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AN ECONOMETRIC FRAMEWORK OF POLYTHENE INDUSTRIAL COOPERATIVES IN TAMIL NADU

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ABSTRACT

As an alternative to the paper bags, the polythene bags was introduced for packing material and widely used in many household items. It has a credit of cheap, light weight and portability, with its intrinsic values of non-bio degradable, hazardous and unfriendly to environment. Under cooperative manifestation, the polythene industries are in the category of industrial cooperatives. Forestry, agriculture, horticulture, consumer cooperative stores and other cooperative organizations are the major customers of the unit. The remuneration for worked laboures is given either shift basis (Purposively for male) or piece basis (for female) at the end of every month. Data analysis pertains to both State and district level for aggregate and individual respectively. The pattern of paid up share capital from growth orientation is not satisfactory as it gives negative results of CAGR. However, in terms of profit and loss, the societies are progressive scale. The stochastic production function is used to find the rate of returns of the industrial cooperatives and the finding suggests that the societies are under increasing scale. The results of ratio analysis in terms of viability and working capital turn over are moderate. The interrelationship between the economic variables of polythene industry shows that among all the rewards, the wages have more impact on production.

KEYWORDS

Stochastic Production Function, Trend Analysis and Ratio Analysis and Multiple Regression Analysis.

INTRODUCTION

As an alternative to the paper bags, the polythene bags was introduced for packing material and widely used in many household items. It has a credit of cheap, light weight and portability, with its intrinsic values of non-bio degradable, hazardous and unfriendly to environment. The development of polythene industries traced back to early seventies and got emerging sector during eighties. It is manufactured under government patrol, private and also cooperative regime. Under cooperative manifestation, the polythene industries are in the category of industrial cooperatives. Industrial cooperatives aim to provide employment opportunities to the rural and semi urban areas. They are helpful not only for providing employment opportunities but also absorb excess and crowded laboureres in the agriculture sector and Women laboureres also getting employment opportunities. The Industrial Cooperatives comes under the Ministry of Industries and Commerce, Chennai and there is a separate wing for gathering information. For administrative convenience, the functions of ICs are grouped under twenty heads like tea, coir, sago and starch, polythene, coal and coke, estates, handicrafts, bricks and metals. Today's competitive market parlance, packing is inseparable and it is most welcome by the consumers because of the easy handling. Hence, Polythene Industrial cooperative societies are one among the emerging ICs.

In Salem district Polythene Industrial cooperatives in Salem district is started in the year 1976 with an aim of raising economic status of the members. The works under the society was taken on contract basis. Forestry, agriculture, horticulture, consumer cooperative stores and other cooperative organizations are the major customers of the unit. The remuneration for worked laboures is given either shift basis (Purposively for male) or piece basis (for female) at the end of every month.

A few studies throw light about polythene industries and some studies have undertaken under cooperative regime. According to Macur and Pudlowski (2009), the polythene bags was introduced by USA during 1970's for food package materials and latter it expanded to commercial scale during 1973, and after four years 1977 it is used for glossary items. The wide usage has started in after eighties. The studies like Rajendran and Gandhimathy (2010 and 2011) and Gandhimthy and Rajendran (2011a&b) analyses the significance of industrial cooperative sector in the group of Sago and Starch and Coir. In this line, the author endeavors to analyze the performance of polythene industries under cooperative fold. With this underpinning, the present study has been undertaken to explore the performance of polythene industrial cooperatives at aggregate and individual level. The study is segregated into five sections: the first section gives the introduction and earlier studies, the second section pertains to methodology, the third and the fourth section discusses the results at aggregate and individual levels respectively and the fifth section gives conclusion.

OBJECTIVES OF THE STUDY

1. To examine the share capital pattern of polythene industrial cooperatives in Tamil nadu.
2. To analyze the growth of polythene industrial cooperatives in Tamil Nadu.
3. To study the viability position of Polythene industrial cooperatives in Salem district.
4. To bring out the extent of relationship between economic variables in the Polythene industrial cooperatives in Salem district.

METHODOLOGY

Data analysis pertains to both State and district level for aggregate and individual respectively. Depending upon the availability, the former data set contains one decade (2000-10) and the latter data set contains three decades (1981-2009). The variables selected for this study are number of societies, membership and their contribution, government contribution, total capital, profit, sales, government and bank loan, sundry debtors, production, working capital, wages, interest, value added. Compound Annual Growth Rate (CAGR) is find out by using the formula of $\frac{\text{Ending value}}{\text{Starting Value}}^{1/n-1} - 1 \times 100$. Percentage Change = $\frac{\text{Current year} - \text{Base year}}{\text{base year}} \times 100$. Economic Viability (EV) = $\frac{\text{Gross Profit}}{\text{Working Capital}} \times 100$. The Working Capital Ratio = $\frac{\text{Sales}}{\text{Working capital}}$. The simple and multiple regression model and stochastic production function is analyzed for using SPSS package and Micro soft excel 2007. Pictorial form also exhibited for clear understanding.

