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Socio-Economic Characteristics of Female Population in Usilampatti Taluk, Madurai District Using Multivariate Analysis and Structural Equation Model

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ABSTRACT

The female population characteristic of any area or region is a significant reflection of physical, economic, social justice conditions and availability of the resources. Women's status is often described in terms of their level of education, employment, income, and health as well as their roles within the family and the society. In view of this chapter has been analyzed using systematic socio spatial analysis by means of a structural eduation modeling and factor analysis to extract various aspects of the female population characteristic in the Usilampatti Taluk.

Keywords: Female Population Characteristic, Structural Eduation Modeling, Factor Analysis

I. INTRODUCTION

Structural Equation Modeling is a multivariate statistical analysis technique that is used to analyze structural relationships. This technique is the combination of factor analysis and multiple regression analysis or path analysis, and it is used to analyze the structural relationship between measured variables and latent constructs. Structural equation modeling (SEM) provides a very general and convenient framework for statistical analysis that includes several traditional multivariate procedures, for example factor analysis, regression analysis, discriminant analysis and canonical correlation as special cases. Structural equation modeling is a confirmatory approach to data analysis by specifying the relationships among variables since factor analysis is more exploratory and descriptive by nature so that hypothesis testing in rather difficult. Structural equation modeling provides explicit estimates of error variance parameters. Structural equation modeling procedures incorporate both observed and unobserved variables. Structural equation models are often visualized by a graphical path diagram and also a very general, chiefly linear, chiefly cross-sectional statistical modeling technique. Structural equation modeling (SEM) refers to a diverse set of unrelated computer algorithms and statistical methods that fit networks of constructs to data.

II. STUDY AREA

Madurai district is one among the 32 districts of Tamilnadu. Usilampatti Taluk is located in the northwestern part of Madurai district and south of Tamil Nadu state. The Taluk lies between $9^0$51'5" and $10^0$4'28" North latitude and between $77^0$40'7" and $77^0$58'59" East longitude (Fig.No.1). It has an average elevation of 201mts. Its total geographical area is 501.368sq.km. This taluk consist of 5 firkas and 54

revenue villages which include 357 hamlets and one town panchayat under its administrative capacity. Usilampatti taluk is bordered by Dindigul district in the north, Vadipatti taluk in the north east, Thirumangalam taluk in the South east, Sedapatti taluk in the south and Theni district in the west. The National Highway 49 passes through this taluk in the central part connecting the districts of Madurai in the east and Theni on the west in Tamilnadu and extends upto Kerala state. This taluk is located at 40 Kms away from the Madurai city and most of the areas are rural by nature.

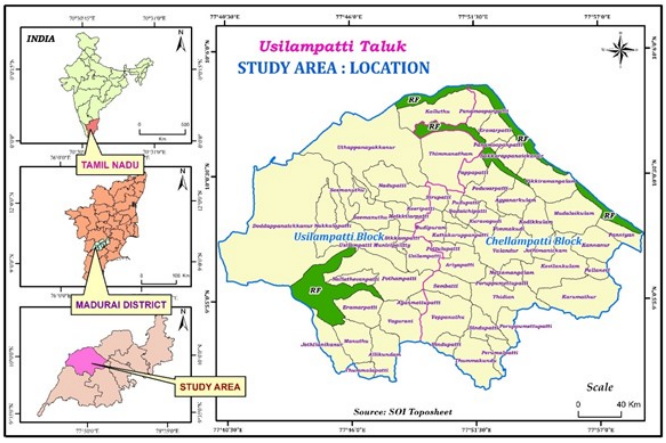

Figure 1

OBJECTIVES

1. To analyse the factors which are determining the status of women in Usilampatti taluk, Tamil Nadu, India, and
2. To evaluate whether all the measures fit the recommended value, indicating a good fit of the path model for the collected sample data.

III. METHODOLOGY

The methodology adopted in order to fulfill the above objective with a rapid inventory of the available information. The present study has been effectively analyses through multivariate factors analysis by selecting 77 variables. The information collected from the primary survey of the female socio-economic characteristics. There are 6 subdivisions such as socio - economic status, occupational status, educational status, mindset, consciousness and self - help group status. The variables are analyzed and synthesized through multivariate techniques over as factor analysis.

