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Ergonomic Principles Needed By Garment Workers for Garment Finishing in South East, Nigeria

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Abstract

The study evolved ergonomic principles needed by garment workers for garment finishing in Southeastern Nigeria. Specifically, it determined important ergonomic principles necessary for garment finishing, ergonomic principles already adopted by garment workers and ergonomic improvement needed by the garment workers. Survey research design was adopted. Population was made up of 267 garment workers drawn from 19 registered garment companies in the area of the study. Questionnaire was used for data collection. Data were analyzed using mean, and improvement need index. Findings show 15 important ergonomic principles for garment finishing which include; improving visibility by contrasting the colour of the garment being inspected from the colour of the work surface ($\bar{X}$= 3.83), titling the work surface towards the operator while pressing to help improve visibility ($\bar{X}$= 3.75), providing adjustable chairs with proper back support and cushioning for hand sewers ($\bar{X}$= 3.74), among others. None of the 15 identified important ergonomic principles were being practiced by the garment workers. Thus, there is need for ergonomic improvement in the 15 identified important ergonomics principles needed for garment finishing. It was thus recommended among others that the needed ergonomic principles should be packaged into a training manual for occupational health and safety education for the garment workers.

Keyword: Ergonomic, Principles, Need, Garment, Finishing, Workers, Workplace, Industry, Workstation.

Introduction

Ergonomics was coined from the word "*ergon*" – work and "*nomous*" – rule, meaning work rule. It is a multidisciplinary science of designing machines, products and systems to maximize safety, comfort, and efficiency of the people who use it (Alan 2008). It is the practice of arranging furniture and equipment considering peoples' sizes, shapes and physical strength limitation to make work comfortable and safe (Occupational Safety Health Administration (OSHA) (2000). Ergonomics endeavours to make a better fit between work and the worker in other to ensure health and safety (Kiron 2023). International labour organization (ILO) (1998) defined it, as the study of work in relation to environment in which it is performed; the work place and those who perform it. Thus, ergonomics can be summarized as the scientific study of human

productivity in the workplace which goal is to eliminate discomfort and risk of injury due to work (Kiron 2023). Ergonomics creates a better work and safety culture in the workplace.

Ergonomics has principles that guide its application which includes; working in neutral posture ie maintaining the "S" curve of the spine, reducing excessive force, repetitive motion and pressure points. Keeping everything within easy reach to preventing reaching, bending and twisting the trunk, working at proper heights, limiting the amount of load that is lifted instead mechanical aids should be used, avoiding static loads on muscles, taking short breaks and regular stretching and exercises among others (Mcleod 2008, Health and Safety Authority 2008). These principles are summarized as principles of maintaining good working posture, safety consciousness in workplace and environment.

Ergonomics is a proactive health measure against induced strains and injuries which results in what is known as repetitive strain injury (RSI) or muscle-skeletal disorder (MSD)(Pascrehi 2008, Scott 2012, Candian Centre for occupational Health and Safety 2014). This occurs when the occupational requirements of the job or task are performed under difficult condition using awkward posture and poorly designed equipment. The resultant effect of the mismatch between the worker and his job is damage to the muscle, tendons and nerves of the neck, back, shoulder, foreman, must and hand (Health and Safety Executive 2013, Environmental Health and Safety2022). These injuries often start as minor aches and pains but can develop into disabling injuries that affect our daily activities or daily living such as house chores, hobbies among others (komal, 2022). The condition worsens, if the job is done repeatedly unless the risk factors are removed.

The garment industry is usually seen as a safe place to work in when compared with other industries because there are relatively fewer major accidents. However, the major health risk does not arise from potentially fatal injury but from more subtle hazards whose effects accumulate overtime (American Appared and Footwear Association AAFA 2005, Kiron 2023). The occupational hazards result from awkward and constrained postures maintained by garment workers during the whole period of work, as well as many repetitive manual tasks involved in the highly fragmental sewing processes.

