International Research Journal of Arts and Social Science Vol. 3(1) pp. 1-7, February, 2014
DOI: http:/dx.doi.org/10.14303/irjass.2013.070
Available online http://www.interesjournals.org/IRJASS

Full Length Research Paper

Effects of ergonomic practices on garment production in Madina, Ghana

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ABSTRACT

The role of ergonomics in everyday occupations has generated attention lately. Consequently, in Ghana, increasing attention is focused on apparel production and ergonomics. The existence of an enabling environment for any type of work promotes efficiency of production and improves performance and well–being of the worker. A survey of 100 garment producers by use of semi-structured interviews to assess tailor's/seamstress's knowledge about ergonomic stressors, showed a marginal ergonomic knowledge and awareness of their workplace inadequacies. An intervening education on what constituted good ergonomic practices was given and subsequently, information was gathered from respondents on perceived increase in production should ergonomic interventions (including use of ergonomically designed seating, and training in low-risk methods and postures). Findings revealed that more than half (50%) said they could produce at least twice the number of items they were producing if ergonomic conditions improved in their workshops. The study concludes an important educational role for trade organizations to assist producers to improve ergonomic practices and working conditions.

Keywords: Garment production, seats, Ergonomic intervention, Posture

INTRODUCTION

Ghanaian garment producers are often self-employed in micro-enterprises within the informal sector. The apparel industry constitutes over one-third of Ghana's labour market and holds a dominant share (40% out of a total of 24,133 establishments) in the country's manufacturing industry (Japan International Cooperation Agency (JICA), 2008; Ghana Statistical Service, 2005).

Although, a common occupation for both genders, it appears very little consideration has been given to the set-up of the working environment. Producers are usually faced with many problems in their workplace. In a separate paper, Vandyck and Fianu (2012) found that temperature of the environment, noise, seats and ventilation in the producers' workplaces were poor. Over 70% of the small-scale garment producers studied had seats that had no backrest or support to provide for correct curvature of the lumber, heights of seats did not allow the placement of feet on the floor, seat depths were very narrow, unadjustable, did not allow adequate knee room and seat pans were not properly contoured and were not padded.

The poor features could result in musculoskeletal problems (Chavalitsakulchai and Shahnavaz,, 1993; Gaardboe, 1993; Li et al., 1995). However, a seat

designed according to ergonomic principles (e.g. figure 4) would; provide adequate support, comfort, would not impose any undue stress on the body, contribute to fatigue, and would allow optimum posture and allow the worker to be productive. It would address such factors as the alignment of the spine to reduce intradiscal pressure. (Kroemer, 2009; CUErgo,2012). Adjustability would be incorporated into such seat, i.e., operators could move it up and down and forwards and backwards to cater for the differences in size and shape of workers; and an adjustable backrest would give additional postural support.

Tables were high and respondents had to raise their upper limb when stitching (Vandyck and Fianu, 2012). This could lead to awkward arm posture, static work and fatigue (Kroemer, 2009). Empirical evidence links poor work environment to stressors and low productivity (Kelegama and Epaarachchi, 2002; Wang et al., 2008). The proper allocation of space, workflow, posture during work, ventilation, lighting, working-surface height, seats and work space set up, to mention a few, are said to be important ergonomic requirements that cannot be ignored (Kessler, 1999). Productivity suffers under negative ergonomic conditions as there may be frequent absenteeism, lack of motivation and decline in work satisfaction among workers. It was hoped that if Ghanaian garment producers' productivity was enhanced through proper ergonomic practices, it could contribute to the government's effort in making garment production a sector to reduce poverty and unemployment in the country. The main aim of this study was to gather information on perceived positive change in production should respondents have favourable ergonomic conditions at their workplace.

Objective

The objectives of the study were to;

- assess tailors'/seamstresses' knowledge of ergonomic features suitable for work and give education on what constituted good ergonomic practices through discussions.
- collect information on daily average production levels about selected garments in Ghana and expected levels after simple ergonomic interventions have been made.

Research question

Did garment workers believe that simple ergonomic interventions would result in increased garment production and by how many?

