relevant to them. It was made clear to the participant that there were no right or wrong answers. If they had any difficulty they were encouraged to ask questions. After finishing the entire set of questions, they were asked to return the questionnaire . The test administration took about 45 minutes.

**RESULT FINDINGS**

**Table-1.1: The table shows the comparison of loneliness between empty nest elderly males and females**

| | N | M | SD | t | p |
|---|---|---|---|---|---|
| **EMPTY NEST ELDERLY MALES** | 30 | 20.00 | 15.245 | .251 | Insg. |
| **EMPTY NEST ELDERLY FEMALES** | 30 | 19.03 | 14.557 | | |

Insignificant at both the levels 0.05* and 0.01**

TABLE 1.1 shows the t value of loneliness (-.251) of loneliness among empty nest elderly males and females .The t value is insignificant at both the levels thus indicating that there is no significant difference between both empty nest elderly males and empty nest elderly female.

**Table-1.2: t value for psychological well-being among empty nest elderly female and empty nest elderly male.**

| EMPTY NEST ELDERLY MALES | N | M | SD | t | p |
|---|---|---|---|---|---|
| | 30 | 167.27 | 33.46 | 1.185 | Insg. |
| **EMPTY NEST ELDERLY FEMALES** | 30 | 177.57 | 33.84 | | |

Insignificant at both the levels 0.05* and 0.01**

TABLE 1.2 shows the t value of psychological well-being (1.185) of psychological well-being among empty nest elderly males ands females .The t value is insignificant at both the levels thus indicating that there is no significant difference between both empty nest elderly males and empty nest elderly females

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**Table-1.3: t value of depression among empty nest elderly male and females**

| | N | M | SD | t | p |
|---|---|---|---|---|---|
| **EMPTY NEST ELDERLY MALES** | 30 | 5.73 | 5.407 | 2.433 | Sign*** |
| **EMPTY NEST ELDERLY FEMALES** | 30 | 11.87 | 12.703 | | |

significant at both the levels 0.05* and 0.01**

TABLE 1.3 shows the t value of depression (2.433) of depression among empty nest elderly males ands females .The t value is significant at (0.05)levels thus indicating that there is a significant difference between both empty nest elderly males and empty nest elderly females.

**Table-1.4: Shows the correlation between loneliness and depression among empty nest elderly males.**

| | N | r | p |
|---|---|---|---|
| **LONELINESS** | 30 | .135 | Insg |
| **DEPRESSION** | 30 | | |

Insignificant at both the levels 0.05* and 0.01**

Table 1.4 shows the correlation (.134) between loneliness and depression among empty nest elderly males. The correlation is found to be insignificant at both the levels thus indicating that there is no relationship between both the variables among empty nest elderly males

**Table-1.5 Shows the correlation between loneliness and psychological well-being among and empty nest elderly males.**

| | N | r | p |
|---|---|---|---|
| **LONELINESS** | 30 | .194 | Insg |
| **PSYCHOLOGICAL WELL- BEING** | 30 | | |

Insignificant at both the levels 0.05* and 0.01**

TABLE 1.5 shows the correlation (.194) between loneliness and psychological well- being among empty nest elderly males. The correlation is found to be insignificant at both the levels thus indicating that there is no relationship between both the variables among empty nest elderly males

**Table-1.6: Shows the correlation between depression and psychological well-being among empty nest elderly males**

| | N | r | p |
|---|---|---|---|
| **DEPRESSION** | 30 | -.191 | Insg |
| **PSYCHOLOGICAL WELL-BEING** | 30 | | |

Insignificant at both the levels 0.05*and 0.01**

TABLE 1.6 shows the correlation (-.191) between depression and psychological well-being among empty nest elderly males. The correlation is found to be insignificant at both the levels

Thus indicating that there is no relationship between both the variables among empty nest elderly males

**Table-1.7: Shows the correlation between loneliness and depression among empty nest elderly females**

| | N | r | p |
|---|---|---|---|
| **LONELINESS** | 30 | .283 | Insg |
| **DEPRESSION** | 30 | | |

Insignificant at both the levels 0.05* and 0.01**

TABLE 1.7 shows the correlation (.283) between loneliness and depression among empty nest elderly females. The correlation is found to be insignificant at both the levels thus indicating that there is no relationship between both the variables among empty nest elderly females

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**Table-1.8: Shows the correlation between loneliness and psychological well-being among empty nest elderly females**

| | N | r | p |
|---|---|---|---|
| **LONELINESS** | 30 | .206 | Insg |
| **PSYCHOLOGICAL WELL-BEING** | 30 | | |

Insignificant at both the levels 0.05* and 0.01**

TABLE 1.8 shows the correlation (.206) between loneliness and psychological well-being among empty nest elderly females. The correlation is found to be insignificant at both the levels thus indicating that there is no relationship between both the variables among empty nest elderly females

**Table-1.9: shows the correlation between depression and psychological well-being among empty nest elderly**

| | N | r | p |
|---|---|---|---|
| **DEPRESSION** | 30 | .492 | Sign*** |
| **PSYCHOLOGICAL WELL- BEING** | 30 | | |

significant at both the levels 0.05* and 0.01**

TABLE 1.9 shows the correlation (.492) between loneliness and psychological well- being among empty nest elderly females. The correlation is found to be significant at both the levels thus indicating that there is a relationship between both the variables among empty nest elderly females

**DISCUSSION**

The title of the present research *loneliness, depression and psychological well- being among empty nest elderly males and empty nest elderly females. I*t is a comparative study between empty nest elderly males and empty nest elderly females the sample of the study comprises of 60 empty nest elderly that is 30 empty nest elderly males and 30 empty nest elderly females ranging from 60-80 years of age were engaged in the investigation. For this research tools were used UCLA loneliness scale by Russell, D., Peplau, L.A., and Ferguson, M.L, ryff psychological well-being scale by Carol Ryff and Beck's depressive inventory by Aron t. beck. Mean, standard deviation, t test and correlation were used for statistical analyses

The findings of the present research can be summarized as the correlation between loneliness and depression is insignificant among empty nest elderly males. the correlation between loneliness and psychological well-being is insignificant among empty nest elderly males. The correlation between depression and psychological well-being among empty nest elderly males is insignificant. The correlation between loneliness and depression among empty nest elderly females is insignificant. The correlation between loneliness and psychological well-being is insignificant among empty nest elderly females whereas the correlation between depression and psychological well-being among empty nest elderly females is significant. There is no significant difference on the level of loneliness among empty nest elderly males and females, there is no significant difference found on the level of depression among empty nest elderly males and females, there is no significant difference found on the level of psychological well-being among empty nest elderly males and females.

Loneliness is a complicated and normally unpleasant emotional response to isolation. To see if empty nest elderly males and empty nest females differ in terms of loneliness each of their mean value was calculated (table 1.1) where t value (.251) was found to be insignificant at both the levels (0.01 and 0.05).A research which can be linked with this present finding is a study by Shelly Borys,Daniel Perlman on gender differences in loneliness it concluded that The subjects had been more rejecting of a lonely male than of a lonely females. These consequences guide the view that females are more apt to well-known their loneliness than males because the bad results of admitting loneliness are less for females.

Psychological well-being Confer with fantastic mental states, which include happiness or pride. To see if empty nest elderly males and empty nest females differ in terms of psychological well-being each of their mean value was calculated (table 1.)where t value (1.185) was found to be insignificant at both the levels (0.01 and 0.05).A research which can be linked with this present finding is a study by Diego Gomez-Baya in 2018 Gender Differences in Psychological Well-Being and Health Problems among European Health Professionals: Analysis of Psychological Basic Needs and Job Satisfaction The research emphasizing the want for satisfaction as a promising mechanism underlying for lady fitness professionals' psychological well-being.

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Depression, a state of low mood and aversion to activity, can affect someone's thoughts, conduct, tendencies, feelings, and sense of nicely-being. To see if the empty nest elderly males and empty nest elderly females differ in terms of depression each of their mean values was calculated (table 1.3) where t value (2.433) was found to be significant at level (0.05) A research which can be linked with this present finding is a study by Paul. R Albert in 2015 why is depression more common in women it was found that the depressive symptoms were more in females than males.

Relationship between loneliness and depression was studied among empty nest elderly males as can be seen in (table 1.4) the value of r (.135) was found to be insignificant According to Nishi Mishra in 2009 loneliness, depression and sociability in old age the Results revealed a good-sized relationship between depression and loneliness. Most of the aged people were found to be common inside the dimension of sociability and preferred remaining engaged in social interactions.

Correlation values for loneliness and psychological well-being was studied among empty nest elderly males as can be seen in (table 1.5) the values of r (.194) was found to be insignificant which can be linked to a study by lovina c.h Doman in 2011the relationship between loneliness and psychological well-being among elderly males and females the results show that psychological well-being effect loneliness significantly

Relationship between depression and psychological well-being was studied among empty nest elderly males as can be seen in (table 1.6) the values of r (-.191) was found to be negative and insignificant. which can be linked to a study by Samantha ramkinson, Basil. J. Pillay Anxiety, depression and psychological well-being in a cohort of South African adults with Type 2 diabetes mellitus There was a strong negative correlation which indicated that an increase in tension and depressive capabilities decreased psychological well-being.

Correlation between loneliness and depression was studied among empty nest elderly females as can be seen in (table 1.7) the value of r (.283) was found to be insignificant According to Claudia beal in 2009 loneliness in older women the results indicated Older ladies record greater loneliness than male peers. Loneliness is an area of challenge related to the nicely being of older females due to the fact it is a cause of emotional distress and is related to an expansion of health problems in older individuals. Life adjustments, such as widowhood and relocation, are related to expanded vulnerability to loneliness. Gender, social, and cultural elements have an impact on the revel in of loneliness in older women. Cognitive and interactionist theoretical methods to loneliness have software for nursing practice and research with older women who revel in loneliness.

Correlation values for loneliness and psychological well-being was studied among empty nest elderly females as can be seen in (table 1.8) the values of r (.206) was found to be insignificant which can be linked to a study by lena.L.Lim and Ee-Heok Kua in 2009 Living Alone, Loneliness, and Psychological Well-Being of Older Persons in Singapore the results show Seniors who were dwelling by myself were more likely to be older, ladies, non-Chinese, unmarried, divorced or widowed, and without formal education. Notably, they had been two times much more likely to document feeling lonely (24.2% versus 10.9%). Interestingly, they said higher frequency of social touch. There had been no enormous differences in leisure, health and health activities scores, number of medical issues, and cognitive and functional disability; but individuals who lived alone mentioned substantially better range of depressive symptoms

Relationship between depression and psychological well-being was studied among empty nest elderly females as can be seen in (table 1.9) the values of r (.492) was found to be significant. According to the study by Doshi Dhara R1 * and Yogesh a Jogsan Depression and Psychological Well-being in Old Age concluded that There was good sized distinction in depression and psychological properly being amongst adult and elderly. There changed into a negative correlations was seen between despair and psychological properly-being.

**HYPOTHESIS TESTING**

In the present research following hypothesis were formulated, some were accepted and some were rejected the first hypothesis states that there will be significant difference on the level of loneliness among empty nest elderly males and females. This was rejected as no significant relationship has been found on loneliness among empty nest elderly males and females. The second hypothesis states that there will be significance difference on the level of psychological well- being among empty nest elderly males and females .

This was rejected as no significant relationship has been found on psychological well-being among empty nest elderly males and females The third hypothesis states that there will be significant difference on the level of depression among empty nest elderly males and females. It has been proved as significance difference has been found among empty nest elderly males and females.

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The fourth hypothesis states that there will be a significant relationship between loneliness and depression among empty nest elderly males. this was rejected as no significant relationship has been found among empty nest elderly males on loneliness and depression The fifth hypothesis states that there will be a significant relationship between loneliness and psychological well- being among empty nest males. this was rejected as no significant relationship has been found among empty nest elderly males on loneliness and psychological well-being The six hypothesis states that there will be a significant relationship between depression and psychological well-being among empty nest elderly males. this was rejected as no significant relationship has been found among empty nest elderly males on depression and psychological well- being.The seventh hypothesis states that there will be a significant relationship between loneliness and depression among empty nest elderly females. this was rejected as no significant relationship has been found among empty nest elderly females on loneliness and depression.The eighth hypothesis states that there will be a significant relationship between loneliness and psychological well- being among empty nest females. this was rejected as no significant relationship has been found among empty nest elderly females on loneliness and psychological well- being.The nine hypothesis states that there will be a significant relationship between depression and psychological well-being among empty nest elderly females. This has been proved significant on the level of depression and psychological well being among empty nest elderly females.

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# EQUILIBRIUM AND THERMODYNAMIC STUDIES ON REMOVAL OF ORANGE-II DYE FROM AQUEOUS SOLUTION USING JACKFRUIT LEAF POWDER

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## ABSTRACT
*In this paper, removal of orange II dye from aqueous solution by acid treated Jackfruit leaf powder (AJLP) has been studied . The effect of adsorbent dose, contact time, dye initial concentration, solution pH and temperature were evaluated in batch adsorption process. The equilibrium adsorption data were studied with the help of Langmuir and Freundlich isotherm models. The equilibrium is best described by Langmuir and Freundlich isotherm with regression coefficient (R2 ≈ 0.993). The isotherm studies have been utilized to evaluate change in Gibbs Free Energy (ΔG)o, Enthalpy (ΔH)o and Entropy (ΔS.)o. The results of thermodynamics parameters and separation factor RL < 1 for removal of orange II by acid treated Jackfruit leaf powder (AJLP) was found to be spontaneous and favorable hence acid treated Jackfruit leaf powder could be used as low cost adsorbent l.*

*Keywords: Orange II, Jackfruit leaf powder, adsorption isotherm, Langmuir isotherm*

## INTRODUCTION
The discharge of synthetic dyes wastewater by textile, cosmetic, leather, plastic, printing, paper and pharmaceutical industries causes water pollution and deteriorate the quality of water . The dye contained wastewater released into natural water sources without proper treatment have harmful effects on human being and aquatic life [1-2]**.** Various treatment methods have been employed by researchers for removal of dyes from aqueous solutions such as coagulation,electro-osmosis, membrane filtration, ion exchange, oxidation, ozonation and adsorption [3]. Among these methods, adsorption has been found to be more effective over these conventional methods which have low efficiency and high cost[4]. Though commercially available activated carbon is very effective, but its high cost and regeneration difficulty led to the search of low cost adsorbents for removal of pollutants from aqueous solutions.

