Observing knowledge of ergonomic product in Indonesia

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Abstract. A range of ergonomic products have started to be widely produced and used in Indonesia. Office supplies as well as computer peripherals appear to be the majority of product types which are ergonomic labeled by the manufacturer. However, how well is people’s knowledge regarding the characteristics of ergonomic product and its benefit are still unidentified. Not to mention the intention to use ergonomic-labeled product after realizing the benefit. This research is aiming to observe people’s level of awareness and intention to use the ergonomic-labeled products through a set of experiments. The investigation used several types of office chair, keyboard, and mouse representing the ergonomic product and standard product. Participants’ productivity by using ergonomic and standard product were compared and analyzed. The intention to use ergonomic products before and after trial were also observed.

Keywords. ergonomic product, intention to use, knowledge

1. Introduction

Ergonomic product is designed to improve the usability of the product and to reduce the risk of injury which is possibly appeared during the product use. Ergonomics aspects on product development in industry is one of major strategies for prevention of work-related injuries and illnesses among employees at the moment of manufacture of new products [1]. In fact, many ergonomic products are having an increase in its production and utilization rate, because they are claimed to be able to give more benefit than any other standard products with the same function. The claims are supported by several relevant studies. Smith and Bayeh [2] for instance, showed that the ergonomic product, in this case a fully adjustable chair, utilized by call center team members in Midwest, United States, can improve the average productivity by 4.78%. Study by Cofco [3] mentioned that the probability of having injury, such as low back pain, carpal tunnel syndrome, sprained, hernia, etc. is higher when the product was not designed based on the ergonomics principles.

Not only for the customer, the ergonomic product can also bring benefit to the manufacturer of the product. The “ergonomic” label appears to be one of marketing strategies one can use to increase their business. The manufacturer can bring the ergonomic design as a competitive advantage in the market [4]. Some manufacturers even use ergonomic-product label explicitely to attract the customers. Not to mention, some are chasing the certification of ergonomic product through a credible institution like US Ergo in United States [5]. The certificate basically guarantees scientifically that the product has better comfort as well as minimum risk of injury for the user. However, this type of marketing strategy will be succeed only when the manufacturer could deliver the advantage of ergonomic product to the correct group of targeted customers.
It is important to deliver the ergonomic-labeled product to a group of target customers who are aware of the existence and the benefit of the particular product. On the other hand, unfortunately, customer’s level of awareness of ergonomic product in some developing countries, including Indonesia are still considered as low. In Indonesia particularly, a big problem of applying the ergonomics principles in a work system is the stakeholders’ low level of awareness [6]. A study by Kamaroddin [7], involving 60 university students in South East Asia shows that 96.3% of the participants agreed to the importance of the application of ergonomics principle and design particularly related to a computer-based work. However, it is also interesting to see that only 50% of participants in mentioned study were actually apply the ergonomics principles or use any ergonomic product for their work. Therefore this study aims to observe Indonesian people’s level of awareness as well as their intention to use the ergonomic-labeled product.

2. Methods

This study involved 40 university students and office workers ranging from 18~53 years old; 52% female - 48% male; 60% student - 40% office workers. An experimental scheme were designed in this study to investigate the effect of user perception to the intention to use an ergonomic product. A set of activities was used to evaluate the effectiveness of particular work using a range of ergonomic-labeled products. The product used in this experiment were office chair, computer keyboard, and mouse. A set of questionnaire were also given to the participants in order to know their intention to use the product, before and after experimental activities were conducted.

Before the experiment were conducted, a questionnaire was given to each participant to measure their level of awareness on ergonomic product. First, the participants were asked whether they have any knowledge of human factors/ergonomics either from formal or nonformal education. Second, they needed to indicate whether they have known or aware of any ergonomic product exists in the market. Lastly, the participants were given three sets of different product (office chair, keyboard, and mouse) with only one actual ergonomic-labeled product in each set (Figure 1). Participants had to choose which product they perceived to be the ergonomic product and stated their reason. The correct answer for each set were determined based on existing patents of relevant ergonomic products.

