ORIGINAL ARTICLE

DEVELOPING ERGONOMICS INTERVENTION FOR IMPROVING SAFETY & HEALTH AMONG SMALLHOLDERS IN MELAKA OIL PALM PLANTATION: A PARTICIPATORY ACTION ORIENTED APPROACH

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ABSTRACT

In the Malaysia Economic Transformation Programmed (ETP) launched on 2010, palm oil industry has been highlighted as one of the key sector towards national economic development. There are a lot of concerns directed towards safety and health in the agricultural sectors where oil palm plantations are the main agricultural sectors in Malaysia. Correspondingly, several tasks by the small holders in the oil palm plantation have been shown to lead to musculoskeletal disorders which are attributed to various safety and health issues. This study intends to determine the effects of ergonomics interventions approach, highly promoted by International Labor Organization to resolve ergonomics issues specifically among oil palm plantation small holders and to improve Occupational Safety and Health aspects of the workplace. The study will be divided into two phases, the first phase of the cross-sectional design which will involve 360 male respondents working as small holders in the oil palm plantation. Questionnaires will be used to collect information on socio demographic data, occupational history, social lifestyle and prevalence of musculoskeletal disorders (MSDs) data. The second phase of the intervention study (Quasi Experimental) involve intervention program based on Participatory Action Oriented Training (PAOT) approach using qualitative observation and quantitative results of analysis during the first phase. A training program consisting of 3 primary instruments (lecture, action checklist and video), reinforcing activities (to increase knowledge, enhance understanding and associate practical application) and indicators (questionnaires and qualitative observation) were created, modified and customized to the small holders' working in oil palm plantation. Palm oil industry provides job opportunity for more than half a million people and living opportunity for more than 1 million people (MPOB, 2011). Improving safety & health for the small holders in the oil palm plantations become the overall outcome of the ergonomics intervention. Specifically, the ergonomics Intervention will be expected to increase Knowledge, Attitude and Practice (KAP) among the small holders, to be used as a program for occupational safety & health improvement in oil palm plantations around Melaka as well as to reduce risk of developing Musculoskeletal Disorders (MSDs) due to small holder's multi task in the oil palm plantations. As the current knowledge gap of agricultural workers such as small holders remains wide in terms of safety and health, awareness among the small holders in the rural areas is low. In addition, focus of research was generally low on agricultural workers especially of health components further increasing the knowledge gap and status of health of agricultural workers or specifically small holders in Malaysia.

Keywords: intervention, ergonomics, participatory, small holders, oil palm plantation

INTRODUCTION

In the Malaysia Economic Transformation Programmed (ETP) launched in 2010, palm oil industry has been highlighted as one of the key sector towards national economic development. Particularly, National Key Economic Area (NKEA) is the mechanism designed for the country to become high income and developed nation by 2020 (PEMANDU, 2010). According to Global International Islamic Finance Forum 2012, the oil palm industry accounts for 5-6% of Malaysia's Gross Domestic Product (GDP). Palm oil mill plantation is the main agricultural industry for Malaysia under 12 NKEA (National Key Economic Areas) for the development of the country in the future. Agricultural industry was found to be most hazardous in most countries (Fatallah, 2010; etc.). Researches worldwide has consistently highlighted the agricultural sectors as among the most hazardous industry with musculoskeletal disorders (MSDs) the most prevalent and costly of all work-related injuries. Generally, large plantations of oil palm trees are cultivated primarily in Malaysia and Indonesia (Henriksson, 2012). Plantations in Malaysia are still heavily dependent on manual Labor for all upstream key activities (PEMANDU, 2010). The rapid growing industry of the oil palm plantations is heavily concentrated on the upstream sector (Abdullah et al., 2011). There are a lot of concerns directed towards safety and health in the agricultural sectors where oil palm plantations are the main agricultural sectors in Malaysia. Generally, safety and health issues in oil palm plantations contribute by manual Labor in the upstream sector (Adnan, 2012). Many literatures such (Nizam and Rampal, 2007; Hendra and Rahardjo, 2009; Henry et al., 2012)

has highlighted issues on occupational safety and health in oil palm plantation studied. In general, these studies conclude that occupational safety and health issues were work-related in the physically Labor intensive nature of the work tasks and exposure of multi ergonomics risk factors.

Smallholders may experience MSDs at different body sites due to different harvest mechanism accordingly as reported by Ng et al. (2013a). The risk factors reported were combination of awkward posture besides forceful exertion and repetitive task. There is thus a need for an intervention program in order to improve safety and health issues of the oil palm fruit small holders. As being reported by various journal articles and review papers, participatory ergonomics interventions have been proven to be effective (ILO, 2005). This paper intends to describe the modification as well as implementation of an ergonomics intervention program which employ participatory action oriented approach guided by safety and health questions.