METHODOLOGY

The study design was a cross-sectional survey. The population for the study was made up of 264 members of the Tailors and Dressmakers Association (TDA) at Madina. A sample of one hundred (100) members made up of 81 seamstresses and 19 tailors were randomly selected for the study. From each respondent's workplace, the researchers interviewed respondents using a semi-structured questionnaire with open and closed-ended questions to seek information on ergonomic stressors such as noise, lighting, temperature, ventilation and seat characteristics, among others, in their workplace.

This was to determine the respondents' knowledge on ergonomic stressors present in the work environment that could hinder garment production. Based on the respondents' responses and hazards identified by the researchers in the work environment, education was given through discussions.

The education was on what constituted good ergonomic practices (such as good ventilation, proper lighting, suitable seats and working height, awkward postures and injuries) and how simple ergonomic interventions could have significant impact on productivity. Ergonomic interventions including redesign and proper adjustment of workstations, use of ergonomically designed seating, and training in low-risk methods and postures which might substantially reduce errors, time spent and ergonomic complaints such as musculoskeletal disorders were discussed. Subsequently, the participants were presented with hypothetical situations with regard to ergonomic changes to their workplaces such as discussed earlier on and were requested to indicate how many of the selected garment (straight dress, political suit, kaba and slit, shirts trousers) they could produce under those new conditions.

A copy each of a second questionnaire with open and closed-ended questions was given each respondent. They were asked to indicate daily average production of each selected garment under their present and expected daily average production if ergonomic conditions should improve. Frequency and percentage distributions were calculated and these were used to present the results. The chi-square statistic was used to test the hypothesis that there is no difference between the respondents who will have increase (two or three times) in production for the selected garment and those who will not have any

Table 1. Structural Changes Desired by Respondents

Changes desired	**%**
Expansion of facilities.	72
Improvement in the workshop environment.	51
Purchasing of new equipment.	34
Relocation/ building of new shops.	18
Improvement in ergonomic features.	7
No change needed.	7
Total	189*

N= 100. *Total more than 100 due to multiple responses

Figure 1: Example of wooden stool used in workplace

Figure 2: Example of metal seat used in workplace

Figure 3: Example of a Bench used as seat in the workplace.

Figure 4. An ergonomically designed seat

Source: http//:www.w3.org/199xhtml (2012)

increase.

RESULTS

The respondents' knowledge of ergonomic features suitable for their work

Between 91% and 100% respondents each listed lighting, type of seats, table height and temperature as important for work. In contrast, less than 40% each considered colour of wall surfaces, noise, ventilation and posture as less important. The respondents (56%) were not satisfied with their workshop environment while 44% were satisfied. Reasons given for their satisfaction included access to water supply and electricity, a peaceful and friendly neighborhood, security and access to customers, amongs others. Those who expressed the need to make changes in their workplaces were 93%, (Table 1).

Those who wanted bigger workshops to accommodate more apprentices, shelves and showcases for exhibition and sale of fabrics and haberdashery for increased income were 72%. The respondents (51%) indicated that they would repair or replace the floor of the kiosk with fresh wooden board or linoleum and roofs that leak. They would also wire the kiosk for electricity supply for sewing, connect pipe-borne water to the workshop, fix hinges on windows, re-paint the interior and exterior of workshops and change torn mosquito nets. In addition, old curtains and bulbs would be replaced, a hand basin would be provided in the workshops. Thirty-four percent (34%) of the respondents would purchase electric sewing equipment such as neatening and buttonhole machines, pressing iron and ironing boards. Those who wished to relocate their kiosks in a more conspicuous place for more customers, or move it from an unauthorized area or build new workshops were 18%. Seven percent of the respondents indicated that they would like to enlarge windows for more air, raise the ceiling of kiosk to reduce the high temperature, provide padded seats, expand workshop to improve human traffic and improve the lighting system. When all the respondents were asked why they had not yet made the changes, 86% attributed their inability for making changes to financial constraints.

Type of seat used by garment producers

Seats were not ergonomically designed with anthropometric dimension of garment workers. Poor seats (figure 1,2 and 3) unlike ergonomically designed seats (figure 4) results in awkward or bad postures and can indirectly affect productivity. Figure 3-4

Average Daily Production Level of Selected Garment

Each respondent was asked to indicate the average number of each of the selected garments they produced daily under his/her present ergonomic conditions (Table 2).

