



Research Paper

Ergonomics and Quality of Work-Life for Waste Management Service Providers In Nigeria.

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ABSTRACT

This paper identified domestic waste management as a huge public health challenge in Nigeria and explored ergonomics and quality of work-life as remediating corporate contextual variables for the improvement of service delivery. The impetus for this work was driven by the need to understand how the design of work apparatus and processes could ease employees discomfort and dignify notions as they perform their duties as well as how the psychological and physiological acceptance of the work environment are important determinants for the optimization of work behavioural outcomes. Also of significant relevance to this work, is an understanding of the mindset of the disposing public so as to propose acceptable and workable ergonomic reorientations and designs which could be adopted for efficient waste collection and disposal on the part of the service recipients. This paper highlighted the challenges and prospects of adopting ergonomic designs for the improvement of waste management service delivery and focused on approaches and strategies that leverage on the physiological and psychological empowerment of employees for the attainment of the desired work behavioural outcomes. The adoption and use of ergonomically compliant tools, equipment, processes and work flows are strongly advocated in this work with a view to improving employees' quality of work -life for efficient service delivery.

Keywords: Domestic waste, Efficiency, Morale, Public health, Service delivery

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I. INTRODUCTION

Domestic waste management is a vital issue of attention in addressing the public health challenge of a society. Nigeria, which has a huge population of over two hundred million persons, has a high potential capacity to generate all sorts of wastes. Duru, Ikpeama and Ibekwe (2019) opined that there is a continued increase in the proportion of waste generation worldwide as well as the concern of their impacts on the environment. Nigeria's average domestic waste generation rate is estimated at 0.65-0.95 kg/capita/day which gives an average of 42 million tonnes of wastes generated annually and is believed to be more than half of the total waste generated in sub-Saharan Africa annually (Ike, Ezeibe, Anijiofor and Daud ,2018). Waste management services providers have enormous potentials for employment and social and economic development of Nations. To carry out this all important task are persons with various dimensions of manpower mix for adequate clean up whose physical and mental health and safety must be given adequate attention for efficient work behavioural outcomes. While complying with applicable occupational safety and health regulations, many firms may have overlooked certain aspects of work. Unbeknownst to them, the physical environment and the mental outlook of the task itself are being psychologically evaluated by the employees and forms the basis of the rate of work behavioural outcomes. Waste management service providers need to be armed with such information that make for a better understanding on how to optimize efficiency in service delivery. Ergonomics is the use of processes, tools, equipment to increase efficiency and employee satisfaction. The focus of ergonomics is to allow employees to work comfortably, more efficiently and more productively while also guarding their health and safety. The World Health Organization defined health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (WHO, 1946). With the right ergonomic design option, even the

waste generating public will dispose their waste conveniently and properly. The quality of work-life expectations of work and the work environment are important to employees especially in the Nigerian corporate work space. Afroz and Hague(2021) opine that as the trend in work continue to change, organizations that focus on ensuring healthy working environment and best possible quality of work are more likely to gain leverage and reduce the risk of employee turnover.

For the achievement of the optimum benefits from waste management service providers, there has to be a drastic and radical re-visitation of the suboptimal and awkward tools, methods and processes currently being used in Nigeria. Domestic waste management services require the use of manual labour with high demand of physical energy. With the adaptation of mechanized equipment, less physical energy is exerted. There is the dire need to address the potential and actual occupational hazards related to the job of the employees of service providing firms. The present methods being used makes workers to assume certain positions and weight lifting postures that increase the chances of developing multiple work-related disorders such as musculoskeletal disorders (MSDs). MSDs such as carpal tunnel syndrome often lead to intractable pain, repeated surgery, employee time off, low productivity and, ultimately, higher costs for the employer(Fasanya, Shofoluwe, 2019; Jadhav, Arunachalam, & Salve, 2020). These authors believe that work activities such as; loading and unloading, lifting, reaching, and workplace design factors; such as wrong work surfaces height and poorly designed tools; all contribute to an increased risk of MSDs. Shoaf, Genaidy, Karwowski and Huang(2004) opine that when an employee's quality of work life deteriorates, psychological and mental stresses materialize and that pain-related consequences of an ergonomically unsafe work environment could reach far beyond the job, affecting an employee's quality of life. These authors suggest that pain causes stress and stress causes pain and that chronic pain sufferers may feel guilty, depressed, and anxious about their inability to contribute the way they ought to. Even the pain medications and other prescription drugs to ease pain often cause side effects such as drowsiness, sedation, confusion, and impaired thinking (Shoaf, Genaidy, Karwowski & Huang, 2004). Employing ergonomics can lessen all sort of pain and the risk of injury with a positive effect on quality of work-life. A proper understanding of the aims of an ergonomics intervention creates the right context for improvements and their incorporation in the daily processes as well as in the organizational culture (Gani, Zamberi&Teni, 2018).

