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Impact of Socio-Economic Profile on Handloom Weavers Productivity: A Case Study of Handloom Enterprises in Odisha

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ABSTRACT

Handloom sector is the second best alternative for the rural non-agricultural households and preserves traditional art and culture of weaving since time immemorial. This sector faces major obstacles in terms of obsolete technology, low level of production and marketing facility. However, the younger mass are moving towards higher education for expecting higher income through getting a secure job. So, the study tries to explore technological innovation in pre/on/post loom activity. However, this study analyses socio-economic profiles and its impact on handloom weaver's productivity before and after technological adoption in weaving activity. Multiple regression analysis is used to conduct this analysis. To overcome the above problems, government support in terms of various schemes would be really benefitted to the weavers.

Keywords: Handloom Sector, Obsolete technology, Technological Innovation, Multiple regression

1. Introduction

Textile and apparel industry is one of the cornerstone of the Indian economy. Moreover, it is the second largest provider of employment after agriculture, employing nearly 45 million of workers. The industry's manufacturing set up is the second largest in the world after China. India is the 6th largest exporter of textiles covering apparel, home and technical products in the world (Ministry of Textiles Report, 2023-24). This industry concentrates 2.3 percent of GDP, 13 percent of industrial production and 12 percent export earnings of India (Economic Survey of India, 2024-25). The uniqueness of the industry lies in its strength of Power loom, mill and hand-woven sector. Power loom and mill sectors are capital intensive whereas handloom sector is based on labour intensive & traditional instruments for cloth production (Rao, 2012).

The Handloom sector is one of the important element of textile industry in India providing direct and indirect employment to 35.22 lakhs weavers and allied worker in both rural and semi-urban areas (Ministry of Textile report, 2023-24). The weavers of this industry are keeping alive the traditional crafts of different states in India (Goswami & Jain, 2014). The level of artistry and intricacy achieved in the handloom fabrics are unparalleled and certain weaves/designs are still beyond the scope of modern machines (FICCI, 2019). Therefore, handloom sector has a high reputation in the national and international market only for its design and quality of cloth. In spite of high reputation of the handloom fabrics, this sector faces major obstacles like outdated technology, lack of credit facility and low level of production (David, Ngulube, & Dube, 2013).

Handloom sector in India, contributes 17.4 percent in total cloth production, registering a compound annual growth rate (CAGR) of 2 percent during 2007 to 2017 (Kumar, 2018). The other sources of cloth production are power loom sector and organized mill sector having the share of 77.7% and 4.9% respectively (Kumar, 2018). Despite of economic crisis 2007-08, the CAGR in handloom sector (2%) overheads power loom sector (0.8%) during 2007-17. However, handloom sector beset with several problems like difficulties in obtaining loans from financial institutions, shortage and uncertainty of yarn supply, problems in hiring labour and selling products (Jaforullah, 2010). However, these are the major obstacles of handloom units in terms of cloth production. Therefore, it is vital for the handloom enterprises to adopt modern technology in weaving activity. It is not only sustain the handloom sector in terms of competitiveness but also provide a decent standard of living to the weavers (Hazarika, Bezbaruah, & Goswami, 2016).

2. Review of literature

There are various literatures on technological upgradation in pre/on/post loom activity but very few studies explaining the challenges in this innovation. However, this study tries to analyse the variation in impact level on weavers productivity before and after use of advanced techniques in weaving activity. Handloom industry preserves the traditional art and culture of weaving since time immemorial. Moreover, the weavers are not recognized in

the present era due to the globalization, mindless acquiescence to import and low-cost imitations of power loom (Chatterjee, 2015). Again, the withdrawal of several subsidies (hank yarn), winding up the Janata Cloth Scheme and new economic reforms lead to worsening the condition of the handloom sector (Abdul, 1996). This brings about a serious issue and hence the relations of production in handloom sector, involves reduction from independent to dependent weavers (Roy, 2019). The stiff competition from power loom & mill sector and high cost of yarn and dyes has a serious challenge for the weaver's survival (Srinivasulu, 1994). Market potentiality of handloom products are influenced by the demand for cloth, awareness among the customers and aesthetic value of the product (Mishra and Mohapatra, 2020). To overcome the above problems, some issues like organizational aspects, technological linkages between cotton and yarn processing and policy questions have to be taken into consideration (Niranjana, 2001). Differentiation in terms of new product, quality assurance system, and promotion & distribution channel is the best strategy to sustain the handloom sector (Goswami & Jain, 2014).