The primary task in the finishing department of garment production assembly line is pressing, hand sewing, final inspection and packaging (Mudhunham 2013). In the pressing unit workers stand for long hours on a hard floor without anti fatigue mat with flexed back and neck posture where the work surface is low or with elevated shoulder and arm where the ironing surface is higher (Kabir and Armed 2003, Mehta 2012). Also, the input and output movement of picking and dropping the finished garment in pile boxes or cart creates another awkward posture of bending and reaching. A good working height that is easily adjustable will help to reduce strains and stress. Furthermore, the finishing task also involves the hand sewing jobs,

which may include fixing of buttons, eyelets, sequins, beads among others. The work surface and the chair are highly considered. Unfortunately, a non-existence or inappropriate work surface for hand sewing results in the worker using his or her lap as work surface. This creates poor neck and back postures that are maintained for extended periods (Guning et. Al 2001, AAFA 2005). This situation is sometimes further aggravated by inadequate or poor lighting which creates shadow and glare in work surfaces increasing the visual demand on the operators. Finally, workers at the packaging unit also suffer similar ordeals of standing on hard floor for prolonged period of time, bending, reaching in constrained posture for extended periods (Gunning et.al 2001).

Ergonomically designed workstation would ensure that the workers physical biomechanics are considered, taller worker having enough space to perform the work and shorter worker should reach his tools and work surface without reaching beyond comfortable and safe range (Kiron 2023) Titled tables and work surfaces are used to increase visibility, task lightings are used for greater visibility, ergonomic chairs with adjustable heights, antifatigue mats are also used to reduce static load during prolonged period of standing, ergonomic hard tools eg scissors and cutters used to reduce contact pressure in the hand and cornification of skins and fingers, taking short breaks and intermittent periods of rests to allow the strained nerve and muscle to recover among others (Guning et. Al 2001, saving craft and Alliance SC & A 2008, Polajnar, Leber and Herzog 2010, Kabir and Armed 2013, Komal 2022)

Preliminary study carried out by the researcher in (July 2012) in South eastern Nigeria to ascertain ergonomic awareness and compliance of garment workers using Focus Group Discussions. The study revealed the prevalence of symptoms of repetitive strain injury among the garment workers. The respondents complained of pains at the neck, lower back and waist, eye strain, insomnia, numbness, pedal odema, tingling, use of anagelsics to reduce body pain among others. These could have resulted from poorly designed and unorganized workstation and work practice. Several studies have shown that ergonomically optimized workstation can considerably reduce the incidence of RSIS or MSDs (Kelly et al 1992, Gunning et al 2001, American Apparel and footwear Association 2005, Polajnar, Leber and Herzog 2010, and Komal 2022).

The obvious ignorance about ergonomic principles by garment workers and prevalence of RSIs or MSDs is a serious gap that needs to be filled. This cannot be achieved effectively until their workstation and work practice have been carefully studied to determine the ergonomic principles they needed, to make garment finishing unit congenial for the workers.

Purpose of the study

The major purpose of the study was to evolve ergonomic principles needed by garment workers for garment finishing in Southeastern Nigeria. Specifically the study determined:

1. important ergonomic principles necessary for garments finishing.
2. those important ergonomic principles already adopted by garment workers in garments finishing.
3. ergonomic improvement needed by garment workers for garment finishing.

Methodology

Design of the Study: Descriptive survey research design was adopted for the study.

***Area of the Study*:** The study was carried out in Southeastern Nigeria. South eastern Nigeria is largely dominated by the Igbo ethnic group which is generally known for their commercial activities. Their entrepreneurship drive has made them to diversify in various areas of manufacturing, including garment production. Most of these garment industries are sited in Aba and Onitsha which are the two major commercial cities in the South Eastern Nigeria. There are many garment companies but only 19 garment companies were registered; ten (10) in Aba and nine (9) in Onitsha (Source: Garment Industries (Ad) www.webcrawler.com) However, for the purpose of this study, only the registered ones were used.

***Population for the Study*:** The population for this study was made up of 267 garment workers who were drawn from the 19 registered garment companies in Aba and Onitsha (Source: Garment Industries Ad www.webcrawler.com). These are the two major commercial cities where most garment companies were sited in South East Nigeria. The garment workers or operators within these companies were the respondents for the study, because they are directly involved in the sewing job, drafting, cutting, stitching/assembling, finishing and packaging of garments. The garment workers were mainly young and middle aged men and women who spend 8 hours or more in their job each day. Majority of them were literate who had secondary school education.