METHODOLOGY

As the ergonomics intervention package is based on participatory action oriented approach, several published manuals and practical guides were used; the Ergonomic Checkpoints (2nd Ed.), Ergonomic Checkpoints in Agriculture, Work Improvement in Neighbourhood Development (WIND), Stress Prevention at Work Checkpoints by ILO and study by (Ng et al,2013, 2014; etc.). These manuals and practical guides were used to compile and customize a checklist adapted to the small holders' risk factors.

The intervention program for smallholders of oil palm plantation was modified in consideration of various qualitative informal interviews, discussion or as a result of small talks based on experience and quantitative data gathering. It was based on a cross-sectional study involving 520 oil palm plantations managed by organized smallholders in Melaka. In order to customize the intervention packages, a few self-directed questions used by large oil palm plantation researcher, Ng Yee Guan were modifying to guide the development of the intervention package while taking into consideration the qualitative and quantitative data collected during the past cross-sectional study.

There are basically 2 main intervention phase in the intervention program. Cross-sectional study will be employed in the pre intervention study in the first part and subsequently follow by post intervention study in the second part. The first phase is the cross-sectional design which will involve 360 male respondents working as smallholders. Questionnaires will be used to collect information on socio demographic data, occupational history, social lifestyle and prevalence of musculoskeletal disorders (MSDs) data. In order to get the overview of the current ergonomics health situation in the oil palm plantation, a cross-sectional study will be initially carried out among smallholders and their work environment.

An intervention package based on Participatory Action Oriented Training (PAOT) approach will be subsequently used for the second phase of the intervention study using qualitative observation and quantitative results of analysis during the first phase. The purposes of the two phases of the study are to determine prevalence of Musculoskeletal Disorders (MSDs) among smallholders and to determine whether ergonomics intervention program has the intended effect on a study's participant. There will be 2 stages of post intervention on phase 2 Quasi Experimental (Pre-Post Intervention Study Design) which involve pre-intervention, post-intervention and follow up intervention.

In order to improve the health situation for the smallholders, the intervention packages were implemented among the respondents (intervention group) from the pre intervention study. The aim is to reduce the existing ergonomics risk factors, increase on knowledge, attitude and practices (KAP) as well as safety and health practices among Melaka's small holders. Then follow up intervention study will be carried out by conducting an interview on the relevant participant to get the feedback on the impact of the intervention program conducted by the researcher.

Basically, as a more detail explanation in order to perform this study the methodology used will be divided into two category pre intervention study and post intervention study. The pre intervention study will collect baseline data and information. From the data analysed, the output or result of the pre intervention study will be used in the post intervention study for fully implementation of the intervention approach.
The purposes of the two phases of the study are described below;

- Phase 1- Cross Sectional

To determine prevalence of Musculoskeletal Disorders (MSDs) among local smallholders.

- Phase 2-Quasi Experimental (Pre-Post Intervention Study Design).

To determine whether ergonomics intervention program has the intended effect on a study's participant. There will be 2 stages of post intervention on phase 2.

Table 1: Guide for the OSH improvements using intervention package

Occupational Safety & Health (OSH) Improvement Aspects	Measurements
Knowledge, Attitude & Practices (KAP)	a) Comparison on result of questionnaires before & after intervention
	b) Do the target participants have changes on KAP?
Occupational Safety & Health Practices (Action Checklist)	a) Comparison action checklist before & after intervention
	b) Do the target participants want changes on Safety & Health practices?
	c) If not, can the intervention be modified to accommodate the lack of commitment?
	d) Result from participant's interview before & after intervention
Researcher's Observation	a) Comparison of Researcher's Observation before & after intervention.
	b) Result from participant's interview

RESULTS

The research is a new study and the component of the intervention program has been developed and modify based on the module of work improvement in the neighbourhood development by International Labor Organization using the concept of Participatory Action Oriented Training. The qualitative evidence of the improvement on occupational safety and health is based solely on the finding of the researcher through pictorial evidence as well as feedback from the participant's interview. The action checklist for guidance on the improvement of occupational safety and health of the smallholder's usage has been designed based on the input from of work improvement in the neighbourhood development by International Labor Organization using the concept of Participatory Action Oriented Training as well as previous research by Ng Yee Guan on the safety and health for the large plantation of the oil palm (Ng et al, 2013, 2014; etc.). The modification of the measurement for the knowledge, attitude & practice (KAP) is also based on the previous research input by Ng Yee Guan (Ng et al, 2013, 2014; etc.). The video on OSH issues developed by Ng Yee Guan researcher in the large oil palm plantation has been used as the supporting component of the intervention program for OSH improvement among smallholders in the Melaka oil palm plantation. After careful consideration and review of available data, an intervention program consists of 3 primary instruments, 2 reinforcing activities and 2 indicators were developed and modified to be used in the program. The intervention program integrates various approaches using multimedia resources, printed graphical and illustration materials in both didactic and participatory discussion sessions and in a conducive environment.

