

# Reviewing interventions to enhance comfort and productivity of workers in Enterprises

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■ **ABSTRACT** : The following study deals with the detailed reviews regarding the interventions that have been done globally in the sector of entrepreneurial interventions in aspect of work simplification. Various standards hence can be considered while referring to different designs for enterprises, especially small scale enterprises. The studies have revealed the musculoskeletal disorders from manual material handling (MMH) works often involving strains and sprains to the lower back, shoulders, and upper limbs. The ergonomic interventions are found to give comfort to the workers in various postures. It is concluded that the design of the system must be incorporating to the worker, equipment, and environment as a whole.

■ **KEY WORDS**: Reviewing interventions, Enhance comfort, Productivity, Workers in Enterprises

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**O**SHA concluded that the Work related MSDs were the most frequently reported causes of lost or restricted work time and accounted for 33% of all worker injury and illness cases (Bureau of Labor Statistics (BLS) in 2013). Employers were responsible for applying ergonomic principles to provide a safe and healthful workplace for their workers to reduce the severity of MSDs. The important elements of an ergonomic process recommended were provision of management support, involvement of workers, providing training, identifying problems, encouraging early reporting of MSD symptoms, implementing solutions to control hazards and progress evaluation of workers.

Kogi *et al.* (2003) examined simple improvements in materials handling and workstations undertaken in

WISE project in the Philippines to reduce work-related musculoskeletal disorders through low-cost improvements relying on local resources. Many of over 2000 improvements reduced musculoskeletal loads in about 2 weeks using push carts or lifting devices, better worksite layout, worktables and chairs of appropriate height, fixing hand tools, better lighting, job rotation and inserting breaks. The effects were measured applying electromyography, heart rate recording and posture study methods and reduced muscular activities and productivity increase were found after work changes with improvements made. WISE training courses proved useful for various training programmes and advisory maneuvers. This resulted in reducing the risk of musculoskeletal disorders in a large number of small

enterprises.

Neumann *et al.* (2006) discussed the economic interest of management to take a more active role on preventing MSDs and other occupational health problems among workers in SSIs by using ergonomic interventions. Design teams; role was considered important for meeting ergonomic goals along with productivity goals.

NIOSH (2007) revealed the musculoskeletal disorders from manual material handling (MMH) work often involved strains and sprains to the lower back, shoulders, and upper limbs. Effective ergonomic interventions lowered the physical demands of MMH work tasks hence, lowering the severity of the musculoskeletal injuries caused. They were the useful tools which improved a company's productivity, product quality, and overall business competitiveness potential by reducing injury related costs alone. Proper planning of using energy, equipment, and exertion for doing job in the most efficient, effective, and effortless way possible can result in big wins for all concerned.

Khan *et al.* (2009) found in his study that design change in the pliers reduces discomfort in the ulnar deviation and wrist extension and increases productivity. He examined that discomfort rating increased rapidly due to the influence of wrist deviation combined and forearm rotation angle, while they were greater than 30% joint range of motion.

Kuijt-Evers (2009) revealed the goal of ergonomics to design jobs and tasks around the user's limitations and capabilities. He concluded that the design of the system must be incorporating to the worker, equipment, and environment as a whole. Ergonomically well-designed models and tools provide comfort to the user along with decreasing the risk of occupational health problems and increasing the job performance.

Dahiya *et al.* (2011) conducted a study on 20 bead makers of Mangali village to identify the problems and improve the condition of workers engaged in bead making activities and analyzed five major steps of bead making on the basis of physical, chemical and environmental hazards. NORDIC scale was used to identify musculoskeletal discomfort in different body parts due to postural discomfort and found that 41.67% respondents were engaged in bead making since 15-25 years and 58.34% spent 6-8 hours per day for bead making. Majority of respondents (83.34%) adopted squatting posture in the process. High level of noise and dust/ fiber create problem

during prolonged working hours in awkward posture and shoulder bending. They designed a new work station for bead making on the basis of anthropometric measurements of workers of north Haryana.

De Vries *et al.* (2011) suggested success factors for staying at work and psychological intervention to reduce MSDs. Such interventions were found helpful in rehabilitation and occupational medicine and helped prevent absenteeism.

Mead (2011) designed a portable ergonomic workstation, substantially having multiple purpose applicability in small electronic repair, costume jewelry, factory assembly, hobbyists, craft workers and the physically challenged, etc. It included a support frame attached to an arm rest base with an arm rest pad while accommodating multiple removable adjustable attachments and allowed optimal positioning of the upper body and the secured working materials. One embodiment of the table can also function as a standalone apparatus without attachments, in conjunction with existing non-ergonomic apparatuses or working materials while another embodiment can work when a height adjustment is not desired excluding the inclined extensions.

AICRP, Home Science, CCSHAU Hisar (2011-2012) reported that training had been conducted in Mangali village on improved tool (bead string maker) for string making through beads. This tool saved 70.83 percent time of workers in comparison to traditional method and reduced postural discomfort and drudgery and increased efficiency.

Ajala (2012) revealed the influence of workplace environment on workers welfare and productivity in government parastatals of Ondo State, Nigeria. The study adopted the descriptive survey research design of the ex-post facto type and using the random sampling technique selected 350 respondents. Analyzing the mean values and simple percentages of collected data resulted that workplace features and good communication network at workplace had effect on worker's welfare, health, morale, efficiency, and productivity. It was recommended that industrial social workers should advocate with management to create a conducive workplace environment and good communication network to attract, keep, and motivate its workforce for healthy living and improved productivity.

