

# FACTORS AFFECTING THE GROWTH OF SPORTS GOODS INDUSTRY IN PUNJAB

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## Abstract

*This paper is an attempt to identify the factors affecting the growth of sports goods industry in Punjab. A sample of 160 sports goods manufacturing units was drawn by using stratified random sampling. Data were collected by direct personal investigation and the results of the analytical study were subjected to exploratory factor analysis. Principal Component Analysis (PCA) was followed with varimax orthogonal rotation and results of the study based on factor analysis, indicated that dynamic outlook, fulfilment of basic requirements of rawmaterial and power, policy matters and adoption of quality control measures have emerged as the important factors influencing the growth of this industry.*

**Keywords:** Factor Loading, Communality, Eigen value, Orthogonal Varimax rotation, Anti-image correlation.

**JEL Classification:** L69.

## 1. Introduction

The only industry which appears to offer some prospect to Punjab is the sports goods (Chandra Mohan, 2002). The industry originated in 1880 in Sialkot, now in Pakistan but due to partition of the country in 1947, many of Sialkot's hindu craftsmen migrated across the border into Punjab and laid the foundations of this industry. These displaced industrialists are credited for having laid the foundations of industry in whole of the country but Punjab and Meerut emerged as the leading centres of sports goods manufacture.

A very large share of all India output of sports goods originate from Punjab (Pandit, 1985, p.118). This industry has experienced a phenomenal growth over the previous decades and occupies a place of prominence in Punjab economy due to its massive growth potential. Jalandhar in Punjab first of all witnessed the existence of 125 production units(SIDO and Non SIDO both) by 1953-54 (Pandit 1985, p.117). Till 1980-81, there appeared all over the state, 212 registered manufacturing (SIDO) units all over the state providing direct employment to 1763 persons, producing sports goods worth Rs. 19.38 crore. Till 1991-92, the number of units escalated to 975, directly employing 5587 persons and producing sports goods worth Rs. 45.18

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crore. Now, in 2003-04, we find this industry with 1588 registered manufacturing units providing direct employment to 10003 persons and producing goods worth Rs. 267.67 crore. As far as growth of the industry is concerned, the number of units have grown with 6.82 percent compound annual growth rate (CAGR) and for the same period during the last two and a half decades, in case of variables- direct employment, fixed capital investment and production, the compound growth rates (CAGRs) have been observed as 5.75, 9.54 and 5.50 percent respectively. As far as share of this particular industry in Punjab's total small scale industrial space is concerned, In 1980-81, sports goods industry of Punjab accounted for the percent share of the order of 0.61, 1.20, 2.15 and 0.15 in number of units, direct employment, production and fixed capital investment of total small scale registered manufacturing units of the state and upto 2003-04, these share figures were detected as 1.02, 1.27, 1.19 and 0.44 percent in case of these four variables respectively.

## 2. Database and Methodology

The universe of the present study consists of all the sports goods manufacturing units registered (SIDO) with Directorate of Industries, Punjab. There are total 1588 registered manufacturing units (in the year 2005), out of which 1322 units (83.25 percent) are in Doaba region, 174 units (10.96 percent) in Majha region and 92 units (5.79 percent) in Malwa region of the State. A sample of about 10 percent i.e. 160 units from total 1588 units was selected by using stratified random sampling technique with proportional allocation. {A sample should be at least 10 percent or more of its population if it is to be credible but one should not be so rigid about sample size, even a very small sample can truly represent the population (Cooper and Emory, 1995, p. 206)}. Strata were: Majha, Malwa and Doaba regions i.e. geographical strata. 133 units (83.25 percent of total sample units), 18 units (10.79 percent of total sample units) and 9 units (5.79 percent of total sample units) were randomly chosen from 1322 units of Doaba region, 174 units of Majha and 92 units of Malwa region respectively. A non-disguised structured questionnaire was prepared keeping nineteen statements (structured on the basis of results of pilot survey of the industry) measured on five point likert scale where 1 is strongly agree and 5 strongly disagree. For collection of data from sample units, direct personal investigation method was followed. Respondents were asked to read the statements carefully and indicate their level of agreement or disagreement with them. These statements along with their respective codes average scores and standard deviations are exhibited in Table 1.

