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A STUDY ON PERFORMANCE AND FORECASTING OF SILK HANDLOOM WEAVER'S CO-OPERATIVE SOCIETY LIMITED IN KANCHIPURAM CITY IN TAMILNADU

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Abstract
Kancheepuram is the city not only famous for Temples; it is also famous for Silk. Silk Handloom in this city maintains the culture of TamilNadu and attracts peoples all over the World. Some parts of the peoples depend on the silk industry for their livelihood. So, the study is intended to focus on forecasting performance of five Silk Handloom Weaver's Co-operative societies located in Kancheepuram city in TamilNadu. For this purpose secondary data are collected from the 10 year reports of five silk Handloom Weaver's Co-operative Societies namely Arinar Anna, Kamakshiamman, Thiruvalluvar, Kancheepuram Silk Weavers Co-operative Production and Sales Society (KPM) and Dr. Kalaignar Karunanidhi Silk Weavers Co-operative Society. The collected data have been processed by Statistical softwares Excel, SPSS and R. This study focuses the current performance and forecasting of the five societies using time series analysis and some statistical techniques like regression and one way ANOVA.

Introduction

The Silk weaving industry of Kanchipuram can be broadly divided in to two segments. One is the Master Weaver in the private sector and other is Weaver co-operative societies. While the Master weaver use their own financial resources to run the business, the societies which are under the administrative control of the Department of Handlooms and Textiles are given cash credit by the co- operative banks at the concessional rate of interest to run the business.

Many small societies once in the production of real zari sarees could not afford real zari production and had switched over to production of silk varieties using Half Fine Zari. Currently, the following 6 societies in Kanchipuram are involved in the production of silk varieties using Real Zari.

1. Kanchipuram Aringnar Anna Silk Weavers Co-operative Society
2. Kanchipuram Murugan Silk Weavers Co-operative Society
3. Kanchipuram Kamakshiamman Silk Weavers Co-operative Society
4. Kanchipuram Thiruvalluvar Silk Weavers Co-operative Society
5. Kanchipuram Silk Weavers Co-operative Society (KPM)
6. Kanchipuram Kalaignar Silk Weavers Co-operative Society

Even though the Kanchipuram sarees has been registered under the Geographical Indication Act, and the Kanchipuram Silk Weavers Co-operative societies are registered as authorized user of Kanchipuram Silk Sarees under the Act, Owing to increase in the gold and silk rate, Wage cost, etc, The Cost of the finished products that is the Silk sarees increased manifold. This cost escalation together with stiff competition from the private traders, reduced the sales in the societies of Kanchipuram circle and share of private traders increased over the years. Further, The Societies are selling Kanchipuram sarees, whereas the private traders sell most of the sarees procured from outside Kanchipuram area and selling them as Kanchipuram sarees.

The co-operative societies are under the serious condition for sustaining in to the market. Hence this paper has discussed about the performance and forecasting of sales on Silk Handloom Weavers Co-operative Societies in Kanchipuram District.

Table 1: Profile of the societies for the year 2016-17

Particulars	Anna	Kamakshi-amman	Thiruvalluvar	KPM	Dr.Kalaignar
Date of Regn.	22/05/1971	3/3/1955	24/12/1962	19/04/1942	7/3/1973
Commencement of business	22/05/1971	6/3/1955	6/3/1963	27/04/1942	6/4/1973
No. of looms	2856	1236	2369	3736	6105
Active looms	1047	995	800	365	415

Particulars	Anna	Kamakshi-amman	Thiruvalluvar	KPM	Dr.Kalaignar
Products manufactured	Pure Silk Sarees / Half Fine Sarees	Pure Silk Sarees / Half Fine Sarees	Pure Silk Sarees / Half Fine Sarees	Pure Silk Sarees / Half Fine Sarees	Pure Silk Sarees / Half Fine Sarees
Production (Rs. lakhs)	2815.15	710.68	722.62	468.88	338.36
Sales (Rs. lakhs)	4414.35	1178.91	909.1	694.93	526.82