There are several factors like financial inclusion, family labour, social network and marketing linkages are crucial for adoption and use of weaving technologies in rural areas (Goswami et al., 2016). A study has shown that technological innovations have enhanced the productivity & income of the weavers and ensured better occupational health and gender equity (Agasty et al., 2021; Balanagalakshmi and Amaravathi, 2021). Technical efficiency shows the ability of the handloom weaver to use modern techniques in weaving activity (Coelli et al., 1998). In the last two decades, technological modernization has increased the trend of labour productivity but the share of labour in net value added has been declining in the Indian Manufacturing sector (Khasnabis and Nag, 2001). As a result, employment is increasing but not regular rather it is on contractual terms (Kukreja & Bathla, 2018).

3. Research Gap

Despite the reputation of handloom sector in Indian economy in terms of growth and employment, still the technological innovation has not been studied comprehensively. Although many literature analysed technological innovation but very few studies found on adoption related issues concerning rural, non-farm and informal enterprises in the developing economies. So this study tries to analyse the factors majorly challenging the use of technical instruments in handloom activity. It is also important to examine the impact of technological innovation on handloom weavers productivity. A systematic analysis of these issues may offer fresh insights into existing literature on technological innovation. Such insights may offer policy implications for growth and employment generation in the economy like India where joblessness as the biggest problem.

4. Objectives of the study

On the basis of above research gaps, the following objectives are formulated in the present study.

1. To examine the factors influencing handloom weavers productivity in the study area.

2. To study the variation in impact level of socio-economic profile on productivity level before and after technological adoption on weaving activity.

5. Data and Methodology

5.1 Data Sources

This is a cross-sectional study for analysing the use of advanced techniques and the challenges faces for its adoption in handloom activity. Mainly, sambalpuri saree weavers are focused in this study. Both primary and secondary data are taken in to account for this study. The primary data is collected from five districts of western Odisha on the basis of handloom household's concentration. Handloom household is the sample unit of the study and 360 samples are taken through probability proportional to size sampling method. Cochran's formula is used to determine the sample size of the study. The samples are taken proportionately from five different districts such as 83 from Bargarh, 88 from Subarnapur, 80 from Boudh, 58 from Balangir and 51 samples from Sambalpur district respectively. This samples are calculated on the basis of handloom household on the selected villages of five districts of Odisha. Multistage and purposive sampling are used in this study. Similarly, the secondary data are collected from National handloom Census, Ministry of Textiles, Directorate of Economics and Statistics & Handlooms, Textiles and Handicrafts Department, Odisha.

5.2 Methods of the study

In this study, multiple regression analysis is used to examine the variation in impact of various factors on handloom weavers productivity before and after technological adoption.

5.2.1 Multiple Regression Analysis

Multiple Regression Analysis will be used to measure the factors influencing the productivity level of handloom artisan in selected villages of western Odisha. The efficiency of handloom artisan is measured in terms of cloth production. So, the factors influencing the productivity level are explaining with the multiple regression model.

$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6$ ………….. $\beta_{14} X_{14} + u_i$…………………………………………………..(2)

Where, Y is the productivity of handloom household worker (Dependent variable)

$X_1, X_2, X_3, X_4, X_5, X_6, X_7$..... X_{14} are independent variables.

α is the intercept or constant factor.

β_1 is the coefficient of age of owners.

β_2 is the coefficient of gender

β_3 is the coefficient of Social categories

β_4 is the coefficient of level of education

β_5 is the coefficient of categories of weaver

β_6 is the coefficient of type of dwelling

β_7 is the coefficient of financial incentives

β_8 is the coefficient of average household income

β_9 is the coefficient of electricity

β_{10} is the coefficient of marketing facility

β_{11} is the coefficient of working time

β_{12} is the coefficient of cost of production

β_{13} is the coefficient of profit of the household

β_{14} is the coefficient of types of dwelling

u_i is the error term

6. Socio-demographic profile of handloom weavers

This section discussed about age, gender, social category, level of education and different weaving categories in the below table.

