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Productivity and Export Growth of Textile Industry in Northern India: A Study of Haryana State

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Abstract

The present study analyses the growth of the textile industry in Haryana for a decade (2008-09 to 2017-18). The study is based on secondary data and using quantitative analysis considering cotton production, area, and export of handloom, handicraft, and raw cotton as variables. To support the data analysis, correlation, regression, CAGR, and trend analysis have been applied. A positive correlation (0.68) was observed between area and production. Production and productivity of cotton both are increasing with a CAGR of 7% over 10 years of study period except 2015-16 when they are decreasing by 37% due to the whitefly pest attack and leaf curl virus in Haryana. Export data of handloom, handicraft, and raw cotton is showing a positive linear trend.

Keywords: Indian Economy, Textile Industry of Haryana, Export, Increasing Growth, Production

Introduction

Haryana's economic growth has been exemplary, except for some periods, since its creation as a separate State. Despite Haryana being a geographically small state, the State's contribution to the national GDP (India) was 3.6% as per the estimates of 2017-18 (IBEF, May, 2019). Haryana is one of the leading states in terms of agriculture and industry in India. Due to the excellent business environment and its favorable policies initiated by the government, it has been made possible. Hence, the State facilitating ease of doing business, fiscal incentives, and development of skills for Industrial sector promotion. The state government of Haryana is continuously working for the betterment of industries and agriculture in the State. The State has recognized its robust existing infrastructure for textiles, abundant supply of raw material, skilled labor, and strategic location is ideally positioned (Haryana Textile Policy, 2019 Department of Industries and Commerce Chandigarh). Cotton is the primary raw material for producing 'fiber' used for making cloth/clothes in textile mills. There are 9 central cotton-producing states in India with 3 zones as the North Zone (Haryana, Punjab, Rajasthan), Central Zone (Gujrat, Maharastra, Madhya Pradesh), and South Zone (Telangana, Andhra Pradesh, Karnataka). Production and productivity of cotton are improved significantly throughout all the zones during the last decade (2008-09 to 2017-18).

In contrast, Haryana secured the 1st position in India's north zone *(Ministry of Textile, 2018 Report from Cotton Advisory Board*). Fatehabad, Sirsa, Hisar, Jind, Bhiwani found in the significant cotton-producing districts of Haryana. Domestic consumption and export of Haryana's textile products are being increased today by innovative strategies and targeted interventions. The government's vision is to promote sustainable development that will increase the industrial output and boost the income of millions of people (PHD Chamber of Commerce and Industry, 2019). The textile sector of Haryana contributed to improving the living standard by employing approx 1 million people. In this direction, the textile policies 2018, 2019 provide fiscal incentives, provisions for infrastructure augmentation, setting up new textile parks, skill training, and promotion of Khadi and village industries and aims to create 50000 new jobs. The objectives of Textile Policies, 2018 and 2019, are to set up new units and ensure modernization and growth of

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the existing textile industry in Haryana. Further, Textile Policy 2019 favors promoting export (by 20% CAGR) of all types of its products. The policy's particular thrust is garments, made-ups, technical textiles, etc., by creating a favorable ecosystem (Haryana Textile Policy, 2019 Department of Industries and Commerce Chandigarh).