A number of low cost adsorbents such as Azadirachta indica leaf [**5]**, Ashoka plant leaf [6] , Gulmohor plant leaf [7] ,Coconut shell[8] , Rice husk[9-11], Almond tree bark,Teak tree bark[12] have been used by various researchers for the removal of dyes from wastewater.

In present study, removal of orange II dye from aqueous solution using acid treated Jackfruit leaf powder (AJLP) as the low cost adsorbent have been investigated

## MATERIALS AND METHODS
Orange II dye was used to prepare dye stock solutions in distilled water. The adsorbent was prepared by shadow dried Jackfruit leaves treated with 20 % formaldehyde followed by dilute Sulphuric acid then washed with distilled water and dried in electric oven at 100-120 $^0$C for 8-10 hours and powdered with electric grinder and used as adsorbent

### Batch adsorption experiments
Batch adsorption experiment were carried by using 50 mL of 50 mg/L stock solution of orange II dyes treated with 1.2 g of AJLP as adsorbent.The effect contact time, solution pH, adsorbent dose, initial dye concentration and temperature were studied. After desired interval of contact, dye solutions were filtered and residual dye concentration were determined by using UV/VIS Spectrophotometer (Elico SL-150) at 485 nm wavelength as $\lambda_{max}$.The pH of dye solutions were adjusted by adding 0.1 m HCl and 0.1 m NaOH solution using digital pH meter

## RESULTS AND DISCUSSION
### Effect of contact time
The orange II dye solutions were taken in a conical flasks and treated with 1.2 g of Jackfruit leaf powder as adsorbent. The % variation with contact time for AJLP has been shown in Fig. 1.revealed that % dye removal% increased from 34.40 to 64.19 % with increased contact time and equilibrium was attained in 60 minutes . The similar observations were reported by other researchers[13]

### Effect of adsorbent dose
To study the effect of adsorbent dose for removal of orange II dye from aqueous solution. Experiment were carried out by taking 50 mL of 50 mg/L dye solutions and adsorbent dose was varied from 0.2 to 1.2 g. The

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removal of orange II was 24.02 to 64.49 % when treated with different doses of AJLP. The increase in dye removal with increased dose is due to presence of more active sites on surface of adsorbent[14]

**Effect of dye solution pH**

Dye solutions of orange II of 50 mL of 50 mg/L was treated with 1.2 g of AJLP powder for 60 minute equilibrium contact time. The dye solution pH was adjusted from 2 to 10 by adding 0.1 N HCl and 0.1 N NaOH solution. The results shown in Fig.4 revealed that 74.12% orange II dye was removed at 2 pH whereas at 8 pH it was found to be 47.54% .The equilibrium was reached at 8 pH .Similar decreasing adsorption results were reported by other researchers [15]

**Effect of dye initial concentration**

The adsorption of orange II dye onto AJLP was rapid initially and gradually reaches to equilibrium (Fig.5) indicating saturation stage, similar results were reported by McKay et.al.[16] The increased dye adsorption % onto AJLP may be due to surface activity and formation of aggregates of molecules in the studied range of dye concentration, similar results were reported by other investigators [17]

**Effect of temperature**

To study the effect of temperature, batch mode experiment was carried at the temperature ranging from 30 to 50 $^{o}$C. It was observed that, AJLP removed 69.34% orange II dye from solution in 60 minutes .The increase in dye removal with temperature is attributed due to increased interaction between adsorbate-adsorbent system[18]

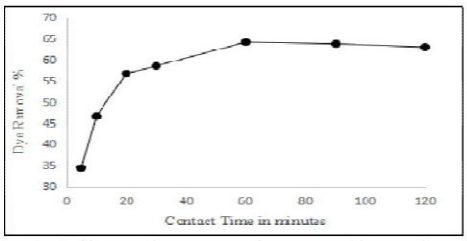

Fig-1: Effect of contact time on adsorption of orange II onto AJLP

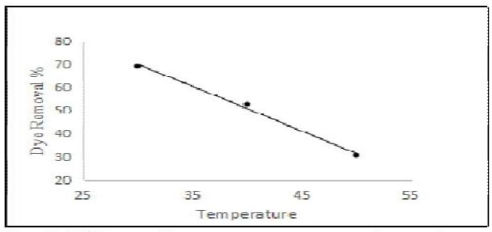

Fig-5: Effect of temperature on adsorption of orange II onto AJLP

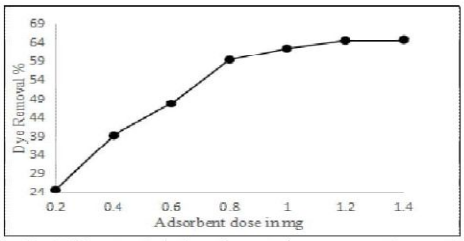

Fig-2: Effect of Adsorbent dose on adsorption of orange II dye onto AJLP
$C_o$= 50 mg/L, contact time 60 minutes pH =8.0

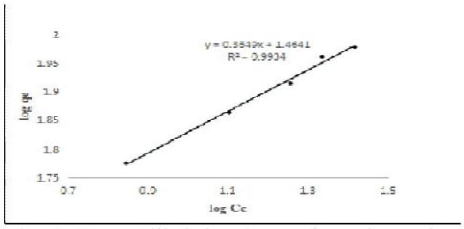

Fig-6: Freundlich isotherm for adsorption of orange II dye onto AJLP

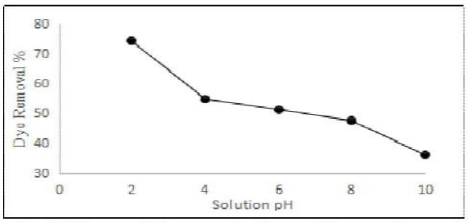

Fig-3: Effect of Dye solution pH on adsorption of orange II dye onto AJLP
$C_o$= 50 mg/L, contact time 60 minutes

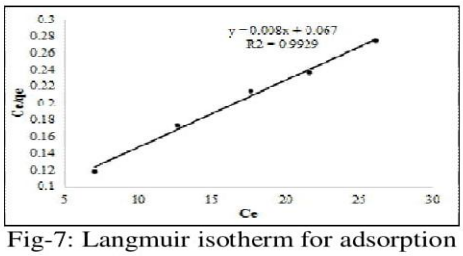

Fig-7: Langmuir isotherm for adsorption of orange II dye onto AJLP

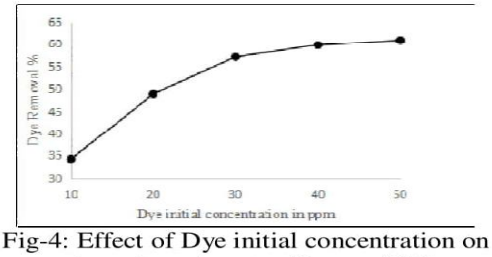

Fig-4: Effect of Dye initial concentration on adsorption of orange II onto AJLP
Dose= 1.2 g, contact time 60 minutes pH= 8.0

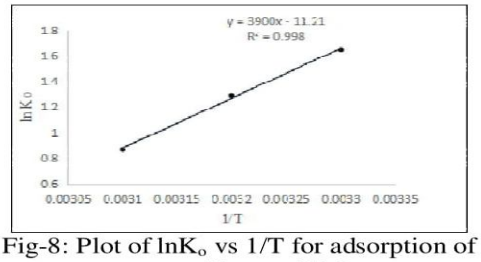

Fig-8: Plot of $\ln K_o$ vs 1/T for adsorption of orange II onto AJLP
Co= 10 mg/L, Adsorbent dose 1.2 g, Contact time 60 minutes , pH=8.0

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**Equilibrium adsorption isotherms**

The adsorption of orange II dye was studies by models of Langmuir and Freundlich isotherms the linear form of Langmuir isotherm equation is given as

$$Ce/qe = 1/qmb + 1/qm\ Ce \quad (1)$$

Where Ce is equilibrium concentration of dyes (mg/L),qe is amount of dye adsorbed (mg/g) qe and b are the Langmuir constants for maximum adsorption capacity and adsorption energy respectively.when Ce/qe is plotted against Ce gives a straight line with slop 1/qmb (Fig.7) indicate that adsorption of orange II dye follows Langmuir isotherm. Langmuir constants are evaluated (Table 1 ) at three different temperatures (30, 40, 50 oC) and constant b is used to evaluate dimensionless separation factor given by RL = 1 / (1+ b Ci). The value of RL between 0 to 1 confirms the feasibility of adsorption process

The Freundlich isotherm is given by

$$\log qe = \log Kf + 1/n \log Ce \quad \text{…..(2)}$$

Where qe is the amount of dye adsorbed (mg/g),Ce is equilibrium concentration of dyes (mg/L), Kf and 1/n are Freundlich constants given in (table 1)which are related to adsorption capacity and adsorption intensity respectively[19] A linear plot of log qe against log Ce (Fig.6) indicate that adsorption of orange II follows Freundlich isotherm equation.

**Table-1: Langmuir and Freundlich constants for adsorption of orange II dye on AJLP**

| Langmuir Constants | | | | Freundlich Constants | | |
|---|---|---|---|---|---|---|
| $q_{m\,(}$mg/g) | b (L/mg) | $R_L$ | $R^2$ | $K_f$ | n | $R^2$ |
| 125.0 | 0.12 | 0.522 | 0.993 | 29.11 | 2.74 | 0.993 |

**Table-2: Thermodynamic parameters for adsorption of orange II dye on AJLP**

| $-\Delta G^o$ kJ $mol^{-1}$ | | | $-\Delta H^o$ $kJmol^{-1}$ | $-\Delta S^o$ $kJmol^{-1}$ | $R^2$ |
|---|---|---|---|---|---|
| 303 K | 313 K | 323 K | | | |
| 4.16 | 3.36 | 2.34 | 32.42 | 0.093 | 0.998 |

**Thermodynamic Studies**

The values of equilibrium constants at different temperatures were used to calculate thermodynamic parameters i.e.change in standard free energy ($\Delta G^o$) , enthalpy ($\Delta H^o$) and entropy ($\Delta S^o$) were evaluated using the equations[20]

$$K_0 = C_{solid} / C_{liquid} \quad \text{……..} (3)$$

$$\Delta G^o = -RT \ln K_0 \quad \text{……..} (4)$$

$$\ln K_{0\,=} \Delta S^o/R - \Delta H^o/RT \quad \text{……..}(5)$$

$\Delta G^o$ values were obtained from equation (4) $\Delta H$ and $\Delta S$ were obtained from slope and intercept of a plot of $\ln k_0$ versus 1/T Fig.8 represented in table 2. The results showed that adsorption of orange II dye on acid treated jackfruit leaf powder i.e. AJLP was spontaneous, favorable and exothermic with decreased randomness during adsorption process

**CONCLUSIONS**

In present study, acid treated Jackfruit leaf powder was used for adsorption of orange II dye from aqueous solution and found to be good alternative for commercial activated carbon

The equilibrium adsorption data indicated that Langmuir and Freundlich isotherms models were found to be best fitting isotherms. The thermodynamic parameters and separation factor RL< 1 (0.522) indicated that adsorption process is favorable and spontaneous since ΔGo = - 4.16 , - 3.36 , - 2.34 kJ mol-1 , exothermic (ΔHo was -32.425 kJ mol-1) process and decrease in randomness at the surface of adsorbent (ΔSo = -0.093 kJ)

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# ROLE OF NABARD IN POVERTY ALLEVIATION: AN EMPIRICAL STUDY OF SIVAGANGAI DISTRICT OF TAMIL NADU

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**ABSTRACT**
*The Indian rural sector is an important segment of the economy and the basic reason for the slow economic development in our country is due to the neglect of this sector. Since then this fact was realized by the Indian government in regard to agriculture and rural development which was given top priority. NABARD provides refinance assistance for the promotion of agriculture/small scale industries, cottage and village industries, handicrafts/ rural crafts and other allied economic activities in rural areas with a view to promote integrated development for employment and income generation. NABARD by way of loans to commercial banks, regional rural banks and state cooperative banks and in case of state land development it is by way of contributing to the special development debentures floated by them. This working paper tries to outline the prevailing conditions of poverty in the study area and highlighting the financial & promotional support by NABARD for the benefits of the poor people,*

*Keywords: NABARD, Refinance, Poverty, debenture, financial & promotional support*

## INTRODUCTION

The Indian rural sector is an important segment of the economy and the basic reason for the slow economic development in our country is due to the neglect of this sector. Since then this fact was realized by the Indian government in regard to agriculture and rural development which was given top priority. The national bank for agriculture and rural development (NABARD) was established on 12th July 1982 by an act of parliament and it has given the mandate to provide "credit for the promotion of agriculture, small scale industries, cottage, village industries, and other allied economic activities in rural areas with a view to promoting integrated rural development and securing prosperity of rural areas". NABARD is an apex development bank primarily involved in providing different types of refinance to the eligible institutions and it also performs developmental and regulatory functions. Over the last 10 years of its existence, NABARD has emerged as a crucial source of finance disbursed by the banks for agricultural and rural development.

## NABARD's PARTICIPATION IN POVERTY ALLEVIATION PROGRAMMES:

- Integrated Rural Development Programme (IRDP)
- Swarnajayanti Gram Swarozgar Yojana (SGSY)
- Development of Women and Children in Rural Areas
- Training cum Production for Women
- Training cum Production for Women
- Self Help Group (SHG)
- Scheme for Monitoring Evaluation and Research Activities
- Vikas Volunteer Vahini Programme
- External Aid Projects
- Inspection and Supervision of Cooperative banks and Regional Rural Bank
- Human Resource Development
- NABARD continued to focus on watershed development, integrated development of backward areas, supporting non-farm activities, farmers' club programme, improving the outreach of the rural credit delivery system through micro-finance initiatives, supporting research and development activities and training of rural banking personnel.
- NABARD introduced the Village Development Programme (VDP) across the country
- The pilot project for integrated development (PPID) of backward blocks
- Tribal Development Fund (TDF) created in 2004 with an initial corpus of Rs.50 crore
- The Farm Innovation and Promotion Fund was created '

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- Farmers' clubs (FCs) were launched
- The District Rural Industries Project (DRIP), introduced as a pilot project during 1993-94 was extended in phases, to cover 106 districts by end-March 2007.
- NABARD continued to support gender development programmes through its various schemes like Marketing of Non-Farm Products of Rural Women (MAHIMA) and Development of Women
- To motivate and assist members of matured SHGs to take up income generating activities on a sustainable basis,
- R&D Fund is created for research projects/studies training activities and other activities like conduct of seminars, preparation of occasional papers, etc.,
- The Kisan Credit Card (KCC) scheme, introduced in August 1998 for short-term (ST) loans for Seasonal Agricultural Operations (SAO), with the objective of providing adequate, timely, cost effective and hassle free credit support to the farmers is being implemented .
- The National Agricultural Insurance Scheme (NAIS), being implemented
- Rural Entrepreneurship Development Programmes (REDPs) is being inplemented across the country

**IMPORTANCE OF THE STUDY**

Finance is the a critical input pin the development process of the farm and non farm sectors in rural India . NABARD being the apex insititution with mandate to ensuure timely and adequate flow of finance into agriculture and rural development, has devised many schematic lending programme to banks which assist in turn the farming and non farming operations of the country.