Intervention Instruments

The three instruments which was developed, modified and used based on existing resources were, lecture with interactive sessions and a participatory action oriented training (PAOT) checklist and video. The video and lecture were primarily used to increase the smallholders' knowledge on safety and health working in oil palm plantation while the checklist was used to determine change or improvement required on occupational safety and health practices. The video focusing on the general safety and health of oil palm plantation was used based on smallholder's lack of knowledge with regards to Occupational Safety, Health and Ergonomics of their tasks. The storyboard focuses on the hazards, risks and health effect which smallholders commonly encounter reinforced with testimonial of experienced workers in the large oil palm plantation.

For the lecture, didactic technique was chosen as the knowledge and education level of the smallholders were generally below average with the exception of very few participants who had received pre-university entry level knowledge. Nevertheless, the 20 minutes for each session aided by presentation slides were alternated with interactive sessions. The workers were encouraged to response and participate using suggestive questions making the session more interactive.

On the other hand, the 24 item-checklist developed consists of five technical areas which were compiled and modified based on data and information available as well as estimated time

required and available for execution. The questions in the checklist retained the format of the manual and guidelines but were further customized by translating into Malaysian Language and visually aided with graphical illustration.

Reinforcing activities

In order to improve and reinforce the understanding of the delivered theoretical concepts and practical applications, field activities based on the participatory action oriented training (PAOT) approach were implemented. Besides that, the activities were also to allow participants clarify any doubts or correcting their concepts during lecture sessions and group support assistance. The session involves group discussion which requires the participants to discuss the implementation of the action checklist which related in group they currently are practicing in their daily work tasks. Subsequently, the participants were required to go to the field and implement the action checklist as well as present the good practices. This activity cross-checks the participants understanding, comprehension, practical application and perception.

Besides that, the participants were exposed to various pictures of workplace improvement some of which includes low cost improvement. After explanation, the group of the workers was required to present their findings from the fieldwork on the workplace improvement such as low cost improvement, health improvement and any creative improvement. In order to customize the activities to the nature and agricultural background of the smallholders, the pictures were selected from good practices observed which has been practiced among the smallholders as well as various other agricultural activities to increase the collection of examples. This activity intends to give examples for workers on various other good practices and simple improvement which can be modified to their work environment.

Indicators

Also known as post-intervention assessment, the indicators serve as important tools to measure the degree of changes on safety and health practices or improvement which has occur over time since the introduction of the intervention. In this case, the two used indicators were, knowledge, attitude and practices (KAP) questionnaire as well as qualitative observation using 24 items action checklist. While the questionnaires used were direct to measure the improvement of KAP, qualitative observation offer a different dimension of indicator. Using this approach, data can be captured based on observation or in terms of graphical picture as evidence to show past and present changes on safety and health practices whereas interviews are commonly used to track changes in perception and behavior which are generally used as a support for any changes on safety and health practices.

DISCUSSION

Palm oil industry provides job opportunity for more than half a million people and living opportunity for more than 1 million people (MPOB, 2011). Improving safety & health for Melaka Oil palm plantations become the overall outcome of the ergonomics intervention. Specifically, the ergonomics Intervention will be expected to;

- Increase Knowledge, Attitude and Practice (KAP) among Melaka smallholders.
- Be used as a program for improvement on occupational safety & health practices in oil palm plantations around Melaka.

The effectiveness of PAOT program (ergonomics interventions) is being measured towards improving safety & health among organized smallholders of Melaka's oil palm plantation. The research intended to determine the effectiveness of an integrated ergonomics interventions approach, highly promoted by International Labor Organization to resolve ergonomics issues specifically among oil palm smallholders and to improve Occupational Safety and Health practices of the workplace. A cross-sectional study will be conducted among workers involve with the manual task which may expose themselves to the risk of injury and the focused will be on smallholders of the oil palm plantation in Melaka.

i. The effects of ergonomics intervention program using concept of Participatory Action Oriented Approach between pre and post-intervention among intervention and control group is being determined by comparing:

- Knowledge, attitude and practices of ergonomics (KAP) among the study group.
- Qualitative improvements of Occupational Safety and Health (evidence from pictorial observation) at the workplace before and after intervention.
- Qualitative improvements of Occupational Safety and Health (evidence from participant's feedback) after intervention through participant's interview.

ii. The quantitative and qualitative OSH improvements of the ergonomics intervention program will become an indicator on the effectiveness of PAOT in improving Occupational

Safety and Health (OSH) practices for small holders in the oil palm plantation.