Then, the data collected were subjected to exploratory factor analysis.

## 3. Reliability of the Scale

Before applying factor analysis, testing of the reliability of scale is essential. The reliability of the scale can be tested by a widely used method Cronbach's Alpha. Its value varies from 0 to 1 but satisfactory value of Alpha should be more than 0.6. A value of 0.6 or less generally indicates unsatisfactory results (Cronbach, 1951). In the present study, we have also computed Cronbach's Alpha and its value was found to be 0.6540 ensuring reliability of the used scale.

**Table 1. Descriptive Statistics of Statements**

Code	Statement	Average Score	Standard Deviation
X1	Location is conducive to the growth of firm. Any change can reduce sales hence affect growth	2.1563	0.7974
X2	Mechanisation of production process is essential for growth of firm.	3.4188	0.9548
X3	Traditional methods (labour intensive) of production provide comparative cost advantage in case of competition with firm of other regions in country and abroad	1.825	0.6399
X4	Favourable Govt. Policy significantly affects the growth of firm	1.8	0.5697
X5	Regular availability of cheap raw material is essential for growth of firm.	1.1625	0.3701
X6	Adequate Bank Finance is essential to implement new techniques/ methods.	1.775	0.6535
X7	Policy of product diversification can accelerate growth.	2.6	1.0106
X8	Brand-Image of firm affects the sales hence growth.	1.6313	0.6406
X9	Advertisement plays role in augmentation of sales hence growth.	3.5625	0.7241
X10	Tours by entrepreneurs to various markets can accelerate sales hence growth.	1.5688	0.5565
X11	Protection of industry on the part of Govt against foreign competition is essential for growth.	1.6563	0.5145
X12	More expenditure on R & D by industry as well as Govt. can step up the pace of growth.	2.175	0.4698
X13	Entrepreneurs should be technically literate.	3.1188	0.9341
X14	Adoption of quality control measures can accelerate the growth of firm.	2.3625	0.7564
X15	Awareness about changing world demand pattern is must for growth of the firm.	2.4688	0.8081
X16	Awards and Incentives by Govt./ Other agencies induce firms to perform better.	2.075	0.6873
X17	Participation in Training Programmes organised by various agencies/ Govt. gives orientation to perform better.	2.3875	0.7606
X18	Only own experience of entrepreneur matters a lot in functioning and conduct of a business unit.	1.9813	0.7968
X19	Without adequate power supply, it is very difficult to run and grow.	1.125	0.3677

Source : Author's own calculations based on primary data by using SPSS

#### 4. Data Adequacy Test for Factor Analysis

It is obligatory to check the adequacy of the collected data for application of factor analysis. The appropriateness of factor analysis is dependent upon the sample size. A sample below 50 observations is not found suitable for factor analysis. The minimum sample size should be at least five times of the variables taken under consideration (Hair, 2003, p.99 ; Sen and Pattanayak, 2005). 5 to 10 subjects per variable (upto the total of 300) are sufficient and recommendable (Kass and Tinsley, 1979). Present study has used a sample of 160 observations against 19 variables, thus qualifies the adequate sample size requirement for a stable factor solution.

Further, correlation matrix was computed and substantial number of correlations were found greater than 0.30. For factor analysis to be appropriate, enough number of correlations should be greater than 0.30 (Hair, 2003, p. 99 ; Malhotra, 2002, p. 590).

Then, anti-image correlations were calculated and it was observed that these were very low indicating that true factors existed in the data.