In this context an assessment of the schemes of refinance, the trend in refinance of NABARD is needed to take stock of achievements, strength and challenges. Based on the findings suitable suggestions for improvement could be evolved . Hence the importance of the study

**STATEMENT OF THE PROBLEM**

The objectives of refinance facilities provided by NABARD are increasing the credit flow to agricultural and rural development activities, ensuring credit outreach to the rural poor for whom access to credit is difficult, supplementing the resources of banks as their own resource mobilization is not normally adequate, and upgrading the quality of appraisal and monitoring of loans by the banks through sound technical and financial pre-conditions for project sanction. The agencies eligible for refinance are Commercial Banks (CBs), Regional Rural Banks (RRBs) State Cooperative Banks (SCBs), District Cooperative Banks, State Cooperative Agriculture and Rural Development Banks (SCARDBs)/Primary Cooperative Agriculture and Rural Development Banks (PCARDBs). The personnel policies of banks need reorientation. There are many constraints in extending the refinance to financial institutions. Evaluation of NABARD schemes by outside agencies should encouraged. The funding of such studies will help NABARD to learn useful lessons from the experience of development schemes and to make necessary changes in operational policy and procedure with a view to improving the over all performance and impact of schemes. In this context this study assumes a greater significance.

**OBJECTIVE OF THE STUDY**

**The objective of the study is**

- To examine the role played by NABARD in rural transformation through its funding schemes activities.
- To study the NABARD; s refinancing disbursement in Sivagangai district of Tamil Nadu
- To study the status of poverty alleviation in the study area

**METHODOLOGY**

**SOURCES OF DATA**

The data will be collected from various annual reports of NABARD, such as reserve bank of India bulletin, report on currency and finance report On trends and progress of banking in India, economic survey and report of various commissions And committee set up the government of India. The reserve bank of India and The national bank for agriculture and rural development banks annual report, circulars, national banks new review, newsletters, information Boucher etc of NABARD shall also be the main sources of data.

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**SAMPLING DESIGN**

Survey method is adopted for the study by using the random sampling frame. All the two Revenue Divisions of the District (Sivagangai and Devakottai) are covered for selecting the bank branches refinanced by NABARD and the beneficiaries of sample branches. From Sivagangai, relatively bigger divisions over the rest of the one division, four Commercial Bank Branches, Sivagangai District Central Cooperative Bank Branches and Six Pandian Grama Bank branches have been chosen at random from the list of bank branches prepared alphabetically. The sample works out at 25 percent to the total number of branches in each division. In the second stage, 203 beneficiaries from a total of 1280 have been chosen from Commercial Bank Branches, 150 out of 1007 from Central Cooperative Bank Branches and 237 out of 1422 from Pandian Grama Bank Branches, at the rate of 6 percent sample, were chosen for the purpose of study. Thus, the bank sample constitutes 36 Commercial Bank branches, 12 Sivagangai District Cooperative Central Bank branches and 30 Pandian Grama Bank branches (Total 78) with 203, 156 and 237 beneficiaries (Total 590) respectively for the present study

**PERIOD OF STUDY**

A study of last 5 years i.e. from, 2011-12 to 2016-17. The period of 5 years under the study will provide some reasonable thought for appraising the role of NABARD in rural **transformation.**

**RURAL INFRASTRUCTURE DEVELOPMENT FUND IN TAMILNADU**

The Government of Tamil nadu had not availed any assistance under the first tranche of RIDF. However, fi-om the year 1996-97, the state Government started availing loan assistance under the fond, initially for irrigation and rural sector projects. With submission of more and more projects covering diversified sectors, there has been substantial increase in the loan assistance sanctioned to Government of Tamil nadu, reaching a cumulative level of Rs. 3385.52 crore as an 31st'March 2016. The tranche wise position of number projects sanctioned, amount sanctioned and amount disbursed made under RIDF to Government of Tamilnadu is indicated below:

In Tamilnadu the amount of Rural Infrastructure Development Fund assistance increased from Rs. 248.42 crores in 20054 -2006 to Rs. 3139.87 crores in2015-16 . The projects which received attention included Irrigation, Rural Roads, Rural Bridges, Primary Hospitals, Power, Construction of Schools and Drinking Water. Rural Roads and Rural Bridges accounted for a major share of the total, of late Education, Health and Drinking Water too received increased attention.

**RURAL INFRASTRUCTURE DEVELOPMENT FUND IN SIVAGANGAI DISTRICT**

The Government of Tamilnadu had availed assistance after the second tranche of RIDF. The Sivagangai district has also availed assistance under second tranche of RIDF. The projects sanctioned under RIDF in the district envisage improvements of 118 road works, construction of 50 bridges, 2 irrigation projects, construction of 1 health sub-centre and 31 school projects, 26 drinking water structures, 39 vertinary projects and 5 projects under power sector. The total outlay is Rs. 109.66 crores and RIDF assistance of Rs. 95.38 crores. The tranche wise position of number projects sanctioned, amount sanctioned and amount disbursed under RIDF in Sivagangai district

The infrastructure development is the basic need of the rural people. The NABARD plays an important role in the rural infrastructure development in the last one decade. The result of the study showed that Irrigation, Rural Road and Rural Bridges accounted for 83 percent of the total allocation during the study period. Further, construction of Rural Roads in sample area increased entering the thereby helped in the economic development of th

**DATA ANALYSISI AND DISCUSSION**

Commercial Banks (CBs), Pandiyan Grama Banks (PGBs) and Sivagangai District Central Co-operative Banks (CDCCBs) have been directed to extend credit through their widespread branch network to priority sectors which include agriculture and its allied activities, village and cottage industries, small scale industries, self-employed persons, retail traders and small business for achieving agriculture and rural development. The impact of NABARD's refinances on the occupation, income and financial status of sample beneficiaries of select bank branches are discussed as in the following sections

The present chapter deals with the review of refinance operations of NABARD in the district of Sivagangai through Sivagangai District Cooperative Bank (SDCCBs) and its branches, Commercial banks (CBs) and their branches and Pandian Grama Bank (PGBs) and its branches during the period from 2000 to 2005 in terms of scheme, purpose and agency-wise. A schedule was frames and empirical data were collected from select bank branches relating to refinance operation of NABARD as well as their performance in terms of deposits, advances, priority sector advances, covering the period 2008-10. The analysis and the interpretations of the data are presented in the following paragraphs

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**Agency-wise Refinance**

Table 1 presents agency-wise schematic refinanced by NABARD in Sivagangai district during 2005-2012. Out of the total of Rs.7898.862 lakhs of refinance provided by NABARD during 2011-16, Rs.3788.82 lakhs or 48 percent was allocated to APCCADB followed by 31 percent to CBs and 21 percent to PGBs. Out of the total refinance to all agencies put together, the highest amount of refinance, Rs.62346.62 lakhs was in 2011-12 and the lowest was Rs.909.394 lakhs in 2012.13

The LGRs of schematic refinance by NABARD to CBs, PGBs and TNSCAB in Sivagangai District during 2012-13 is not significant at 5 percent level and the corresponding 'F' value of 't' statistic was recorded as 0.2620, 0.5953 and 0.1683 respectively.

**Table-1: Agency-wise Schematic Refinance by NABARD in Sivagangai District during 2011-2016 (Rs. in Lakhs)**

| Year | CBs | PGBs | RRBs | SSDCCBs | Total |
|---|---|---|---|---|---|
| 2011-12 | 559.708 | 302.096 | 1129.816 | 6.355 | 62346.62 |
| 2012-13 | 352.986 | 390.710 | 157.760 | 7.938 | 909.394 |
| 2013-14 | 506.062 | 320.912 | 707.940 | 8.832 | 1543.746 |
| 2014-15 | 530.478 | 282.080 | 943.604 | 9.212 | 1765.374 |
| 2015-16 | 509.006 | 314.112 | 849.700 | 9.555 | 1682.373 |
| **Total** | **2458.240** | **1609.910** | **3788.82** | **41.892** | **7898.862** |
| Percentage | 64.58 | 8.96 | 16.94 | 9.52 | 100 |
| LGRs | 1.547611 | -2.62741 | 2.977338 | | |
| 't' values | $0.262023^{NS}$ | $-0.59530^{NS}$ | $0.168347^{NS}$ | | |

**Table-2: Agency and Purpose-wise disbursement of Refinance by NABARD in Sivagangai District during 20012 -2017 (Rs. in Lakhs)**

| Purpose | PGBs | CBs | RRBs | SDCBs | TOTAL | 6 as % of that column total |
|---|---|---|---|---|---|---|
| MI | 88.12 (4.96) | 178.36 (10.05) | 1509.88 | - | 1776.36 (100) | 22.56 |
| EPS | - | 452.1 | - | - | 452.1 (100) | 5.74 |
| LD | 0.06 (17.65) | 0.28 (82.35) | - | - | 0.34 (100) | - |
| FM | 179.38 (16.88) | 443.36 (41.73) | 439.68 | - | 1062.42 (100) | 13.49 |
| PHC | 0.36 (-) | 12.94 (6.28) | 192.64 (41.39) | - | 205.94 (100) | 2.62 |
| SERI | 3.1 (10.08) | 4.24 (13.75) | 23.48 (76.18) | - | 30.82 (100) | 0.39 |
| BIO | - | - | 11.52 (100) | - | 11.52 (100) | 0.15 |
| PF | 17.72 (28.90) | 22.9 (37.35) | 20.68 (33.75) | - | 61.3 (100) | 0.78 |
| SSF | 50.28 (16.43) | 23.66 (7.73) | 225.56 (73.74) | 6.396 (2.10) | 305.88 (100) | 3.88 |
| MT | - | - | 50.1 (100) | - | 50.1 (100) | 0.64 |
| EMPC | - | - | 984 (100) | - | 984 (100) | 12.50 |
| ED | 68.54 (66.22) | 21 (20.29) | 12.66 (12.23) | 1.36 (1.26) | 103.56 (100) | 1.31 |
| AGRO | 71.94 (100) | - | - | - | 71.94 (100) | 0.91 |
| NFS | 291.16 (81.80) | 64.8 (18.20) | - | - | 355.96 (100) | 4.52 |
| IRDP (PS) | 396.04 | 400.04 | - | 8.62 | 804.7 | 10.32 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| | (49.22) | (49.71) | | (1.07) | (100) | |
| IRDP (ISB) | 409.22<br>(66.72) | 203.9<br>(33.24) | - | .20<br>(0.04) | 613.32<br>(100) | 7.75 |
| MAP | 1.26<br>(13.75) | 7.9<br>(86.25) | - | - | 9.16<br>(100) | 0.12 |
| SCAP (FS) | 11.16<br>(34.77) | 20.94<br>(65.23) | - | - | 32.1<br>(100) | 0.41 |

**Performance of CBs**

Table 2 presents year-wise number of accounts and deposits of select commercial bank branches in Sivagangai district. With regard to the percentage growth rate of number of accounts under each kind of deposits in **20012 -2017** , the RDs stood at high with 65.96 percent followed by FDs with 50.33 percent others with 41.04 percent and SB A/c with 30.73 percent. Regarding the increase in the amount of deposits the highest percentage of increase was in FDs with 64.53 followed by SBs with 62.05, other with 60.54 and RDs with 55.60. The percentage of increase in the total number of accounts and the total amount deposited for all accounts put together was at 38.75 percent and 63.49 percent respectively and it indicates that the increase in the rate of accounts was lagging behind that of deposits and this holds good for deposits also severally.

In the case of deposits accounts the highest LGR was 13.19 percent in RDs and lowest was 5.80 percent in SB A/c with regard to deposit amount the highest LGR recorded was 11.68 percent for other deposits and the lowest was 10.71 percent for RDs. The same trend was noticed with regard with to CGR both for accounts and deposits.

It is observed from the analysis that almost all the growth rates are significant at 1% level. Thus, there is significant growth in the variables studied.

**Table-3: Year-wise Number of Accounts and Deposits of select Commercial Banks' branches during (20012 -2017) (Rs. in Lakhs)**

| Year | Fixed Deposits | | Savings Deposits | | Recurring Deposits | | Others | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. of A/cs | Amount | No. of A/cs | Amount | No. of A/cs | Amount | No. of A/cs | Amount | No. of A/cs | Amount |
| 2009- 10 | 24054 | 2754.72 | 56370 | 395.04 | 2583 | 58.11 | 7149 | 137.94 | 49944 | 1968.45 |
| 2010-11 | 22674 | 2618.88 | 53382 | 350.58 | 2346 | 51.75 | 6540 | 123.93 | 46914 | 1835.70 |
| 2011-12 | 30342 | 3667.42 | 66306 | 467.37 | 3030 | 69.12 | 84.30 | 162.39 | 59784 | 2332.59 |
| 2012-13 | 32022 | 3409.14 | 67686 | 474.63 | 3225 | 75.39 | 8388 | 161.46 | 61467 | 2416.05 |
| 2013-14 | 33000 | 3966.24 | 70476 | 553.38 | 3921 | 81.48 | 9432 | 194.58 | 65094 | 2812.56 |
| 2014-15 | 32032 | 4102.32 | 71070 | 565.77 | 4113 | 84.15 | 9906 | 205.98 | 65568 | 2907.06 |
| 2015-16 | 36162 | 4532.52 | 73698 | 640.20 | 4287 | 90.42 | 10083 | 221.46 | 69300 | 3218.34 |
| Percentage | (50.33) | (64.53) | (30.73) | (62.05) | (65.96) | (55.60) | (41.04) | (60.54) | (38.75) | (63.49) |
| LGRs | 8.56<br>(4.83)** | 11.67<br>(9.99)** | 5.80<br>(5.02)** | 11.31<br>(7.07)** | 13.19<br>(8.03)** | 10.71<br>(6.70)** | 8.26<br>(6.27)** | 11.68<br>(7.41)** | 11.49<br>(2.73)** | 11.57<br>(9.08)** |
| CGRs | 7.42<br>(4.42)** | 9.68<br>(8.96)** | 5.27<br>(4.58)** | 9.63<br>(6.17)** | 10.91<br>(7.05)** | 9.25<br>(5.45)** | 7.31<br>(5.50)** | 9.87<br>(6.52)** | 9.36<br>(3.23)* | 9.66<br>(8.01)** |
| CVs | 15.02 | 18.71 | 10.92 | 19.05 | 21.06 | 18.05 | 14.65 | 19.45 | 23.17 | 18.17 |

Notes: 1. Percentage increase in figures in 2015-16 over those of initial year 2009-10 are indicated in parenthesis.