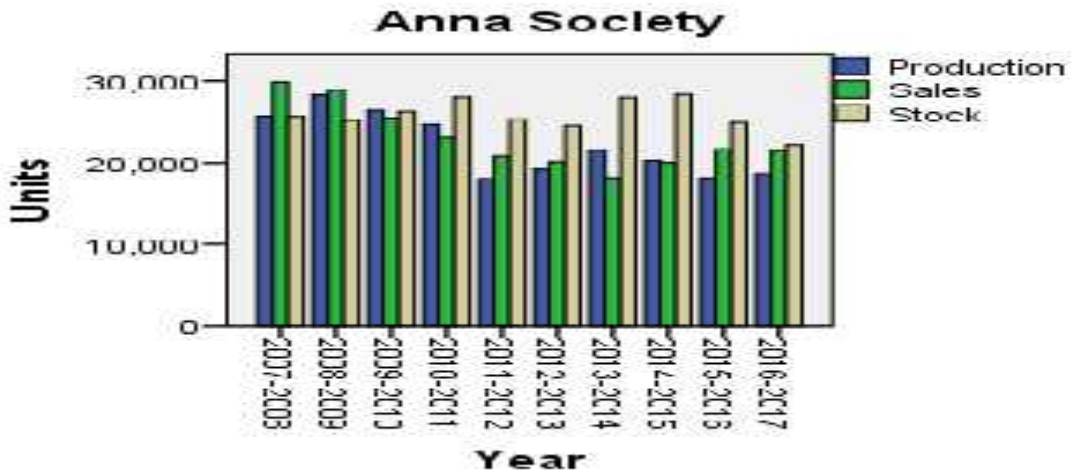
Kanchipuram has acquired an important status in India by the production & sales of its renowned handloom silk saris. The weaving of silk saris dates back to the Pallava & Chola periods and is flourishing since then. Because of the uniqueness and the weave quality, the Kanchipuram silk saris have conquered the hearts of millions of Indian women. And now, the Kanchipuram Silk Saris are covered under Geographical Indications Act. The specialties of Kanchipuram silk saris is its weight, color, pallu and the zari border. The Kanchipuram saris are woven using pure silk & original zari. With the changing preferences and life styles of the peoples weavers in Kanchipuram now incorporate contemporary trends in their weaving techniques without losing their traditional values. The Kanchipuram Kamakshiamman Silk Co-operative Weaving Society was established in 1955 and the Kanchipuram Murugan Silk Cooperative Society was established in 1957 both are under the control of the Department of Handlooms & Textiles, Govt. of TamilNadu and at present operates more than 1000 looms and having showrooms in Kanchipuram, Chennai and in all important towns in TamilNadu and Karnataka.