On the average, 35%, 7%, 8%, and 9% of the respondents could produce one slit and kaba, one straight dress, one men's trousers and one political suit respectively. While, respectively, 31% could sew two slits and kaba daily, 20%, 16%, 28% and 6% said they could in a day sew two straight dress, two shirt, two men's trousers and two political suits. Forty one percent, 43%, 20% and 5% of respondents could sew three straight dresses, three shirts, three men's trousers and three political suits respectively per day. The rest (3%) mentioned four slits and kaba, 23% said four straight

Table 2. Daily Average Production of Each Type of Selected Garment under present Ergonomic condition

Daily Production level	Slit and Kaba (%)	Straight Dress (%)	Shirt (%)	Men's Trousers (%)	Political Suit (%)
1	35	7	-	8	7
2	31	20	16	18	6
3	17	41	43	20	5
4	3	23	25	6	0
5	1	7	8	0	0
6	0	2	1	0	0
No Response	13	0	7	48	82
Total	87	100	93	52	18

N=100

Table 3. Production Changes in the wake of Ergonomic Changes Indicated by Respondents

Garment type	No Change in production (%)	Improvement (Two or Three Times) (%)	Total (%)
Kaba and Slit	31	56	87
Straight Dress	17	83	100
Shirts	22	71	93
Mens' Trousers	10	42	52
Political Suits	4	14	18

dresses, 25%, four shirts and 6% indicated four men's trousers. Less than 10% of the respondents thought they could produce five or six of each of the selected garments daily. Not all the respondents made all the different types of garments listed for evaluation. For example, none of the female respondents made political suit though some said they could if the need arose.

Expected Daily Average Production levels after Ergonomic Interventions.

The respondents indicated, on the average, how many of each of the selected garments they could produce daily if ideal ergonomic features and conditions were improved (Table 3).

Fifty six out of the 87 respondents, who produced Kaba and Slit, indicated that their daily average could, at least, be doubled or tripled if ergonomic conditions in their workshops would improve. Eighty three percent could increase the production of straight dresses and 71% shirts by two or three times more. Similarly, the daily average production of men's trousers and political suits could be increased two or three times the present level with ergonomic improvement. Table 4 indicates the results of chi square analyses to determine the hypothesis that; there is no difference between the respondents who will have increase (two or three times) in production for the selected garment and those who will not have any increase, under improved ergonomic changes.

The calculated P-values of 6.38 for kaba and slit, 34.90 for straight dress, 25.82 for shirts, 19.69 for men's trousers, and 5.56 for political suits were lesser than the alpha level of (0.05); hence, the null hypothesis that there will be no difference between the respondents who will have increase in daily average production for the selected garments and those who will not was rejected. This means that there were significant differences between the number of respondents who indicated an increase in production due to ergonomic changes and those who did not. This suggests that majority of the respondents agreed that ergonomic changes would result in increase in their production levels.

DISCUSSION

Factors such as good posture, suitable seats, table height, and good levels of ventilation, lighting, temperature and noise all combine in different ways to help a seamstress/tailor work with efficiency and in

Table 4. Summary of Statistics for Chi-Square Analyses

Garment type	Calculated Chi square	df	Tabulated Chi square (p value)
Kaba and Slit	6.38	86	0.007
Straight Dress	34.90	99	0.000
Shirts	25.82	92	0.000
Mens' Trousers	19.69	51	0.000
Political Suits	5.56	17	0.018

*Significant at $p < 0.05$

comfort (Ortiz et al., 1991; Kroemer, 2009). However, when such factors are absent there may be less performance in production. The respondents seemed to be only marginally aware of how such workplace inadequacies might be relevant to garment production. Though, more than 90% of respondents each listed lighting, type of seats, table height and temperature as important for work, they did not explicitly relate the reasons they gave to ergonomic concerns.