2. Figures in parenthesis of LGRs and CGRs rows indicate the calculated values of 't' statistics.

3. * - Significant at 5% level * - Significant at 1% level NS – Not Significant at 5% level

Source: Primary data.

**NABARD' Refinance: SDCCBs**

Table 4 presents year- and scheme-wise refinance received from NABARD by select Sivagangai District Cooperative Central Bank (SDCCB) branches during 2009-16 The highest percentage of increase in credit refinance received in 2015-16 over 2009-10 was recorded at 472.69 for FM followed by IRDP at 451.26, MI at 443.11 and for others at 333.02. The total amount of refinance received from NABARD by SDCCBs rose from Rs.115 lakhs in initial year, 2009-10, to Rs.610.08 lakhs in terminal year, 2015-16 registering an average six

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fold increase in the operation. MI received more amount of refinance in absolute terms than 'SCAP, STAP and others' type of operations during the period under review. The highest and lowest LGRs recorded were for MI at 107.61 percent, and others at 74.11 percent respectively. The same rank order was maintained in the case of CGRs. As per CV farm mechanism showed more consistency. It indicates that there is significant growth of the entire variable under study.

**Table-4: Year and Scheme-wise Credit Refinance received from NABARD by select Sivagangai District Cooperative Central Bank branches during 2009-2016 (Rs. in lakhs)**

| YEAR | MI | FM | IRDP | SCAP, STAP & Others | TOTAL |
|---|---|---|---|---|---|
| 2009-10 | 46.2 | 37.8 | 7.14 | 23.86 | 115 |
| 2010-11 | 58.5 | 49.5 | 9.64 | 24.78 | 143.42 |
| 2011-12 | 77.08 | 73.8 | 13.32 | 24.62 | 188.82 |
| 2012- 13 | 119.6 | 98.04 | 18.66 | 51.6 | 287.9 |
| 2013-14 | 251.1 | 195.28 | 39.04 | 100.4 | 585.84 |
| 2014-15 | 360.96 | 216.2 | 47.02 | 120.32 | 744.5 |
| 2015-16 | 250.92 | 216.48 | 39.36 | 103.32 | 610.08 |
| Percentage | (443.11) | (472.69) | (451.26) | (333.02) | (430.50) |
| LGRs | 107.61 (4.25)** | 92.67 (7.61)** | 88.39 (5.17)** | 74.11 (4.95)** | 94.83 (5.31)** |
| CGRs | 42.08 (6.63)** | 38.42 (9.48)** | 37.99 (7.23)** | 37.06 (5.42)** | 39.90 (7.49)** |
| CVs | 67.15 | 57.86 | 60.59 | 60.99 | 62.49 |

Note: 1) Figures in parentheses are percentages of increase in 2015-16 over 2009-10 , the initial year.

2) Figures in parentheses in LGRs and CGRs rows indicate the calculated values of 't' statistics.

3) ** - Significant at 1% level.

Source: Primary data

**FINDINDS OF THE STUDY**

**The findings of the paper are summarized as follows**

- ✓ It is observed that the major of refinance received from NABARD was towards MI for the period under study.
- ✓ It is found that NABARDS' refinance towards SDCCBs**,** MI received more amount of refinance in absolute terms than 'SCAP, STAP and others' type of operations during the period under review.
- ✓ It is infered that there is significant growth of the entire variable under study
- ✓ It can be seen from the analysis that amount sanctioned, and recovered show significant growth at 1% level under recoovery of loan towards CBs
- ✓ In the agency-wise credit flows of NABARD's refinance CB's had predominant share.

**SUGGESTIONS**

To improve the efficiency of NABARD; s schemes the followings measures could be taken - Spreading education

- ✓ Leadership development programmes
- ✓ Effective organizational and financial management
- ✓ Engage in productive and income generating activities
- ✓ More participation of banks
- ✓ Corporate governance for SHGs
- ✓ Having own apex regulatory body
- ✓ Giving relaxation in interest rates
- ✓ Training centers at block level
- ✓ Technological intervention

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- ✓ Evaluation of NABARD;s schemes
- ✓ A comprehensive approach on area development need to adopted.

**CONCLUSION**

Apart from above analysis, the schemes is slowly but steadily moving towards the fulfilling its objectives of poverty alleviation, raising the living standards of targeted people and taking the excluded section of population, women, into main stream . These schemes have a power to create a socio- economic revolution in the rural areas of our country. SHGs not only produce tangible assets and improved living conditions of the members, but also help in changing much of their social outlook and attitudes. It provides not only finance to the programmes but also prescribe rules and regulations from time to time to monitor and achieve the well defined goals of the programme. In this way, it can be said that NABARD is playing a vital role in transforming the rural India. Without initiating measures explained earlier all other efforts including pumping money through banks by NABARD cannot create any significant impact either on the development of district economy or on the beneficiaries **.**

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# PERSONALITY VARIABLES AFFECTING SPORTS PERFORMANCE: A STUDY COMPARING COLLEGE AND UNIVERSITY LEVEL FEMALE SPORTS-PERSONS

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## ABSTRACT
*Personality has received the most attention in recent research in the field of sport psychology and athletic behavior. Development of motor skills involved and techniques and tactics of the game are the main areas to be focused upon besides the physical fitness and physique of the players, during his training usually the psychological factors are little emphasised upon for the performance of player at higher levels of competitive sports. The present study deals with comparison of seven traits of personality (sociability, dominance, extraversion, self-concept, conventionality, mental toughness and emotional stability) as well as internal and external locus of control between 600 female sportspersons of ball games and combat games participating at college and university levels of competition.*

*Keywords: Achievement, Locus of Control, Athletes, Personality Variables, Events*

## INTRODUCTION
There is a significant relationship between personality variables and sports performance. the major dimension of the study of psychological aspect of sports is concerned with inquiries into the personality of sportsmen and sportswomen. There are numerous theories about the personality of athletes. But only a limited amount of research has been undertaken to support these theories. Several investigators have directed their attention towards an understanding of the relationship between personality and level of performance. Hence one of the most popular issues in sport personality concerns the relationship between personality and sport participation. Numerous physical, psychological and sociological factors influence the participation of an individual in modern sports. Development of motor skills involved and techniques and tactics of the game are the main areas to be focused upon besides the physical fitness and physique of the players, during his training usually the psychological factors are little emphasised upon for the performance of player at higher levels of competitive sports. The present study would be undertaken to investigate important psychological components of the sports-persons participating at different levels of competition.

There is a significant relationship between personality variables and sports performance. Sports psychologists and coaches are interested in the measurement of personality traits of athletes and players, which has become an important area of study of psychological aspects of sports. The development of personality and the achievement of desirable social values have been the objectives of sports and physical education since early times, as sports produce the more well-adjusted individuals in society. In the present study the seven personality traits of the sports-persons would be used; e.g. sociability, dominance, extraversion, self-concept, conventionality, mental toughness and emotional stability.

1. **Sociability** means a sociable person is warm, easy going, good-natured, attentive to people, ready to cooperate, trustworthy, soft-hearted, kind, adaptable and warm-hearted. It is an important trait for athletes in that it implies being generous to team-mates and that criticism from others will be accepted in good faith (Singh and Cheema 2005).
2. **Dominance** indicates hardness, self-assertiveness, self-assurance, and unconventionality and competitive aggressiveness, seducing or commanding others. Dominance is characterized by desire to influence and control one's environment and other people and is linked with ability for directing and controlling other people through subduing, persuading, seducing or commanding them (Singh and Cheema 2005).
3. **Extraversion** means outgoing, uninhibited, impulsive, sociable, friendly, craving for excitement, and having many social contacts. They are aggressive, optimistic, lose their temper easily and act at spur of the moment are unable to keep their feelings under control. (Singh and Cheema 2005)
4. **Self-concept** reflects several kinds of identifiable personality traits such as self-assurance, self-esteem, self-confidence, self-consistency, self-assertiveness, self-enhancement, self-regard and self-respect. self-security. (Singh and Cheema 2005)
5. **Conventionality** denotes behaviour such as being alert to proper ways of doing things, being very practical, narrowing of interests to immediate problems, being realistic, dependable, sound, being concerned and worried about issues.

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6. **Mental Toughness**. Cattell (1960) described the tough-minded individual as one who is emotionally mature, independent in action, hard and realistic in his appraisal of himself and the world can overrule his feelings and does not show anxiety about events occurring about him. (Singh and Cheema 2005)
7. **Emotional Stability** is characterized by maturity, placidness, absence of neurotic fatigue, unaffectedness, stability quiet realism, optimism and self-discipline. While on the other hand, emotional instability is characterized by low tolerance of frustration, immaturity, instability, high excitability, evasiveness and neurotic fatigability.

**LOCUS OF CONTROL**

The construct of locus of control is an expectancy variable of personality requiring an individual's perception of controlling over events occurring in his life. People have internal or external locus of control.

Kroll and Carlson (1967) contend that there is a definite personality factors existed which motivate people to select a sport and participate in it. Such factors might be different form general psychological factors relating to ordinary activity of body. Cooper (1969) lists athlete's personality structure as below:-

(i) The male competitor is basically an emotionally healthy person who tends toward extraversion.

(ii) He is self-assertive, tough-minded and self-confident with a higher capacity to reliance the stress of high level of competition.

(iii) He sets high goals for himself as well as for his team and try hard to achieve.

(iv) He has great psychological endurance and mental toughness, but a 'dominant, take charge' type of person, yet does not seek leadership.

(v) He is slightly free to express his natural aggressiveness tendencies with a high need to affiliate with others.

(vi) He is basically an orderly, organized sort of person with a lower than average tendency to act impulsively.

(vii) He will live in a socially highly desirable manner.

(viii) A superior athlete has a high need to achieve within his respective athletic endeavour.

Malumphy (1968) used the Cattell's 16 PF to compare the personality traits of 120 women, 77 athletes and 43 non-athletes. He found athletes playing individual sport being more burnout as compared to those participating in team sports. Although the high degree of conscientiousness and tough-mindedness is found among sport participant but they were less venture some and imaginative than their counterparts i.e non sport participant.

Berger and Littlefield (1969) compared the personality of football players and non-athletes. They found insignificant differences in CPI score between outstanding football players, less outstanding athletes and non-athletes. However Cooper (1969) found differences among the non-athletes and athletes. He described and painted the picture of the athlete such as:-

(i) More venture some and socially confident;

(ii) More socially more aggressive, leading and dominant;

(iii) Having higher social adjustment, prestige, social status and self-confident;

(iv) Better competitors;

(v) Less compulsive;

(vi) Less impulsive;

(vii) Having greater tolerance for physical pain

(viii) Having lower feminine interests and higher masculine ones.

Studies conduced by Kane (1965), Berhram and Kroll (1967) and Dardin (1972) have indicated that determination, drive and killer instinct are the qualities that are expected to be found extraordinarily in champion athletes. They have also shown that athletes of one sport differ from those of other sport and non-athletes in their personality characteristics.

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**OBJECTIVES OF THE STUDY**

The objectives of the present study are given below:-

1. To know the differences on the seven tracts of personality and internal and external locus of control among the female sports-persons of different games at college levels of competition.
2. To know the differences on the seven tracts of personality and internal and external locus of control among the female sports-persons of different games at university levels of competition.
3. To make comparison of seven personality traits and internal and external locus of control between sports-persons of ball games and combat games at college and university levels of competition.

**HYPOTHESES OF THE STUDY**

**1.** There would be significant differences on seven traits of personality, and internal and external locus of control between the female sports-persons of ball games and combat games at different levels of participation.

**2.** There would be significant differences on personality traits and locus of control among the female sports-persons of the different games (ball games and combat games) at college levels of competition.

**3.** There would be significant differences on personality traits and locus of control among the female sports-persons of the different games (ball games and combat games) at university levels of competition.

**PROCEDURE AND STATISTICAL TECHNIQUES**

In order to achieve the objectives and test the hypotheses ; a sample of 600 female sports-persons were selected, out of which 300 were from inter-college level and 300 were from inter-university level competition. An attempt was made to have 50% of the sample from the ball games and 50% players from the combat games. The players of the ball games were selected from Baseball Football, and Handball and players of the combat games were taken from the games of Judo, Taekwondo and wrestling.

**TESTS/TOOLS USED**

All the sportspersons were administered the following two standardized tests for measuring their psychological characteristics-Specific Sports Personality Test devised by Cheema and Singh (2005) & the I-E Scale of Rotter (1966).

After collecting the data, the following statistical techniques were used on the raw data in order to find out the results:

1. The means, SDs, and SEs of the scores of all the variables belonging to different groups were calculated.
2. t-ratios were found out in order to know the significant differences on scores of seven traits of personality between two groups formed on the basis of types of games ,i.e. sportspersons of ball games and combat games.
3. Pearson's product moment of correlation was worked out to find the relationships between two variables as well as inter-co-relationship among all these variables under study.

**STATISTICAL ANALYSIS**

The objective of the present study was to make comparison of seven traits of personality as well as internal and external locus of control between female sportspersons of ball games and combat games. The ball games consisted of baseball, football and handball. All these three are team games. On the other hand, combat games were judo, Taekwondo and wrestling which are individual games. It means that comparison were made between team games and individual games players of inter-college and inter-university level competition female sports-persons on seven traits of personality, i.e.; sociability, dominance, extraversion, self-concept, conventionality, mental toughness and emotional stability as well as internal and external locus of control. In order to achieve this objective, mean scores and standard deviation scores were calculated of all the variables under study for the female players of ball games and combat games separately and then t-ratios were computed in order to find out if significant differences existed and if so at what level of significance.