***Sample for the Study*:** There was no sampling the entire population was used since the size is manageable.

***Instrument for Data Collection*:** Data was collected using a structured 15-item questionnaire. The instrument was validated by three experts. Two Home Economics lecturers and one Physiotherapist. The questionnaire items were designed based on the specific purposes of the study. The reliability coefficient of 0.83 was obtained for the instrument. The questionnaire was structured into four responses of Highly Important (HI), Averagely Important (AI), Slightly Important (SI) and Not Important (NI), while the Practiced category was structured into four responses; Highly Practiced (HP), Averagely Practiced (AP), Slightly Practiced (SP) and Not Practiced (NP)

***Method of Data Collection*:** Two hundred and sixty-seven (267) copies of the questionnaire were administered by hand to the respondents with the help of five research assistants. A total of 260 copies were returned out of the 267 copies of the instrument administered. This gave 97.3 percent return rate.

***Method of Data Analysis*:** The data were analyzed using mean and improvement need index . To determine

the need gap, the following procedures were adopted:
Weighted mean of each item under the needed category (XN) was calculated.
Weighted mean of each item under the performance category (Xp) was calculated.
Difference between the two means for each item (Xn-Xp) was determined.
The decision rules were as follows:

- A zero (0) value indicated that ergonomic principles were not needed because the level at which the item was needed is equal to the level at which the respondents can perform it.
- A positive (+) value indicated that capacity building is needed because the level at which the item was needed is higher than the level at which the respondents perform it.
- A negative (-) value indicated that ergonomic principles is needed because the level at which the item was needed is lower than the level at which the respondents can perform it.

Results

Table 1: Need Gap Analysis (NGA) of Ergonomics Principles Needed by Garment Workers for Garment Finishing in South East Nigeria (N=260)

SN	Ergonomic Principles Needed By Garment Workers For Finishing Garments(EPNGWFG).	NG $\bar{X}n$	$\bar{X}p$	($\bar{X}\bar{X}p$)	R
1	Using an adjustable height for ironing, to accommodate operators with different body sizes.	3.30	2.90	0.40	IN
2	Tilting work surface towards the operator while pressing to improve posture and visibility.	3.75	2.61	1.14	IN
3	Placing anti-fatigue mat at the pressing area to reduce strains on the operator	3.55	2.84	0.71	IN
4	Organizing workstation so that operators can rotate between standing and sitting work positions.	3.61	2.64	0.97	IN
5	Providing a large table slightly above the elbow for finishing tasks such as hand sewing of buttons, sequins or beads, eyelets, etc	3.48	2.53	0.95	IN
6	Providing adjustable chairs with proper back support and cushioning for the hand sewers at finishing tasks.	3.74	2.80	0.94	IN
7	Delivering of garments for finishing jobs to the workers at a height that does not require high extended reaches	3.60	2.61	0.99	IN
8	Providing foot rest for the workers to relieve the stress on their legs and backs while seated.	3.40	2.56	0.84	IN
9	Using of small sharp clippers for cutting thread instead of large heavy scissors.	3.65	3.15	0.50	IN
10	Using an inclined ease with clips to hold the garments for inspection.	3.42	2.78	0.64	IN
11	Storing of hand tools e.g. thread, clipper, needles and notions on a shelf near the	3.57	2.62	0.95	IN

Table 1 continued

	workplace or hung directly beside the work surface for easy access.				
12	Improving visibility by contrasting the colour of the garment being inspected from the colour of the work surface	3.84	2.73	1.11	IN
13	Appropriate height of packaging table with small released area at the front that can hold frequently used items	3.41	2.49	0.92	IN
14	Locating storage bins beside the bagging station to limit reaching and lifting	3.80	3.00	0.80	IN
15	Placing shelf directly beside the operator in other to place the packaged garments.	3.65	2.36	1.29	IN

Note: $\overline{X}_n$ = Mean Needed; $\overline{X}_P$ = Mean Practices; NG= Need Gap; IN= Improvement Needed; R =Remark.

Table 1 shows that all the 15ergonomics principles had their need gap (NG) values ranged from 0.40 to 1.29 which are all positive. This indicated that garment workers in southeast Nigeria need improvement in all the 15 identified important ergonomic principles that are necessary for garment finishing in southeast Nigeria.