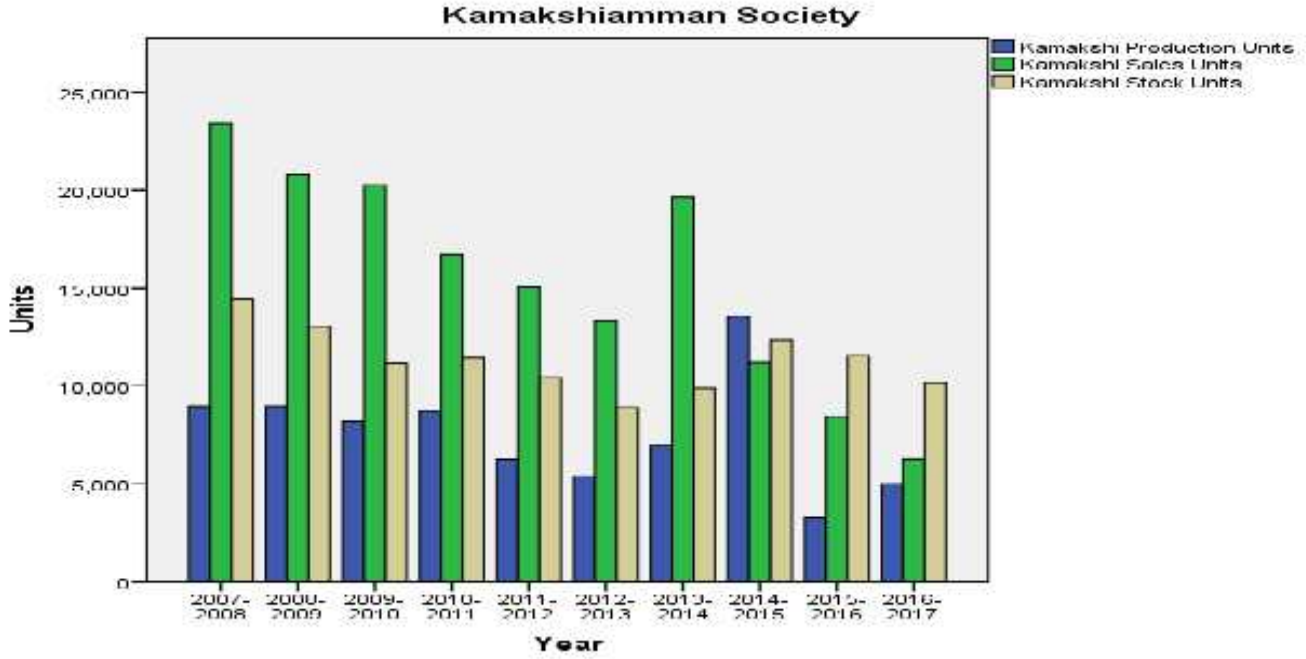
Objectives of the Study

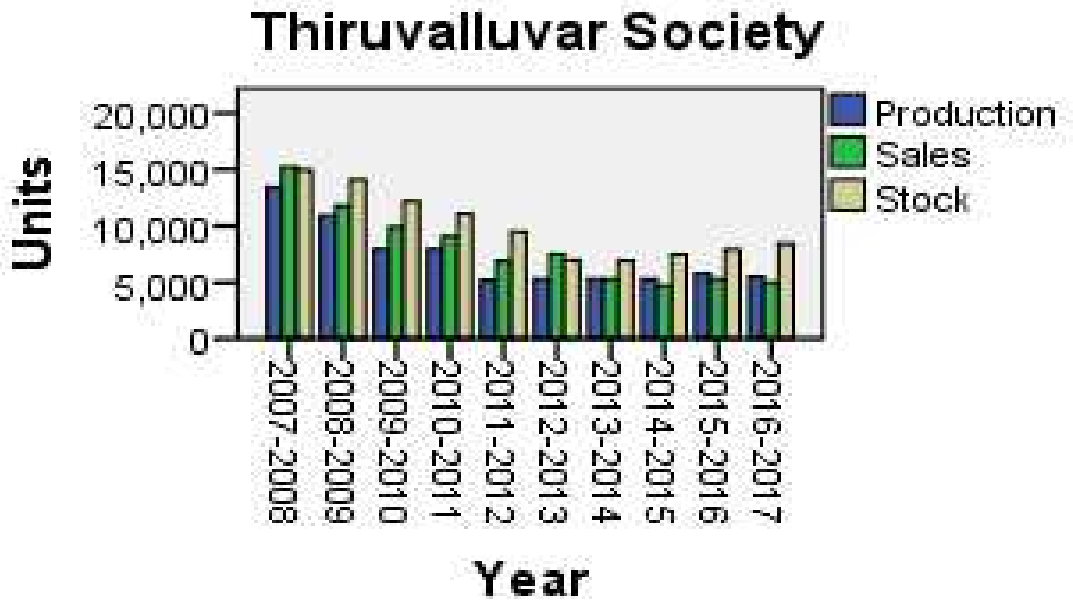
1. To analyse the performance of Silk Handloom Weavers Co-operative Societies.
2. To forecasting future periods Sales and Productions of Silk Handloom Weavers Co-operative Societies.

Research Methodology

Past ten year (2007-2017) performance reports are collected from the above societies as Secondary data. Analyses of working performance of Five Co-Operative Societies in Kanchipuram are discussed:The Mean Number of Active looms of Anna, Kamakshiamman, Thiruvalluvar, KPM and Kalaignar are 1337, 1056, 1018, 476 and 467 respectively. The Mean Number of Ideal Looms of these societies are 3074, 1970, 1384, 996 and 249 respectively. From this, it is understood that maximum number of ideal looms are in KPM Society and minimum number in Anna Society. Most of the looms in Anna society are active in the past ten years. More than 50% of the total looms are ideal in Thiruvalluvar, KPM and Kalaignar Societies.




Kamakshiamman Society
Kamakshi Production Units
Kamakshi Sales Units
Kamakshi Stock Units
Units
25,000
20,000
15,000
10,000
5,000
0
2007-2008
2008-2009
2009-2010
2010-2011
2011-2012
2012-2013
2013-2014
2014-2015
2015-2016
2016-2017
Year


Thiruvalluvar Society
Production
Sales
Stock
Units
20,000
15,000
10,000
5,000
0
2007-2008
2008-2009
2009-2010
2010-2011
2011-2012
2012-2013
2013-2014
2014-2015
2015-2016
2016-2017
Year