Literature Review and Theoretical Background

The present study enriches the literature of growth-related measures of the textile industry of Haryana. Many researchers have used different methodologies to examine the textile industry's productivity, growth, trends, and other manufacturing industries (Gorman, 2001; Kalamkar, Atkare & Shende, 2002; Sheetal & Kumar, 2016; Shanthini & Radjaramane, 2018; Rani, 2019). The extensive review of the textile industry is beyond the scope of the present study. Cotton production growth over the area and export weightage of textile from Haryana analysed for more than the last decade. Similar studies have considered some common variables such as Production (Bloch & Madden, 1995; Kalamkar, Atkare & Shende, 2002; Shanthini & Radjaramane, 2018; Rani, 2019), Area (Kalamkar, Atkare & Shende, 2002; Shanthini & Radjaramane, 2018; Rani, 2019), Export (Thangavelu & Owyong, 2003; Lam, 2013), Employment (Rahman & Fatima, 2011; Furlan, Grandinetti & Paggiaro, 2014; Moreno & Coad, 2015), Labour and Capital (Bloch & Madden, 1995; Thangavelu & Owyong, 2003; Das et al., 2019) to measure the productivity and growth. According to Majeed (1986), growth is an important mechanism for the survival of an economic system or a society. Innovation is the most powerful tool during the decline and growth of Industry development (Chandler, 2015). In addition to this, external relations and simple mechanisms lead to entrepreneurial growth over time Furlan, Grandinetti, and Paggiaro, (2014). Cities considered as an appropriate economic unit for employment growth and innovative activities (Rahman & Fatima, 2011). According to Bloch and Madden (1995), labor productivity reaches its full potential when workers equipped with the newest equipment. Still, when new and vintage equipment types mixed, average labor productivity falls short of best practices. A small number of High Growth Firms (HGFs) are most job creators and tend to be relatively young, but the possibility of repeating their HGF performance is low (Moreno & Coad, 2015). Thangavelu and Owyong (2003) stated that the export growth and scale economies contributed significantly to selected industries' productivity growth, such as clothing and textile. The higher the export industry's linkage effect, the greater the externality (GNP growth, Economic growth) and the faster the development of export examined by Lam (2013). Production and productivity of all the crops positively increased except Jowar, Bajra, and grams in India (Kalamkar, Atkare & Shende, 2002). Rani 2019, found an increasing trend of American cotton production and a declining movement of desi cotton. Sirsa, Fatehabad, and Hisar districts are the leading cotton-producing districts of Haryana, according to Rani (2019). The results also indicate that the foreign direct investment (FDI) intensive industries are the main contributors to productivity growth in the manufacturing industries in terms of export performance and economies of scale compared to the non-FDI intensive sectors. Uniformity of the central government's policies instead of the monopoly in state government policies provide rational and mutual benefits against the chronicle industry problems (Sheetal & Kumar, 2016).

Research Methodology

The present study analysed the growth of textile units in Haryana. In the beginning, relevant literature has been reviewed on the growth of different industries including the textile sector. Based on the existing literature, important variables such as Cotton production, area, and export have been identified for the study. Thereafter, annual data has been collected from 2008 to 2018 on selected variables from the Ministry of Textile, Government of India (New Delhi), and Department of Industries and Commerce, Chandigarh (Haryana). Then data has been analyzed by applying correlation, regression, CAGR, and trend analysis techniques in SPSS, R-studio, and Ms-Excel. A positive correlation (68%) between the area and production of cotton has been observed. Hence, it is appropriate to use the simple linear regression by using both independent (Area) and dependent (Production) variables. Further, year-wise expected production and error term was calculated based on the actual production over the area by applying the regression equation. Also, it was observed that the Compound Annual Growth Rate of cotton production in Haryana is 7% over the last 10 years. Trend analysis has been applied to export data

of Handloom and Handicraft that is showing a positive linear trend. However, export data of raw cotton was not available for the initial years of the study period. This data is available from the year 2011 and depicting a sharp increase from 805 lakh in 2010-11 to 31897.98 lakh in the year 2012-13.

Correlation of Variables

The correlation Table 1 of independent and dependent variables shows that all the correlation values are significant at 5% level. There is a moderate degree of correlation between independent (area) and dependent variable (Cotton Production), which is 0.682* significant at a 5% level appropriate to carry on with data analysis.

Table 1: Correlation between Area and Production

		Area	*Production*
Area	Pearson Correlation	1	.682*
	Sig. (2-tailed)		.030
	N	10	10
Production	Pearson Correlation	.682*	1
	Sig. (2-tailed)	.030	
	N	10	10

*. Correlation is significant at the 0.05 level (2-tailed).
Source: Calculated through SPSS.

Regression Equation

Intercept and coefficient of regression equation calculated through "r studio" based on annual data of 10 years, regression equation will be:

Where,

-6.194 = Intercept

4.659 = Coefficient of x

y = Expected Production

x = Area of Cotton production

Regression analysis showed that the production is based on the area, and there is no production without the area's existence or the area's value. Thus, production must be positive in proportion to the area because the production (Output) is in units that produce some value. Hence, the lesser the area shows lesser the production or maybe zero production (can be a possible situation) or vice-versa.

Compound Annual Growth Rate (CAGR)

It measures the compounded growth of any finite data over many years (Here, 10 years of Haryana's textile industry data is calculated).

Formula to calculate CAGR; ((End value/First value)^(1/Period of study))-1

Coefficient of Variation (CV)

The Coefficient of Variation (CV) is the multiplication of 'Coefficient of S.D.' by 100 that provides the percentage of the coefficient of S.D. to depict the variation percentage. It is the best measure of dispersion for comparing the homogeneity and heterogeneity of two or more distributions.

