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Barriers of Adopting Harvesting Technology Inmalaysian Oil Palm Industry

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ABSTRACT

Nowadays, technology has been recognized as one of the strategic tools in enhancing the economic competitiveness of a country. In oil palm industry, many types of machinery were invented to assist workers to perform their work process. However, manual methods still remain as the most effective way of harvesting fresh fruit bunches (FFB) in oil palm industry. This situation may give negative impact to the Malaysian economy especially in terms of upstream productivity and sustainability. Therefore, the objective of this paper is to identify the factors that cause fresh fruit bunches harvesters to refuse or resist in using the new harvesting technology. Based on the literature of past studies, it was found that reasons the major identified are the large size and heavy weight, vibration, high cost, limited height of reach and difficult to access from palm to palm. In conclusion, these problems can be solved by incorporating ergonomic approach in the design of machinery for human use.

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INTRODUCTION

The agricultural sector remains as one of the most important provider of food raw materials for the Malaysian resource-based development and gives many advantages to our life especially for our economy and social well-being. In agriculture itself, there are many types of commodities such as rubber, cocoa, paddy and oil palm. Nowadays, Malaysia is focusing on twelve National Key Economic Areas (NKEAs) whereas palm oil is one of the major source to intensify economy and achieve high income nation status by 2020 (Economic Transformation Programme. 2012).

In order to further develop the agriculture industry, technology has become one of the main components (Tai-Yue, W. and C. Shih-Chien, 2007). In a broad sense, technology refers to the use of hardware and software for multipurpose functions, problem solving and value creation (Jin, Z., 2002). Technology plays a very significant role and needs to be explored extensively in order to develop strategies for sustainable growth in an increasingly competitive industry (Mat, A. and R.C. Razak, 2011).

In recent years, technology of harvester machines has stimulated interest of many researchers to work on better method and improvement. Until now, different technologies have been designed for harvesting fruits such as grape (Duraj, V., 2000) and strawberries (Simcox, N., 2001). As in oil palm industry, there are many new technologies of harvesting oil palm fresh fruit bunches (FFB). Nowadays, mechanization of harvesting process has been chosen as a means to improve productivity and make easier some of the tasks, which are manually performed. This is supported by Jelani *et al*. (2003) who stated that labour productivity can be increased by several factors such as adopting new technology, improving cultural practices, mechanized field operations and improving the quality of the workforce.

Adopting newly innovated technologies can also solve several problems easily such as reducing the number of foreign workers and increasing time-based efficiency (Jayaselan, H.A.J. and W.I.W. Ismail, 2010). Moreover, technology also gives high contribution in giving better safety and health to the harvester (Hope, A., 1999). This is because without mechanized technology in oil palm plantation, harvesters need to fully operate their work by manual methods such as using chisel and sickle to cut FFB. Overall tasks of harvesting oil palm would expose harvesters to ergonomic risk factors such as repetitiveness, awkward postures, static muscle loading and forceful

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exertion. Therefore, by adopting and using technology effectively and efficiently, it will provide the foundation for global competitiveness for Malaysian agriculture.

However, not all implementation of technology adoption will succeed. Presently, the technology machineries are still in a low level of acceptance and limited application of harvesting technology in industry. Harvester still preferred to use manual handling compared to new existing harvesting technologies. This is in line with the study by Abdullah & Samah (2013) which focused on factors impinging farmers' to use new agriculture technology. Based on the findings of the study, farmers' perceptions and low levels of education are the two main factors that affect technology adoption among farmers.

The main reasons for non-adoption of technology can be categorized into three aspects, which are human related (Abukhzam, M. and A. Lee, 2010; Cosar, A.K., 2011) process related (Abdullah, F.A. and B.A. Samah, 2013) and technology related (Ale, K. and A. Chib, 2011). Human related aspect is a criterion that focuses on several factors, such as age, level of education and perception. Meanwhile, process related aspect is a category that focuses on implementation after adopting the technology, such as training and extension programs. Technology related aspects are about the tools and machinery itself, such as easy to handle and efficient, low investment, and maintenance. In oil palm industry, some of the common problems come from workplace environment, worker abilities and interrelation human–machine and management programs. Table 1 shows the past studies on technology adoption in oil palm industry and the reasons why harvesters refuse to use existing technologies.

Table 1: Studies on technology adoption and the problems.

Author(s)	Technology	Problems
Jelani *et al*. (2003)	Hand-held mechanical cutter	-Vibration -Weight 5.5kg
Shuib *et al*. (2004)	Telescopic and elbow type arm harvester (for tall palms)	-High cost -Difficult to access from palm to palm
Jelani *et al*. (2008)	Cantas	-Vibration -Limited height of reach
Shokripour *et al*. (2012)	Automatic cutting system	-Heavy, weight 6.3kg -Vibration
Jayaselan et al. (2012)	Manipulator automation for mechanical harvester	-High cost -Big and Heavy
Intara *et al*. (2013)	Pruner and harvester machinery	-Limited height of reach, 6-12m

RESULT AND DISCUSSION

Based on the critical literature review, majority of the problems come from technical aspects or technology related, which includes; not user friendly, expensive, heavy, noise, vibration, difficult to access in the plantation and others. To overcome this problem, technologies need a solution from the ergonomic element (Kogi, K. and T. Kawakami, 1997; Jin, Z., 2002). The technology must not only concentrate on design, sketching and modeling the design, fabricate the prototype using suitable material and test the functioning of this machine but most importantly is the design of machinery must have ergonomic features. The technical machinery must deal with an unstructured, unknown, uncertain and varying environment due to the oil palm fruits that are randomly located on trees and are difficult to reach. By application of ergonomic element, it not only could help to increase work performance and productivity, but also ensure the workers to be more comfortable and secure (Jelani, A.R., 2008).

It is very important to incorporate ergonomics features in designing work station, working environment, working tools and methods which will enhance human performance, health, safety, quality and productivity of workers (Ansari, N.A., 2013). Ergonomics and technology, if properly applied can reduce injuries and give benefit to company on lowering medical costs. Disregarding ergonomic principles will cause inefficiency and pain to the workers. Furthermore, workers are being encouraged to adopt technology that suits their work by implementing ergonomics principles (Kogi, K. and T. Kawakami, 1997).

Conclusion:

Successful technology adoption should focus on three main elements which are human, process and technology. Besides these elements, several characteristics of the technology should be considered when adopting new technology, such as simplicity, visibility of results, usefulness towards meeting an existing need and low capital investment. The ergonomic element should be included in the design to achieve ease of use and comfort in harvesting technology. In addition, it will be able to reduce injuries and increase high productivity.

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