Ergonomic Design Intervention; a Critical Step for the MSMEs in India

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ABSTRACT

As India embarks on its aspirations to transfer herself into a global manufacturing hub through the recently announced national programme *'Make in India'*, the focus is now firmly shifting to labor intensive manufacturing. Over 94% of the Indian industries comprise of micro, small and medium enterprises, MSMEs, spread across the country. The workers, the laborers, the artisans, majority of them from the lower economic strata of the society, and many of these industries operating either from small places or from individual homes, spend most of their time with poorly designed hand tools, machine tools, equipment, lighting, workstations, thereby exposing them to serious health hazards. Ergonomically designed tools, equipment and workstations that are contextual and appropriate will thus be the critical step for the government, towards embarking this ambitious journey.

The Design Clinic Scheme for MSMEs, a unique and ambitious design intervention scheme launched by the Government of India aims to bring the designers and experts to the doorsteps of these industries to discuss, analyze and identify such opportunities to then develop remedial solutions.

While sharing the experiences gained over the last four years of implementing this scheme, the paper attempts to sensitize the young designers and engineers to look at this critical issue that needs immediate attention.

Key words - Ergonomic Design; MSMEs; Design Clinics

1 INTRODUCTION

On September 25th this year, the Prime Minister of India unveiled an ambitious national campaign *'Make in India',* with an aim to make India a global manufacturing hub [1]. With the view to bring in the much needed economic transformation in the country, the campaign aims to attract global businesses to invest and manufacture in India.

India has a favourable demographic profile with over 60% of its population in the working age group of 15-59 years. Over 10 million people join the workforce every year in India. This will require creation of 220 million jobs by 2025 [2]. The country thus needs to grow faster to increase per capita income to create decent jobs for the unemployed. Reviving the country's manufacturing sector is a key initiative in this direction. While farming, which employs nearly 50 per cent of population, contributes just 14 per cent to GDP, and while services sector contributes nearly 60 per cent to the economy, but employs just around 27 per cent of workforce [1]. Manufacturing leads to creation of lot of jobs, service enterprises and thereby contributes to GDP. Every job created in manufacturing has a multiplier effect of creating two to three. The manufacturing sector would thus have to be the bulwark of this employment creation initiative [2]. The country needs to now move towards labour-intensive manufacturing-driven growth model [1]. The *'Make in India'* campaign promises effective and easy governance to help achieve this vision [3].

The share of manufacturing in India's GDP is stagnated at 15 to 16% since 1980 [2]. Though the growth of the manufacturing sector has generally outpaced the overall growth rate of the economy, the contribution of the manufacturing sector in India is much below its potential. Its share in comparable economies in Asia is much higher at 25 to 34% [2]. Recognising that the manufacturing sector has a multiplier effect on the creation of jobs, even in allied sectors, the Government of India, in the year 2011, announced a National Manufacturing Policy with the objective of enhancing a share of manufacturing in GDP to 25% within a decade and creating 100 million jobs [2].

2 MSMES IN INDIA

Micro, Small and Medium Enterprises, MSMEs, are the backbone of Indian economy. Over 95 % of the country's industries come under MSME category. MSMEs contribute nearly 8 percent of the country's GDP, 45 percent of the manufacturing output and 40 percent of the exports [4] [5]. They produce over 8000 value-

added products [6]. More than 31 mn units spread across the country, MSMEs produce a diverse range of products and services to meet the needs of the local markets, the global market and the national and international value chains [5]. MSMEs have been globally considered as an engine of economic growth and as key instruments for promoting equitable development.

The economic importance of this sector also lies in its high employment potential at low capital cost. MSMEs are the second largest source of employment in the country, after agriculture. They provide employment to over 73 million people in the country [5]. Over 50,000 people, majority of them women are involved in agarbatti rolling industries in Baruipur, West Bengal. And over 60,000 people are engaged directly and indirectly with the scissors manufacturing industries at Meerut. The Meerut Scissors industry is over 360 years old. The Indian footwear manufacturing industries engage around 1.10 million people, with over 2000 artisans involved in ladies footwear industries in Lucknow itself. Channapatna, also called as the city of toys, is a hub of micro and small scale units involved in making lacquered toys. Situated at about 65 Kms from Bangalore towards Mysore, the sector engages around 6000 people directly and indirectly. The 150 years old brass and bronze utensil cluster at Pareo, 40 Kms. from Patna, Bihar, employs nearly 3000 people from the village [7].

The labour intensity in the MSME sector is estimated to be almost 4 times higher than the large enterprises [6]. By providing employment in the rural area, MSMEs help arrest migration from villages to cities. The geographic distribution of the MSMEs is also more even. In view of these factors, MSMEs are important for achieving national objectives of growth with equity and inclusion.