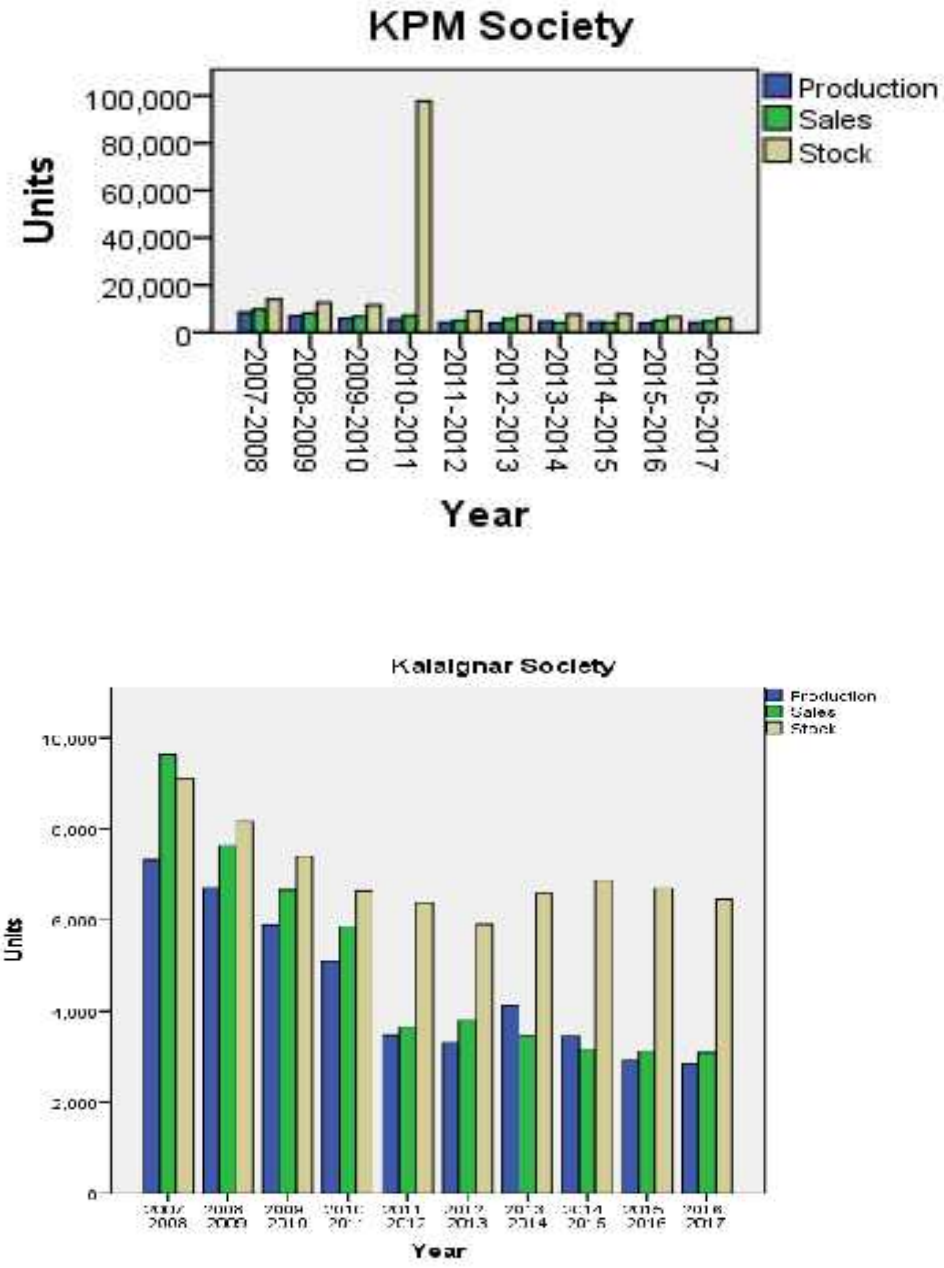


Fig. 1. Comparison of Production, Sales and Stock units of Silk Weaver's Co-operative Societies

Only Kamakshiamman Society has higher mean number of Sales Units but all other societies have higher in stock Units only. But every year, number of production units is less than sales and stock units in all the societies. In the year 2010-11, KPM Society had high number of stock units.