AGGREGATE ANALYSIS

As industrial cooperatives are State subject, the data analysis pertains to Tamil nadu Polythene Industrial cooperative societies. The following table shows the growth of paid up share capital.

TABLE – 1: GROWTH OF PAID-UP SHARE CAPITAL

Years	Members	Members contribution	Per Unit members contribution	Government contribution	Total capital	Percentage Change
2000-01	1117	1840	1.65	1212	3052	-
2001-02	1008	1797	1.78	1212	3009	-1.41
2002-03	818	1450	1.77	1012	2462	-18.18
2003-04	1097	2328	2.12	1213	3541	43.83
2004-05	1138	1507	1.32	1013	2520	-28.83
2005-06	1142	999	0.87	1012	2011	-20.2
2006-07	998	925	0.93	988	1913	-4.87
2007-08	1002	969	0.97	1303	2272	18.77
2008-09	996	930	0.93	1329	2259	-0.57
2009-10	804	724	0.9	1569	2293	1.51
M	1012	1346.9	1.324	1186.3	2533.2	-1.11
SD	121.33	521.55	0.46	186.36	513.68	
CV	11.98	38.72	35.32	15.70	20.27	
CAGR	-3.58	-9.84	-6.51	2.91	-3.12	

The table 1 reveals that except government contribution, all other factors have shown the negative growth rate. The members of the society, members' contribution, government contribution and paid up capital is decreasing from year to year as shown by the table. The extent of correlation between profit and sales is identified with the help of simple regression model. The following table 2 shows it.

TABLE – 2: RESULTS OF SIMPLE REGRESSION MODEL FOR PROFIT AND SALES (From 2000-01 to 2009-10)

Trade Type	Unstandardised Co-efficients		Std. Co-efficients		t	Significance	R2 Value
	B	Std.Error	Beta				
Polythene	.269	.048	.892		5.586	.001	.796

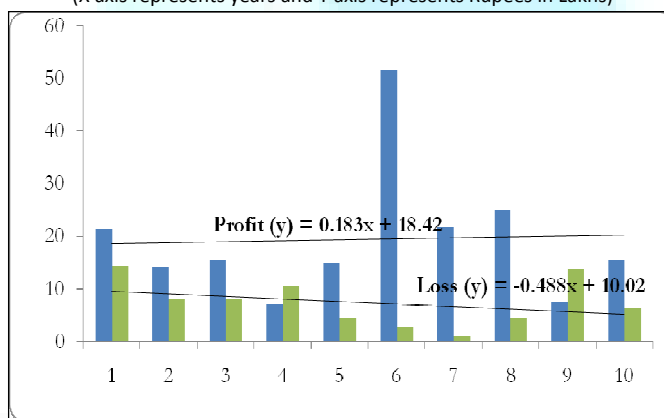
Note: Profit dependent variable and sales independent variable.

The table 2 indicates that, for every unit increase of sales, the profit increases at 0.29 units. The coefficient of determination is 0.796, hence it indicates that the profit explained by sales is 80 percent and remaining 20 percent is due to non included variable.

TREND ANALYSIS

Financial performances of the societies are identified by taking the values of profit and loss. Trend line equation is constructed for the movement of the society. It shows the financial position of the society. X = Time factor, Profit (y) = Profit amount, Loss (y) = Loss amount. The following chart shows it.

CHART -1: TREND LINES OF PROFIT AND LOSS IN POLYTHENE ICS
(X axis represents years and Y axis represents Rupees in Lakhs)



The average annual increase of profit value of the society is 0.183 lakhs and the average annual loss of the society decreased at 0.488 lakhs. Hence, it is clear that the societies are progressive scale.

STOCHASTIC PRODUCTION FUNCTION MODEL

Stochastic production function serves as a better tool for analyzing production function. It is hypothesized that the variables such as number of societies, workers, members' contribution, government contribution, government loan, bank loan and sundry debtors are the influencing factors for production. Hence, these factors are selected to compute the production function.

Model is constructed for the PICs as Production = f (No of societies (X₁), Labourers (X₂), Members Contribution (X₃), Government Contribution (X₄), Government Loan (X₅), Bank Loan (X₆) and Sundry debtors (X₇).

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n + \epsilon;$$

Y is the dependent variable,

X₁, X₂, X₃,.....X_n are the independent variables,

β₀ = constant

β₁, β₂, β₃,.....+ β_n are the regression co-efficient.

ε =error term.