The lesser the value of CV is more homogenous distribution than others, the greater the value of CV is the more heterogeneous distribution.

Formula to calculate CV;

$$\text{Coefficient of S. D.} = \frac{SD\ of\ X}{Mean\ of\ X}$$

$$\text{Coefficient of Variation} = \frac{SD\ of\ X}{Mean\ of\ X} * 100$$

Where,

$$SD = \sqrt{\frac{\Sigma(\text{X}-\text{mean})^2}{\text{N}}}$$

Range

The range is an absolute variation of a distribution, is calculated by subtracting the Minimum value of variable X by its Maximum value;

$$Range = X_{Maximum} - X_{Minumum}$$

Analysis and Interpretation

Table 2 depicts the year-wise cotton production (in lakh bales, 170 kg) and area (In lakh hectare) in Haryana. The Compound Annual Growth Rate of production is 7%, and the area is 4% across 10 years of the study period (2008 to 2018). In line with the results of present research, Ramesh et al. (2020) has attempted in his study to understand the growth rate in area, production and productivity of cotton crop in Karnataka and found that area production and productivity of cotton crop registered increasing significant growth rate during the study period of (46 years) 1970 to 2016. Production of cotton is continuously increasing (14 lakh bales to 25 lakh bales) in all the years except for the years 2013, 2014 and 2015. Various fluctuations were observed in terms of the area covered by cotton production. In the year 2010-11 area is decreased by 2.95%, but the production has increased by 11.47% that shows a remarkable performance whereas in the year 2012-13 area has again reduced by 4%, but production was same as the previous year but the highest (26 lakh bales) across 10 years of data. In the year 2013-14, area and production have decreased by 13% and 8%. In the year 2014-15, despite an increment in the area by 21%, production has reduced by 4%, was the most malicious condition ever observed throughout the data of 10 years. The mean value of the area and production of 10 years is 5.735 lakh hectares and 20.525 lakh bale, respectively. The absolute dispersion or range of production is 12 lakh bales {Max (26) – Min (14)} that is 6 times the range of area is that is 2 lakh hectares {Max (6.56) – Min (4.56)}. The coefficient of variation of production is found at 23.92%, and the area's coefficient is found at 12.55%. It is observed from the results that production is more heterogeneous or variable than the area. Hence, the area is more reliable or homogeneous than the production over it. Table 3 shows the actual and expected cotton production (Through regression equation) with error terms across all ten years of the study period. If the error term is +ve, then it can be explained that actual production is losing based on the expected value. It means actual production is less than the expected cotton production over the occupied area. On the other hand, if the error term is –ve, it means that the production volume is higher over the allocated area, which is a favorable situation. As per the observation mentioned above, it is found that the actual production is increasing almost every year except 2013-14, 2014-15, 2015-16 but the Predicted production deviates positively and negatively almost every year. The actual production is lesser by 1.05 and 2.17 lakh bales (error term) at the initial 2 years (2008-09 and 2009-10) as compared to the predicted production in these years is an unfavorable condition. In the next four years (2010-11 to 2013-14), where actual cotton production is higher than the expected production each year with the increasing ratio is a favorable condition.

Table 2: Descriptive Statistics and Growth of Area and Production of Cotton

Year-Wise Cotton Production, Area and Yield in Haryana				
(Area in Lakh Hectare, Production in Lakh Bales 170 Kgs)				
Year	*Area*	*Annual Growth (%) in Area*	*Production*	*Annual Growth (%) in Production*
2008-09	4.56		14	
2009-10	5.07	11%	15.25	9%
2010-11	4.92	-3%	17	11%
2011-12	6.41	30%	26	53%
2012-13	6.14	-4%	26	0%
2013-14	5.36	-13%	24	-8%
2014-15	6.48	21%	23	-4%
2015-16	6.15	-5%	14.5	-37%
2016-17	5.7	-7%	20.5	41%
2017-18	6.56	15%	25	22%
Mean	5.735	5%	20.525	10%
Maximum	6.56	30%	26	53%
Minimum	4.56	-13%	14	-37%
Range	2	43%	12	90%
SD	0.72	15%	4.91	27%
C AGR	4%		7%	
Coef-ficient of Variation	12.55%		23.92%	

Source: 1. Ministry of Textile, Government of India taken from Cotton Advisory board as per CAB meeting dated 12-12-2017.
2. Descriptive Statistics have Calculated by Author from R-Studio and Excel.