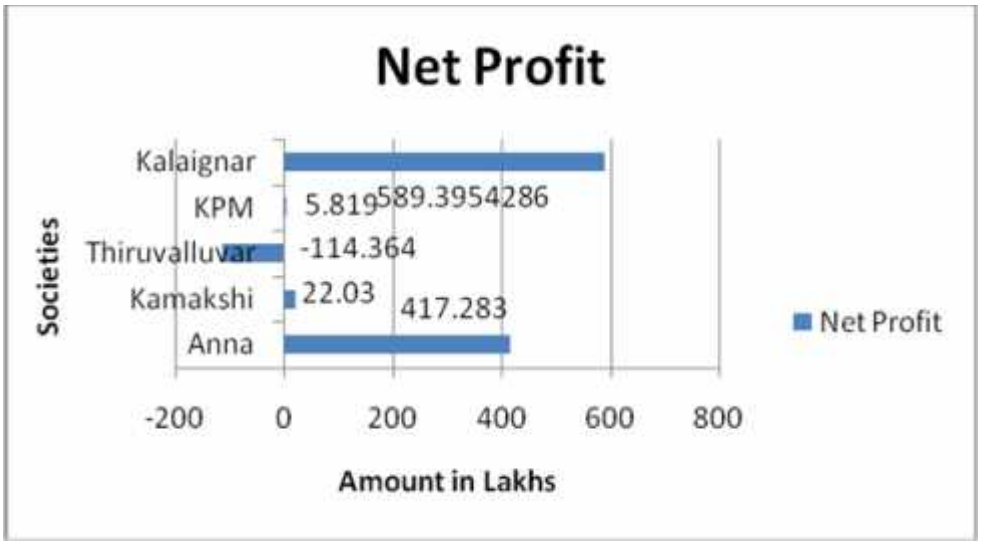


Figure 2: Performance report shows Mean Net Profit/Loss of Societies

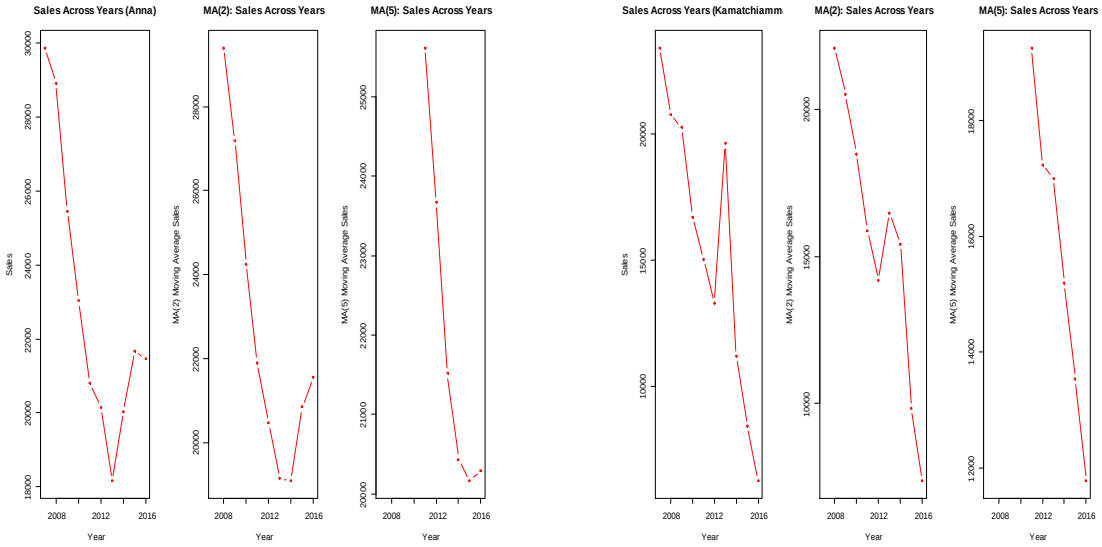
The above figure indicates The Kalaignar Society and Anna Society in Kancheepuram district had earned high net profit in the past ten years turn over but Thiruvalluvar Society had Net loss in the same period. KPM and Kamakshiamman incurred only 5.819 and 22.03 lakhs Net Profit respectively.

Performance Reports analyzed by using Time Series Method

Time series analyses enables the researcher understand the changes in the past, it is useful in forecasting and also in assessing the present performance and it also helps in comparing different time-series and draw inference there from.

Method of Moving Averages

This Average tends to smoothen the curve and minimize the effects of cyclical fluctuations. The period of the moving average must coincide with the period of the cycle so that cyclical fluctuations can be got rid off. The method of moving average is simple and flexible and the trend is got from the data itself without giving room for subjectivity of the statistician. Forecasting is used to estimate future value of a time series. When apply 2 year and 5 year moving average method in the performance report of the all societies, it shows that Anna Society Sales Units are decreasing up to year 2012 and slightly having increasing trend but all other societies sales units are decreasing from the year 2007 and future results are also shows that decreasing trend in sales.