Realizing the significance of this sector in overall growth and progress of the country, the government has taken several initiatives over the years towards strengthening this vital sector. The MSME development organization was set up in 1954 as an apex body for sustained and organized growth of MSMEs in the country. For the first time in Indian history, the government in the year 1991 announced a separate policy for the small scale sector that focuses on further promotion of the sector. The MSME development Act 2006 came in effect from 2nd October 2006. With the objective to ensure healthy growth of this sector and to increase its competitive edge, the Government of India announced the National Manufacturing Competitiveness Programme (NMCP) during the budget speech 2005-06. Through the amendment of the Government of India (Allocation of Business) Rules, 1961, through Presidential notification dated 9th may 2007, Ministry of Agro and Rural Industries and the Ministry of Small Scale Industries were merged into the single ministry - Ministry of Micro, Small and Medium Enterprises, MSMEs [7].

3 ERGONOMICS AND HUMAN FACTORS IN MSMES

Over 60,000 fisher women from different villages of the costal belt of Saurastra, Gujarat are engaged in fish sale business. They carry over 35 kg. of load on their head everyday and walk for hours to sell their goods in the local markets and /or in the nearby villages. Majority of them above the age of forty five, had shoulder pain and/or spinal cord injuries. As part of the design intervention project sponsored by the department of fisheries, Government of Gujarat, a fish cart comprising insulated box has been designed, that can be pulled or pushed and can also be used as platform to display, sell and process their goods in the markets.

A project 'Redesign and Development of Railway Track Tools on Ergonomics Principles' was undertaken in the year 2006. The project evaluated the existing track maintenance tools like beater, shovel, spanner, crowbar and the hand safety lamp, resulting into proposal of their improvements from the view points of ergonomics and industrial design. The Indian Railways are one of the largest railways in the world, with its network comprising 115,000 km of track. To ensure smooth running of the trains, regular maintenance of the tracks is very essential. Track maintenance in India has traditionally been done manually. Most of these frequently used tools require considerable muscle forces and stressful working postures. Continuous and long hours of usage of these tools in extreme weather conditions result into serious health injuries.

Over 94 per cent of the MSMEs in India are in the unregistered segment, with a large

number established in the informal or unorganized sector [7]. Majority of these enterprises would be self-initiated and self-managed. They operate with minimum of capital investment. These enterprises normally operate from their home or utilise the space available in or around their home. The workers, the laborers, the artisans, majority of them from the lower economic strata of the society, spend most of their time with poorly designed hand tools, machine tools, equipment, lighting, workstations, thereby exposing them to serious health hazards. Majority manual processes, coupled with long hours and uncomfortable work postures result in critical health issues and decreased productivity.

For majority of enterprises and industries in India, traditional methods of production, labour intensive processes, unergonomic and unhygienic work environment, old and improper tools and techniques, they all result in low productivity, lower quality of products and inconsistent outputs. Ergonomically designed tools, equipment and workstations that are contextual and appropriate will thus be the critical step for the government, towards embarking its ambitious journey.

4 DESIGN CLINIC SCHEME FOR MSMES

Conventional mode of design intervention through design consultancy and training would not be affordable to the MSMEs. By the very nature of their business, MSMEs would expect quick, practical and demonstrative solutions/results that can be immediately implemented with minimum or no investment cost. The design intervention approach for these industries should take into consideration these aspects [8].

The design clinic approach of design intervention brings design to the door steps of these needy industries where a solution to an existing design problem is diagnosed and remedial steps suggested by a multi-disciplinary team of design experts. Thus a design clinic defined as a mechanism where clinical design solutions are made available to the design problems of products/services concepts and ideas that are brought in for design analysis and scrutiny [8].

The first of its kind design intervention scheme aims to bring design to the doorsteps of the needy MSME industries of the country, through organizing series of Design Awareness Seminars, Design Awareness Programmes and Design Projects. Through these efforts, the scheme aims to create a platform for the needy MSME industries and the designers for continuous and constant interaction to improve their products and processes. One of the ten schemes launched by the Ministry of MSME, Government of India, under its National Manufacturing Competitiveness programme, NMCP, the Design Clinic Scheme for MSMEs, would encourage creation of 'Designed in India' and 'Designed for India' products and services.

Launched on February 17th, 2010 with the initial target to reach out to 200 MSME clusters, the scheme till date has reached out to over 20,000 MSME participants across the country, through organisation of over 350 Design Awareness Seminars, 200 Design Awareness Programmes, 236 Professional Design Projects and 98 Student Design Projects.