Further, Kaiser-Meyer-Okin (KMO) measure of sampling adequacy was used to examine the appropriateness of factor analysis. High values (between 0.5 and 1.0) indicate the adequacy of data for application of factor analysis. Values below 0.5 imply the inadequacy of data (Kaiser, 1974 ; Malhotra, 2002, p. 588). Present study has observed the computed value of KMO statistic as 0.633 ensuring the suitability and appropriateness of the collected data for application of factor analysis.

Bartlett's test of sphericity is another adequacy testing measure used in the present study. This test finds the overall significance of correlation matrix and provides the statistical probability that the correlation matrix has significant correlations among atleast some of the variables. The test value should be significant indicating that correlation matrix is not an identity matrix (Bartlett, 1950 ; Hair, 2003, p. 99 ; Malhotra, 2002, p. 588). In our study, Bartlett test's chi-square value was 3044.366, d.f. = 171 significant at 0.000 level i.e. highly significant indicating adequacy of data for application of factor analysis.

## 5. Factor-Analytic Approach

After ensuring the reliability of scale and testing the adequacy of data, the set of 19 statements regarding the factors affecting growth of sports goods industry in Punjab were subjected to factor analysis. Principal Component Analysis (PCA) was used for extraction of factors and number of factors to be retained was on the basis of Latent-root criterion. Only the factors having latent roots (eigen values) greater than 1 are considered significant. Only four components emerged with the values greater than 1. Further, the component matrix (without rotation) was constructed. The factor loadings greater than 0.45 are to be retained (ignoring signs) because loadings below it are poor (Bhaduri, 2002; Sidhu and Vasudeva, 2005). Moreover, the acceptance level of factor loading should be in accordance with the sample size. A data with sample size from 150 to 200 should take 0.45 as the acceptance level (Hair, 2003, p. 112). Our study has also adopted 0.45 as the acceptance level of factor loadings in component matrices (with and without rotation). The unrotated matrix nodoubt indicates the relationship between the factors and individual variables, it seldom results in factors that can be interpreted because the factors are correlated with many variables (Malhotra, 2002, p. 595). The solution to this problem was found by orthogonally rotating the principal factors using varimax rotation. This rotation doesn't affect the communalities and the percentage total variance explained. However, the percentage of variance accounted for by each factor does change. It minimizes the number of variables that have high loading on a factor (Hair, 2003, p. 109). Table 2 contains the varimax rotated component matrix:

Perusal of Table 2 revealed that there are four factors which accounted for 70.064 percent variance. The percentage of variance explained by the factors 1 to 4 are 24.575, 20.911, 15.304 and 9.274 respectively. Thus, a model with these four factors explaining 70.064 percent variance can be considered adequate to represent the whole data. A communality expresses the amount of variance a variable shares with all the other variables being considered. Large size of

communalities indicate that a large amount of variance in a variable is extracted by factor solution. Communalities are accepted between 0.40 and 0.70 and considered high (highly acceptable) if they are 0.8 or greater (Costello and Osborne, 2005, P. 4). In our study all the communalities are above 0.40 and many of them are above or very close to 0.8 also. Further perusal of Table 2 indicates that variable X<sub>1</sub> had been loaded on two factors namely 1 and 2, but on the basis of higher loading, it was considered in Factor 1 only because we know 'the process of considering only the single highest loading as significant for each variable is an ideal' (Hair, 2003, p.113). Variable X<sub>12</sub> was loaded on Factor 1 and 3 both but considered in Factor 1 on the basis of again higher loading criterion. Similarly variable X<sub>15</sub> was loaded on factor 1 and 3 both but considered in Factor 1. Variable X<sub>13</sub> was loaded on Factor 1 and 2 both but considered in Factor 2. Variable X<sub>10</sub> was loaded on Factor 2 and Factor 3 but again on the basis of higher loading, was considered in Factor 2. Variable X<sub>14</sub> was loaded on Factor 1 and Factor 4 both but it was also considered in Factor 4 only on the basis of higher loading criterion.