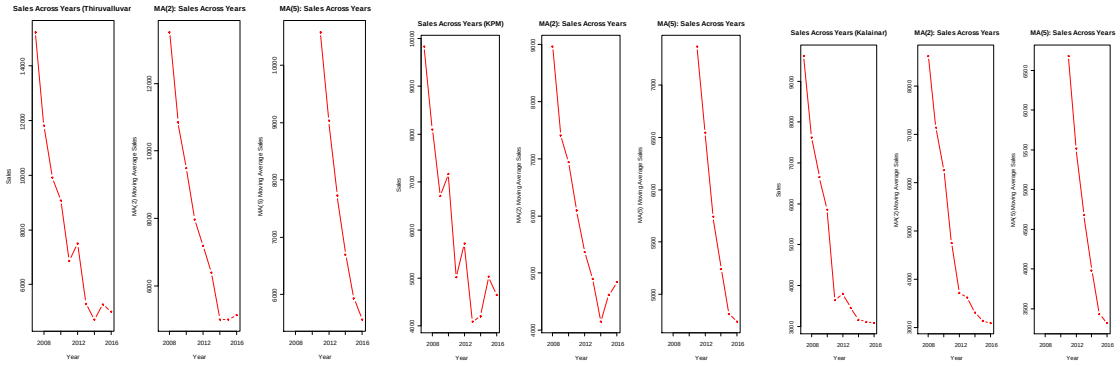
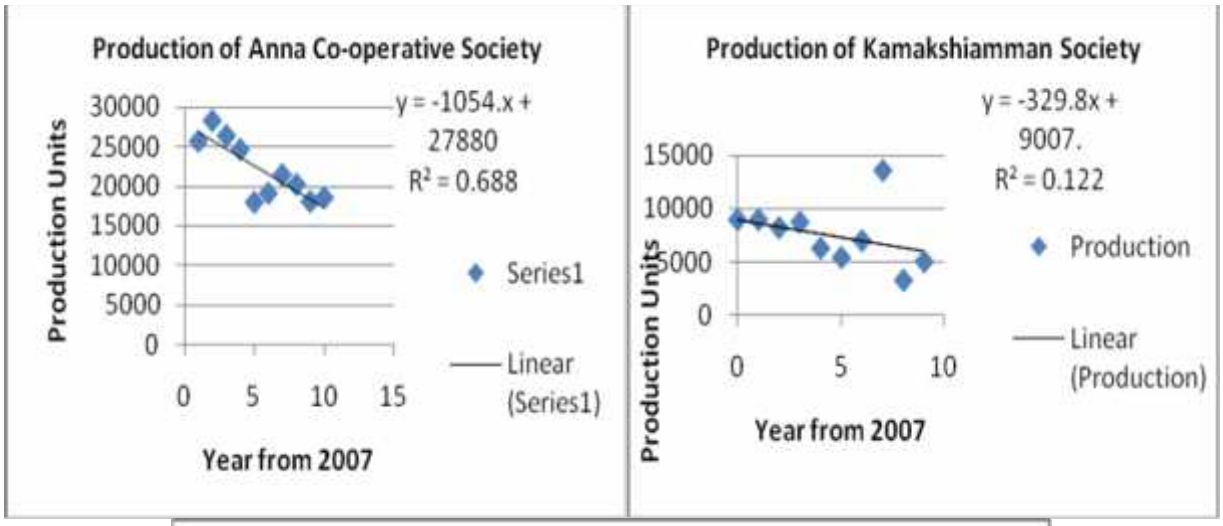
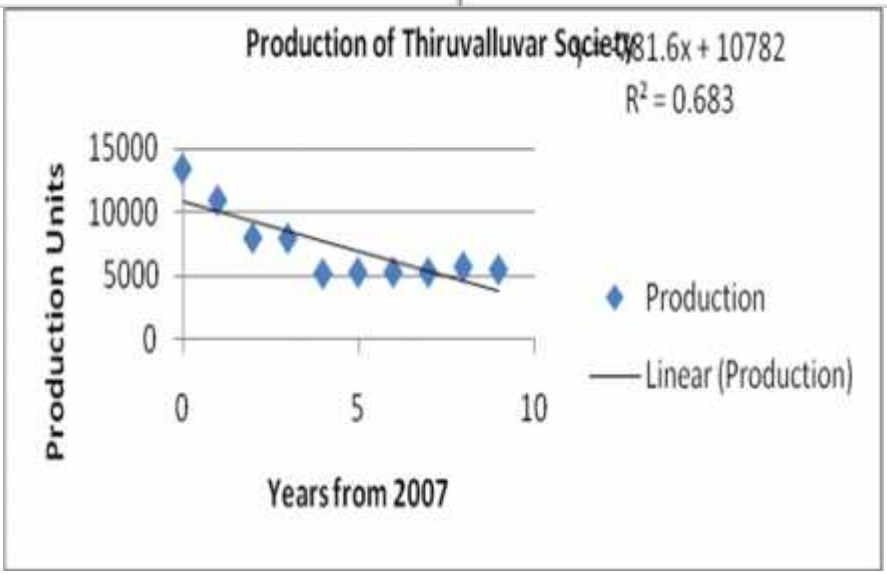


Figure 3: Plotting of Actual and Moving Average Series for all the societies sales Units

Method of Least Squares

This is the most widely and commonly used method which being mathematical eliminates subjectiveness and enables forecasting, if the functional relationship between the variables involved can be justified theoretically. In this paper, fitting a straight line by the method of least square for the Production Units of the Societies to know the past and future analysis.





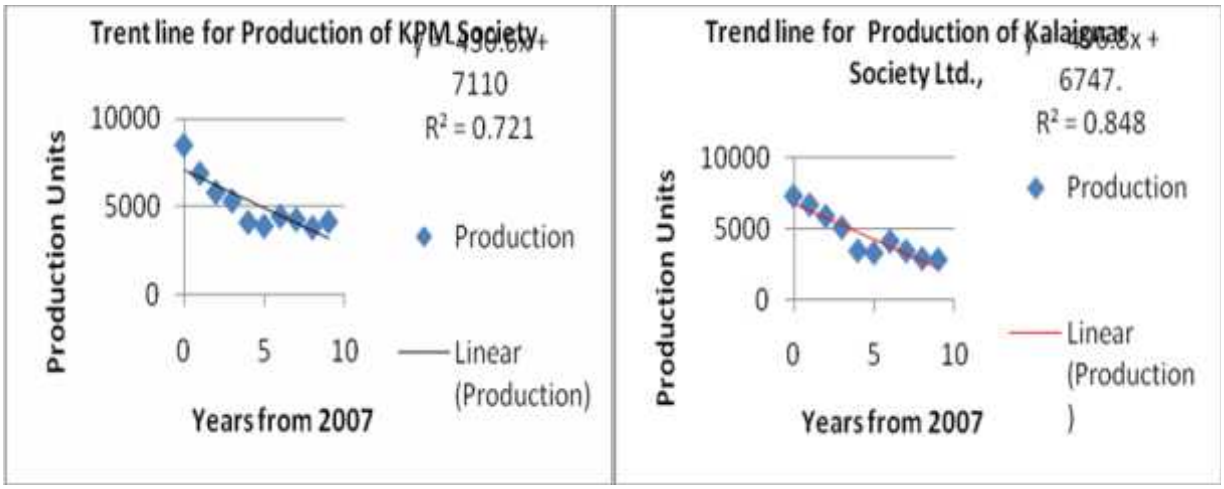


Fig 4: Fitting Trend Line by least square method for Production Units of all Societies

From the above diagram it is understood that, this method is not suitable for Kamakshiamman Society because the points are scattered and the independent variable explain 12.25% variance over the dependent factor (Production). For all other societies this model fit is fairly good. This method is best fit for Kalaignar Society data.

