Abstract—The objective of this paper is to study the affect of the ergonomics factors in handicraft industries of Jaipur district, Rajasthan, India. Indian handicrafts are uniquely and traditionally the best in the world. India has a rich heritage of hand work and handicrafts like Marble handicrafts, Hand block printing, Blue Pottery, Painting, Leather, Gems jewelry, carving sculpture etc. Jaipur is one of the most important areas not just in Rajasthan, but also in the country for the production & subsequent export of handicrafts. Currently, there are more than 2000 units in the handicraft export business, employing more than 5 lakh people. Ergonomics considers the physical and mental capabilities and limits of the worker as worker to interacts with tools, equipment, work methods, tasks, and the working environment and strives reduce work-related musculoskeletal disorders (MSDs) by adapting the work to fit the person instead of forcing the person to adapt to the work.

Keywords—Ergonomics, Handicraft, Work-related Musculoskeletal Disorders.

I. INTRODUCTION

Handicrafts can be defined simply as objects made by the skill of the hand and which embody a part of the creator’s personality in addition to as centuries of evolutionary tradition. Handicrafts are individualistic, therefore generally provided by informal unorganized sector artisans works. The informal sector in India, including almost the entire craft sector, plays a significant role in the Indian economy in terms of its share in employment, output production and wealth creation. The total workforce of 457.46 million workers in India comprises and 422.61 million (92.38%) are informal workers. Of this 92.38%, 86% (394.90 million) are in the informal sector as shown in the Figure 1 and the remaining 6.38% (27.71 million) are actually sub-contracted workers of the formal sector. Going by industry group, a sizeable number of informal sector workers are engaged in trade and manufacturing related to small scale industries and traditional industries covering Khadi and Village Industries, Handlooms, Sericulture, Coir and Handicrafts [1].

Musculoskeletal disorders (MSDs) are currently one of the most critical problems globally faced by the ergonomists in the workplace. In industrially developing countries, the problems of workplace injuries are extremely serious. Poor working conditions and the absence of an effective work injury prevention program in industrially developing countries have resulted in a very incidence of MSDs [2].

The goal of the science of ergonomics is to find a best fit between worker and job environment. Handicraft work is a tough occupation. Handicraft workers get backaches, hearing problem, breathing problem, joint, lower abdomen more than any other health problem. The reasons identified include unnatural work postures, use of hazardous chemicals, unsafe working practices, long working hours and many risks of work accidents caused by unsafe conditions [3].

II. LITERATURE REVIEW

Ergonomics is the scientific study of the relationship between man and his working environment. In this sense, the term environment is taken to cover not only the ambient environment in which he may work but also his tools and materials, his methods of work and the organization of his work, either as an individual or within a working group. All these are related to the nature of the man himself; to his abilities, capacities and limitations [4]. Human factors is the discipline science that discovers and applies information about human behavior, abilities, limitations, and other characteristics to the design of tools, machines, systems, task, jobs, and environments for productive, safe, comfortable, and effective human use [5]. Motamedzade et al. studied the ergonomic design of carpet weaving hand tools. From the
 usability test, it could be concluded that, new hand tools caused the concentration of contact stress on the palm of hand to be eliminated. The redesigned handles were perceived to be more comfortable than the conventional ones [6]. Arphorn et al. studied on the sculptors’ workstation in pottery handicraft to reduce muscular fatigue and discomfort, if used modified workstation designed. This study was conducted in 24 sculptor’s subjects who had no illness history, muscular injury and bone diseases. They found that the modified workstation could clearly reduce discomfort in low back muscles and right shoulder muscle with significant difference. Moreover, the average time spent per piece of carving work was reduced and the score of workstation satisfaction with the change of the posture was increased. The results confirmed increased productivity and comfort for the sculptors using this modified workstation [7]. Nurmianto studied ergonomic intervention in handicraft producing operation. Twenty trainees were questioned regarding musculoskeletal disorders (MSDs). Among the trainees, knees, back and shoulders problems were more prevalent compared to other body regions. Based on the problems found, a new workstation was developed and five trainees were asked to work on the new workstation. The working posture was improved by developing a new working table [8].

III. IDENTIFIED ERGONOMIC FACTORS IN HANDICRAFT INDUSTRIES

To study the affect of the ergonomics factors in handicraft industries of Jaipur, four different handicraft sectors were chosen. Industries related to these sectors were visited and analyses were done. Through the analysis of the affecting factors some conclusions were made, which can be shown in table 1.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Handicraft Sector</th>
<th>Ergonomic Factors</th>
<th>Impact of ergonomics factors on handicraft industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Hand Block Printing</td>
<td>Awkward posture in block making; Standing posture in printing; Bending posture in washing; Falls from heights</td>
<td>Increase the absenteeism of workers due to back pain, lower back, shoulders, and the cervical spine area.</td>
</tr>
<tr>
<td>2.</td>
<td>Leather Handicrafts</td>
<td>Awkward posture in cutting/curving/stitching; Improper ventilation; Odour from hides</td>
<td>Increase the absenteeism of workers due to eye strain, Muscular/Body Pain, Breathlessness problem, Respiratory problem, Cuts and wound while cutting, curving and stitching, fixing etc. Odour nuisance can have physical as well as mental effects.</td>
</tr>
<tr>
<td>3.</td>
<td>Blue Pottery Handicrafts</td>
<td>Improperly adjusted workstations and chairs; Awkward, limited and repetitive movements; Poor Illumination; Heat from kiln</td>
<td>Decrement in production of company due to Muscular Pain, Chest pain, Insomnia and Abdomen pain, Shoulder Blades, Cough and Cold, gastric and digestion problems.</td>
</tr>
</tbody>
</table>

Any physical factor within the workplace that harms the musculoskeletal system (muscles, joints, bones and related structure) of workers is termed as ergonomic hazards. Ergonomic hazards impact employers and workers and their families. Poor workplace design, awkward body mechanics or postures, repetitive movements, and other ergonomic hazards induce or contribute to a staggering number of cumulative trauma disorders that affect hands, wrists, elbows, arms, shoulders, the lower back, and the cervical spine area. Structures involved include tendons, muscles, bones, nerves, and blood vessels.

IV. CONCLUSION

Handicraft sector is part of the small manufacturing industries. Significant part of Indian population is dependent on handicraft sector. Major problems associated with handicraft producing operations, awkward postures in different parts of body (i.e. neck, shoulders, elbows, wrists/hands, upper back, lower back, thigh, knees, and ankles). It is concluded that the high rate of absenteeism has an adverse effect on quality and quantity of production, efficiency of workers and organization, organizational discipline and more importantly on the organization's intention to fulfill the new market demands. Unscheduled absenteeism badly hurts the progress of an organization resulting in loss of productivity, increased costs in hiring additional staff and low morale among the workers. Several studies in different handicraft trade [6,7,8]. Ergonomic intervention and ergonomic redesign of workstations to improve posture and working conditions helps in reducing workers discomfort and fatigue, increasing productivity and a significant reduction of employment related MSDs.

REFERENCES