The management of waste may involve a number of simple to complex activities such as waste collection, sorting, treatment, re-cycling and others aimed at increasing waste usability while reducing health and environmental imperilments. Waste management is one of the myriads of unresolved burning issues Nigeria has to grapple with. Forms of wastes may include domestic waste, industrial waste, hospital waste, toxic waste and so on. This work focuses on domestic waste management and shall be used interchangeably with the term waste management. Domestic wastes as used in this work may include waste generated in residential premises as well as grocery shops and markets stalls. This paper contributes to the discourse of ergonomics as it relates to work designs for waste management service providers with the aim of improving the waste management design of work and improving employee quality of work-life for efficient service delivery.

II. ERGONOMICS AND QUALITY OF WORK LIFE

Impaired employee neurocognitive functions brought on by chronic pain could result in expensive mistakes, customer dissatisfaction, and further injuries as individuals in pain find it difficult to concentrate(Shoaf, Genaidy, Karwowski, & Huang, 2004). The need for ergonomics is sometimes likened to treating an illness. Vink, Koningsveld and Molenbroek (2006) believe that ergonomic designs are for improving work situations or work environment that need to innovate and achieve greater comfort. This work drew from the Comfort Theory (Kolcaba, Tilton & Drouin, 2006). The Comfort theory provides a foundational and holistic approach to comfort management and although primarily in the nursing care domain, could be applied to other relevant areas where comfort is desired such as in health practice, research education and, as in this case, work settings. The Comfort Theory was developed by applying concept analysis of comfort that examined literature from several disciplines such as nursing, medicine, psychology, psychiatry and ergonomics to mention a few. Kolcaba, Tilton and Drouin (2006) described comfort as existing in three forms namely relief, ease, and transcendence. If specific comfort needs of a patient are met, the patient experiences comfort in the sense of relief. In this case, an employee whose task has been designed to ease the pain as well as mental stress usually felt on the job has received relief comfort. Ease addresses comfort in a state of contentment. If the employees' physical and psychological feelings, worries and fears about the job are calmed, such persons feel at ease. Transcendence is described as a state of comfort in which patients are able to rise above their challenges. In this work setting case, transcendence could be likened to when employees have been able to live above board with ergonomically designed tools, equipment and processes. The theory stresses four contexts in which patient comfort can occur to include physical, psychospiritual, environmental, and sociocultural all of which employees desiring comfort in their workplaces can relate to. All of these aforementioned scenarios as

presented by the comfort theory are totally in line with the expectations of ergonomically designed work activities that will be of great benefit to domestic waste management service providers.

Ergonomics can contribute usefully to domestic waste management services in ways that will contribute positively to the healthy living conditions of the citizens and physical outlook of the landscape of Nigeria. Domestic waste collection, storage, processing and possibly re-cycling should all be done with ergonomic considerations while also noting the physical environmental implications. The mental and psychological state of persons doing or wishing to do such jobs will need to be understood to optimize their work behavioural outcomes. Thus the adaptation of ergonomic approaches that will accommodate the psychological and physiological component of the job. Ergonomic design should allow the work to go on in a safe and efficient manner and grant the worker the psychological satisfaction in terms of the comfort and dignity the labour provides. Ergonomics is the practice and research of the interaction between the human and the physical environment with the goal of optimizing human well-being and overall system performance (Dennerlein, 2017). Ergonomics is the study of designing equipment and devices that fit the human body and its cognitive abilities Gani, Zamberi & Teni (2018). Ergonomics focuses on the adaptation of work to employees so as to obtain sufficient balance between workers' well-being and productivity (Apud & Meyer, 2004; Shahab, Fatima & Ali, 2019). The aforementioned will need to be backed by firm's commitment, employee involvement and commitment to the proper training for the usability of the equipment. Ergonomics is useful to create a conducive system among people, work facilities, and work environment so that the task demands are not under-loaded or overloaded (Panjaitan & Ali, 2019). Task demands far greater than the human ability or capacity can cause the impact of over stress, accidents, fatigue, injury, illness, pain and others thus elucidating the meaning of ergonomics as the interaction between people and the objects they use and the environments they function in (Baba, Baba & Oborah, 2021). Ergonomics is also seen as a discipline that aids the theoretical and fundamental understanding of human behaviour and performance in purposeful interacting socio-technical systems, and the application of that understanding to design of interactions in the context of real settings (Wilson, 2000). Fernandez (1995) defines ergonomics as the design of the workplace, equipment, machine, tool, product, environment and system, taking into consideration the human's physical, physiological, biomechanical and psychological capabilities and optimizing the effectiveness and productivity of work systems while assuring safety, health and wellbeing of the workers. Fernandez (1995) is of the view that the aim of ergonomics is to fit the task to the individual and not to fit the individuals to the task. Widana, Sumetria and Sutapa (2018) advocated that workstation design should be technically easy to work, economical, ergonomic, energy saving, environmentally friendly and in accordance with the trend of the era so as to make work processes effective, convenient, safe, healthy, efficient and productive. Afroz and Hague (2021) are of the opinion that Ergonomics when applied tend to humanize work, improve quality of work life, reduce the risk of injury and musculoskeletal disorder at work as well as increase productivity. Ergonomics promotes a good quality of work life, better safety culture, boost morale, and strengthen employee commitment and engagement. The goal of applying ergonomics is to provide a logical and suitable relationship among staff and their work as ergonomics can help to organize workers psychology and physiology at work with a complicated system among humans, tool and environment (Abarqhouei & Nasab, 2011).