TABLE – 3: RESULTS OF THE STOCHASTIC PRODUCTION FUNCTION MODEL

Independent variable	Production (Dependent Variable)	
	B	t
Constant	-3.43	-2.42
Societies	2.56	2.94
Workers	-.38	-2.26
Members contribution	-.35	-1.52
Govt. Contribution	.22	.56
Govt.loan	-.02	-.70
Bank Loan	.84	5.45
Sundry Debtors	1.09	7.18
R2		.98
F		.98*
Sum of Regression co-efficients	3.964	
Rate of Returns	Increasing	
*.05 level of Significance		
Y= -3.43+2.56X ₁ -0.38X ₂ -0.35X ₃ +0.22X ₄ -0.02X ₅ +0.84X ₆ +1.09X ₇		

The inferences of the table 3 elaborated that for every increase of the society, production increases at 2.56 units. Establishment of new societies brings more production and there exists a positive association between production and societies. There exists a negative association between workers and production. Some of the workers under the polythene societies are either disguised or unproductive workers. All the workers do not contribute total production because every unit increase of the workers, the production decreases at 0.38 units. It indicates that while employing the labourers, care should be taken to see that they are actually contributing to the society are disturbing other workers. The members' contribution is negative and for every unit increase of members' contribution, production decreases at 0.35 units. For every unit increase of the government contribution, the production increases at .22 units. The government loan is used for productive purposes like purchase of raw materials. The society borrowed money either for production or repaying the loan amount including service charges and interest. For every unit increase of the government loan production decreases at .02 units, but the bank loan increases the production at 0.84 units. Sundry debtors are the miscellaneous small customers that are not assigned individual ledger accounts but are classified as a group. The sundry debtors are assets of the society, if the borrowers repay the amount at right time. It gives optimistic view about the society. The statistical significance of the variable is highly fit as it shows the R2 = 0.98. Only two percent is due to other factors and P value also satisfied at five percent. In order to find whether the societies are under increasing/decreasing/constant returns, the researcher sums all the b co-efficients of selected variables. As it is greater than one (3.964), the polythene industrial cooperative societies in Tamil nadu are under Increasing Returns to scale.

CASE STUDY FOR INDIVIDUAL ANALYSIS

Salem district is industrial pooled area and there is demand for polythene bags among various sectors like households, firms, government and cooperative societies. Taking advantage of this, the ministry of industries and commerce was decided to setup the polythene industrial cooperative society during the year 1976 in the Pachnampatty village, Omalur taluk in Salem district. The total area of the society is 1693 sq feet. Per value of share is fifty and maximum share is 100000. The members can avail a minimum of one share to a maximum of 2000 shares. The required raw material and machine are purchased and distributed to the members for ready cash or on credits. The society purchases granels from the Indian Petro Chemicals Corporation Dealers – Steel Tex Agency to make polythene bags. Members' contribution to the society is more in the first half of the study period where as government contribution is more in the second part of the study period.

TABLE – 4: CAGR OF PROFIT IN SALEM DISTRICT

Years	CAGR (%)
1981-91	3.84
1991-01	9.29
2001-09	7.60

The table 4 shows the CAGR of profit of the Omalur Polythene ICs in Salem district. Decadal comparison is made and it shows that during 1981-91, the CAGR is 3.84 percent, 1991-2001, it is 9.29 percent and in the last decade it is 7.60 percent. Relatively, post liberalization first phase (1991-01) had a higher level of growth than other two decades. The quantum of relationship between production and sales is finding out by the correlation matrix computed with the help of SPSS package.

TABLE – 5: CORRELATIONS BETWEEN PRODUCTION AND SALES

		prod	sales
prod	Pearson Correlation	1	.988(**)
	Sig. (2-tailed)	.	.000
	Sum of Squares and Cross-products	8646150900000.000	11100728700000.000
	Covariance	960683433333.333	1233414300000.000
	N	10	10
sales	Pearson Correlation	.988(**)	1
	Sig. (2-tailed)	.000	.
	Sum of Squares and Cross-products	11100728700000.000	14590874100000.000
	Covariance	1233414300000.000	1621208233333.333
	N	10	10

** Correlation is significant at the 0.01 level (2-tailed).

There exists a high degree of relationship between production and sales turn over. The correlation coefficient is 0.988 and P value is highly significant.

RATIO ANALYSIS

Economic viability of the society is finding out by using the ratio analysis. But profit in terms of working capital indicates the economic viability of the society and it is relatively bad condition during mid of the period. From the reference point of view, the working capital ratio is equal to five times. If it is less than five, it indicates idle cash and the society should enhance its trading activities. If it is more than five times, it indicates abuse of the working capital, indicates wastages. Hence, the idle ratio should be nearer or equal to five. The working capital ratio is not good in post liberalization first phase, than pre and post second phase.