1. Principal Component Analysis (PCA): This is the most common method used by researchers. PCA starts extracting the maximum variance and puts them into the first factor. After that, it removes that variance explained by the first factors and then starts extracting maximum variance for the second factor. This process goes to the last factor.
2. Common Factor Analysis: The second most preferred method by researchers; it extracts the common variance and puts them into factors. This method does not include the unique variance of all variables. This method is used in Structural Equation Model (SEM).
3. Image Factoring: This method is based on correlation matrix. OLS Regression method is used to predict the factor in image factoring.
4. Maximum Likelihood Method: This method also works on correlation matrix but it uses maximum likelihood method to factor.
5. Other Methods of Factor Analysis: Alfa factoring outweighs least squares. Weight square is another regression based method which is used for factoring

IV. FINDINGS AND DISCUSSIONS

The application of factor analysis in the present study is very useful in separating the major dimensions of female population characteristics. In the present study, the Kaiser-Meyer-Olkin (KMO), a Measure of Sampling Adequacy (MSA) was used that the appropriateness of carrying out of factor analysis can be detected. The maximum value of KMO can be 1.0, a value of 0.9 is considered as 'marvelous', 0.80, 'meritorious', 0.70, 'middling' 0.60, 'mediocre', 0.50, 'miserable' (Andony & Rao, 2007). The output of present study, the data, Kaiser-Meyer-

Oklin (KMO) value is 0.875 (Table 5.1), signaling that a factor analysis of the variables can proceed. Another test of the strength of the relationship among variables was done using the Bartlett's (1954) Test of Sphericity. The Bartlett's Test of Sphericity is used to examine the hypothesis that the variables are uncorrelated in the population. This helps the researcher to reduce the uncorrelated parameters entered in the analysis to test the hypothesis. The error data can be eliminated to get corrected data set. The results of our analysis showed a significance level of 0.001. It can be concluded that the strength of the relationship among variables is very strong or the correlation matrix is not an identity matrix as is required by factor analysis to be valid. In the present study even though 360 variables, under 6 sub headings has been entered only 77 highly associated parameters are deducted for the analysis. These diagnostic procedures indicate that the factor analysis is appropriate for the data set.

Table 1. Kaiser-Meyer-Oklin and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.875
Bartlett's Test of Sphericity	Approx. Chi-Square	11644.94
	df	465
	Sig.	0.001

Table 2. The Eigen Values and Cumulative Percentage of Variance

Component	Eigen Values	% of Variance	Cumulative %
Economic Status of Women	7.885	10.411	10.411
Status of Women Sharing Family Burden	6.006	8.089	18.5
Partially Independent Status of Women	5.91	7.991	26.491
Low Social Status of Women Community	5.165	6.707	33.198
Women Ignorance Status	4.368	5.761	38.959
Awareness Status of Women	4.022	5.458	44.417
Educational Status of Women	3.624	4.946	49.363
Status of Women SHG	3.21	3.958	53.321
Inequality of Wages	2.94	3.888	57.209
Motivation of Girls' Education	2.777	3.707	60.916
Female Marginal Workers - Participation	2.526	3.513	64.429
Family Head - Husband	2.482	3.214	67.643
Status of Dowry	2.28	3.054	70.697
Elementary Level Education	1.907	2.537	73.234
Women Status	1.807	2.352	75.586

Source: Field Survey, Calculation by SPPS 16 Software

Principal components analysis of the present study revealed the presence of fifteen components with Eigen values exceeding 1.0 and together account for almost 75.5% of the total variance (Table - 2). The spatial difference in the pattern of female population characteristics are successfully explained by these fifteen components. There are only the seven components factors extracted by using factor

analysis like Economic Status of Women, Status of Women Sharing Family Burden, Partially Independent Status of Women, Low Social Status of Women Community, Women Social Status of Ignorance, Awareness Status of Women and Educational Status of Women are confirmed and these measured variables determine the socio-economic development of women in Usilampatti taluk of Madurai district. The confirmatory factor analysis is used for testing the relationships among the observed variables. Hence, this present study focuses by Path analysis with Structural Equation Modeling using AMOS software.

V. MAXIMUM LIKELIHOOD ESTIMATES

Path analysis with Structural Equation Modeling was used to analyze the suitability of the model based upon the selected variables. As recommended by Anderson and Gerbing (1988), measurement model to test the reliability and validity of the survey instrument was analyzed first, and by using AMOS, the path analysis model was analyzed. This path analysis with structural equation model (SEM) is the most useful while assessing the causal relationship between the variables as well as verifying the compatibility of the model used (Peter, 2011).