	Category	**Number of Respondents**	**Percentage (%)**
Table 1	**Age group of respondents**		
	15-24	26	7.2
	25-34	84	23.3
	35-44	135	37.5
	45-54	74	20.6
	55-59	13	3.6
	60-64	22	6.1
	More than 65	6	1.7
	Total	360	100.0
Table 2	**Gender**		
	Male	342	95.0
	Female	18	5.0
	Total	360	100.0
Table 3	**Social Category**		
	SC	41	11.4
	OBC	319	88.6

	Total	360	100.0
Table 4	**Educational Status**		
	Illiterate	19	5.3
	Below Primary	54	15.0
	Primary	53	14.7
	Upper Primary	107	29.7
	High School	96	26.7
	Higher Secondary	24	6.7
	Graduation	7	1.9
	Total	360	100.0
Table 5	**Categories of weavers**		
	Attached Weaver	276	76.7
	Primary Cooperative Society	16	4.4
	Independent Weaver	66	18.3
	NABARD	1	.3
	Sambalpuri Bastralaya	1	.3
	Total	360	100.0

Source: Author Calculation from field survey, 2023

Table 1 shows that highest proportion of respondents are in the age group of 35-44, followed by the age groups 25-34 and 45-54 respectively. Hence, 37.5 percent of weavers are in the age group 35-44 and actively participating in the handloom activity. Only, 1.7 percent of respondents are in the age group of more than 65 in the present study. It clearly indicates that larger participation are among the younger generations and they have a keen interest for the growth of handloom industry. They are more interested to deploying the modern technological upgradation in handloom activity which not only improves this sector but also compete with the power loom and mill sector. As a result the production of handloom cloth rises and it leads to raise the income level of the households.

Table 2 explains that 95 percent males are involved in this activity whereas 5 percent females found as an interviewee during the time of survey. So, mostly males are involved in this interview process to discuss about handloom activity. It is also found that, 32.04 percent female are involved in allied activity whereas only 1.6 percent involves in weaving activity. Alternatively, 4.4 percent and 30.6 percent male are involved in allied and weaving activity respectively. So, major proportion female are involving in allied activity of handloom sector.

The social category of handloom households are interpreted in table 3. It clearly reflects that 11.4 percent are found as SC handloom households and 88.6 percent are OBC households in the field survey. It clearly shows that major households are OBC in the study area and Bhuliya community is the major caste involves in weaving activity.

Table 4 shows the educational status of respondents, the highest proportion i.e. 29.7 percent covered upper primary and 26.7 percent are passed out from matriculation, 15 percent are below primary level, 6.7 are in higher secondary and 1.9 percent are completed graduation.

Table 5 analyse the categories of weaver, highest proportion i.e. 76.7 percent are in attached weaver those who are working under master weaver. Similarly 4.4 percent are found under primary weaver's co-operative society, 18.3 percent are independent weaver and 0.3 percent are found under each category of NABARD and sambalpuri bastralaya respectively.

7. Income, wages and earning of handloom households

In this section income, wages and financial provision of handloom households are explained in the following table. In this table, average income of households, type of looms, loan facility from formal and informal sources, average working time and day to produce a cloth are analysed.

	Category	**Number of respondents**	**Percentage (%)**	
Table 6	**Household's average income category wise distribution**			
	Less than 100	39	10.8	
	100-200	144	40.0	
	200-300	84	23.3	
	300-400	54	15.0	
	400-500	24	6.7	
	500-600	8	2.2	
	600-700	4	1.1	
	700-800	1	.3	
	800-900	1	.3	
	Above 1100	1	.3	
	Total	360	100.0	
Table 7	**Type of looms**			
	Pit looms	344	95.6	
	Stand loom	14	3.9	
	Owner of attached weavers (Master Weaver)	1	.3	
	Wefting yarn preparation (Tie dye work)	1	.3	
	Total	360	100.0	
Table 8	**Indebtedness of weavers (Formal Sources)**			
	Less than 10000	3	.8	9.7
	10000-50000	21	5.8	67.7
	50000-100000	5	1.4	16.1
	100000-150000	1	.3	3.2
	150000-200000	1	.3	3.2
	Total	31	8.6	100.0
	No	329	91.4	
	Total	360	100.0	
Table 9	**Informal sources**			
	Less than 10000	4	1.1	3.2
	10000-50000	116	32.2	92.1
	50000-100000	5	1.4	4.0
	100000-150000	1	.3	.8
	Total	126	35.0	100.0