**Table 2. Varimax Rotated Factor Loading Matrix**

Factors → Statements ↓	1	2	3	4	Communalities
X16	<b>0.816</b>	1.07E-02	4.30E-02	0.3	0.757
X1	<b>-0.792</b>	0.458	-0.133	0.105	0.866
X18	<b>-0.791</b>	0.168	0.108	0.305	0.758
X17	<b>0.716</b>	-0.325	0.423	-4.77E-02	0.8
X3	<b>-0.634</b>	0.4	0.101	-0.323	0.676
X12	<b>0.587</b>	0.116	0.464	-0.109	0.585
X15	<b>0.566</b>	-0.311	0.501	0.165	0.696
X9	-9.86E-03	<b>-0.77</b>	0.134	0.301	0.701
X5	-0.301	<b>0.75</b>	3.10E-03	-0.139	0.672
X2	0.394	<b>-0.749</b>	0.19	0.176	0.783
X8	-7.82E-02	<b>0.708</b>	0.181	0.445	0.738
X13	0.531	<b>-0.667</b>	0.177	-4.48E-02	0.761
X10	0.147	<b>0.619</b>	0.49	0.11	0.657
X19	-0.423	<b>0.483</b>	0.162	-9.92E-02	0.448
X7	0.402	-0.195	<b>0.801</b>	0.185	0.875
X4	-0.158	8.36E-02	<b>0.76</b>	-0.442	0.804
X11	-1.35E-02	6.34E-02	<b>0.712</b>	0.129	0.528
X6	6.23E-02	0.102	1.35E-02	<b>-0.739</b>	0.56
X14	0.497	-0.142	0.333	<b>0.518</b>	0.646
Eigen Value*	4.669	3.973	2.908	1.762	
% of Variance Explained	24.575	20.911	15.304	9.274	
% of Cumulative Variance Explained	24.575	45.486	60.79	70.064	

Source : Author's own calculations based on primary data by using SPSS

\* Values obtained after rotation.

Ultimately, we find the variables-  $X_{16}$ ,  $X_1$ ,  $X_{18}$ ,  $X_{17}$ ,  $X_3$ ,  $X_{12}$  and  $X_{15}$  loaded on Factor 1, the variables-  $X_9$ ,  $X_5$ ,  $X_2$ ,  $X_8$ ,  $X_{13}$ ,  $X_{10}$  and  $X_{19}$  on Factor 2 and  $X_7$ ,  $X_4$ , and  $X_{11}$  on Factor 3 and  $X_6$ ,  $X_{14}$  on Factor 4.

## 6. Factor Labeling

Factors can be labeled symbolically as well as descriptively. Symbolic tags are precise and help avoiding confusion (Rummel, 1970). Present study has also used symbolic tags to factors. The factors along with codes and factor loadings are given in Table 3.

**Table 3. Interpretation of Factors**

Factors	Code	Statement (Factor Loading)
F1	X16	Awards and Incentives by Govt./ Other agencies induce firms to perform better (0.816).
	X1	Location is conducive to the growth of firm. Any change can reduce sales hence affect growth(-0.792).
	X18	Only own experience of entrepreneur matters a lot in functioning and conduct of a business unit (-0.791).
	X17	Participation in Training Programmes organised by various agencies/ Govt. gives orientation to perform better (0.716).
	X3	Traditional methods (labour intensive) of production provide comparative cost advantage in case of competition with firm of other regions in country and abroad (-0.634).
	X12	More expenditure on R & D by industry as well as Govt. can step up the pace of growth (0.587).
	X15	Awareness about changing world demand pattern is must for growth of the firm (0.566).
F2	X9	Advertisement plays role in augmentation of sales hence growth (-0.770).
	X5	Regular availability of cheap Raw Material is essential for growth of firm (0.750).
	X2	Mechanisation of production process is essential for growth of firm (-0.749).
	X8	Brand-Image of firm affects the sales hence growth (0.708).
	X13	Entrepreneurs should be technically literate (-0.667).
	X10	Tours by entrepreneurs to various markets can accelerate sales hence growth (0.619).
F3	X19	Without adequate power supply, it is very difficult to run and grow. (0.483)
	X7	Policy of product diversification can accelerate growth (0.801).
	X4	Favourable Govt. Policy significantly affects the growth of firm (0.760).
F4	X11	Protection of industry on the part of Govt against foreign competition is essential for growth (0.712).
	X6	Adequate Bank Finance is essential for growth of firm (-0.739).
	X14	Adoption of quality control measures can accelerate the growth of firm (0.518).