TABLE – 6: PERFORMANCE OF OPWICS (1981-09)

Years	EV (%)	WCR (Times)
1981-82	107.91	12.62
1986-87	49.22	2.28
1991-92	55.83	3.08
1996-97	31.18	3.61
2001-02	34.31	2.15
2008-09	4.60	1.94
1981-91	64.14	4.35
1991-01	63.81	4.02
2001-09	33.69	2.44
1981-09	55.32	3.69

The table indicates that during the study period the economic viability is more than fifty percent. In the first decade the viability is relatively better than other two decades. The table four shows that the CAGR of profit is high in the mid nineties. To contradict to this the viability of the society is lower level in this period. It indicates that in absolute terms the growth of profit is good in during 1991-2000, but in terms of working capital and profit, the first phase (1981-2000) is good. The society should try to enhance its trading activities because it is lower than its ideal level. The viability position for the period of three decades is 55 percent.

ORDINARY LEAST SQUARE EQUATION

The trend equation is given that $Y_t = a + bX_t$ ($t = 1, 2, \dots, 30$). Y_t = Character under study, X_t is the time period under study. In this study the characteristics under study are Production (Pr), Wages (W), Purchase (Pu), Membership (M) and Time (T).

TABLE – 7: SUMMARY OF TREND ANALYSIS (1981-2009)

Variables	R2	P value & Significant level	Trend Equation	t value & Significant level
Production (Pr)	0.383	4.976 (0.056)	$Pr = 1642333 + 200466.7T$	2.231 (.056)
Sales (S)	0.041	5.715 (0.044)	$S = 1907600 + 271472.7T$	2.391 (0.044)
Wages (W)	0.251	2.677 (0.140)	$W = 153866.7 - 8684.84T$	-1.636 (0.140)
Purchase(Pu)	0.822	36.899 (0.000)	$Pu = 925116.4 + 308711.2T$	6.074 (0.000)
Membership(M)	0.745	23.335 (0.001)	$M = 42.733 - 2.370T$	-4.831 (0.001)

The results revealed that the average annual increase of the production is Rs. 200466. The average annual increase of the sales is Rs.271472.7, the average annual decrease of the wages is Rs.8684, and purchases are rs.308711. The average annual decrease of the membership of the society is two. The wages and membership decreases.

INTER RELATIONSHIP BETWEEN THE ECONOMIC VARIABLES

There are four factors of production viz., land, labour, capital and organization and their rewards are rent, wages, interest and profit respectively. As the society is situated in own land it need not pay the rent. Hence, excluding rent, other factor rewards such as wages, interest and profit are taken into account. One more variable value added is taken due to its significance. It is hypothesized that value added and factor rewards influences the production function. Hence, in order to find the extent of relationship between production and factor rewards and value added, multiple regression analysis is computed. Production (y) = f (Value Added, Wages, Profit and Interest).

TABLE – 8: MULTIPLE REGRESSION ANALYSIS

Independent variable	Production	
	B	t
Constant	4.198	
Value Added	0.153	1.053
Wages	0.376	1.960
Interest	-0.167	-1.559
Profit	0.045	3.154
R2	0.846	
F	6.879	
$Y = -4.198 + 0.153X_1 + 0.376X_2 + 0.045X_3 - 0.167X_4$		

There exists a positive relationship between value added and production. For every unit increase of value addition, the production increases at 0.15 units. The excess amount is capital formation, which is used for further investment. If it increases the production also increases. The remuneration given for labourers (wages) and production have positive relationship. Increased wages increases the marginal productivity of labourer. For every unit increase of wages, production increases at 0.37 units. Interest is paid for borrowed capital; hence it shows the negative association between the interest and production. For every unit increase of interest, the production decreases at 0.16 units. There exists a positive correlation between profit and production. The profit amount gives incentives to the society. The society can acquire fund by showing their profit amount. For every unit increase of profit, the production increases at 0.045 units. As the society is cooperative organization, it does not aim at profit. That's why the b co-efficient for profit is relatively smaller than other factor rewards like wages and interest. The profit level is acquired after deducting wages and interest. The co-efficient of determination (R2) value is 0.846 which is statistically significant P value at 0.05 level.

CONCLUSION

This study is an attempt to explore the economic performance of Polythene industrial cooperative societies. The pattern of paid up share capital from growth orientation is not satisfactory as it gives negative results of CAGR. However, in terms of profit and loss, the societies are progressive scale. The stochastic production function is used to find the rate of returns of the industrial cooperatives and the finding suggests that the societies are under increasing scale. From the case study, a few inferences are drawn. The CAGR of individual society is moderately good and the correlation between production and sales is excellent. The results of ratio analysis in terms of viability and working capital turn over are moderate. The interrelationship between the economic variables of polythene industry shows that among all the rewards, the wages have more impact on production.

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