	No	234	65.0	
	Total	360	100.0	
Table 10	**Average working time of households**			
	Up to 8 hours	93	25.8	
	8-10	155	43.1	
	10-12	84	23.3	
	12-14	28	7.8	
	Total	360	100.0	
Table 11	**Average working day of households to weave a cloth**			
	Up to 4 days	8	2.2	
	4-5 days	235	65.3	
	5-6 days	4	1.1	
	6-7 days	110	30.6	
	9-10 days	3	.8	
	Total	360	100.0	

Source: Author Calculation from field survey, 2023

Table 6 examines the households average income i.e. 40 percent are in the range of 100-200 rupees a day. Likewise, 23.3 percent earns in the range of 200-300 and very less proportion i.e. 0.3 percent household's average income in each category of 700-800, 800-900 and above 1100 respectively.

Table 7 reflects the type of loom used by the handloom households, 95.6 percent are using pit looms with dobby/jacquard, 3.9 percent uses stand loom and one household is engaged in master weaver and tie-dye work i.e. 0.3 percent in each cases.

The indebtedness of handloom households from formal institutions are explained in table 8. However, 67.7 percent i.e. the highest proportion of households are indebted in the range of 10000-50000 for the reasons like handloom activity, health hazard and housing purposes. Similarly, 0.3 percent household belongs to each category of 100000-150000 and 150000-200000 respectively i.e. the lowest proportion of total handloom households. This table clearly find out that largest proportion of households are receiving small amount of loan and lowest proportion are getting large amount of loan facility.

Likewise, the indebtedness of handloom households from informal sources are analysed in table 9. The highest proportion of handloom households i.e. 92.1 percent in the range of 10000-50000 loan whereas 0.8 percent are getting loan facility in the range of 100000-150000. It clearly shows the gap in terms of loan accessibility from informal sources among the handloom households.

Table 10 reflects the average working time of handloom households, 43.1 percent are working 8 to 10 hours a day. But, 7.8 percent households are working 12 to 14 hours a day. Similarly, the average working day of handloom households to produce a piece of cloth are interpreted in table 11. In the present study, 65.3 percent are working 4-5 days to weave a cloth whereas 0.8 percent are working 9-10 days in order to produce a cloth. This gap clearly indicates the experiences of weavers which are useful in handloom activity.

8. Variation in impact of socio-economic factors on weavers productivity

In this study, various factors impacting handloom weaver's productivity are explained in the following table. It is important to analyse the variation in impact level before and after deployment of handloom instruments. Some of the households are getting supports which are helpful for technological adoption in pre/on/post loom activity. The supports like concrete facility in workshed area, financial provision, solar light, inverter facility and other training provision really helpful for the handloom households in some extent of using advanced techniques. These are the factors partially supporting the deployment of weaving technology. Apart from that marketing facility, education level, electricity connection, type of dwelling and cost of production are important factor determining the technological adoption in pre/on/post loom activity.

Table 12. Impact of factors in case of traditional methods on weaver's productivity

	β	**SE**	**t**	**p**	**VIF**
Constant	.437	.163	2.681	.009	

Average income	.270	.000	2.152	.034**	3.430
Total working members	-.391	.015	-4.675	.000*	1.523
Distance	-.121	.001	-1.566	.121	1.310
Average working time	.041	.009	.545	.587	1.231
Financial incentives	.038	.000	.494	.623	1.267
CPMS	-.583	.000	-5.612	.000*	2.354
Average profit	.225	.001	1.841	.069	3.246
Electricity connected	.015	.052	.144	.886	2.525
Illiterate	.139	.072	1.517	.133	1.844
SC	.123	.053	1.107	.271	2.713
Male	.119	.062	1.604	.113	1.207
15-34 age group	.066	.039	.852	.397	1.314
Above 60	.160	.020	1.981	.051	1.417
Attached weaver	.215	.050	2.240	.028**	2.002
Semi-pucca	.038	.016	.515	.608	1.204
R Squared			0.638		
Adjusted R Squared			0.569		

Source: Author Calculation from field survey

* = Perfectly significant (P = 0.00)

** = Significant (0.00 < P < 0.05)

Dependent variable: Average productivity of household worker

The above table clearly interprets the results of multiple regression model in case of traditional methods of production. In this table, socio-economic factor and its impact on handloom household working members are explained. It shows that total working members and cost of production are statistically significant but negatively associated with the productivity level. Suppose, total working members are increased by one person, then the productivity level will decrease. As there are fixed number involves in weaving and allied activity, additional person leads to decline productivity level of the households. Average income is significant and positively related with the cloth production. Similarly, households working under master weaver have a significant impact on the productivity level. Correspondingly, distance, working time, loan facility, profit level, education, caste, gender, age groups and type of dwelling do not have any significant impact on the productivity of the household enterprises.