Further, a positive error term has been observed in the years 2014-15 and 2015-16 by 0.99 lakh bale and 7.96 lakh bales respectively, where 2015-16 is the most un-favorable year ever by producing 7.96 lakh bale cotton less. In the later 2 years '2016-17 and 2017-18' the negative error term has been observed by producing (actual production) more 0.14 and 0.63 lakh bale cotton than the predicted production is a favorable condition.

Based on the regression equation estimation of the production each year is shown in the table below:

Table 3: Year-Wise Cotton Production, Area and Yield in Haryana

(Area in Lakh Hectare, Production in Lakh Bales 170 Kgs)				
Year	*Area (x)*	*Actual Production (y)*	*y = -6.194 + 4.659 (x) /Predicted Production*	*Error (In Lakh Bales)*
2008-09	4.56	14	15.05104	1.05104
2009-10	5.07	15.25	17.42713	2.17713
2010-11	4.92	17	16.72828	-0.27172
2011-12	6.41	26	23.67019	-2.32981
2012-13	6.14	26	22.41226	-3.58774
2013-14	5.36	24	18.77824	-5.22176
2014-15	6.48	23	23.99632	0.99632
2015-16	6.15	14.5	22.45885	7.95885
2016-17	5.7	20.5	20.3623	-0.1377
2017-18	6.56	25	24.36904	-0.63096

The major reason for the downfall of cotton production in 2015-16 was the whitefly pest attack and leaf curl virus in Haryana (Business Standard published on 24 May/ 2016). The same situation happened with Punjab and Rajasthan (The rest part of Northern India), but the downfall ratio of Haryana was more this year as per Table 4. It is worth mentioning here that role of bio-technology is important in the cotton production in producing durable product and mitigating the amount of insecticides by using an appropriate use of chemicals and fertilizers (Radhakrishan, S. 2017). Consequently, the limited amount of available area can yield more.

Table 4 depicts the year-wise comparison between cotton production in Northern India* and cotton production in Haryana. Lakh bale cotton production over per lakh hectare area in Haryana/ is greater than North India each year except 2015-16 and 2017-18, a slight decrease of 0.19 and 0.01 lakh bale respectively have been observed in these years. CAGR of cotton production in Haryana is 7%, whereas CAGR of Northern India is 5% for 10 years from 2008-09 to 2017-18.

Table 4: Year-Wise Comparison of Production in Haryana in Lakh Bales (170 kgs) Over Area Per Lakh Hectare to Northern India

	India					
Year	*Area in Lakh Hectare (Haryana)*	*Production in Lakh Bales (170 kg) (Haryana)*	*Area in Lakh Hectare (North India)*	*Production in Lakh bales (North India)*	*Lakh Bale Production Over Per Lakh Hectare Area (Haryana) – Productivity*	*Lakh Bale Production Over Per Lakh Hectare Area (North India) – Productivity*
2008-09	4.56	14	12.85	39	3.07	3.04
2009-10	5.07	15.25	14.62	40.25	3.01	2.75
2010-11	4.92	17	13.57	45.6	3.46	3.36
2011-12	6.41	26	16.71	64	4.06	3.83
2012-13	6.14	26	15.44	64	4.23	4.15
2013-14	5.36	24	13.75	59	4.48	4.29
2014-15	6.48	23	15.55	53	3.55	3.41
2015-16	6.15	14.5	14.02	35.75	2.36	2.55
2016-17	5.7	20.5	13.26	46	3.6	3.47
2017-18	6.56	25	15.44	59	3.81	3.82
Mean	5.735	20.525	14.521	50.56	3.563	3.467
Min	4.56	14	12.85	35.75	2.36	2.55
Max	6.56	26	16.71	64	4.48	4.29
SD	0.68	4.66	1.17	10.07	0.6	0.54
CV	12%	23%	8%	20%	17%	16%
CAGR	4%	7%	2%	5%	2%	3%

North India* = Rajasthan + Haryana + Punjab

Hence, it is observed that Haryana is performing 2% more than Northern India based on compounding growth. Results of the study indicate that productivity* of cotton (lakh bale cotton production over per lakh hectare area) in Haryana is also higher than Northern India each year, but CAGR of productivity (Lakh bale Production over per lakh hectare area) in Haryana (2%) is lower by 1% than North India (3%).