For example, colour of wall surfaces, noise, ventilation and posture were each considered by some as even less important elements for their work. Over 85% of the respondents would like to make changes, but the changes did not portray improvement in ergonomic features in the workshop. They considered changes that would help them display fabrics and haberdashery and take on more apprentices. When fabrics and haberdashery are displayed, they may attract customers to purchase them thereby increasing income. The more apprentices one has, the more money one is likely to make from apprenticeship as apprentices pay training fees. Similarly, the reasons given by the respondents for their satisfaction of their workplace, (such as peaceful and friendly neighborhood, access to water supply and electricity, security, access to customers among others) were not explicitly related to ergonomic concerns.

Noise levels in the work environment are important as they can hinder efficiency and might interfere with optimal performance (Dul and Weerdmeester, 2008); proper ventilation prevents discomfort, dizziness, headaches and nausea which could affect productivity (Ekuban and Brew, 1991 and Dees, 1998); lighting for viewing levels have direct bearing on performance and productivity (Dul and Weerdmeester, 2008); and excessive heat in a workshop could adversely affect performance, comfort and one's health (Oborne, 1982); non-ergonomic seats could cause musculoskeletal diseases resulting in absenteeism, fatigue, errors, condition that can cause risk, and distress and reduce efficiency and turnover (OHSA, 2000; Erdinc and Vayvay, 2008).It can be assumed that respondents did not possess an appreciable sense of ergonomics with regard to productivity, their workshops or ergonomics was not a priority for majority of them. Probably this was due to lack of knowledge because respondents were enthusiastic about providing ergonomic features in their workplace to improve performance after discussions with researchers. The discussions on ergonomics aimed at improving knowledge of practical ergonomics such as low-cost improvement on seats, lighting, table height, colour of wall surfaces, noise and ventilation to create safer and healthier workplaces and could increase productivity. Such improvements could include the proper chair for the worker, the use of correct and efficient work-methods to avoid unnecessary repetitive motions, maintenance of good posture by keeping the spine and head upright to reduce MSDs. The respondents thought the influence of poor ergonomic features had, to a large extent, a negative impact on the production of garments. They came to the realization that ergonomics interventions could have a significant impact resulting in fewer errors, lessen time spent and improve the well-being and productivity. It also pays as an increase in output and will mean more income for the garment producer and corresponding improvement in their quality of life.

More than half of the respondents said they could produce twice or more times the number of the selected items they were producing, if ergonomic conditions improved in their workshops. In an operation like garment making where production has multiple phases, production rates vary according to a wide range of variables such as complexity of processes and skills to morale of worker. The production levels for the different selected items were varied. For example, the respondents could produce more straight dresses and shirts per day, on the average, than men's trousers or political suit. All the female respondents did produce kaba and silt but very few of the males were engaged in that production. Similarly, more males than females manufactured men's trousers or political suit.

Probably, this was because kaba and silt is purely a feminine garment and females tend to specialize in making female clothing rather than male garments and vise versa. Less than one third of the respondents each

felt there would be no change in their production of the selected items. Possibly, they did not understand the ergonomic discussions to appreciate the value of ergonomics and productivity. The majority of the respondents agreed that ergonomic changes would result in improvement in their production levels two or three times over their current levels.

However, the production levels reported by the respondents generally seemed to have been exaggerated. This is because from the researchers' observation of the levels of daily production, the number of garments they reported they could make was on the high side. For example, producing five or more shirts or straight dresses or four pairs of trousers daily, single-handedly might be beyond them.

CONCLUSION

The study revealed that respondents' knowledge level of the relationship between ergonomic features and productivity was poor as the reasons for changes they wished to effect at the workplaces were not related to ergonomics principles. The ergonomic education however, made them aware of the importance of ergonomics and work performance. They therefore reported that they could produce twice or three times the number of the selected items they were producing before the intervention. To help improve the work environment of the tailor and dressmaker, it is suggested that the National Tailors and Dressmakers Association and other trade institutes (such as Apprentice Training Board) should organize seminars or workshops for its members to discuss the problem of ergonomics and the commercial advantages of a positive work environment. More research on what changes garment producers would make to increase productive would be helpful.

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How to cite this article: Vandyck E., Tackie-Ofosu V., Ba-ama E., Senayah W. (2014). Effects of ergonomic practices on garment production in Madina, Ghana. Int. Res. J. Arts Soc. Sci. 3(1):1-7