Maity (2013) evaluated the musculoskeletal disorders (MSDs) and postural stress among female

craft-workers in different districts of West Bengal. The prevalence of MSDs, body part discomfort (BPD) rating, body joint angles of the workers along with electromyography (EMG) of the shoulder and back muscles was recorded with the BIOPAC system. The MSDs, BPD rating and deviation of joint angle were lower while sitting on the floor with folded legs than squatting and sitting on the floor with stretched legs postures. The EMG values of the shoulder and back muscles were also lower in this posture. Hence, it was concluded that sitting on the floor with folded legs was less hazardous and imposed less postural stress with respect to other sitting postures.

Idrus *et al.* (2014) highlighted the lack of training and education as a barrier to women entrepreneurs and how a training program could solve these problems which was essentially an investigation into the nature and effectiveness of the Women Entrepreneurship Program (WEP). The principal aim was to make a valuable contribution towards the area of entrepreneurship training program. The study addressed the training of entrepreneurs and reveals that education and training are crucial for the development and creation of entrepreneurs. The findings helped to highlight the benefits derived by the WEP delegates and the new entrepreneurial, as well as business skills and knowledge, which they gained. It outlined future research areas and made various recommendations to guide entrepreneurship training program developers, providers, funders and sponsors.

Mpsych *et al.* (2014) suggested a multi-component approach to compare the efficacy of a multi-component intervention to reduce workplace sitting time through height-adjustable workstations intervention so to address excessive sitting as a health risk. Installation of height-adjustable workstations and organizational-level and individual-level elements were done. At baseline, the mean proportion of workplace sitting time was approximately 77% across all groups in comparison workplace sitting time in the multi-component group was reduced by 89 minutes/8-hour workday making the intervention successful in reducing workplace sitting.

Gupta *et al.* (2015) demonstrated how intervention through simple technology brought about improved manufacturing of beads from holi basil (tulsi) stems and favoured the convenience, productivity and income generation of the women from Brij Area of Rajasthan,

India. An overall improvement in the performance of the device was brought introducing a new stem holder and contactless sensor which improved the vibration of the device and replaced the mechanical switch inconvenience.

Gandhi (2016) challenged the role of Occupational safety and health (OSH) in SMEs to protect and promote health of SMEs' major workforce because the hazards at workplace and lack of attention given to safety and health, work related accidents and MSDs are very common. Poor design of workstations for seated or standing work in job determined with prolonged sitting, standing or squatting cause fatigue and development of work related musculoskeletal disorders (WRMSDs). WISE (Work improvement in small enterprises) methodology's simple low cost solutions applied in bead making enterprises were found very effective in workplace improvements. A checklist covering materials handling, workstation changes, work environment and work organization introduced many workstation improvements. The WISE action programme improvements (Noro and Imada, 1991, Kogi, 1995) reduced work hazards in small enterprises which lead to better health, safety and hence, enhanced efficiency of the workers.

Mrunalini and Logeswari (2016) revealed musculoskeletal problems of the workers in unorganized jobs like jewellery making, pottery, stone carving, metal craft work, wood carving and *patti* work. About 15 studies collected from International and national journals were examined to understand the musculoskeletal problems faced by artisans, the techniques and the interventions to assess the musculoskeletal problem suggested for relief. Nordic musculoskeletal survey schedule was used and high prevalence of musculoskeletal problems in the form of pain and discomforts in body parts were reported by the artisans. Ergonomic interventions and personal protective measures were the major reconciliations suggested in the studies.

Mahato *et al.* (2019) discussed the quality of life of the Assam people working in the metal handicraft sector, which was improved through design intervention in tool design with application of appropriate technology. The 'beading process' involved was improved with tool design intervention. Initial field study comprised the study of the existing manufacturing process, tools and machinery involved and problems associated with the existing

process to prioritize the scope of design intervention in tool design. The result after validation and testing CAD models with workers showed that newly designed tool was affordable and easy to use and could also substantially improve the quality and productivity.

Melkani *et al.* (2020) studied wooden beads related activities performed by Mangali village women of Hisar and strain to fingers of women stringing the beads. The prolonged exposure to drooping neck and uncomfortable sitting without any back and front support was revealed to be one of the major reasons for grip fatigue. Fifteen women had been given a platform of 10 inches to put their hands over it and working while wrists were in a supported position. The grip fatigue was significantly found to be reduced after observations of each woman working for 2 hours with and without increased platform workstation. The working platform was made as a raised prototype platform for the women inspired trough bed table while a virtual modified and more sophisticated workstation idea was built to prevent overall body discomfort of the workers.

Conclusively, the small enterprises involve different activities performed in poor environmental conditions which lead to various Musculo-Skeletal Disorders. Musculoskeletal problems of the workers in unorganized jobs like jewellery making, pottery, stone carving, metal craft work, wood carving and *patti* work are the major cause of physical and psychological discomforts and need serious recognition in terms of ergonomically equipped workspace provision. Poor design of workstations for seated or standing work in job determined with prolonged sitting, standing or squatting cause fatigue and development of work related musculoskeletal disorders (WRMSDs). The design of the system must be incorporating to the worker, equipment, and environment as a whole. Ergonomically well-designed models and tools provide comfort to the user along with decreasing the risk of occupational health problems and increasing the job performance.

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