The Future Production Units are predicted using the method of least square is given below as table:

Table 2: Expected Production Units of Silk Weaver's Co-operative Societies in Kancheepuram for the period 2017-2022

Year	Anna	Kamakshiamman	Thiruvalluvar	KPM	Kalaignar
2017-18	17337.00	5709.10	2965.20	2803.10	1779.20
2018-19	16282.70	5379.26	2183.52	2372.41	1282.40
2019-20	15228.40	5049.42	1401.84	1941.72	785.60
2020-21	14174.10	4719.58	620.16	1511.03	288.80
2021-22	13119.80	4389.74	-161.52	1080.34	-208.00

When forecasting the production units for the following years it is observed that Thiruvalluvar and Kalaignar Societies are in very poor condition because for the year 2021-22, projection production units are negative trend.

Multivariate Regression Analysis for Production, Sales and Stock Units of all Societies

Multivariate Regression Analysis is used when several independent factors have to be compared against one independent factor. In this study, Sales Units as taken as dependent variable and Production Units and Stock Units are taken as Independent Variables and using Multivariate analysis technique via SPSS, the following table values are obtained:

Table 3: Variables in the Multiple Regression Analysis

Society	R^2 Value	F-Value	P value	Un Standardized Coefficients	Standardized Coefficients	t value	P value
Anna	0.801	14.065	<0.004**				
Constant				24430.86		2.695	0.031
Production				0.935	0.92	5.226	<0.001**
Stock				-0.856	-0.417	-2.368	0.05
Kamatchiam-man	0.228	1.035	.404				
Constant				-1293.065		-0.096	0.926
Production				0.355	0.178	0.455	0.663

Society	R^2 Value	F-Value	P value	Un Standardized Coefficients	Standardized Coefficients	t value	P value
Stock				1.247	0.359	0.916	0.39
Thiruvalluvar	0.922	41.58	<0.001**				
Constant				-1186.826		-0.84	0.429
Production				0.854	0.708	2.306	0.055
Stock				0.306	0.265	0.862	0.417
KPM	0.889	27.978	<0.001**				
Constant				140.89		0.17	0.87
Production				1.104	0.904	7.108	<0.001**
Stock				0.011	0.169	1.332	0.225
Kalaignar	0.955	74.569	<0.001**				
Constant				-2909.362		-1.439	0.193
Production				1.191	0.843	4.892	<0.002**
Stock				0.361	0.149	0.867	0.415

Note: ** Denotes significant at 1% level

From the above table, it is found that R square value for Kamakshiamman Society is 0.228, which shows that independent variables explain 22.8% variance over the dependent factor. This leads to the further verification of fit of regression out of unique dependent and multiple independent variables. For this society, F value significance is also greater than 0.05. So, it is advised that regression fit is not appropriate and independent variables production units and stock units do not influence the unique dependent factor sales unit. But all other societies, F value significance are highly significant because these values are less than 0.001. t-value is significant for the variable production units in all societies except Kamakshiamman Society. So, the variable Production units only influence the dependent factor Sales Units.

One Way Anova for Sales Value

In statistics, one-way analysis_of_variance (abbreviated one-way ANOVA) is a technique that can be used to compare means of two or more samples (using the F distribution). This technique can be used only for numerical response data, the "Y", usually one variable, and numerical or (usually) categorical input data, the "X", always one variable, hence "one-way". The ANOVA tests the null_hypothesis that samples in all groups are drawn from populations with the same mean values. To do this, two estimates are made of the population variance. These estimates rely on various assumptions. The ANOVA produces an F-statistic, the ratio of the variance calculated among the means to the variance within the samples. If the group means are drawn from populations with the same mean values, the variance between the group means should be lower than the variance of the samples, following the central_limit_theorem. A higher ratio therefore implies that the samples were drawn from populations with different mean values.

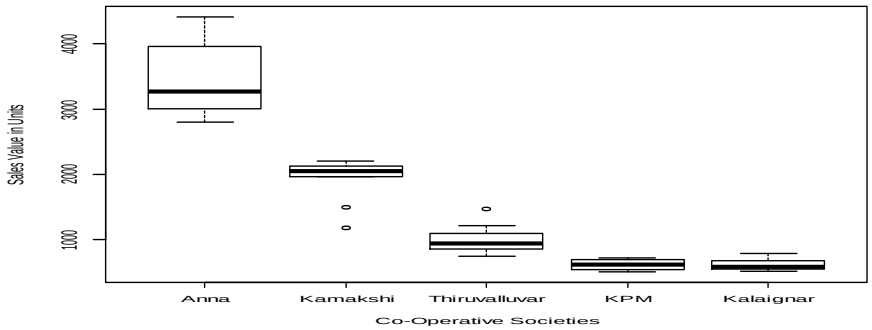


Fig. 5: Box Plot for sales value in all Societies

Box plot is a method for graphically depicting groups of numerical data through their quartiles. Box plots may also have lines extending vertically from the boxes (whiskers) indicating variability outside the upper and lower quartiles, hence the terms box-and-whisker plot and box-and-whisker diagram. Outliers may be plotted as individual points.