**Table 1.** shows the means, SDs and t-ratios of scores of different personality characteristics between female sportspersons of ball games and combat games.

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**Table-1: Means, SDs and t-ratios of personality characteristics of female Sportspersons of Ball Games and Combat Games**

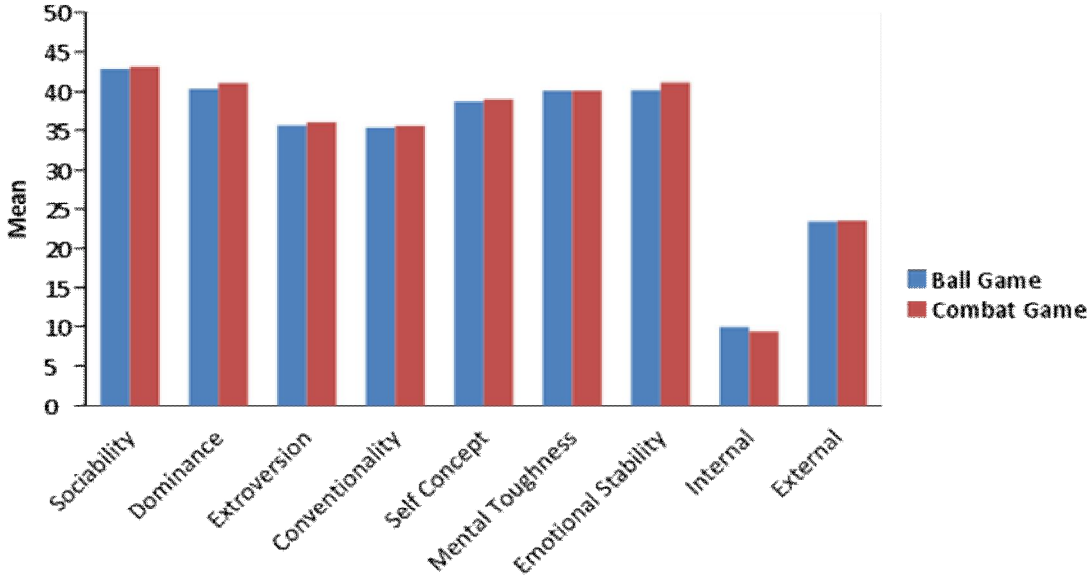
| Variables | Sports | N | Mean | SDs | SEM | t-value | df | p-value |
|---|---|---|---|---|---|---|---|---|
| Sociability | Ball Game | 300 | 42.92 | 5.817 | .335 | .634 | 598 | .526 |
| | Combat Gm | 300 | 43.22 | 5.897 | .340 | | | |
| Dominance | Ball Game | 300 | 40.41 | 4.455 | .257 | 2.225* | 598 | .026* |
| | Combat Gm | 300 | 41.18 | 3.970 | .229 | | | |
| Extroversion | Ball Game | 300 | 35.68 | 5.254 | .303 | .975 | 598 | .330 |
| | Combat Gm | 300 | 36.08 | 4.785 | .276 | | | |
| Conventional | Ball Game | 300 | 35.41 | 4.381 | .252 | .731 | 598 | .465 |
| | Combat Gm | 300 | 35.67 | 4.219 | .243 | | | |
| Self Concept | Ball Game | 300 | 3.75 | 5.328 | .307 | .832 | 598 | .406 |
| | Combat Gm | 300 | 39.09 | 4.867 | .281 | | | |
| Mental Toughness | Ball Game | 300 | 40.21 | 4.981 | .287 | .018 | 598 | .986 |
| | Combat Gm | 300 | 40.20 | 4.186 | .241 | | | |
| Emotional Stability | Ball Game | 300 | 40.29 | 5.444 | .314 | 2.196* | 598 | .028* |
| | Combat Gm | 300 | 41.21 | 4.877 | .281 | | | |
| Internal LOC | Ball Game | 300 | 9.93 | 4.927 | .284 | 1.343 | 598 | .180 |
| | Combat Gm | 300 | 9.41 | 4.549 | .262 | | | |
| External LOC | Ball Game | 300 | 23.46 | 7.131 | .411 | .201 | 598 | .841 |
| | Combat Gm | 300 | 23.57 | 5.773 | .333 | | | |

*Significant at 0.05 level (t should be between 1.96 and 2.58)

As per the above table, significant differences were not observed on many variables between ball games and combat games players except dominance and emotional stability traits of personality, as t-values of 2.225 and 2.196 were found to be significant at 0.05 level of confidence. On these traits, combat games players were found to be better (M= 41.183 & 41.216) than ball games players (M=40.416 & 40.290). On all others traits, ball games and combat games players were at the same level, as significant differences were not found statistically.

The mean scores of all personality characteristics of female sports-persons of ball games and combat games have been depicted graphically through histograms which have been given in the Figure 1

**Figure-1: Histograms showing the mean scores of all personality characteristics of female sports-persons Ball games and Combat games**




An attempt was also made here to find out the significant differences on the personality characteristics between ball games and team games female players participating at inter-college and inter-university level competition separately. **Table 2** shows the means, SDs and t-ratios of scores of different personality characteristics between female sportspersons of ball games and combat games at inter-college level competition.

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**Table-2: Means, SDs and t-ratios of personality characteristics of female Sportspersons of Ball Games and Combat Games participating at inter-college level competition**

| Variables | Sports | N | Mean | SDs | Sem | t-value | df | p-value |
|---|---|---|---|---|---|---|---|---|
| Sociability | Ball Game | 150 | 41.86 | 5.957 | .486 | 3.98** | 298 | .000** |
| | Combat Gm | 150 | 44.70 | 6.401 | .522 | | | |
| Dominance | Ball Game | 150 | 39.91 | 4.706 | .384 | 3.83** | 298 | .000** |
| | Combat Gm | 150 | 41.80 | 3.796 | .309 | | | |
| Extroversion | Ball Game | 150 | 35.11 | 5.466 | .446 | 3.02** | 298 | .003** |
| | Combat Gm | 150 | 36.96 | 5.109 | .417 | | | |
| Conventional | Ball Game | 150 | 34.62 | 4.321 | .352 | 2.89** | 298 | .004** |
| | Combat Gm | 150 | 36.11 | 4.572 | .373 | | | |
| Self Concept | Ball Game | 150 | 37.76 | 5.586 | .456 | 3.26** | 298 | .001** |
| | Combat Gm | 150 | 39.75 | 4.956 | .404 | | | |
| Mental Toughness | Ball Game | 150 | 40.02 | 5.459 | .445 | 1.934 | 298 | .054 |
| | Combat Gm | 150 | 41.13 | 4.462 | .364 | | | |
| Emotional Stability | Ball Game | 150 | 39.99 | 5.589 | .456 | 3.34** | 298 | .001** |
| | Combat Gm | 150 | 42.06 | 5.116 | .417 | | | |
| Internal LOC | Ball Game | 150 | 10.24 | 4.970 | .405 | 2.88** | 298 | .004** |
| | Combat Gm | 150 | 8.60 | 4.871 | .397 | | | |
| External LOC | Ball Game | 150 | 25.72 | 7.453 | .608 | 3.23** | 298 | .001** |
| | Combat Gm | 150 | 23.13 | 6.336 | .517 | | | |

**Significant at 0.01 level (t should be more than 2.58)

As per the above table, significant differences were found between ball games and combat games female players of inter-college level competition on almost all the personality characteristics except only one i.e.; mental toughness, where the difference was not significant statistically (t=1.934 NS) On the other hand, differences were found to be significant for sociability (t=3.987;p<0.001), dominance (t=3.835;p<0.001), extroversion (t=3.023 ;p<0.001), conventionality (t=2.894; p<0.001), self-concept(t=3.269;p<0.001),emotionality stability (t=3.340;p<0.001), internal LOC (t=2.886 ;p<0.001), external LOC (t=3.238; p<0.001). The mean scores indicate that the combat games female players of inter-college were getting higher mean score on the seven personality characteristics e.g.; on sociability (M= 44.706). Dominance (M=41.806) extroversion (M=36.96), conventionality (M=36.113), self-concept (M=39.753),emotional stability (M=42.04) than the ball game players whose mean scores can be compared as 41.86 for sociability, 39.913 for dominance, 35.113 for extroversion, 34.626 for conventionality, 37.76 for self-concept,39.993 for emotional stability. But on the internal and external locus of control variables, ball games players scored higher than combat game players, as they can be compared as 10.24 &8.60 in case of internal Loc and 25.72 & 23.133 for external LOC.

The mean scores of all personality characteristics of female sports-persons of ball games and combat games at inter-college level have been depicted graphically through histograms which have been given in the Figure 2.

**Figure-2: Histograms showing the mean scores of all personality characteristics of female sports-persons Ball games and Combat games at inter-college level**

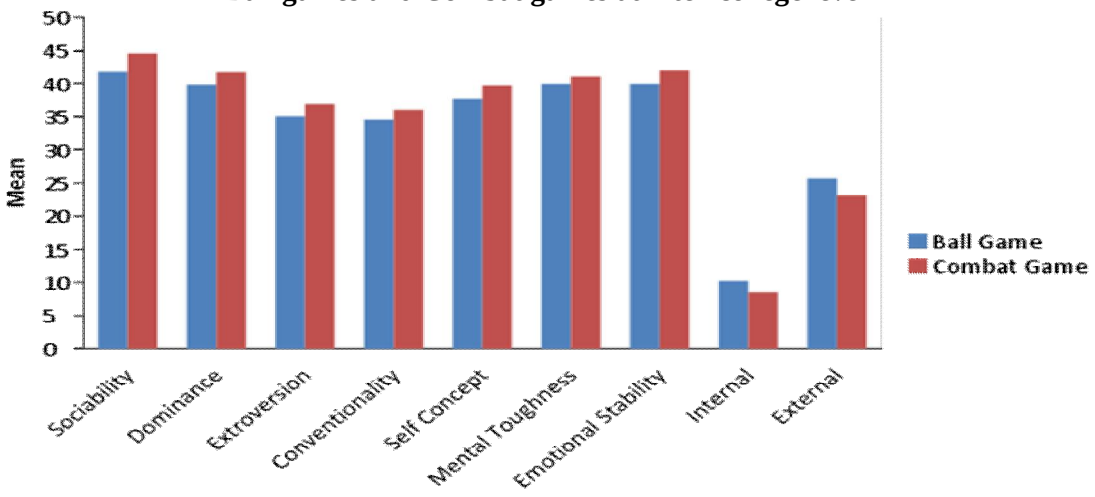

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Table 3 shows the means, SDs and t-ratios of scores of different personality characteristics between female sportspersons of ball games and combat games at inter-university level competition.

**Table-3: Means, SDs and t-ratios of personality characteristics of female Sportspersons of Ball Games and Combat Games participating at inter-university level competition**

| Sports | | N | Mean | SDs | SEM | t-value | Df | p-value |
|---|---|---|---|---|---|---|---|---|
| Sociability | Ball Game | 150 | 43.98 | 5.491 | .448 | 3.71** | 298 | .000** |
| | Combat | 150 | 41.74 | 4.937 | .403 | | | |
| Dominance | Ball Game | 150 | 40.92 | 4.144 | .338 | .761 | 298 | .448 |
| | Combat | 150 | 40.56 | 4.054 | .331 | | | |
| Extroversion | Ball Game | 150 | 36.24 | 4.987 | .407 | 1.951 | 298 | .052 |
| | Combat | 150 | 35.20 | 4.275 | .349 | | | |
| Conventionality | Ball Game | 150 | 36.20 | 4.311 | .352 | 2.075* | 298 | .039* |
| | Combat | 150 | 35.22 | 3.797 | .310 | | | |
| Self Concept | Ball Game | 150 | 39.74 | 4.877 | .398 | 2.350* | 298 | .019* |
| | Combat | 150 | 38.44 | 4.702 | .383 | | | |
| Mental Toughness | Ball Game | 150 | 40.40 | 4.460 | .364 | 2.387* | 298 | .018* |
| | Combat | 150 | 39.27 | 3.676 | .300 | | | |
| Emotional Stability | Ball Game | 150 | 40.58 | 5.296 | .432 | .376 | 298 | .707 |
| | Combat | 150 | 40.37 | 4.486 | .366 | | | |
| Internal LOC | Ball Game | 150 | 9.62 | 4.880 | .398 | 1.158 | 298 | .248 |
| | Combat | 150 | 10.22 | 4.059 | .331 | | | |
| External LOC | Ball Game | 150 | 21.21 | 6.024 | .491 | 4.33** | 298 | .000** |
| | Combat | 150 | 24.01 | 5.133 | .412 | | | |

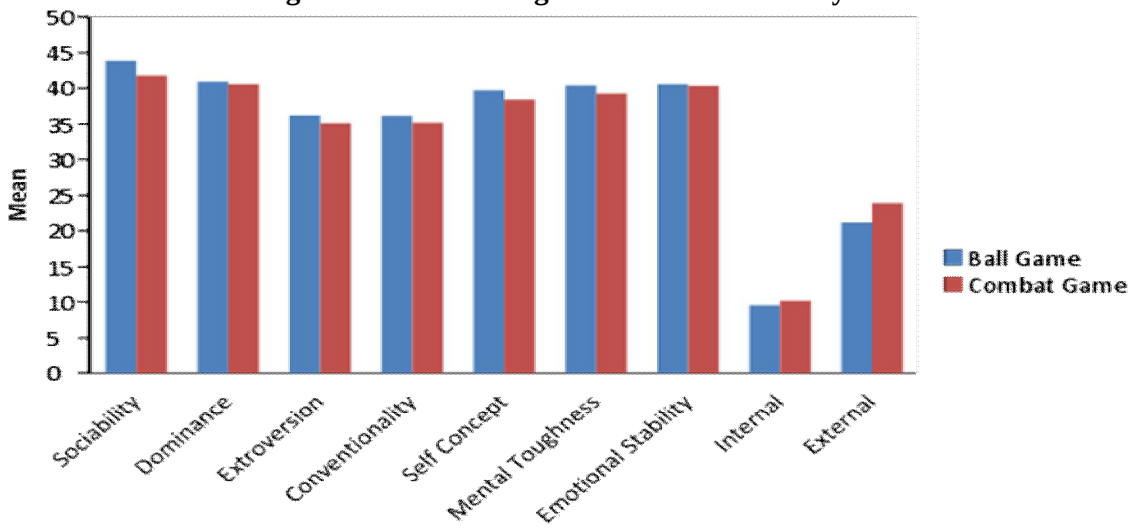
**Significant at 0.01 level (t should be more than 2.58)

*Significant at 0.05 level (t should be between 1.96 and 2.58)

As per the above table, significant differences were observed in case of sociability (t=3.715;p< 0.001), conventionality (t=2.075;p<0.05), self-concept (t=2.35 ;p<0.05), mental toughness (t=2.387;p<0.05) and external locus of control (t=4.333;p<0.001), whereas in case of dominance, extroversion, emotional stability and internal LOC, no differences were significant statistically. The mean scores indicate that on the personality traits like sociability, conventionality, self-concept and mental toughness, ball games players were getting higher mean scores as 43.98, 36.20, 39.74, 40.40 than the combat games players whose mean scores were as 41.74, 35.22, 38.44, 39.27 respectively. But on the other hand, combat games players got more mean scores on external LOC (M=24.013) than the ball game players (M=21.213). On all other variables both ball game and combat game players were having the same level of characteristics.