Source: Author's own calculations based on primary data by using SPSS

**Factor-1:** Perusal of Table 3 reveals that it is the most significant factor with 24.575 percent of total variance explained. Total seven variables have been loaded on this factor. Variables-  $X_{16}$ ,  $X_{17}$ ,  $X_{12}$  and  $X_{15}$  have been positively loaded and the variables  $X_1$ ,  $X_{18}$  and  $X_3$  have been negatively loaded on this factor {on each factor, like signs mean the variables are positively related and opposite signs mean the variables are negatively related but the sign for factor loading relate to only that factor on which they appear, not to other factors as they are

orthogonally rotated (Hair, 2003, p. 114)). This factor reveals that in the changing world scenario, more expenditure on research and development ( $X_{12}$ ), adoption of new ideas through training programmes ( $X_{17}$ ), awareness about world demand pattern ( $X_{15}$ ) and incentives on the part of Government ( $X_{16}$ ) play an important role in the growth of sports goods industry. Use of traditional methods ( $X_3$ ), locational advantages ( $X_1$ ) and dependence on only own experience of entrepreneur ( $X_{18}$ ) are found negatively related to other four positively loaded statements. Here with in this factor, we find two groups of variables moving in opposite directions.

**Factor-2:** Analysis of Table 3 shows that it is the second important factor with 20.911 percent variance explained, highly influencing the growth of sports goods industry in Punjab. Seven variables have been loaded on this factor. Variables-  $X_5$ ,  $X_8$ ,  $X_{10}$  and  $X_{19}$  have been positively loaded where as  $X_9$ ,  $X_2$  and  $X_{13}$  have negative loading on this factor. Two positively loaded variables emphasized upon the need of regular supply of raw material at genuine rates ( $X_5$ ) as well as adequate supply of power ( $X_{19}$ ). Brand-image ( $X_8$ ) also matters a lot in this industry, having positive loading on this factor. Moreover, main tool of enhancing sales has found to be the business tours of entrepreneurs to various markets ( $X_{10}$ ), having positive loading on factor 2. Advertisement ( $X_9$ ), mechanisation of production process ( $X_2$ ) and technical knowledge on the part of entrepreneurs ( $X_{13}$ ) are found negatively loaded on this factor. Here again, with in this factor, we find two groups of variables moving in opposite direction.

**Factor-3:** Examination of Table 3 reveals that it is the third important factor explaining 15.304 percent of total variance with three variables  $X_7$ ,  $X_4$  and  $X_{11}$  loaded on it. All the variables are positively loaded on this factor. Favourable Government policy ( $X_4$ ) and protection of industry against foreign competition ( $X_{11}$ ) is must for the growth of industry. Moreover policy of product-diversification ( $X_7$ ) has also found to be important variable significantly loaded on this factor.

**Factor-4:** The last factor i.e. fourth factor contains only two variables-  $X_6$  and  $X_{14}$  explaining 9.274 percent of total variance variable  $X_{14}$  has positive loading where as  $X_6$  has negative loading on this factor. Adoption of quality control measure ( $X_{14}$ ) is a significant tool for the growth of a firm. While essentiality of bank finance ( $X_6$ ) has been found negatively loaded on this factor. Both the variables are moving in opposite directions.

From the above, it is clear that there are four factors affecting the growth of sports goods industry in Punjab.