Intervention program implemented must be evaluated in order to determine if the objectives of the intervention has been successfully achieved. Thus, the intervention should produce a measurable outcome which is attributed to the intervention program (Stoto and Cosler, 2005). Commonly, if the intervention is executed for rarely studied group, a close-to-reference population are used to assist in developing the intervention strategy (Nissinen, Berrios and Puska, 2001; WHO, 2000; Moran et al., 2007). In this study, in spite of many issues on safety & health reported by various studies, researcher have not found any intervention program addressing ergonomics risk factors or occupational safety and health issues of smallholders in oil palm plantation. The search for literatures used various keyword and in different combination. It was however limited to electronic databases such as academic journals and open access journals. The literature review examined previous research and current practice reported in government documentation, academic journal publications, international labor organization document, conference materials and all relevant documents to the research. Some of the journals that has been referred to are study on back pain and factors associated with it among oil palm plantation workers in Selangor where the prevalence of back pain that was related to work, experienced throughout their work in the plantation and in the last 12 months was 76.7% and 67% respectively. “High frequency of bending was the only suggestive predictor increasing the risk of back pain by 5 fold” (Mohd Nizam J. dan Rampal K.G., 2001). There is also study on back pain among oil palm plantation workers in Bintulu, Sarawak. “The study showed the prevalence rate of back pain is at 34.8%” (Majority of respondents were Indonesian workers and in younger age group - 30’s) (Kamaluddin B. Hashami B, Norr Hassim I, Jamal Hisham H, Rampal KG, 2001). Whereas Chapman & Meyers (2001) wrote in an article a decade ago that MSDs in agriculture appears to be at the brink of epidemic as a result of ergonomics hazards based on emerging data. Nevertheless, different agricultural activities present significantly different hazards (Frank et al., 2004).

Whereas the study on intervention was referred to previous study on intervention in oil palm plantation by Ng Yee Guan which the result show that previous ergonomics intervention for oil palm plantation is not effective for foreign workers because lack of management support and lack of cooperation among foreign workers (Ng et al,2013, 2014; etc.).Nevertheless, it is thought that the ergonomics concern in oil palm plantation sector was not given sufficient attention due to its relatively less highlighted industry promoted by developing countries. In addition, the concern was also over-shadowed by controversies and boycott over sustainability of the industry in terms of environmental aspects and impacts. Among other reasons were difficulty of access in terms of logistics; travelling distances and accommodations where oil palm plantations usually are geographically located at a considerable distance away from urban area or town. As such, the differences in terms of socio-demography, psychosocial status and the cultural background of the smallholders must be accounted during development stage of the intervention program. It is also important to take note of the approach design as these smallholders were not used to sit-back on listening to lectures over an extended period of time. This was to ensure sufficient consideration of the content; instruments, activities and indicators of the program developed do not exceed the capacity of the smallholders or biased by limitation.

CONCLUSION

Although safety and health issues has been acknowledged by the major agricultural industry in Malaysia, implementation of any ergonomics intervention program or their effectiveness in improving safety and health among agricultural workers or smallholders or plantation workplace improvement was not available or unreported. This tropical commodity crop will expand correspondingly because the demand for palm oil continues to increase yearly. As the current knowledge gap of agricultural workers remains wide in terms of safety and health, awareness among the smallholders especially in the rural areas is low. In order to improve safety and health of the oil palm plantations smallholders, the need for intervention program are necessary. This was reflected by the tasks analysis, prevalence of MSDs and ergonomics assessment revealed by several past studies. Nevertheless, many manual tasks of oil palm expose risk as addressed by Ng et al. (2013a) where different tasks present different ergonomics risk factors to different body sites.

In order to improve safety and health of the oil palm plantations smallholders, the need for intervention program are necessary. Thus, the intervention should be repeated which allow continuous review and modification such as the use of participatory action oriented program in order to cater for the smallholders at different tasks in addressing safety and health issues. Findings in this study may indicate that effective intervention strategy among smallholders during manual tasks implementation is required considering the health effect in term of safety & health practices as well as KAP.Despite being reported effective in various other agricultural

applications, the effectiveness of PAOT approach particularly in oil palm plantation of organized smallholders may be impeded by old tradition of practices. In addition, focus of research was generally low on agricultural workers especially of health components further increasing the knowledge gap and status of health of smallholders in Malaysia.

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