From the box plot, it is understood that median sales value for KPM and Kalaignar Societies are nearly same but it is different for other societies. Now use One way analysis for Sales value variable in all societies. Here, Null hypothesis is mean Sales value of all societies are same and alternate hypothesis is at least one of the mean sales value is different from other. 5% level of significance is taken.

Table 4: ANOVA for significant difference among Societies with respect to Sales Value

	Degrees of freedom	Sum of Squares	Mean Sum of Square	F value	P value
Societies	4	57341516	14335379	144	<0.001 ***
Residuals	45	4479565	99546		

Significant codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

P-value is less than 0.001. So, reject null hypothesis at 1% level of significance. So, it is concluded that one of the mean sales value is different from the other. To test which two mean sales values are different then use Tukey multiple comparisons of means test.

Table 5: Difference between mean sales value, Lower and Upper limits and corresponding P-value of all Societies

Societies	Difference	Lower	Upper	P-value
Kalaignar-Anna	-2820.081	-3221.010	-2419.1527	<0.001**
Kamakshi-Anna	-1503.796	-1904.720	-1102.8677	<0.001**
KPM-Anna	-2816.053	-3216.980	-2415.1247	<0.001**
Thiruvalluvar-Anna	-2431.500	-2832.430	-2030.5717	<0.001**
Kamakshi-Kalaignar	1316.285	915.357	1717.2133	<0.001**
KPM-Kalaignar	4.028	-396.900	404.9563	0.9999998
Thiruvalluvar-Kalaignar	388.581	-12.347	789.5093	0.0615328
KPM-Kamakshi	-1312.257	-1713.190	-911.3287	<0.001**
Thiruvalluvar-Kamakshi	-927.704	-1328.630	-526.7757	<0.001**
Thiruvalluvar-KPM	384.553	-16.375	785.4813	0.0657625

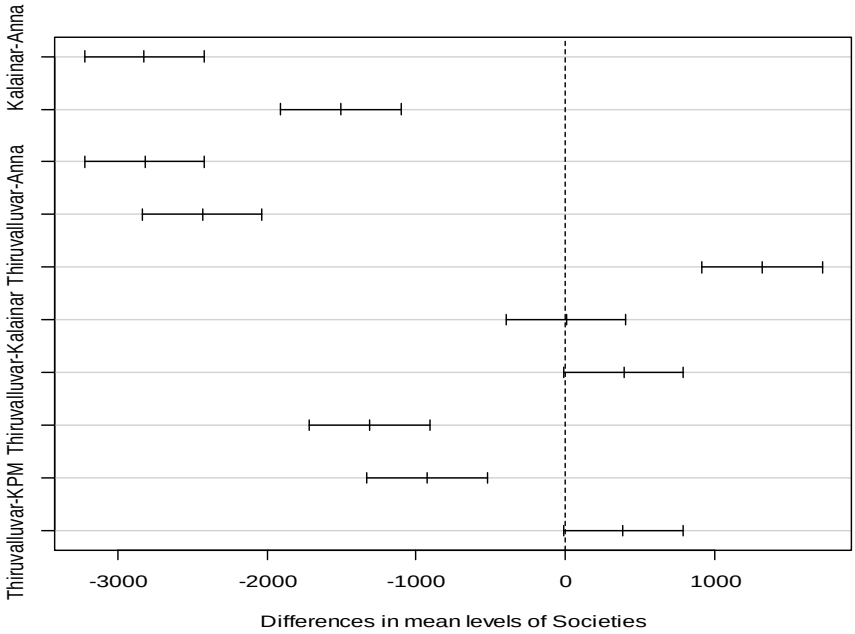


Fig.6: 95% Society wise Confidence Interval

From the above table it is observed that the P value of KPM-Kalaignar, Thiruvalluvar-Kalaignar and Thiruvalluvar-KPM are greater than 0.05. So, there is no significance sales mean difference among these three societies. But these societies are highly significantly different in other two Societies i.e. Anna and KPM. The Diagram also indicates the same thing.

Summary

Most of the looms in Anna society are active and also ideal in the past ten years. KPM Society had high number of stock units. The Kalaignar Society and Anna Society in Kancheepuram district had earned net profit in the past ten years but Thiruvalluvar Society had Net loss in the same period. It is clearly observed that the production and sales of all societies in Kancheepuram are in decreasing trend only. To change this situation more attention should be taken seriously by the Government of TamilNadu.

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