The International Ergonomics Association suggests three broad domains of ergonomics namely- physical, cognitive, and organizational. Physical ergonomics refers to the body's response to the physical demands of a person's workspace or profession which may include human anatomical, anthropometric, physiological and biomechanical characteristics as they relate to physical activities such as posture, material handling, repetitive movements, musculoskeletal disorders, workplace layout, safety and health; Cognitive ergonomics is related to mental processes such as perception, attention, and reaction as it involves human interaction and other elements in a system. This concerns the study of how a product, system, task, or environment interacts with an individual's cognitive abilities. Cognitive ergonomics includes mental workload, decision making, human-computer interaction, work stress and training. All of these will require designing things that are user-friendly, developing training programs, creating guidelines and brochures and ensuring that employees can perform what is asked of them; Organizational ergonomics focuses on optimization of subsystems such as organizational structure, mission and processes and the smooth running of the workplace as a whole. Communication, human resource management, work design, working hours, teamwork, new work paradigm, virtual organization and quality management are of particular interest of this domain. (IEA, 2021). Panjaitan and Ali (2019) classified ergonomics into macro ergonomics, meso ergonomics and micro ergonomics. Macro ergonomics included concerns for the production system as a work organization. Micro ergonomics approach is aimed at a specific process while Meso ergonomics encompasses relationships between individuals and organizations and sociotechnical systems. Tricker and Tricker (1999) saw ergonomics as being concerned with the application of a human system interface technology to the design or modification of systems to enhance performance, safety, health, comfort, effectiveness and quality of life. This view suggests four

major components of ergonomics to include Hardware ergonomics which concerns the study of human, physical and perceptual characteristics and its application to the design of controls, displays, tools, seating, work surfaces, workspace arrangements, and so on; Environmental ergonomics which concern how factors such as noise, vibration, lighting, climate, chemical substances and other physical agents in the work environment affect human performance and health; Software ergonomics focuses on the psychological and emotional aspects of work. This position was also corroborated by other authors (Gani, Zamberi&Teni ,2018; Graudenz,, Oliveira., Tribess., Mendes., Latorre. &Kalil, 2005;Vimalanathan & Ramesh, 2017; Wong, Mui, &Hui ,2008) Macro ergonomics involves the human's approach and interface with work in order to make the best use of the system and focus on the overall structure of the work system as it interfaces with the system's technology. Strategies such as proper physical planning, personalized approach to designing tools as well as the adoption and implementation of various wellness and ergonomics based programs at workplace will greatly reduce compensation cost, improve organizational productivity and enhance job satisfaction at work, better business outcomes., safe and healthy workplace high quality work life integration as well as cultural and socio-economic development (Abarqhouei.& Nasab,2011;Afroz and Hague, 2021).

The quality of work life for an employee is a measure of the value an employee attributes to her/his life at work. It is the level of the feeling of comfort in the workplace or task as well as in the workplace's ability to meet personal desired needs of the employee. The quality of work life for an employee determines employee involvement and work behavioural work outcome levels in organizations. Where certain set of organizational conditions or practices exist, quality of work life is the degree of satisfaction employees derive from their work (Srivastava & Kanpur, 2014). These authors argue that a high quality of work life exists when democratic management practices are used, employee's jobs are enriched, employees are treated with dignity and working conditions are safe.