Factor-1 advocates dynamic outlook. Entrepreneurs should be aware of the changing world demand pattern. Participation on the part of workers and entrepreneurs in various training programmes gives orientation to perform better, expenditure on R & D can accelerate the pace of growth these days. Awards and incentives to the firms do play role in inducing them to perform better but in such a dynamic scenario, sticking only to locational advantages, traditional methods of production and only own business experiences can't help alot in making satisfactory growth. Here, with in this factor the two groups of variables 'awards and incentives, training, expenditure on R&D, awareness' and 'locational advantages, own experiences, traditional methods' are moving in opposite directions indicating that more the dynamic approach of entrepreneurs, lesser the dependence on traditional methods, own experiences only and locational benefits.

Factor-2 emphasizes upon the fulfilment of basic requirements like raw material and power. It also stresses upon the need of business tours on the part of entrepreneurs. It does emphasize upon the need of a good brand image because only the firms with such a brand image are performing well in this industry but the essentiality of any kind of technical knowledge on the

part of entrepreneurs or advertisement of the product or essentiality of mechanisation of production process are found pulling the factor to reverse direction. Here also, with in this factor, two groups of variables – ‘regular input supply, power supply, brand image, business tours’ and ‘advertisement, essentiality of mechanisation, essentiality of technical education’ are moving in opposite directions clearly indicating that if input and power supply is adequate as per requirement of the firm, brand of the firm is established and entrepreneur or his agents are making direct access to present and potential customers through tours, then firms feel no need of advertisement through other means like television, newspaper etc. Moreover firms don’t find the mechanisation of production process so essential, no doubt it is desirable but up to the some extent. Complete mechanization is not at all needed as per the opinion of entrepreneurs. Majority of the entrepreneurs (as revealed through the field survey) are not technical degree holders but even then running their firms successfully depending upon their ability to approach different markets through business tours and making efforts to ensure uninterrupted input supply and through established image of their firm in market. It is very interesting to note that during field survey, It was observed that persons without technical degrees were running their firms even better than those who were not having such degrees. (Here non-technical degree holders are not necessarily meant as illiterate persons.)

From the discussion of above two factors (F1 and F2), one shouldn’t be trapped into a paradoxical situation that there is any kind of clash between  $X_{13}$  loaded on F2 and  $X_{17}$  and  $X_{18}$  loaded on F1 for the reason that the study has observed the fact that in this industry there is no essentiality of any technical degree for an entrepreneur to run his venture successfully but it doesn’t mean that he should not be educated. Persons with non-technical background can run their ventures in this industry very well but still there is need to have some participation in various training programmes held by different agencies because it will provide them orientation to perform better. Sticking only to own experiences is also not advisable these days.

Factor-3 highlights the role of policy matters. The protection policy of government is highly desirable as well as essential for growth. Moreover, favourable approach of government (i.e. provision of the incentive to firms, less bureaucratic hurdles, simplification of departmental procedures etc.) towards industry also matters a lot. Internal policy on the part of industry to undergo product diversification as per the changing world demand pattern can also lead it to the path of growth. Here all the three variables are moving in the same direction.

Factor-4 emphasizes upon the adoption of quality control measures and bank finance has been found not so essential to implement such steps. Here the two variables have been detected moving in the opposite directions. The logic behind all this has been revealed by the fact that only financially sound firms have adopted quality control measures while marginal producers, who can’t run without bank finance, have not. Basically in this sports goods industry, majority of the firms are found (during the field survey) employing their own funds mainly. Marginal firms and financially sound firms are the two main chunks of this industry. But both no doubt making the use of bank finance but still they don’t find themselves in a position where they are not able to run their ventures without it i.e. such finance is not so essential but still desirable.

## 7. Concluding Remarks

No doubt, sports goods industry is basically a traditional and labour- intensive industry but dynamic approach is need of the hour. Regular availability of inputs and power is essential for



the firms to run in a smooth manner. Government should keep a sympathetic approach while framing policies regarding this industry. Moreover, in face of cut-throat competition, adoption of quality control measures and resultant quality improvement is must to keep this industry's national as well as global market share intact.

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