This study does not find any significant differences in impact of explanatory variables like distance from the market, age groups, education level, type of dwelling, financial incentives, electricity connection and gender on the productivity level. Uniformly, these variables are positively associated with the productivity level of households in case of both using and not using technical instruments in handloom enterprises.

Table 13. Impact of factors in case of technological adoption on weaver's productivity

	β	**SE**	**t**	**p**	**VIF**
Constant	.016	.199	-.080	.937	
Average income	.438	.000	6.445	.000*	3.987
Total working members	-.095	.016	-2.363	.019**	1.398
Distance	-.034	.000	-.891	.374	1.246
Average income from other sources	.078	.002	2.166	.031**	1.121
Average working time	.143	.010	3.694	.000*	1.286
Financial incentives	.058	.000	-1.598	.111	1.122

CPMS	-.504	.000	-11.304	.000*	1.713
Average profit	.214	.000	3.227	.001**	3.802
No of loom set	.037	.085	.966	.335	1.297
15-34 age group	.041	.037	1.114	.267	1.188
Electricity connected	.025	.088	.675	.500	1.178
Kachha	.034	.036	.927	.355	1.142
Illiterate	.017	.104	.370	.711	1.760
Secondary	.004	.029	.088	.930	1.583
SC	.173	.072	4.566	.000*	1.232
Male	.007	.085	.177	.860	1.168
Attached weaver	.370	.048	8.457	.000*	1.650
R Squared	.713				
Adjusted R Squared	.694				

Source: Author Calculation from field survey, 2023

* = Perfectly significant (P = 0.00)

** = Significant (0.00 < P < 0.05)

Dependent variable: Average productivity of household worker

The above table clearly demonstrates the socio-economic profiles and its impact on the productivity of households after adopting technical instruments in handloom activity. The modern technology/upgraded technologies are available in the processes of winding of yarn on dubbas, warping of yarn on asu, wefting of yarn on asu, reeler machine, handloom dobby & jacquard and weaving of cloth on loom. From the above result, it is found that average income, working time, cost of production are statistically significant in this multiple regression model. However, there is a positive association between income and working time with the productivity level whereas the cost of production are negatively related to the cloth production. Likewise total working members, average income from other sources and profit level are significant in this model. But the working members are negatively associated with the cloth production whereas income from other sources and profit level positively related with the productivity level.

Similarly, the production level of SC weavers are low as compared to OBC in social strata and they are mainly belongs to attached weaving category. After technological innovation, SC category makes larger contribution in total cloth production in the study area. The important point is that age groups, education level, electricity connection, type of dwelling & gender do not have any significant impact on the productivity level. There is no any multicollinearity found among the explanatory variables in this model. In this model, R square value is .713, it means 71.3 percent of dependent variable is explained by independent variables. Adjusted R square is .694, it implies 69.4 percent of the dependent variable is explained by other variables which are not taken into account.

9. Conclusion

The above discussion clearly shows that various factors are affecting weaver's productivity before and after technological adoption in pre/on/post loom activity. Hence, the average income, working time, electricity connection, Kachha houses, SC category, female person, attached weavers are positively impacting the productivity level with the use of advanced techniques as compared to conventional methods. But, the important point is that the average profit level, semi-pucca houses, illiteracy, male person, aged person highly impacts weavers productivity with traditional methods as contrast to advancement of technology. Average income from other sources is significantly impacting the productivity level in case of technological adoption as compared to traditional methods. Similarly, working members, marketing facility and cost of production are negatively impacting the productivity level. But, the intensity of decreasing production is more in case of obsolete technology as compared to modern technology. So, the proper implementation of various policies and programmes of the government regarding technological innovation is important to improve the efficiency of handloom weavers.

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