The mean scores of all personality characteristics of female sports-persons of ball games and combat games at inter-university level have been depicted graphically through histograms which have been given in the Figure 3.

**Figure-3: Histograms showing the mean scores of all personality characteristics of female sports-persons Ball games and Combat games at inter-university level**



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## CONCLUSION

From the findings of the study as outlined above, the following conclusions can be arrived at:-

1. While comparing female sports-persons of inter-college and inter-university level on personality characteristics, it was found that no significant differences were observed in almost all the personality characteristics between inter-college and inter-university level female sports-persons except mental toughness and external locus of control variables, where the college level female athletes were had better mental toughness and were more externally oriented than university level female players.
2. The differences between female sport-persons of ball games and combat sports were found only in dominance and emotional stability traits of personality, where the combat sports players were more dominant and emotionally stable as compared to those of ball games.
3. In case of the inter-college level competition, female sport-persons of ball games and combat sports differed in almost all traits of personality, e.g.; sociability, dominance, extraversion, conventionality, self-concept and emotional stability as well as both internal and external LOC; where combat sports players were found to be better in these six traits of personality. But on the other handball game players were more internally and externally oriented.
4. In case of inter-university level female athletes, ball games and combat sports players were found to differ in sociability, conventionality, self-concept, mental toughness and external LOC, but not in dominance, extraversion, emotional stability and internal LOC. Here the ball games female players were better in sociability, conventionality, self-concept and mental toughness, but combat sports players were more externally oriented.
5. In internal LOC variable, female sports-persons of inter-college level of six games differed each other. Here baseball players differed with handball players, football with handball, judo players; handball with judo, taekwondo, wrestling, judo with taekwondo and wrestling players. Handball and judo players were more internally oriented whereas taekwondo and wrestling players were less internally oriented.
6. In external locus of control variable, inter-college female athletes of six games differed from each other. Baseball players differed from football and wrestling players; football from handball, judo, taekwondo and wrestling players, handball from wrestling players as well as judo with wrestling players and taekwondo from wrestling players. Here football players were more externally oriented whereas baseball, handball, judo and taekwondo were less externally oriented.

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# POLITICAL MOBOLIZATION IN AN INFORMATIONAL SOCIETY: THE OCCUPY WALL STREET MOVEMENT (OWS)

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## ABSTRACT
*The present chapter aims at understanding what characterizes Information Society and will also uncover the current debates on Information Society concept. The first section will examine the roots of this concept in the available literatures. The second section of the chapter will try to locate the development of United States as an information society, by examining the emergence of the Occupy Wall Street Movement and how this movement facilitated United States in becoming one of the world's most successful information society.*

## INTRODUCION
What is Information Society? By Information Society we destined a society in which the exchange of information is a central and predominant social activity. As argues Gustavo Cardoso that information society is outcome of the technological process which enables us to process, store, select and communicate information in all forms available whether it is oral, written and visual without the limitations of distance, time or volume. Largely its endows the individual with new capacities and changing the way in which we live and work together. The concern of this present chapter is to map out the emerging debates centred around information society and to locate the emergence of United States as an Information society. This work will basically argue that it is not mere the accumulation or storage of information which makes certain society Information society, however it is the optimum utilization of the information by the individuals to bring forth the change for the betterment of the society which succeed to make a society an information society.

Initially to have a clearer understanding of the term information, it can be understand through three complementary perspectives: firstly by the Information Science perspective which has defined it as the collection, processing and analysis of data and the consequent production of information. Secondly, the communication science perspective has associated it with the content of the message and the communication that is established between two or more unit, whether that communication is technologically mediated or not and thirdly within the perspective of Life Sciences it is defined as information as life, in a reference to the genetic dimension of DNA.

However with the emergence of the information technologies and communication through networks like the Internet, intranets and local networks like Wi-Fi and others on the one hand, and the digitalization of contents in association with the inclination towards technological convergence between computers, telecommunications and television, on the other, has brought the interests of the communication and information sciences closer together. With the establishment of this idea in 1960's it took hold "among many social scientists that information has assumed a new and influential role in human affairs. The proponents of this thought, social processes based these observations on innovative information uses, and particularly the transformation of information into authoritative knowledge, which obviously represented the distinguishing feature of this age. Characterizing the world's "advanced" societies as "information societies" became as axiomatic as bracketing other eras as 'Neolithic societies' or 'feudal societies'".[1]

The present chapter aims at understanding what characterizes Information Society and will also uncover the current debates on Information Society concept. The first section will examine the roots of this concept in the available literatures. The second section of the chapter will try to locate the development of United States as an information society, by examining the emergence of the Occupy Wall Street Movement and how this movement facilitated United States in becoming one of the world's most successful information society.

## DEBATES ON INFORMATION SOCIETY
One of the most prominent theorist of post-industrialism Daniel Bell made the first attempt to understand information and the developing information technologies, in his pioneering work on "post industrial society" in which he established certain principles which still holds relevance.

According to Daniel Bell "we are entering a new system, a post-industrial society, which, though has several distinguishing features, is characterized throughout by a heightened presence and significance of information.

[1] James B. Rule and Yasemin Besen. The Once and Future Information Society. Theory and society, Aug, 2008 Vol.37, Issue .4. Springer Netherlands pg-317-342

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He asserts that information and knowledge are crucial for Post industrial society both quantitatively and qualitatively. On the one hand, features of post-industrialism lead to greater amounts of information being in use. On the other hand, he claims that in the post-industrial society there is a qualitative shift evident especially in the rise to prominence of what he calls 'theoretical knowledge'. In the world of Post industrial society there is not just more information but he says a different kind of information and knowledge in play"[1].

With respect to United States Daniel Bell suggests it leads "world on a path towards a new type of system which calls the post-industrial society. Though he does not claim this to be supreme that the development of Post industrial society is an inevitable outcome of history, he does think it is possible to trace a movement from pre-industrial, through industrial, to post-industrial societies"[2].

As also proposed by Alvin Toffler in his very famous metaphor, "that over time, the world has been decisively shaped by three waves of technological innovation, each as carries inevitable consequences as the mightiest tidal force. The first was the agricultural revolution and the second the Industrial Revolution. The third is the information revolution that is engulfing us now and which presages a new a new way of living" (Webster, Theories of Information Society , 2006). Since the mid-1990s it is been a popular believe that with the merging of information and communications technologies we are ushering into a new kind of society. "Computer communications currently inspire most speculation about a new society in the making. Basically the rapid growth of the Internet and with its capacities for simultaneously promoting economic success, education and the democratic process, has stimulated much interpretation" (Webster, Theories of Information Society , 2006).

Daniel bell writings on post-industrial society examines that there is a transformation in the occupational structure over time. His proposition is that "we have achieved an information society when the preponderance of occupations is found in information work."There is prima facie evidence for this is seen in Western Europe, Japan and North America where over 70 per cent of the workforce is now found in the service sector of the economy, and white-collar occupations are now a majority. Based on these changes he says it is plausible to argue that we inhabit an information society, since the 'predominant group of occupations consists of information workers" (Webster, Theories of Information Society , 2006).

He further argues that "with the emphasis on occupational change as the marker of an information society we have shifted from once dominant concerns with technology. Daniel Bell conception of information society is quite different from that which claims that it is information and communications technologies which distinguish the new age. With the focus on occupational change it is evident that it stresses the transformative power of information itself instead of technologies, information is something which depend on and is produced in occupations or embodied in people through their education and experiences" (Webster, Theories of Information Society , 2006). In his writings on post- industrial society he has "brought the information age to the centre stage of United States and Europe. He argues that "the axial principle of the post-industrial society is the centrality of theoretical knowledge and the new role which it has come to play, which is codified, as the director of social change"[3].

Frank Webster in his work on "Theories of Information" has argued that many scholars have made various attempts to have a general understanding of the term information society. Because of this reason, they keenly "rush to interpret these in terms of different forms of economic production, new forms of social interaction, innovative processes of production and many more. In the process of that they failed to establish in what ways and why information is becoming more central today, so critical indeed that it is growing into a new sort of society. What is it about information that makes so many scholars think that it is at the core of the modern age?"[4] There lies some question which is very important and needs legitimate attention. By having more information are we growing into a better-informed citizenry? By "having numerous amount of information are we better informed? What kind of information is being produced and stored and what benefits it holds for the society at large?" (Webster, Theories of Information Society , 2006)

[1] Daniel Bell. The coming of Post-Industrial Society: A venture into Social Forecasting. 1973. Newyork Books

[2] Webster Frank. Theories of Information society. Third Edition. Routledge Talyor and Francis Group. London and Newyork.

[3] Daniel Bell. The coming of Post-Industrial Society: A venture into Social Forecasting. 1973. Newyork Books

[4] Webster Frank. Theories of Information society. Third Edition. Routledge Talyor and Francis Group. London and Newyork.pg-8

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To ask the same question in different way it is important to have certain understanding of the distinction between having information and being informed. Because "being informed means that a person has information, it is a much grander condition than having access to masses of information"[1]. Accordingly Frank Webster also in his Theories of the Information Society mentions that "the role of information in our societies should be seen from the point of view of historic continuity, because he believes it is not right to converse of an information society. He says we can speak of the subsistence of certain types of information for defined purposes, for specific groups which have particular types of interests that are developing but this is not sufficient to be able to talk of an information society"[2].

He further argues that what he understands as the information society theories have in common the idea that a shift is taking place in contemporary societies and this change is due to the dominant role of information and communication. He propose two thesis types : One that their is radicalization of the trends which either have a negative character or are in a positive direction, but always accepting the radical change and the other is of integration in the current context which means acceptance of the change but relativizing it in terms of its real social impact.

Webster on the other hand argues that, there are people those who argue that we are experiencing radical change in paradigms in the most diverse sectors of society and that it is thus possible to speak of the emerge of a new type of society – the information society as a new stage of social evolution. And on the other, we have second class people who are acquainted with the relative importance of information and communication but are uncertain if this idea is leading to the emergence of a new society based on information. They agree with the fact that transformations which are captivating are not splits within the existing forms of social organization, but to a certain extent are evolutions within a previously established context.

The changes which we are observing in recent times are the "emergence of signs of transformation in distinct areas of society that are not simply secluded changes but have a significant impact on the construction of substantial transformations and which later have an impact on the whole social fabric" (Cardoso 2006). The debate on information society is not complete if it omits the arguments of Manuel Castells who characterizes contemporary societies not as information societies but as informational societies. In his work on "Network Society he has emphasized that the central feature of a new form of social organization in which the production of information and its processing and transmission become the main sources of productivity and power which have emerged with new technological conditions persistence in the current period of history".[3]

Castells by using adjective informational in place of information seeks to establish a parallel distinction between industry and industrial. Therefore it also necessary to establish an analytical distinction between information society and informational society. Thus, the informational society is a product of a specific historic context covering the last three decades of the 20th century. According to his formulation the analysis of the social change allows us to conclude that with emergence of a new social structure which is certainly different from the previous structures because it is based on the detection of structural transformations in the production, power and experiences relations. It is these transformations which according to him lead to a significant change in the "social forms of space and time and to the emergence of a new culture".

Therefore the informational society is correlative to a restructuring of capitalism, of which the most obvious characteristics are globalization of the main economic activities, organizational flexibility and greater power on the part of the employers in labor relations. This restructuring is only possible in the dimensions given in the preceding paragraph, with the temporal coincidence with a new type of technology, the information technologies, which were appropriated by the economic fabric with the aim of stimulating flexibilization of the organizational and spatial relations on the global scale.

Our societies are informational in the sense that the production, processing and transmission of information have become the principal sources of productivity and power. They are also network societies, like the way hierarchical organization of the industrial model pervaded all of the industrial society, the decentralized and

[1] Webster Frank. Theories of Information society. Third Edition. Rout ledge Taylor and Francis Group. London and Newyork.pg-28

[2] Webster Frank. Theories of Information society. Third Edition. Rout ledge Taylor and Francis Group. London and Newyork.pg-

[3] Manual Castells. The Information Age: Economy, Society and Culture Volume 1: The Rise of Network Society. Oxford: Blackwell

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flexible model of the network pervades our existing societies. After like decades the Internet is spreading at an unparalleled speed, as compared with all other means of communication from radio to television, and is rapidly becoming a tool that is used for multiple applications. However the question which is frequently raised by different scholars and most prominently by Castells is but why now? The answer is firstly based on technological factor that due to the diffusion of the personal computer and soon after a whole range of computing and communication devices like World Wide Web's user friendliness and the growth of computer literacy, predominantly amongst the younger generations and the promotion of the use of the Internet at home, in the workplace and in the education system.

The recent success of internet is due to the reality that it responds to a fundamental need of society, a need that is rooted in social evolution and which exists in internet a fortunate tool for its concretization. Through its utilization, the people themselves can change the technology and that is a characteristic made possible by the open technology model itself and this is the logic missing in the preceding communication and information technologies such as "television, telephone, radio, newspapers", and more. Castells also indicates the existence of this new world of informational development and the dominance of space of flows[1] over space of places results in a growing globalization, and although that in itself is not a bad phenomenon because this represents the idea that we can all communicate with each other, buy and sell globally and thus form a global community in real sense globalization represents, for a large part of humanity, that political power is being taken from it and it is being given economic impoverishment.