Structural Equation Modeling evaluates whether the data fit a theoretical model. As per the result, Chi square statistics with P = 0.069 is greater than recommended value (p=>0.05). Therefore, it shows a good fit of the model. However, this model is considered for further interpretation in the goodness of fit measures. Common model-fit measures like chi-square/degree of freedom (χ^2/df), the comparative fit index (CFI), root mean square error of approximation (RMSEA), the normated fit index (NFI), incremental fit index (IFI), and the Tucker Lewis index (TLI) were used to estimate the measurement model fit. Table – 3 shows the estimates of the model fit indices from AMOS structural modeling.

Table 3. Fit Statistics of the Measurement Model

S.No.	Fit Statistic	Recommended	Obtained
1	Chi Square	-	19.083
2	df	-	10.00
3	Chi Square significance	p = > 0.05	0.069
4	Chi Square/df	≤ 5.0 (Hair et al., 1998)	1.908
5	Goodness of Fit Index (GFI)	0.90 (Hair et al. 2006)	0.991
6	Adjusted Goodness of Fit Index (AGFI)	0.90 (Daire et al., 2008)	0.969
7	Normated Fit Index (NFI)	≥ 0.90 (Hu and Bentler, 1999)	0.927
8	Relative Fit Index (RFI)	0.90 Hu and Bentler, 1999	0.965
9	Comparative Fit index (CFI)	0.90 (Hu and Bentler, 1999)	0.961
10	Tucker Lewis Index (TLI)	≥ 0.90 (Hair et al., 1998)	0.891
11	Incremental Fit Index (IFI)	Approaches 1	0.964
12	Root Mean Square Error of Approximation (RMSEA)	< 0.05 (Hair et al., 2006)	0.041
13	Root Mean Square Residual (RMR)	< 0.08 (Hair et al. 2006)	0.054
14	Parsimony Goodness-of-Fit Index (PGFI)	Within 5.0 (Mulaik et al., 1989)	0.275

According to Gerbing and Anderson (1992), the criteria for an acceptable model are as follows: RMSEA of 0.08 or lower; CFI of 0.90 or higher; and NFI of 0.90 or higher. The fit between the data and the proposed measurement model can be tested with a chi-square goodness-to-fit (GFI) test where the probability is greater than or equal to 0.9 indicating a good fit (Hu and Bentler, 1999). The Goodness of Fit Index (GFI) of this study was 0.991 more than the recommended value of 0.90 the other measures fitted satisfactorily. Adjusted Goodness of Fit Index (AGFI) =0.969, Relative Fit Index (RFI) =0.965, Comparative Fit index (CFI) =0.961, Tucker Lewis Index (TLI) =0.891, Incremental Fit Index (IFI) =0.964, Normated Fit Index (NFI) =0.927 with Chi Square /difference (χ^2/df) =1.908, Root mean square error of approximation (RMSEA) =0.041 (Bagozzi and Yi, 1988), Root Mean Square Residual (RMR) =0.054 and Parsimony goodness-of-fit index (PGFI) =0.275 indicate a good absolute fit of the model. Goodness of fit indices support the model fit and these emphasized indices indicate the acceptability of this structural model. According to Bollen (1989), the higher the probability associated with Chi-square, the closer the fit between the hypothesized model and the perfect fit. The test of our null hypothesis H_0 - is a seven-factor structure as shown in Figure 2 and 3, giving a chi-square value of 19.083 with 10 degrees of freedom and the calculated P value 0.069 is greater than 0.05. As per the result, Chi square statistics with P = 0.069 is shows a good fit of the model. However, this model is considered for further interpretation in the goodness of fit measures. Hair et al. (1998) suggested the value for the fit statistic minimum discrepancy/degrees of freedom (CMIN/DF), otherwise chi-square/degrees of freedom as ≤ 5.0. As per the table 13, the value for the chi-square/degrees of freedom is 1.908 which is less than the accepted cut off value of ≤ 5.0.

