

Ergonomic Endeavours to Enhancing Safety and Health in the Transportation Industry

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Introduction

A modern transportation system provides a vital role to the economic, environmental, and societal challenges faced around the world [1]. With continued innovations and improvements, new technologies for the transportation system have been introduced. The new developments have implemented for delivery of improved operational performance, interoperability, and reputation but all ultimately for the purpose of safety and health improvements [1].

Despite the continued efforts to enhance overall safety practices, workers from the transportation industry are exposed to a number of unhealthy working conditions which put them at frequent dangers for injuries and accidents. They are uncovered to the high risks of developing musculoskeletal disorders (MSDs) amongst other indispositions such as ocular, gastric, and psychological disorders [2]. They are simply unprotected to unfavourable working circumstances.

For example, exposure to heavy vibrations, extreme temperatures, frequent raisings and carrying, and handling loads without any aids from other workers or devices, and working more than 8-hour per day are all factors that may result in work-related musculoskeletal disorders (WMSDs). Another frequent contributor to this WMSD problem is specialization or requiring a worker to perform only one function or movement for a long period of time and/or recurrently.

The injuries perceived as a consequence of working under such detrimental environments can stimulate earlier arrival of the worker' ageing, thus affecting occupational performance [3,4]. Because safe working conditions and satisfactory practices allow the maintenance of health and workability throughout the advanced age, it is important that recognizing risk factors in the transportation workplace and industry is an essential step to correct hazards and improve worker protections.

Injuries and fatalities amongst the transportation workers generally arise from their tasks such as driving, loading/unloading, tarping, and bolting. These tasks involve various ergonomic risk factors, including heavy lifting, pulling, pushing, reaching, bending, and combined with sitting in a static position for a prolonged period in a vibrating vehicle. Sudden shocks when travelling over rough terrains further increases the risk.

Therefore, a systemized assessment of workability is required to identify possible agents associated with occupational symptoms, injuries, illnesses, and stresses amongst the workers in the transportation industry [4,5]. To assess such types and degrees of WMSDs and other related injuries in the transport sector, ergonomic approaches seem to be a good starting point. With the application of ergonomic concepts, principles, and tools, the likelihood of WMSDs and associated sufferings can be significantly reduced if transit control

systems are conceived to be effective through user-centred design developments. In this sense, ergonomic involvements seem to be a necessary step to develop defensive and/or corrective measures for the avoidance and reduction of injuries and incidents in the transportation industry.

Safety and Health Issues in the Transportation Workforce

Transport workforce

The transportation industry is growing older at a larger rate than the general working population. For example, around 68% of workers in the transportation workforce from European Union (EU) countries were aged between 25 and 49 and 26% were in the 50 to 64 age group in 2006 [6]. Only 6% of workers in the sector were under 25 years old, in comparison with 11% in the overall EU workforce, and the ratio of young workers has been more than halved over less than 10 years in several EU nations [6].

Such demographic changes raise the question as to how to best certify the transportation industry will contribute to the development of skills amongst older workers, whilst maintaining employability, motivations, and skills of workers as they become old [6]. Furthermore, the presentation of a number of new technical applications such as electronic planning and remote monitoring systems and mobile channels of communication has changed the content and workload of the transportation worker.

For those reasons, transportation workers need to adjust complex working conditions. As a result, they have been requested to conduct periodic and adapted training that keeps up with confronting organisational and technological changes and increasing customer demands. In addition, more considerations should be offered to the ergonomics of workplaces, as it is a known fact that some health problems, including MSDs, increase with age and seniority, at least because of the length of exposure and unsatisfactory working conditions [6-9].

Musculoskeletal disorders in transportation workers

Musculoskeletal disorders (MSDs) are injuries or pains in the human musculoskeletal system, including the joints, ligaments, muscles, nerves, tendons, and structures that support limbs, neck, and back [10-13]. MSDs are one of the main health problems faced by workers nowadays and may force them to an inability to perform activities due to the repetitive use of movement or maintenance of awkward postures at work [14]. As a result of MSDs, workers may

experience symptoms such as discomfort, pain, numbness, tingling, weakness, and restricted movement.

Musculoskeletal injuries also include muscle and joint symptoms such as muscle strains, tendonitis, carpal tunnel syndrome, and rotator cuff syndrome. Thus, eliminating employee's unsafe and unhealthy work postures and/or habits is an important and essential matter for the treatment of musculoskeletal damages [14].

Amongst a variety type of professions and industries, workers in the transportation business are exposed to highly susceptible working environments that can cause to MSD developments from their work activities such as long hour and/or long distance driving, frequent loading/unloading operations, day/night works, sleepiness and/or loss of vigilance, and scheduled delivery rounds. These tasks involve various ergonomic risk factors, including heavy lifting, pulling, pushing, reaching, and bending, combined with sitting in a static position for a prolonged period in a vibrating vehicle [15].

Unexpected shocks when voyaging over rough terrain further increases the risks. Exposure to a whole body vibration syndrome through their working conditions can result in numerous short- and long-term symptoms including interruptions to circadian rhythms, increased heart rate, and disorders of the spinal, digestive, nervous and reproductive systems, and psychosocial risks such as driving stress and fatigue [15].

