Design Intervention in Maheshwar Handloom, MP, India

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Abstract

Textile industry plays important role in our country's economy. Handloom weaving sector is one of the most important sectors, have the potential to produce employment. However, this sector is ignored in terms of development. Due to lack of development in this field, the workers were forced to use traditional methods and equipment for their task, which was time consuming and hard work. Workers suffered a lot of health problems due to the practice of traditional techniques of weaving. This leads to loss of interest by workers in this field and their migration to other areas of work. It also seriously affects the socio-economic conditions of rural people. Besides, directly or indirectly it does affect the economy. It is also very time-consuming task. So, an ergonomic and technical improvement was important for upgrading traditional weaving. This work identified the issues with traditional weaving process of Maheshwar handloom sector and propose solution provide a better working condition to the workers involved in the Maheshwar handloom weaving sector. Further, the work also focuses to provide a viable and feasible solution to reduce ergonomic risk factors and satisfy workers of Maheshwar handloom weaving sector by earn profit and also increase productivity and provide efficient work.

Keywords

Design, Ergonomics, Textile, Handloom, Social and Occupational Ergonomics.

1. Introduction

Musculoskeletal problems are often related to the handloom weaving process. Design deficiencies often led to many problems to the workers and can be seen in the form of bodily pains, Absenteeism, bodily discomfort and job turnover. Bodily pains and discomfort tends to be Aggravated by the tasks performed in poor design workstation. (Eklund, J. A., 1995). In India excess of 38 million people were utilized in the Handloom weaving area. All through the nation and 15,000 local Handloom weaving businesses had been set up in a condition of north and southern parts of India. The greater parts of them had a place with low strata of society and were very poor, working in little families. Over 40% of weavers were women (Narzary, J., 2013). When modern machines for weaving captured the market, handloom market greatly affected and it disturb the Handloom weaver's life. Due to poor workstation design, constrain posture, high muscle exertion and repetitive nature of the weaving task handloom weavers of Ahemdabad reported body pains (Nag, A., Vyas, H., & Nag, P. K., 2010). One other study reported that handloom weaving process involve repetitive task which was causing pain in the upper limbs among the male handloom weavers of West Bengal, India (Banerjee P. & Gangopadhyay S., 2003).

Maheshwar Handloom owe their name to Maharani Ahilyabai Holkar, the leader of the territory of Indore in the late eighteenth century. Maheshwar is a small town in khargone locals of MP State in India where whole study of Handloom was done. The weaving business of Maheshwar gave work to around 5000 individuals. Maheshwar Handloom Weaver got paid 800-1500 INR to work done by them weekly (Ansari T. M, 2016). It was observed that Maheshwar Handloom has same conditions as most parts of the country, their many areas needs to improve and update. Most weavers are facing many problems like health, safety, bad environment, and low wages issue.

A SWOT analysis of Maheshwar Handloom shown in below.

• Strength: Availability of raw material, Skills People, Traditional design.

• Weakness Old Pattern: Design Technology-Old, Transportation issues, No System for working.

• Opportunities: Export market/Demand, Highlight Market, Indore commercial capital.

• Threats: Fake products, Competition, Power Loom Industries.

2. Objective

To provide a viable and feasible solution to reduce ergonomic risk factors, also satisfy workers of Maheshwar Handloom weaving sector by earning profit, increase in productivity and efficient workspace.

3. Methodology

For the purpose of data collection, methods namely questionnaire, interview and direct observation, task analysis, posture and anthropometric analysis, workspace study, time and motion study were used (Gill, P., Stewart, K., Treasure, E., & Chadwick, B., 2008). The Questionnaire was used to determine needs and problems of the workers/weaver. The interview was conducted for getting deep insights into the problems (Kuorinka, I., Jonsson, B., Kilbom, A., Vinterberg, H., Biering-Sørensen, F., Andersson, G., & Jørgensen, K., 1987). Analysis performed in Rehwa Society and was observed directly, to get more reliable data in the weaver's environment. Wherever allowed, video and photos were clicked for Task Analysis and time study.

4. Results

A total number of 40 weavers were involved in the study in which 16 weavers were men and 36 were female. It was found that more than 78% of the weavers were facing pain in different body parts. Weaver started worked from morning 10:00 am to evening at 05:30 pm. They sat all day long with the same posture which was the major reason behind this pain. From RULA (McAtamney, L., & Corlett, E. N., 1993). We found out at time of working some posture RULA score more than 6 which was needed to be changed. From task analysis we analysed that lot of foot action required at time of weaving, a weaver needs to lift his/her leg regularly. Workspace study showed the necessary adjustments were needed to customize as per the weavers' comfort and choice. Time and motion study gave as standard time average time taken for complete a basic cycle or pick of weaving to create fabric without motive. (Nakayama, S. I., Nakayama, K. I., & Nakayama, H., 2002).

Table 1. Physical characteristic of weavers

N=40	Mean	Range	SD
Age (in years)	24.3	18-55 and more	8.02
Height (in feet)	5.43	4.5-5.10	0.31
Working experience (in years)	13	3-40	13.1

Table 2. RULA and Motion Results

	Task	RULA score	Time Taken SD in seconds

1.	Entering into loom	5/8	19
2.	Preparing Threads	3/8	5
3.	Picking	5/8	7
4.	Return Beating In	7/8	6
5.	Beating In	5/8	8
6	Manual Errors/allowance	7/8	58

5. Discussion

Each weaver who was working on the loom complaining about the legs pains and issues related to other body parts. Weaver normally worked for 6-7 hours if they work at factory site or workstations. From Direct observation touch point led design direction to distribute this work to both feet to make it more comfortable and easy to operate by both feet. If it was possible to reduce the standard time so more productivity could be achieved. Also if travelled distance of legs decreased than it was more comfortable for weaver.

6. Conceptualization

It was found that during shedding step repetitive motion on paddle cause leg muscle pain due to continuous strain and load on foot as weaver need to put same energy to continue the process. To solve this complex problem found during our study and also from the design direction gathered through the other similar previous study done on the handloom suggested design attachment of additional part (Hani U., Das A., 2017) Flywheel was selected to overcome this problem where it was connected with the help of push rod which decrease the amount of energy applied. Other identified problem was the application of force done by only one foot during the shedding step. Here, we applied distribution of load using treadle mechanism. Final concept was prepared after analysing both the concepts and integrated them for better performance.

7. Conclusion

This study showed that Maheshwar Handcraft sector needed lots of ergonomics intervention. Many people were still working in bad condition which caused them health, safety, and financial issues. Initial testing was qualitative, importantly the proposed working solution was able to satisfy simulate subject's more than previous working process in discomfort and pain response categories. It could be used in actual working conditions. Design solution was portable, low cost and even easy to build with locally available materials, those factors made them more acceptable by the Maheshwar weavers. More work can be done in this direction for the device as it cause less trouble during the whole process. Still modifications were required.

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Biography

Mr. Pratik Mukesh is a Master of Design student at Indian Institute of Information Technology Design & Manufacturing, Jabalpur, India. He earned B.E. in Mechanical from Rajiv Gandhi Proudyogiki Vishwavidyalaya University, Bhopal India. His research interests include user experience research and design, ergonomics, user interfaces.