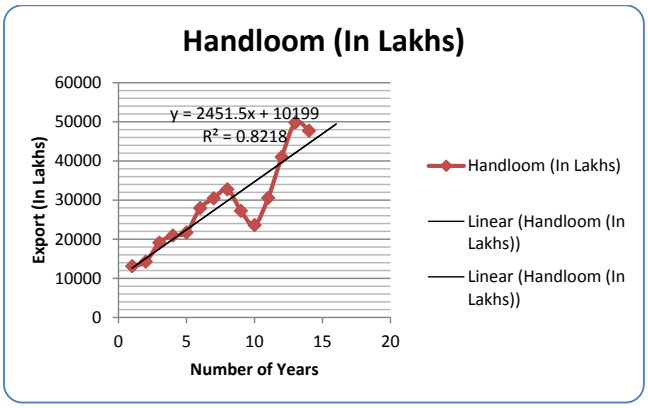
Table 5 shows the year-wise handloom and handicraft export of Haryana for 14 years from 2002-03 to 2015-16. CAGR of handloom is 10%, and the absolute growth of its export is 264% across the 14 years (2002-03 to 2015-16) of the study period. The coefficient of variation of handloom has been observed 38%, which shows homogeneity; here, we can observe this 38% as the outstanding growth of handloom export.

Table 5: Export of Handloom and Handicraft

Year	*Handloom (In Lakhs)*	*Growth*	*Handicrafts (In Lakhs)*	*Growth*
2002-03	13110		92734.11	
2003-04	14240	8.62%	72834.89	-21%
2004-05	19100	34.13%	93616.43	29%
2005-06	20930	9.58%	102584.57	10%
2006-07	21723.9	3.79%	141841.21	38%
2007-08	27956	28.69%	155621.69	10%
2008-09	30430	8.85%	200930.25	29%
2009-10	32749	7.62%	229591.97	14%
2010-11	27256.2	-16.77%	285802.19	24%
2011-12	23600	-13.41%	360499	26%
2012-13	30560	29.49%	331708.29	-8%
2013-14	41015.9	34.21%	299421.68	-10%
2014-15	49810	21.44%	352333.37	18%
2015-16	47720	-4.20%	600634	70%
Mean	28585.786	11.70%	253179.8687	15%
Maximum	49810	34%	600634	70%
Minimum	13110	-17%	72834.89	-21%
SD	10901.26	16%	149083.5892	24%
CAGR	10%		15%	
Co-efficient of Variation	38%		59%	

Source: 1. Data is collected from the website of Department of Industries and Commerce Haryana (Chandigarh).
2. Descriptive statistics have been calculated by the Author.

*Northern India - Only 3 states; Rajasthan, Haryana and Punjab that have been considered in Northern India because these are the major cotton-producing states of North India as per the report of Ministry of Textile.
*Productivity = Lakh bale production (170 kg) of cotton/Lakh hectare area.
*Good fit - When is more than 0.80 (80%).
Source; Presented by Author based on the data collected from the website of Department of Industries, and Commerce Haryana (Chandigarh).



Source: Presented by Author based on the data collected from the website of Department of Industries, and Commerce Haryana (Chandigarh).

Fig. 1 Trend of Handloom Export for 14 Years from 2002-03 to 2015-16

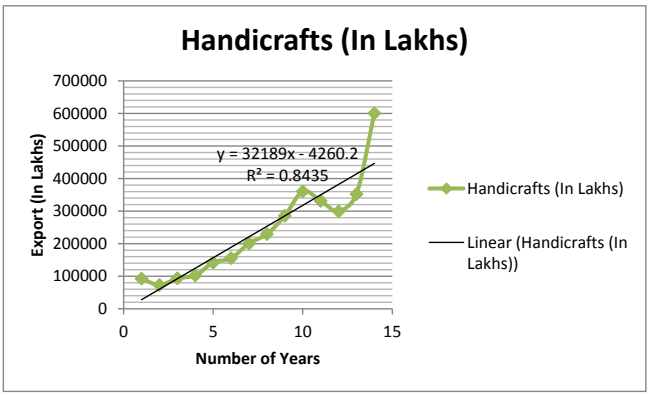


Fig. 2: Scatter Plot and Trend-Line of Handicraft Export from Haryana

Further, data of Handloom export has been plotted on the scatter graph (Fig. 1) to calculate the trend, and it seems positive linear trend as per data line over the year. Therefore, the linear trend-line function applied on the 14 years data shows a good fit equals 0.821. Hence, a trend-line that has been drawn in Fig. 1 shows the predicted possible values of handloom export. On the other hand,