Discussion

The findings of the study showed that garment workers identified the following ergonomic principles for garment finishing; improving visibility by contrasting the colour of the garment being inspected from the colour of the work surface, tilting the work surface towards the operator while pressing to help improve visibility, providing adjustable chairs with proper back support and cushioning for the hand sewers at the finishing task since they are seated for long periods, using adjustable height for ironing which allow the operator to change body parts that are carrying greater stress and to accommodate operators with different sizes among others. These corroborates the findings of Gunning et al (2001) and Komal (2022) which emphasized the need for fundamental ergonomic principles as possibilities for optimizing the tasks in the workplace. According to Kiron (2023) he stressed that consideration must be given to the following in applying ergonomic principles; work station height, lighting, intensity, shift length and work rest cycle. Therefore, the physiological and anthropometric features of the workers must be considered in designing a work station.

Furthermore, the findings of the study revealed that the 15 important ergonomic principles identified, none was practiced by the garment workers. This is in line with the findings of Komal (2022) who observed that against the ideal situation of ergonomically optimizing the work station based on workers need the opposite is often the case. Workers are usually forced to work within the confines of the job or workstation that is already in place. Ignorance could be one of the major reasons for this anormaly. Ismaila (2010) in his survey on ergonomic awareness

in Nigeria found that only 3.4 percent of his respondents were aware of ergonomics, which was very low. In addition to ignorance there maybe the possibilities of the finishing section of garment production being neglected, while greater attention and concentration maybe given to the cutting and sewing departments as the hub of the production floor. Komal (2022) noted that thorough analysis must be carried out in the work environment in order to understand each worker's need and in turn apply solutions that will make the work environment conducive.

Finally the findings of the study also showed that ergonomic improvement is needed in all the 15 important ergonomic principles identified; which include using an adjustable height for ironing, which will allow operators to change body parts that are carrying greater stress and also to accommodate operators with different body sizes, tilting the work surface towards the operator while pressing to help improve posture and visibility, placing anti-fatigue mat at the pressing area to help reduce strains on the operator, organizing the work station so that operators can rotate between standing and sitting work positions to reduce fatigue among others. This affirms the findings of Menke (2017) which reported deplorable working conditions of garment workers, wherein their jobs were neither well-structured nor routinely organized. Tasks are generally repetitive and burdensome to the workers; who sit in a constrained posture in a congested workplace. According (DAKs 2021) Absence of a legitimate contract between the garment workers and their employers, make the workers to be exploited. They quietly endure whatever health challenge resulting from their poor work environment. This may probably be out of fear of being fired. Workers hardly report the occupational hazards they pass through. Only the brave ones publicize their own (Loomis 2015). According to Arushi (2020), these workers, work up to 18 hours a day arriving early in the morning and leaving past midnight, working in small chairs that stress their backs and necks. The resultant effect of this is prevalence of RSIs or MSDs as was observed in the preliminary study. However, research has shown that ergonomic interventions including redesign and proper use of ergonomically designed tools and training in low-risk work practice will substantially improve workers well-being and efficiency (Kelly et al 1992, Gunning et al 2001, Polajnar, Leber and Herzog 2010, Komal 2022), hence the need for ergonomic improvement by the garment workers.

Conclusion

The professional touch in garments cannot be achieved without the finishing department of the garment factory. The sewing processes at this unit require significant amount of repetitive and skilled manipulations, requiring visual and tactile dexterity. This often predisposes the workers at high risk of developing occupational injuries. Proactive healthcare in form of application of ergonomic principles in workplace can address this challenge. The application of these ergonomic improvements should be holistic, multidimensional, task related and

transferable with the focus of ensuring sustainable well- being of workers and productivity.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Public enlightenment by Home Economists, occupational health and safety organization professionals, and public health officers on occupational hazards in garment production and the need for ergonomics.
2. Integration of ergonomic principles in Home Economics school curriculum under first and safety education and Home Management.
3. Packaging of ergonomic principles for garment making in training manuals for garment workers by the government and trade unions.
4. Home Economics teachers should educate their students on the application of ergonomic principles in clothing construction practical lessons during the course of their study.

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