5 ERGONOMICS AND HUMAN FACTOR ISSUES IN MSMES

As part of the Design Awareness Programme, DAP, the second component of the scheme, 230 design experts visited 4005 MSME units in 140 cities/towns/villages till date and had detailed interactions with individual unit owners, it's workers and other stakeholders. The design experts carried out detailed Need Assessment Survey, NAS and opportunity mapping at the micro / unit level as well as at the macro / cluster level to gain holistic understanding of the design status of the particular MSME cluster being studied. The unit members / stakeholders were sensitised to various elements of design such as ergonomics, aesthetics, functionality etc. Remedial solutions for individual MSME units were discussed and developed on the spot, where ever possible. Followed by this, and based on the holistic understanding thus developed, intense workshops were organised with the MSME participants to further discuss identified design opportunities and their possible remedial solutions, future directions, strategies etc.

Most of these units being labour intensive manufacturing units, ergonomics and human factors form critical issue for these MSMES. *"The process usually practiced to roll Agarbatti here is unergonomic. The uncomfortable sitting posture can affect the spinal cord resulting in critical health problems. Providing proper sitting arrangements and tools will help the workers*

increase their productivity." **mentions Piyali Baruah in her NAS report of Agarbatti Cluster, Baruipur, West Bengal, as part of one of the DAP [9].**

Undefined work areas, unorganized workplaces; Haphazard layout of the working area / unit; Poor working conditions leading to labor absenteeism and low turnover; Unorganized work environment, working pattern, time management; Inadequate ventilation, inadequate and improper lighting conditions, space congestion; Need of proper uniform /work-suits as workers wear loose clothes, Improper foot wears; Majorly manual operation of production used, Vey few material handling devices - leading to most material handling tasks performed manually; Unergonomic and uncomfortable processes practiced; Uncomfortable work postures (coupled with long hours of work) results in critical health issues, decreased productivity; Traditional, mostly outdated tools & equipment used; Lack of / few basic facilities for workers; Environmental compliance not strictly followed; Absence of proper waste / solid-waste disposal system, leading to polluted and unhygienic surroundings; Pollution control devices normally not installed / not in proper working conditions; Absence of appropriate safety kits, masks, gloves etc. to enhance safety; etc. were some of the critical ergonomic and human factors issues identified by the designers. Overall health and hygiene conditions of many of the MSME units visited as part of the study, were felt to be weak and needed critical intervention. [9] [10]

While the unit owners were concerned about the health and safely of their workers, these issues however, are either overlooked or neglected, mainly due to financial constraints, lack of motivation, awareness and resources and/ or due to the work pressure. In the process, longer-term financial benefits of improving safety standards get overtaken by shorter-term benefits of reducing costs, increasing production and profits etc. Exposure and sensitisation to this critical aspect of business through the interaction with designers and development of quick implementable solutions through the Design Awareness Programmes organised, have helped bring the focus among the MSME participants to the need for developing effective health and safety management systems.

6 CONCLUSION

As India embarks on its aspirations to transfer herself into a global manufacturing hub through the recently announced national programme *'Make in India'*, the focus is now firmly shifting to labor intensive manufacturing. The country will require creation of 220 million jobs by 2025. Manufacturing sector can create multiplier effect on the creation of jobs. Several initiatives have been announced by the Government of India with the objective to enhance the share of manufacturing in GDP to 25% within a decade. The sector would have to be the bulwark of this employment creation initiatives.

Over 94% of the Indian industries comprise of Micro, Small and Medium Enterprises, MSMEs, spread across the country. MSMEs are important for achieving national objectives of growth with equity and inclusion. MSMEs, are the backbone of Indian economy. The labour intensity in the MSME sector is estimated to be almost 4 times higher than the large enterprises. Majority of these enterprises operate with minimum of capital investment. They normally operate from their home or utilise the space available in or around their home. For majority of MSMEs traditional methods of production, labour intensive processes, unergonomic and unhygienic work environment, old and improper tools and techniques, they all result in low productivity, lower quality of products and inconsistent outputs. The workers, the laborers, the artisans, majority of them from the lower economic strata of the society, spend most of their time with poorly designed hand tools, machine tools, equipment, lighting, workstations, thereby exposing them to serious health hazards. Developing effective health and safety management systems for these MSME units will be the important step towards improving overall health and hygiene conditions and thereby help improve their productivity, quality, capability, competitiveness and thereby economic profits/ gains. Ergonomically designed tools, equipment and workstations that are contextual and appropriate will thus be the critical first step for the MSMEs to move up the value chain.

Design Awareness Programme, the second component of the ambitious Design Clinic Scheme announced by the Government of India for the country's large MSME sector, helps bring designers to the doorsteps of these industries, who otherwise can not afford their services. This interaction so developed, helps

identify opportunities at the individual unit level, create awareness towards the much needed health and safety issues that are otherwise overlooked and develop on the spot implementable solutions. Over 200 such Design awareness programmes organised till date have helped bring the focus of MSMEs, while developing remedial solutions, to improve their overall health and safety conditions.

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