the CAGR of the Handicraft export is 15%, and its absolute growth is 415% across the 14 years (2002-03 to 2015-16) of the study period is remarkable. Cotton export of India has also registered a CAGR 11.36% with increasing trend (Palanisingh, Salahudeen & Gurumoorthy, 2017) is consistent with the present study. The coefficient of variation observed at 59%, showing year-wise outstanding growth of the Handicraft sector in Haryana. Ahead, Handicraft export data plotted on the scatter plot that delivers a positive linear trend (Fig. 2) equal to '0.868' is a good fit*, homogeneous or sound data. Therefore, forward prediction can be made based on the trend-line. Thus, a trend line has been drawn, which shows the possible predicted handicraft export values in Fig. 2. Data of raw cotton export from Haryana is available from 2010-11 to 2017-18 with an absolute growth of export is 4842%, which is the highest ever among all segments of the textile sector in Haryana across these 8 years. The CAGR of the raw cotton export is 75% (Calculated with 8 years of raw cotton data). The coefficient of variation is observed at 60% that explains year-wise outstanding growth in the export of raw cotton in Haryana than handloom and handicraft.

Conclusion

This paper aims to study the textile industry's growth pattern in Haryana for a decade (2008-09 to 2017-18) by considering the production of cotton over a specified area and export of handloom, handicraft, and raw cotton. A comparison of production and productivity of cotton of Haryana and Northern India is also conducted where Haryana found as the best performer state out of the whole north zone (Haryana + Punjab + Rajasthan). The trend of cotton production (Over the area) in Haryana is showing increasing across the study period as per the data collected from the website of the Ministry of Textile, Government of India. A downfall in cotton production has been found in 2015-16 and 2016-17 because of the whitefly pest attack and leaf curl virus in Haryana and north India. CAGR of cotton production in Haryana observed at 7%, whereas CAGR of Northern India is 5% for the 10 years of the study period. Results of the study indicate that the productivity (Lakh bale cotton production over per lakh hectare area) of cotton in Haryana is higher each year than in Northern India, but CAGR of productivity (Lakh bale Production over per lakh hectare area) in Haryana (2%) is lowered by 1% than the CAGR of Productivity in North India (3%). Export performance is selected as another variable to measure the growth of the textile sector in Haryana. The handloom and handicraft export trend of Haryana for 14 years from 2002-03 to 2015-16 analysed. CAGR of handloom observed at 10% and absolute growth of export is 264% across these 14 years of the study period. Data is positive linear so that the linear trend equation for the prediction. CAGR of Handicraft export is 15% with an absolute growth of 415% is remarkable. Whereas raw cotton export data is available only for 8 years from 2010-11 to 2017-18 with an absolute growth of export is 4842% that is the highest ever among all segments of the textile sector in Haryana across these 8 years. CAGR of the raw cotton export is 75% (Calculated with 8 years of data). It is observed from the interpreted results that Haryana is growing well in the textile sector. Production of cotton is increasing every year and export performance as well. There is a huge employment scope in the near future as textile policy 2019 targeted to create more than 50000 jobs in Haryana shortly.

Implications

The present study observed an increasing trend in the textile sector of Haryana in production and export for the last ten years of the study period. The Government needs to make policies to protect handloom and Handicraft segments of the textile as these sectors face competition from power-loom. Moreover, the Government should monitor and create an adequate textile industry database for policy planning, formation, and review process. Continuous awareness and improvement should be initiated over time to improve credit delivery to entrepreneurs. The Government should focus on the necessary quality parameters to sustain the industry in the global market.

Limitations and Future Research

Non-availability or lesser availability of state specific-data on the textile industry like Haryana was the major constraint faced during the study. Only 10 years of data on cotton production and 14 years of export data (handloom, handicraft) are available. Arima modal could have been applied with time-series data for more than 50 years for better prediction. Year-wise growth of Labour, capital, age, size, etc., variables may be used in further studies related to Haryana's textile sector.

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Appendix

lm(formula = y ~ x)

Residuals:

Min	1Q	Median	3Q	Max
-7.958	-1.037	0.205	1.906	5.222

Coefficients:

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-6.194	10.202	-0.607	0.5606
x	4.659	1.766	2.637	0.0298 *

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

Residual standard error: 3.812 on 8 degrees of freedom

Multiple R-squared: 0.4651, Adjusted R-squared: 0.3982

F-statistic: 6.956 on 1 and 8 DF, p-value: 0.02983