Factors that may affect an employee's quality of work life include, the level of satisfaction on the job, working conditions and the general job environment –physical and psychological, as well as the amount of stress experienced on the job. Firms interested in enhancing employees' quality of work- life tend to re-design jobs to have the desired attributes and their organizations to have the desired environment, promote human dignity and growth as well as instill in employees the feelings of security, equity and pride (Shoaf, Genaidy, Karwowski,.& Huang, 2004). Leber, Bastić, Moody and Schmidt Krajnc (2018) suggested that ergonomics principles should help in a range of ways such as in the designing of workplace furniture, training, adjusted hours, changes to policies, and provision of assistive technology. The authors also highlighted that factors such as working atmosphere, relationships at work, treatment of people at work, including issues of social inclusion in working environments, emphasize meaningfulness of work, independence, creativity , self-respect and a positive self-image must not be overlooked,especially for physically challenged persons. A work environment that is uncomfortable and seem dangerous can affect concentration and affect the health of employees (Fasae, & Ajayi,2019;Gani, Zamberi&Teni ,2018).It has been noted that factors such as office or factory design, machinery and workshop tools, workspace availability, light intensity, weather, temperature ventilation, humidity, noise, vibration, hygiene and welfare facilities which are ergonomic factors affect performance and productivity of employees (Ajala,&Okanlawon, 2019) . The enhancement of improved general working environment within the workplace will make employees happy and comfortable for the full utilization of their potential in the workplace (Ndubuisi&Nhadi, 2018).

III. PROSPECTS AND CHALLENGES

The prospects of adopting ergonomic designs for the improvement of waste management service delivery are very bright and well highlighted already earlier in this paper. Suffice it to mention that some prospects are for the improvement of ease and comfort of doing work, employee quality of work- life, employee dignity, employee morale, self-confidence ,efficiency ,work flow, productivity, health, safety, environmental aesthetics, cost reduction in terms of illness, accidents, injuries and workers compensation claims,employee engagement, reduction in rate of employee turnover, job satisfaction, increased work quality and lower absenteeism rate.

Employees of domestic waste management service firms work in harsh and awkward situations such as in the rain,sun or at night and all of which have to be considered in ergonomics designs. The challenges are indeed enormous but surmountable if identified and understood.

Some challenges include the lack of the right type and quality of machinery for the task. The capacity of the available machinery or equipment may sometimes be small for the work to be done. Though the equipment may be working, the ability to deliver will be truncated because it will waste more time, manage less waste and may ultimately breakdown because of the excess load on it. Thus,ergonomics efforts should be geared towards matching the load with the capacity of the equipment to deliver so as to strike a balance and avoid capacity overload or under load. Another challenging factor is the proximity of the dumpsite to the

individual as well as the ease at which the disposing public are able to access the available waste collection points. Individuals generate wastes and should have easy and comfortable bins that will be ergonomically designed to allow convenient and environmentally-friendly waste disposal. As against the current unhealthy style of waste disposal where refuse are dumped by roadsides, in open space, gutters and drains, ergonomic designs should help in the orientation of the disposing public ability to help in the sorting of the waste by providing various containers for various classes of wastes by their unique types and properties to reduce cluttering. The separation of the various classes of domestic waste into categories such as perishable or biological waste, synthetic, glass, and so on are not made known ab initio, thus making the waste separation cumbersome. The lack of use of proper packaging and timely cleaning is a challenge that makes the waste management cumbersome and inundating. Ergonomics can help Nigerians imbibe the safety culture as well as the culture of proper waste disposal. In instances where some ergonomically designed machines are available, the cost and availability of the fueling and maintenance of equipment and facilities seem to be the challenges. Poor investment in infrastructural development on the part of government and private sector in waste management facilities may also be an impediment in the design of ergonomically-friendly waste management processes. Funding through government tax and subsidized payments through convenient payment platforms could reduce the challenge of funding for the services. As a challenge, there is the apparent psychological disposition of the task of waste management as a demeaning job. Ergonomic efforts should be geared towards designing work tools and processes that will ease the psychological discomfort workers feel and undignifying notions so as to improve quality of work-life. The task of domestic waste management is enormous and challenging. However for waste management service providers to be said to be efficient, they must have seamlessly evacuated wastes from the point of waste generation and transited to the point of processing for re-use, re-cycling or final disposal through ergonomically friendly procedures that will uphold the tenets of public health.

IV. CONCLUSION

Domestic waste management service providers are constantly under pressure to deliver efficient services on their mandates. There is the dire need to have the right facilities, tools, equipment and processes as well as employees with the right frame of mind to meet these demands as having a job-man-equipment-fit is important for work behavioural outcomes. Ergonomics is one sure way to be responsive to these daunting pressures. Ergonomic principles help in creating work environments where people enjoy what they do, feel like they have dignity and confidence in what they do and work safer, more comfortably and healthier. Ergonomically designed containers for service recipients may kindle the desire to properly dispose waste. The enhancement of ergonomic intervention that take cognizance of comfort and wellbeing as well as the psychological and the physiological desires of employees will positively affect quality of work-life and improve service delivery.

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