Table 4. Structural Equation Modeling Regression Weights

Women Status Component			Unstandardized co-efficient	S.E.	Standardized co-efficient	C.R.	P Value
Awareness Status of Women	<--	Partially Independent Status of Women	-11.284	3.876	-.126	-2.912	<0.004**
Awareness Status of Women	<--	Low Social Status of Women Community	-7.192	2.445	-.130	-2.941	<0.003**
Awareness Status of Women	<--	Women Social Status of Ignorance	6.642	3.833	.075	1.733	<0.083*
Economic Status of Women	<--	Low Social Status of Women Community	-1.142	.340	-.155	-3.358	<0.001**
Economic Status	<--	Educational Status of Women	0.536	.222	.111	2.416	<0.016*
Economic Status of Women	<--	Status of Women Sharing Family Burden	1.782	1.240	.061	1.437	<0.151
Economic	<--	Awareness Status	0.019	.006	.145	3.439	<0.001**

Women Status Component			Unstandardized co-efficient	S.E.	Standardized co-efficient	C.R.	P Value
Status of Women	-	of Women					
Status of Women	<---	Economic Status of Women	0.156	.051	.129	3.022	<0.003**

Note: ** denotes significant at 1% level * denotes significant at 5% level

SIGNIFICANCE TESTS OF INDIVIDUAL PARAMETERS

The above table 4 is demonstrating the unstandardized coefficients, standardized coefficient and associated test statistics. The amount of change in the dependent or mediating variable for each unit change in the variable predicts that, it is symbolized by the unstandardized regression coefficient. Table 4 also shows its standard error (abbreviated S.E.), and the estimate divided by the standard error (abbreviated C.R. for Critical Ratio). Under the column P, the probability value associated with the level of Significance.

LEVEL OF SIGNIFICANCE FOR REGRESSION WEIGH

From the table 4 it could be observed that the unstandardized coefficient of 'Partially Independent Status of Women' is -11.284 and standardized coefficient is -.126 indicating the partial effect of 'Awareness Status of Women' while the other variables are interrelated and constant. The estimated negative sign implies that partially independent status of women with awareness status of women effect is negative that the coefficient value is significant at 1 per cent level. This is evidently proved that the variables of Partially Independent Women increasing with the increasing awareness of women.

The unstandardized coefficient of 'Low Social Status of Women Community' is -7.192 and standardized coefficient is -.130 signifying the partial effect of 'Awareness Status of Women' while the other variables are interrelated and stable. The estimated negative sign implies that low social status of women community with awareness status of women effect is negative that the coefficient value is significant at 1 per cent level. Therefore, this is undoubtedly proved that the increases of low Social status of community with decrease of women awareness status of women.

The unstandardized coefficient of 'Women Social Status of Ignorance' is 6.642 and standardized coefficient is .075 signifying the partial effect of 'Awareness Status of Women' while the other variables are interrelated and stable. The calculated positive sign implies that women social status of ignorance with awareness status of women effect is positive that the coefficient value is significant at 5 per cent level. As a result, this is unquestionably proved that the increases of women social status of ignorance with decrease of awareness status of women.

The unstandardized coefficient of 'Low Social Status of Women Community' is -1.142 and standardized coefficient is -.155 demonstrating the partial effect of 'Economic Status of Women' and holding the other variables are interrelated and constant. The estimated negative sign implies that low social status of women community with economic status of women effect is negative. There are economic status of women would increase with decrease in low social status of women community and this coefficient value is significant at 1 per cent level.

The unstandardized coefficient of 'Educational Status of Women' is 0.536 and standardized coefficient is .111 indicating the partial effect of 'Economic

Status of Women' while the other variables are interrelated and stable. The estimated positive sign implies that educational status of women with economic status of women is positive that the coefficient value is significant at 5 per cent level. This is clearly proved that the variables of educational status of women would increase with the increasing economic status of women.