![Figure 1. Set of products to be chosen by the participants](image-url)
The experiment was divided into three parts of activity: reading a book on office chair, typing with keyboard, and highlighting digital text with mouse. In the first activity, participant was asked to read a novel book within 5 minutes on office chair. Each participant did two treatments using a standard office chair and an ergonomic-labeled office chair. In the end of each reading activity, the participant was asked the last two words on last page they have read so far in order to measure the reading speed of participant. Second activity involved a typing task with a standard keyboard and ergonomic-labeled keyboard as each treatment. The participant typed a set of english text using Mavis Beacon Teaches Typing Software [8] within five minutes. Before the task, participant was allowed to practice using mini games feature of the software for one minute. At the end of the task, the software recorded participant’s typing speed. The third activity was highlighting digital text using a standard mouse and an ergonomic-labeled mouse. On each treatment, participant should highlight character “e” within a set of text within 5 minutes [9]. Participant was not allowed to use any navigation feature in the microsoft word. At the end of the task, the percentage of success rate was measured by counting the total character highlighted.

3. Results and discussion

The initial questionnaire were intended to identify participants’ knowledge of ergonomics in general. The result shows that 70.98% of participants did have initial knowledge regarding human factors or ergonomics principles. Data also indicated that 56.66% of participants were aware that there are ergonomic-labeled products existed in the market. Afterwards, the participants were given three sets of different product figures (office chair, keyboard, and mouse) and they had to choose the product which they perceived as the ergonomic product. The percentage of participants answer is indicated in Table 1.

| Product     | Correct | False |
|-------------|---------|-------|
| Office chair| 32.75%  | 67.25%|
| Keyboard    | 31.43%  | 68.57%|
| Mouse       | 4.62%   | 95.38%|

Participants were also mentioned their reason of choosing particular option on each product type. The reasons can be categorized based on the similar keyword stated in the questionnaire. The keywords represent participants’ definition of ergonomic product. The percentage of appearance of each keyword is shown in Table 2 below. It is clear that the most frequent keywords which appear on three types of product is how the design follows the corresponding body parts’ shape.

| Keywords           | Office chair | Keyboard | Mouse  |
|--------------------|--------------|----------|--------|
| Comfortable        | 17.81%       | 16.67%   | 23.81% |
| Efficient          | 0.68%        | 0.00%    | 4.76%  |
| Makes work easier  | 0.00%        | 7.25%    | 19.05% |
The experiment data was processed using non-parametric statistics where the median differences were analyzed on each data group. The comparison of median value from each task is shown in Table 3 below.

Table 3. Median value of each experiment task.

| Experimental measures                  | Median | Unit         |
|----------------------------------------|--------|--------------|
|                                        | Ergonomic product | Standard product |
| Reading effectiveness on office chair  | 195.5  | 212.5        | Words per minute |
| Typing efficiency using keyboard       | 25     | 36           | Words per minute |
| Highlighting effectiveness using mouse | 87.8   | 98.89        | %                |

The results shown in Table 3 indicates that user’s productivity on activities associated with particular product was lower when utilizing the ergonomic product. Within the experiment, all participants have not used any ergonomic products which became the study’s object. As matter of fact, the procedure of experiment was designed to assign the participants to have trial on each product. However, it is possible that the period of trial in the experiment was too short and incomparable to the frequency of usage of standard product they have been using all this time.

Mann-Whitney U test ($\alpha = .05$) was then conducted to compare participant’s intention to use ergonomic product, before and after experimental tasks. The recapitulation of Mann-Whitney U test result is indicated in Table 4. It is shown that only the keyboard and mouse product have a significant difference on each type of design (ergonomic & non-ergonomic).

Table 4. Mann-Whitney U test results on experiment tasks.

| Data group                           | p-value  | Note                  |
|--------------------------------------|----------|-----------------------|
| Reading effectiveness on office chair| 0.572    | No significant difference |
| Typing efficiency using keyboard     | < .001   | Significantly different |
| Highlighting effectiveness using mouse| < .001   | Significantly different |
Before and after the experiment tasks, the participant was asked their intention to use an ergonomic product. The median of questionnaire results on users’ intention to use ergonomic product before and after experiment shows equivalent number (median before = 6; median after = 6; \( p \)-value = 0.574). This result means that the trial did not actually affect participant’s intention to use the ergonomic product after the trial in the experiment.

4. Conclusions

This study aimed to observe people’s level of awareness and intention to use the ergonomic-labeled products. The questionnaire and experiment results showed that people’s level of awareness of ergonomic product is still low, indicated by many participant choose the wrong product which is perceived as the ergonomic product. People’s perception of the ergonomic product mostly defined by the design of the product which follows the corresponding body parts’ shape.

The interesting part of this result is the fact that the effectiveness of every determined experimental measures were lower on the utilization of ergonomic product. This outcome may indicate that the unfamiliar design of product could affect significantly how the user behave and make their productivity decrease when compared to the use of the standard product.

5. References

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