Moreover, drivers who spend long hours sitting in a static or fixed position whilst driving are at a greater risk of developing lower back pain, which is a typical symptom of the MSDs. The current literature also shows that MSDs contribute to approximately 60 to 70% of lost time injuries amongst workers in the transportation sector [15]. In this sense, working conditions of the transportation industry clearly need to improve the protection of their employees from MSDs. Therefore, it is essential to put ergonomic efforts to prevent and identify MSDs according to the physical demands and psychosocial risks of each work in the transportation industry.

Vibrations, Noise and Physically Exhausting Work Conditions

Transportation workers, especially drivers, are more exposed to vibrations than any other average working population. Whole body vibration and prolonged sitting or standing are prevalent problems, which increase the chances of MSD development, especially back disorders, amongst transport workers. For example, the full body vibration caused by the driver's cabin can have an effect on cognitive faculties such as the vision, coordination, and the overall functional ability of the workers [6].

Heavy lifting tasks are another important occupational risk within the transportation sector, especially during loading and unloading of vehicles, in service tasks such as catering and maintenance of vehicles, ships and trains, and on the delivery of parcels and goods, and at airport check-in desks [6].

In addition, lifting aids and ergonomic and safety equipment may not be available or the workers may depend on the equipment at the site of delivery or on the unforeseen shape or weight of the loads, making it difficult to lift or carry them in an ergonomically acceptable way. It often depends largely on the arrangements with customers and the awareness of occupational safety and health (OSH) risks whether conditions are adapted or not. Thus, precautions should be given to

anticipate individual adaptability of the equipment or the working environment by workers [6].

The recent reviews suggest that transportation workers are also more exposed to repetitive movements during driving such as collecting fares, pulling and pushing of loads, and getting on and off the vehicle [6]. It is also found that transportation workers are more exposed to loud noises. There are important noise sources in and around vehicles and some of the highest noise levels observed at workplaces may result from them, not only in road and rail transport but also on planes or large boats and/or ships. When they drive, perform loading and unloading, and board vehicles, transportation workers may be exposed to high background noise levels.

Noise may also interact with exposure to dangerous substances such as exhaust gases and organic solvents, increase fatigue and reduce attention, thus leading to higher accident risks [6]. Therefore, it is necessary to put ergonomic attempts to prevent vibrations, noise and physically draining jobs for the workers in the transportation industry.

Ergonomic Involvements for the Transportation Industry

Ergonomic concepts, principles, and tools can be applied to study workers and works in the transportation industry. More specifically, ergonomics is the science of designing the job to fit the worker, rather than physically forcing the worker's body to fit the job [16-20]. Adapting tasks, workstations, tools, and equipment to fit the worker can help reduce physical stress on a worker's body and eliminate many potentially serious WMSDs and other related injuries.

As discussed in the above, workers in the transportation industry are exposed to a number of factors which put them at high chances of injuries. For example, exposure to heavy vibrations, extreme temperatures, frequent lifting, carrying and handling loads without supports from other workers or devices, and working more than 8-hours per day are all the elements that may result in WMSDs.

Another frequent contributor to this problem amongst the workers in transportation sectors is specialization or requiring an employee to perform only one function or movement for a long period of time and/or repeatedly. Hence, recognizing ergonomic risk factors in the transportation workplace is an indispensable step to correct hazards and improve worker protection against injuries including MSDs.

Creating an ergonomic-based task force should be based on solid information such as observations and evaluations of body working postures, employee interviews, inputs from in-house safety specialist(s), and workers' compensation claims. The task force also needs to devote times on the jobs with field employees to monitor workplace conditions and routines.

Furthermore, ergonomic approaches need to focus on preventable accidents. Perhaps, one of the most important issues to practising good ergonomics is that it should be able to increase an opportunity of accident avoidance. For example, exercising sound ergonomics improves driver comforts, which can decrease fatigues so that it becomes a key contributor to unnecessary accidents.

In this way, it becomes clear that well-prepared proactive ergonomic efforts can provide practical and feasible solutions in the transportation industry with direct benefits such as reduced workers' compensation costs, improved driver productivities, and decreased

fatigue-induced operator errors, and lessened employee MSD injuries that can lead to preventable accidents.

Conclusion

The transportation industry is a sector that has been researched extensively over the years to improve safety, but little focus has been placed on ergonomic improvements to reduce workers' injuries comprising MSDs [21]. The current literature reveals that the majority of studies for the transportation industry safety and health have focused on seatbelt use, fatigue, cognition, psychosocial factors, drugs and alcohol, and work schedule.

Although managers in the transportation professions have dedicated to ensuring ergonomically safe environments for their workers, injury and accident data from the industry still show the high frequency and occurrence rates. To create ergonomically protected working environments, a variety of possibilities are available to reduce the risk of injuries to their employees, such as hydraulic self-unloading ladder racks, lower-profile service bodies, and step bumpers [22,23].

Accordingly, as discussed in the above section of Ergonomic Involvements for the Transportation Industry, it is important that future endeavours need to be concentrated on preventing and identifying injuries and offering practical and feasible solutions for the industry.

Ergonomic practices such as changes in muscle movements and right postures to perform works will significantly help in the prevention and treatment of repeated trauma disorders and eventually enable to result in better work performance. However, for these measures to be effectively practised in the transportation business, it is also crucial to have continuous improvements and involvement of employees, of all hierarchical levels, regarding the actions related to safety and health practices, including policies and procedures well-defined, disseminated and circulated amongst the members in the industry.

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