He further argues that it is inadequate to use the concept of information society for characterizing the social changes in course in contemporary society. According to him the notion of network society illustrates changes in the organizational paradigm, would be more adequate for characterizing societies, which are not information, but clearly informational societies. With this regard, the culture of the informational societies also differs from culture models of up to a few decades ago. Informational societies are culturally characterized by their taking on of real virtuality features. But if the technology is shared, just as the social organization model, the network and the cultural characteristics are also shared, this does not mean that we are dealing with one single informational society model. On the contrary, societies continue to be built on what they already are and choose to be in cultural, economic, political and social terms.

Examining informational society as a initial point, both in historic and economic terms, in the definition of what information means in our societies constituted a particularly useful contribution, given that it allows for a contextualization for understanding the media system and the way in which we domesticate the technologies and their use in the symbolic mediation spaces. To argue the primary step in understanding how autonomy is managed and citizenship is exercised in the Information Age through the selection and articulation of different media is basically to examine the different informational society models that we are developing in different countries and areas of our world. In recent times our society is one where television and the Internet symbolize a factor of change in our lives, through the sharing of one and the same information environment by elected and electors and an increasingly greater role conferred upon reflexivity as an instrument of choice.

Accordingly media, due to their historical contextualization and the technological developments also evolve. Like for instance the technological innovation at the end of 1970s facilitated new form of production organization, of access to knowledge, new forms of functioning of the economy and, consequently, new forms of culture. He argues further by saying that the interaction between the "media and society have been diverse in nature throughout history. Some have pointed out towards the deterministic cause and effect relationships, with the idea that the mass media "create" the mass society. For these group of analysts there is a proper direct connections between the information and entertainment model originated in the media and processes of social massification and cultural homogenization" (Cardoso, From Mass to Networked Communication: Communicational Models and the Informational Society, 2008). "And the other group analysts whose perspective is that the media expresses, both through their structure and in their contents, and also within the nature of the society in which they are generated.

The central pre-assumption of the analyses thus refer to the view of the non-neutrality of the media and to the idea that technologically different media are the fruit of the society in which they emerge and which promotes,

[1] Manual Castells ." Materials for an exploratory theory of network society. British Journal of sociology Vol. No. 51.Issue No.1. January/ March 2000. London School of Economics. pp-5-24. According to Manual Castells the space of flows refers to the technological and organizational possibility of organizing the simultaneity of social practices without geographical contiguity".

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through their use, distinctive socio-cultural realities" (Cardoso, The Media In Network Society Brownsing, News,Filters and Citizenship, 2006).

A third perspective as is acknowledged by Ortoleva as relation of complementarily, argues that a "re-equation of the effective reach of the mass communications takes place, with its denominated "effects ". He underlines that the users of the media find correspondence in

a network of interpersonal relations that measure, condition and filter the reception of the messages[1]. Thus, "action of any form of technology, such as the media, cannot be considered outside of culture and therefore it interacts with a culture, which hosts it and adapts it from its birth" (Cardoso, From Mass to Networked Communication: Communicational Models and the Informational Society, 2008).

The internet initially had its origin in the new technology but it's originality also lies in the technologies which promotes new forms of communication and new social and economic organization models, create new audiences, and with its new forms of rhetoric and contents and also offer new forms of knowledge. As defined by Fausto Colombo "that all those means of communication, representation and knowledge in which we find the digitalization of the signal and its content, that possess dimensions of multimodality and interactivity". Despite of this above definition having an inclination towards technological orientation, it has the benefit of "being comprehensive, inclusive of everything from the mobile phone to digital television and also embracing game consoles and the Internet" (Jakubowicz, April 2009). The new media has many supposed features that distinguish the new media like digital convergence, many-to-many communication; interactivity, globalization and virtuality are not distinctly new. But the thing which makes it new is their conjugation in one and the same technological support[2].

New Media is seen as the mediators of communication because they have the capability to "introduce the uniqueness of incorporating new technological dimensions. They merge both interpersonal communication and mass media dimensions within the same platform and persuade organizational change and new forms of time management" (Jakubowicz, April 2009). There search combines both "synthesis of the textual and visual rhetoric", and that is why they promote new audiences and social reconstruction tools.

To argue by employing the concept of field mentioned by Pierre Bourdeiu in which he uses the concept of field just to designate the delimitation of the analysis of an object, he provides us with the theoretical tool for characterizing the different Internets. Like for instance if we break the Internet down according to the type of communication established by means of the different types of software, we can analyze that E-mail and real-time chat programmes are part of the interpersonal communication. And so is field just like the telephone or conventional mail correspondence. So to argue the World Wide Web, file sharing programmes and newsgroups make up another field that is of mass communication or mass media.

Media are not to be seen as secluded elements. Because we don't confine our self to "listening radio only, or reading newspapers only or surfing the Internet only. The universal practice which we do is the mixture of various media in everyday life at home, at work, at school or in getting from one place to another" (Cardoso, From Mass to Networked Communication: Communicational Models and the Informational Society, 2008). Media when plays the decisive role gives the expression of the "personal media which, when networked, can become mass media and can therefore organize their flexibility and uncertainty. This idea of media associated individual empowerment has to take into account not only television, radio, newspapers and the World Wide Web but also the telephone, the mobile phone and the Internet messaging" (Cardoso, From Mass to Networked Communication: Communicational Models and the Informational Society, 2008).

With the needs for economic evolution of the traditional mass media, which has on the one hand lead to the territorial expansion of their audiences, and on the other hand with the diffusion of the use of the Internet, has also witnessed the disappearance, or devaluation, of certain concepts that until now were socially and culturally valued? "The first notion that was questioned by the globalization of communication is the idea of boundary. The fall of communicational boundaries brought about by the new information and communication technologies has led to the emergence of two conflicting phenomena. First is that today, there is no longer a national community that can obstruct its citizens from knowing what is happening in other countries even in

[1] Gustavo Cardoso and preface by Manual Castells. The Media IN Network Society: Browsing, News, Filters and citizenship. Centre for research and studies in sociology. 2006

[2] Gustavo Cardoso and preface by Manual Castells. The Media IN Network Society: Browsing, News, Filters and citizenship. Centre for research and studies in sociology. 2006

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authoritarian regimes it is increasingly difficult to rule this out. And secondly, with globalization of communications has introduced modifications at the monitoring level which until very recently was exercised almost entirely by the states" (Cardoso, From Mass to Networked Communication: Communicational Models and the Informational Society, 2008). This significant function is now being shared by and many a times transferred to other centres of power.

The Internet has emerged as a technology which with its competence of adaptation to, and interaction with, other technologies has become the paradigm of the new media. The Internet which sets itself as an example of the new media. The result of its diffusion and social appropriation, constitutes itself as the technology with which all the rest want to interact through the establishment of web links.

Manual Castells also argues in his very prominent work Information Age that "the 'information age' announces 'a new society' (Webster, Theories of Information Society , 2006). "A 'new society' which has been brought into being by the development of networks (enabled by ICTs) and which gives priority to information flows". He further argues that "we are undergoing a transformation towards an 'information age' which is distinguished by its chief characteristic of spreading of networks linking people, institutions and countries. There are many consequences of this, but the most influential is that the network society simultaneously heightens divisions while increasing integration of global affairs" (Webster, Theories of Information Society , 2006).

As also argued by Charles lead beater in his book "Living on the Air" that "it is information which is foundational in the present time. "'Living on thin air' was once a familiar caution given by the worldly wise to those reluctant to earn a living by the sweat of their brow, but all such advice is now outdated"[1]. He asserts that "'thinking smart', being 'inventive', and having the capacity to develop and exploit 'networks' is actually the key to the new 'weightless' economy since wealth production comes, not from physical effort, but from 'ideas, knowledge, skills, talent and creativity'" (Webster, Theories of Information Society , 2006). The thing that makes the information networks significant is the manner in which it interlinks the existing locations which can be between an office, or a city or within a region, a continent or an entire world. The process by which the "electricity network runs through an entire country to be accessed at will by individuals with the appropriate connections. So today we can imagine that a 'wired society' operating at the national, international and global level to provide an 'information ring main' to each home, shop, university and office and even to mobile individuals who carry their laptop and modem in their briefcase. Progressively we are all connected to networks of one sort or another and as the networks themselves are expanding their reach and capacities in an exponential manner" (Webster, Theories of Information Society , 2006).

The prominent idea which can be drawn here is that the "electronic networks have resulted in a new emphasis on the flows of information something which leads to a fundamental revision of time and space relations. Individuals may now connect with others to continue real time relationships without physically coming together" (Webster, Theories of Information Society , 2006). Frank Webster questions that it is "the technological definition of the information society that is being used which is based on networks being defined as technological systems? Or whether the specific focus should be on the flow of information which has captured the imagination of many scholars and is the distinguishing feature of present age" (Webster, Theories of Information Society , 2006).

Many scholars have defined information society in quantitative terms. Like for instance numbers of white-collar workers, percentage of GNP devoted to information, and many more and by this they have come to the assumption that we have arrived in an information society. But there are no distinguishing features by which it can be claimed as a new type of society, one in which all we witness is accumulation of huge quantities of information in circulation and storage. Because accumulation of more and more information does not qualifies to bring forth a radically new society.

According to Frank Webster it is not only the quantitative measures i.e. simply more information cannot be identified as led a break from previous systems, indeed it is the decisive qualitative changes which marks the departure from the past. As for example "just because there are many more automobiles today than in 1970 does not qualify us to speak of a 'car society', rather it is a universal change which is also argued in the writings of

[1] Charles Lead beater. Living On the Air: The New Economy. 24 February 2000. penguin Book Ltd, New Edition.

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scholars like Daniel Bell's "post-industrialism", or in Manuel Castells's 'informational mode of development', or in Mark Poster's concept of 'mode of information'"[1] (Webster 2006).

Alistair S. Duff in his book on normative theory of information society has distinguished his conception of "information" from Weaver's Mathematical Theory of Communication, which quantifies relationship with meaning. Information according to him has an integral bits but not "meaningfulness". The information society is the totality of facts, not flows. Only "true and significant information" is real information. Information is a social, semantic, factual, verifiable, and valuable category, exemplified by paradigms such as hard news and freedom of speech.[2]

**OCCUPY WALL STREET**

Occupy Wall Street movement is one of the most prominent movement in the history of United States. The idea of the movement was inspired by the events that occurred in Arab Word, specifically in Egypt and Tunisia in 2010, which are frequently referred to as the "Arab Spring"[3]. The protesters of OWS declared to follow the same spirit of the movements in Arab Word as they considered it "revolutionary tactic to achieve the ends and encourage the use of nonviolence so that they can maximize the safety of all the participants in the movement". What became crucial for the protesters in OWS was the significant usage of social media as a tool of a grass root revolution that took place in Egypt or Tunisia. In the Arabic countries also the protesters employed the social networking sites like Face book and Twitter to organize and activate themselves to pursue their goals of changing the social reality in which they want to live in[4].

Encouraged by the "Arab Spring and uprisings in Europe, sparked by a challenge from Adbusters magazine to show up at Wall Street on September 17 and "bring a tent," and motivated by veteran New York activists, a few thousand people gathered in the financial district of New York City. At the end of the day, some of them set up camp in Zuccotti Park and started what initially became a national later a international movement"[5]. Occupy Wall Street was a "leaderless resistance movement with protesters of many colors, genders and political persuasions" (www.occupywallst.org). The "protesters define themselves as 'the 99%" of lower wage earners who do not agree with greed and corruption of the 1% top wage earners and an open, participatory and horizontally organized process through which we are building the capacity to constitute ourselves in public as autonomous collective forces within and against the constant crises of our times"[6].

The Occupy Wall street Movement was mainly against income inequality and corporate greed. The movement main claim was that the U.S political and economic system benefits the richest 1 percent as against the 99 percent which has laid the economic fairness front and centre in the presidential race. And with the advent of the economic crisis in 2008, the condition of economic inequality became even worse for the majority of Americans, affected by unemployment, home repossessions, and falling earnings.

While the demand which was made by The Occupy Wall Street movement was not just confine to change. It was centrally based on transforming how we, "the 99%, see ourselves". "The shame many of the people have felt when they couldn't find a job, pay down their debts, or keep their home is being replaced by a political awakening. Millions of people have realized they should not be blamed for a weak economy, for a subprime mortgage meltdown, or for a tax system that favors the wealthy but bankrupts the government. We the 99% are coming to see that we are assured damage in an all-out effort by the super-rich to get even richer"[7].

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[1] Webster Frank. Theories of Information society. Third Edition. Routledge Talyor and Francis Group Books. London and Newyork.

[2] Duff S. Alistair. A Normative Theory of The Information Society. Taylor and Francis: Routledge Research In Information Technology And Society, 2012

[3] Kuhn, R. On the role of human development in the Arab Spring. 2011. University of Denver, Josef Korbel School of International Studies.

[4] IIona Grzywinska, Johnathan Borden. The Impact of social media on traditional media agenda setting theory:The case study of Occupy Wall Street Movement in U.S.A.

[5] Sarah Van Gelder. Introduction: How Occupy Wall Street changes everything.

[6] IIona Grzywinska, Johnathan Borden. The Impact of social media on traditional media agenda setting theory:The case study of Occupy Wall Street Movement in U.S.A.pp-2

[7] Sarah Van Gelder. Introduction: How Occupy Wall Street changes everything.

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*"One of the signs at the Occupy Seattle protest reads: "Dear 1%. We were asleep. Now we've woken up. Signed, the 99%".*

The above sign captures the imagination of Occupy movement. The people of U.S have started seeing their ways of life, aspirations, their security slip away, not because they have turned "lazy or undisciplined, or lacked intelligence and motivation, but because the wealthiest among them have rigged the system to enhance their own power and wealth at the expense of everyone else"[1]. Although initially the movement primary focus was New York City as it is the financial core of the United States, it later spread all over the country. Organizations such as Occupy Together (www.occupytogether.org) and Occupy Colleges (www.occupycolleges.org) were formed to popularize the movement nationally. As argued by Caren and Gaby that "the idea being framed to everybody outside the top 1% of wealth holders in the United States it makes it flexible and easy to apply to different communities and social groups"[2].