STRUCTURAL EQUATION MODEL OF STATUS OF WOMEN: UNSTANDARDIZED ESTIMATES

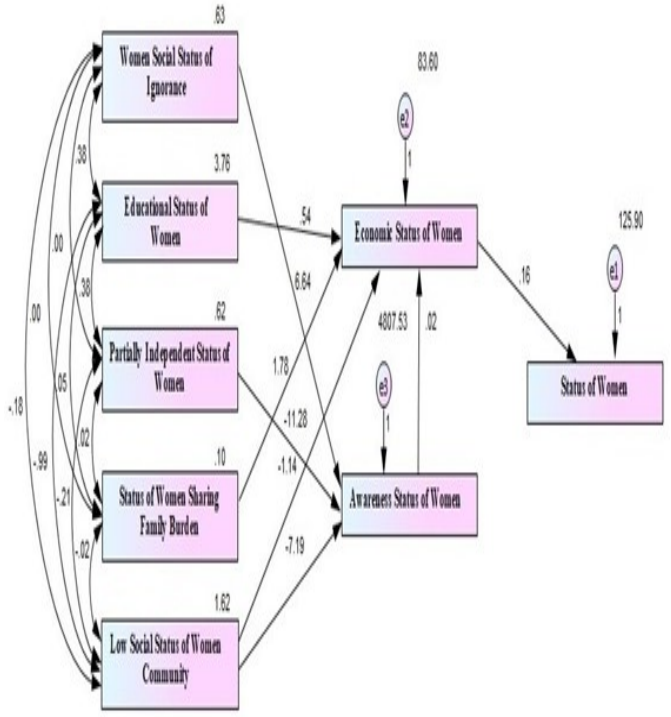

Figure 2. Structural Equation Model Of Status Of Women: Standardized Estimates

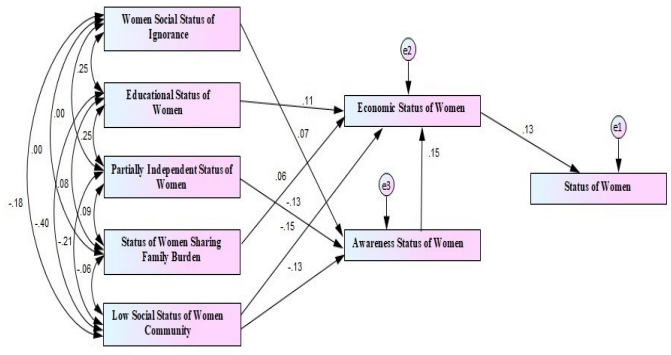

Figure 3

The unstandardized coefficient of 'Status of Women Sharing Family Burden' is 1.782 and standardized coefficient is .061 indicating the partial effect of 'Economic Status of Women' and holding the other variables are interrelated and constant. The estimated positive sign shows that status of women sharing family burden while economic status of women would increase.

The unstandardized coefficient of 'Awareness Status of Women' is 0.019 and standardized coefficient is .145 demonstrating the partial effect of 'Economic Status of Women' and holding the other variables interrelated and as constant. The estimated positive sign implies that awareness status of women with economic status of women would effect is positive and this coefficient value is significant at 1 per cent level. This is evidently proved that the variables of women awareness status increasing with the increasing economic status of women.

The unstandardized coefficient of 'Economic Status of Women' is 0.156 and standardized coefficient is .129 demonstrating the partial effect of 'Status of Women' and holding the other variables as constant. The estimated positive sign implies that economic status of women with status of women effect is positive that women Economic Status would increase while increase in Status of Women and this coefficient value is significant at 1 per cent level.

Figure 2 and 3 shows that the Status of Women Structural Equation Model and it clearly proves that directly correlated with Educational Status of Women, Status of Women Sharing Family Burden and Low Social Status of Women Community are influencing the Economic Status of Women and the factors like Women Ignorance Status, Partially Independent Status of Women and Low Social Status of Women Community are determining the Awareness Status of Women. The factor Awareness Status of Women has direct impact on Economic Status of Women and the factor Economic Status of Women has straight relationship with the Status of Women.

VI. CONCLUTION

The confirmatory factor analysis and structural equation model, it can be concluded that, in the study area in period of study and prevailing socio economic condition of the taluk and resource base the seven factors like Economic Status of Women, Status of Women Sharing Family Burden, Partially Independent Status of Women, Low Social Status of Women Community, Women Ignorance Status, Awareness Status of Women and Educational Status of Women are predicted the Status of Women in Path Model. This study establishes and builds up status of women and examines the relationship among the existing women population characteristics. The status of women identified in this study adequately fit in this area.

The factorial output and the residuals help to formulate a statement that; the status of women is highly determined by Economic, Social, Educational and Awareness Stats of Women. This statement is tested of aim by the use of Structural Equation Model to precisely estimate the significance of the variable determinant for the status of women in Usilampatti Taluk during study period. In variably the Social, Educational factor determine the Economic Status and Awareness Status. Hence the status of women in Usilampatti Taluk is significantly determined by the level of Awareness Status and Economic Status of Women.

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