The protesters of Occupy Wall Street movement does not treated power as something they need to request or something that others can either grant or withhold. "We the people are the sovereigns under the Constitution. The Occupy Wall Street movement has developed into a space where a multitude of leaders are learning to work together, think independently, and define the world in which they want to live in"[3].

The Information communications technologies these days play a significant "role in the development and persistence of many modern social movements. Among these, the American anti capitalist movement Occupy Wall Street is incredible for the outstanding role played by social media, and in particular Twitter, in facilitating communication among its participants. Functioning as a high visibility forum in which adherents and prospective participants could interact and share information, Twitter represented a valuable resource for supporting the movement's political and social objectives" (Michael D. Conover C. D.).

"Twitter platform like many other information communication technologies, has the potential to bestow a number of benefits to burgeoning social movements. The most important among these is the opportunity to connect individuals in service of the dual goals of resource mobilization and collective framing. Resource mobilization is defined as the process whereby a social movement works to marshal the physical and technological infrastructure, human resources, and financial capital necessary to sustain its ongoing activity" (Michael D. Conover C. D.). Collective framing on the other hand is defined as the social processes whereby movement participants negotiate the shared language and narrative frames that help define the movement's identity and goals"[4].

Within the captivating face-to-face environment experienced by the occupiers stood a diffuse emotional space, which was the traversed by tweets, Face book messages, and live streams. After the activists began establishing the camp on the 17th, Twitter streams on hash tags like "#OccupyWallStreet, #OccupyWallSt, #OWS and #OccupywallstreetNYC became a medium for connecting those outside and those inside the camp. Even the smallest of actions of General Assemblies were tweeted live by top movement tweeps like @DiceyTroop, while others would keep people updated on the different events taking place in the park. These Twitter feeds somehow became like the heartbeat of the movement, sometime going up and down accordingly with the evolution of the situation"[5].

Occupy organizers created a number of Twitter accounts to be used for circulating tactical information. Throughout the different actions around Wall Street and in other parts of the city, these twitter accounts provided with a minute-by-minute coverage of events. Sometimes they went further by providing people specific directions or suggestions on what to do, or on how to divert police crowd-control attempts, in a kind of activist equivalent of military Command, Control and Communication[6]. The Twitter streams assisted

[1] Sarah Van Gelder. Introduction: How Occupy Wall Street changes everything. pp-3

[2] Neal Caren, N. Sarah Gaby. Occupy Online: Facebook and the spread of Ocupy Wallstreet. October24, 2011.Social Science Research Network.

[3] Sarah Van Gelder. Introduction: How Occupy Wall Street changes everything. pp-3

[4] Michael D. Conover, Emilio Ferrara, Filippo Menczer, Alessandro Flammini. May 29, 2013. The Digital Evolution of Occupy Wall Street. PLUS ONE 8(5). pp-2

[5] Paolo Gerbaudo. Tweets and Streets: Social Media and Contemporary Activism. 2012 Pluto Press. pp-123

[6] Paolo Gerbaudo. Tweets and Streets: Social Media and Contemporary Activism. 2012 Pluto Press. pp-128

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maintaining a sense of solidarity between "physical occupiers" and "internet occupiers". The supporters of the movement would frequently send messages of encouragement like "'Today Is a Good Day for Revolution! For Everybody In #OccupyWallStreet! Keep It Up!' or #OccupyWallStreet about time. YES!'. These above messages helped in creating an emotional attraction around the occupation, facilitating the continuous in-flow of supporters, sympathizers, tourists and the curious, in a sort of ongoing pilgrimage which lasted until the camp was evicted"[1].

During the Occupy Wall Street movement the process of popular identity building found its venue not only on Face book and twitter, but also on the Tumblr blog "We are the 99%, through which posting of the stories and pictures of struggling Americans, somehow managed to capture the imagination of many supporters and sympathizers". By collecting the stories of Americans of different classes in one place, "the 99% Tumblr blog became a symbolic rallying point for a diffused community of users called upon to recognize that it is not the problems of some specific individuals, but a consequence of the structural injustice of the economic system to which there was no 'biographical solution'"[2], only a collective one.

The reason which gained surprising level of success by Occupy Wall Street was the terrible economic conditions faced by U.S since 1979. As put forward by many activists that, 30 years of neo liberalism had seen the rich getting richer and the poor poorer. "According to the Congressional budget office, between 1979 and 2007 the richest 1 per cent of Americans saw its earnings rise by a whopping 275 per cent, while the rest saw only a 60 per cent rise along with a rising cost of living".

By manifesting itself in physical and web spaces, the movement came to be amounted as "a 'documentation of disgrace' as said by Shane Gill, who was an activist in Occupy movement that the movement demonstrates that how bad things were in America". Apart from its mediated symbolism which was seen during the movement, the physical space of the park also constituted point of access, a sort of recruitment booth, for those interested in joining the movement. The most crucial factor at this point was the strategic location of the park right in the middle of Lower Manhattan, a place traversed not only by bankers, but also by construction workers such as those employed in the building site of the adjoining Freedom Tower, janitors and waiting staff working in nearby offices and bars, as well as American and international tourists on a visit to the Big Apple.

As pointed out by Paolo Gerbaudo in his works on "Tweets and Streets" that Caiti Lattimer also says that "the internet has allowed the people with the kind of voyeurism which legitimizes the people to watch the movement from afar and even to keep track of it daily without having to be there in person. Therefore I assume that there are a lot people who are closet supporters of Occupy Wall Street"[3]. The role of Twitter and other social networking sites were very crucial for sustaining an emotional space around the OWS movement, connecting occupiers and sympathizers. But rather there was also another dimension of Twitter use which needs to be analyzed. The "tactical role as a platform for real-time coordination during action in emergency situations".

The face book comments, the tweets, the blog posts during the movements which took place in 2011 anticipated the construction of an emotional striving to depart from a sense of isolation, dispersion and passivity that the activists had to face as the hallmark of social experience not only in authoritarian regimes like Mubarak's Egypt, but also in societies fallen prey to neoliberalism's (like in U.S) attack on all forms of public space. "In these crisis conditions of public space, social media have become emotional conduits for reconstructing a sense of togetherness among a spatially dispersed constituency, so as to facilitate its physical coming together in public space. This result evidently goes against much research on new media which has tended to locate them in a 'virtual reality' or in a 'cyberspace' or in a 'network of brains' detached from geographic reality".

Informational society can not only be characterizing on the basis economic dimensions. In the last three decades of the 20th century, recognition to the emergence of the social movements at the end of the 1960s and their multiplication in the following decades, brought with them new forms of looking at experience and defining objectives for social claims. As argued by Manuel Castells that the aims of the young members of these activist movements included a "multidimensional reaction to arbitrary authority, a revolt against injustices and the search for personal experimentation" (Castells M. , 29 Jan 2010).

[1] Paolo Gerbaudo. Tweets and Streets: Social Media and Contemporary Activism. 2012 Pluto Press. pp-124

[2] Ulrich Beck. Risk society: Towards a new Modernity. 1992. London: Sage Publications

[3] Paolo Gerbaudo. Tweets and Streets: Social Media and Contemporary Activism. 2012 Pluto Press. pp-127

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Even though he identify that the changes brought by these "movements were fundamentally cultural and independent of the economic and technological transformations, but they did have an impact on the economy and technology as well as on the resulting restructuring processes" (Castells M. , 29 Jan 2010). And the influence can be seen in the libertarian spirit of the individualized and decentralized use of technology. Castells proposes one of the main features of informational society which has resulted with the technological and economic changes and the social movements over the last three decades is that it has network logic as its basic structure.

The logic of network, as an organizational form, has accompanied human societies throughout history and with this development of the information technologies and their domestication by the organizational structures of companies that the distribution of a model that allies flexibility with effectiveness and efficiency has become feasible. The way these information technologies are employed in the OWS movement is commendable in itself. Manual Castells further argues that "in the new informational mode of development the source of productivity lies in the technology of knowledge generation, information processing, and symbol communication. He says that knowledge and information are critical elements in all modes of development, since the process of production is always based on some level of knowledge and in the processing of information. However, the thing which is very prominent to the informational mode of development is the action of knowledge upon knowledge itself as the main source of productivity. Information processing is focused on improving the technology of information processing as a source of productivity, in a virtuous circle of interaction between the knowledge sources of technology and the application of technology to improve knowledge generation and information processing".

Castells's work is influential because he has very intricately examined both the "cultural and institutional manifestations of network societies and their significance and logic of the emergence of social formations" (Mansell, 2009). Although his theories have been challenged several times by scholars like Nico Stehr and Jan van Dijk for its "modern version of "technological determinism". Despite of all the challenges his work is "considered very important for understanding the enabling as well as the disabling characteristics of what he wishes to call "mass self communication". There are enormous possibilities which have developed and are still developing by the Internet, due to the increasing number of social networking sites, and more access to mobile communication" (Mansell, 2009).

By evaluating United States on the grounds of a network society confers a favourable platform for new forms of activism. These are the social movements which are not only the products but also the expressions and manifestations of a technologically connected society. The society which has "employed information communication technologies (ICTs) such as the Internet as the significant communications and operational tools" (Michelle O n.d.).

For Castells these new forms of activism accentuated by the internet has provided with a new space to the people which have seen these space as an essential platform for debate, and it can serve them as their most potent political weapon". The people have engaged with this medium during Occupy Wall Street protest movement in multiple ways like the way they have used the internet as tool for acquiring information and mobilization is credible. They have "employed the internet medium for the production of frameworks to define the movement and their fields of action through publishing manifestos, principles and policies, building networks through different online groups including think-tanks, legal, volunteer and media services, publishing resources such as online toolkits and how-to guides, and physically manifesting their political ideals through the online coordination of events including stand ins, rallies and marches".[1]

With the expansion of the communicative universe, the media are responsible for the diffusion of the idea of communicative rights i.e. the initiative that everyone has the right to be heard and to make themselves heard in addition to their voting rights. This change can be analyzed in the way the social media and the SMS messages, combine with television, the print media and radio, have given rise to new forms of achievement in the fields of information and entertainment. It is incredible to see the way they have led to the formation of diverse forms of individualized opinion and mass protest through the use of interpersonal communication technologies and also allows for the organization of street protest and criticism of politicians and entrepreneurs.

In all it times the medium of mass communication are extremely important for every political actors. This is especially true in the case of social movements and protest groups. Because As they are outsiders vis-á-vis the institutionalized political game, they have few means to get their voices heard and their activities seen. Many

[1] (Michelle O n.d.) pg-4

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scholars have argued that a movement that does not gain enough attention by is considered non-existent. This underlines the fact that groups and events that are not reported by the media are known only to the immediate participants and bystanders, and not by wider public.

With the technological shift taking place what can be seen is the search for an "alternative communication channel, using personal communication devices in a mass communication process with a wish to establish an alternative to the broadcast communication of the television stations" (Cardoso, From Mass to Networked Communication: Communicational Models and the Informational Society, 2008). The participants in the protest actions understood very well that only engaging with the internet would not provide them with enough legitimacy or the necessary force to achieve their goals at the Occupy Wall Street. What they needed was to take the protest actions to the streets, which were on one hand organized through the Internet but spread to the world by television which still is one of the most widespread mass medium.

The "networked society provides a encouraging environment for organizing new forms of activism, largely through the technology at the movement's disposal."Mobile technologies and telecommunications networks also engage active communications channels for modern activist movements, with connecting tools such as cell phones, wireless internet and mobile instant-messaging services which are mobilized to organize movements of groups, communicate across diverse protest locations, and easily record and spread information and documentation of protest events" (Michelle O).

In modern forms of activism the thing which is worth noticing is the emergence of an "electronic fabric of struggle". However this does not particularly explain that modern protests only comprises of digital activity. Occupy Wall Street movement was not just confine to the use of websites as digital communications, there emerge many rebellion "Internet trend that appeared in the "movement's political vocabulary, a trend become a concept in the form of a hyperlink, video, image, hash tag or catchphrase, which spreads virally through the Internet and drive the movements through micro-media communications networks". The very prominent example of an "OWS popular trend is the image of a petite ballerina posing on the head of a bronze bull sculpture from Wall Street which was considered as a metaphor to describe the zen-like and resilient OWS movement taming the wild bull of a capitalist Wall Street and it also personify the movement inclusion of corporate greed, corruption and inequality of wealth"[1].

The distinction between virtual and physical elements of modern social movements is often overstated, but in actuality there is an innate link between the two. During the movement the "Online activist networks are not a 'place apart' but they to a certain extent played a crucial role in both approaching and mobilizing the physical OWS activity. The online networks building up the offline networks, and vice versa. Modern social movements actively encourage online contributors to extend their participation to a physical level. As seen during the occupy street movement when the slogan of the email discussion list provider "Rise Up is "get off the Internet - we'll see you in the streets!". Because the protestors were well aware with the fact that without the physical face the movement will not be able to last for long" (Michelle O).

*"We talk to each other in various physical gatherings and virtual people's assemblies and then we go out and seize a square of singular symbolic significance and put our asses on the line to make it happen".* (Michelle O n.d.)

As also argues Frank Webster that profusion of information is not in itself a assurance of the social usefulness of that information. One must have the necessary skills so that one can act as an information filter, know how to distinguish and select, or the access to all the information available will be fruitless. "One cannot understand, in the most critical and comprehensive sense of the term, a film if one has no notion of the technique of filming and editing".

**CONCLUSION**

In the concluding remarks the significant point is information society is not only ascribed to the individual notions of technological innovations, or occupational changes or economic growth per se. But the chapter argues and tries to collaborate that how all these changes brought about by the information, when combined together facilitate a society to become an information society. The accumulation of information does not in itself certify a society to become a information society, but it is the usage of the accumulative information which marks the shift in society. The way it is approached in U.S during OWS is exemplary. Through the example of OWS movement it is now understandable that the "possibilities of participatory media are beginning to be realized as people have started deploying decentred knots of social media which has created a

[1] Michelle O, Brien. New Forms of Activism in Network Society

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variegated collage of social worlds across a vast array of millions of public screens. Social media does not guarantee a politics, only the possibility of creating new social worlds. The future offer an excess beyond calculation, and that is why there lays the hope" (Kevin M. Deluca, 9 Nov, 2012). With the arrival of social media it can be seen that something different is not only possible but happening. And now it's the correct time to act.

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