THE DESIGN OF ADJUSTABLE FRAME LOOM (SPECIAL TOOLS)

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ABSTRAK
The adjustable frame loom is a tool used for weaving process. The weaving process used a yarn and another textile materials such as ribbon to produce woven fabric and tapestry product. This tool was invented in order to overcome ergonomic problem faced by staff at Institut Kraf Negara. Current tool is static and not movable, thus causes back and neck pain to the users. Other weaving tools also store at different location which require the user to move frequently while doing knitting process. Furthermore, the process is not clear and difficult for staff to demonstrate to the visitors. The Adjustable Frame Loom is designed with adjustable angle and height to meet the user needs and provide more ergonomics condition. Therefore, it helps reducing the problem of back and neck pain. The tool pocket system is built to store other weaving tools such as scissor, yarn, ruler and shuttle. Thus, it eases the movement of staff in doing the weaving process. The adjustable frame loom helps to enhance the staff working condition of the Institut Kraf Negara by providing comfort and systematic storage system.

KEYWORDS: weaving process, fabric, loom, adjustable loom, ergonomic.

1. INTRODUCTION
Weaving is the process of interlacing between warp and weft to produce a fabric. The process can be done using machine or manual methods [2]. This project focuses on the use of manual methods, to ease the demonstration as well as the learning of identifying tools and parts involved in weaving process for the student and visitors. This tool was designed with two elements that can be adjusted in terms of its angle and height of the frame loom structure. Based on the problem faced by the staff at Institute Kraf Negara, the current loom cannot be adjusted and causes back and neck pain to the user. Furthermore, the current weaving tool does not show each tool and part involved in the weaving process due to they are placed separately. Therefore, the users have to move a lot while doing the weaving process. Consequently, the production of fabric and tapestry takes longer time.

The design of adjustable frame loom reduces the back and neck pain as well as eases the weaving process by placing all the tools systematically at the loom. The frame holder is located at the upper part of the loom structure which equipped with the rotated part to be adjusted according to the comfort angle of the user. Then, the height of the loom also can be adjusted to the height of the users to avoid them bending their body while doing the weaving process. This looms also equipped with fabric pockets to place the tools involved in weaving process such as shuttle, yarn, reed, scissors and ruler. With identical part and tools, the loom displays all the element involves in weaving process to ease the process of demonstration to the visitor.

2. Method
Based on observation made, the structure of loom causes problems to the users. The structure of loom has been redesigned and tested to ensure the product can be produce and all element functions as planned. Then the questionnaires have been distributed to analyze the feedback given by the user.

In order to evaluate the usage of this machine, data has ben collected using questionnaires. About 30 respondents involves in this survey. The data collected, has been analyses and interpreted in statistical method. From the result, it shows that the design of adjustable frame loom has ergonomic characters and give comfortable feel to the user.

2.1 Design
The selection of material for designing the structure were based on the previous project which using iron for the body structure and frame holder. The materials were chosen to create light weight effect so that it can be easily moved and stable. The design of the adjustable frame loom with adjustable angle and height to meet the users needs. Thus it provides comfort to the body movement during the process of weaving or tapestry.

2.2 Fabrication
This tool is built through three main parts such as a frame part, lock system part, adjustable part. Welding process required to assemble a main parts and nails arrangements on frame.
2.3 Testing
The adjustable frame loom is tested by textile students. They did the process of weaving and tapestry using adjustable frame loom. In addition, before they want to start using our tool, they can adjust an angle and height to ensure they feel comfortable while making the
weaving process. Questionnaires was distributed to measure the comfortness of user and ergonomic effects of the invented loom.

3. Data
Studies on woven adjustable frame was conducted on 30 respondents consisting of students of Diploma in Mechanical Textiles using survey forms. Respondents for the sample were 37% male and 63% female. The result showed that 53.3% of students strongly agreed with adjustable angle. While 43.3% of the students agreed with the specified angle. Only 7.69% who disagree with angle adjustable frame loom. The findings indicated that the respondents agreed with the loom frame design that can be adjusted according to user comfortness. The results also showed that 60% of respondents strongly agreed and 40% of respondents agreed with the loom frame design that can be adjusted in height. Height level is very important as to make the weaving process takes quite a long time and will cause the user to easily tired and suffering from back pain due to inappropriate equipment to users. From the analysis, the findings demontrated that the adjustable frame loom invented was able to reduce the risk of back and neck pain faced by the user.

![Graph of User Feedback on Ergonomic and Comfortness provide by The Adjustable Frame Loom](image)

Figure 5: Graph of User Feedback on Ergonomic and Comfortness provide by The Adjustable Frame Loom

4. Conclusion
The adjustable frame loom is able to reduce the risk of back and neck pain, as well as ease process of weaving by reducing the body movement while using the looms. With the application of this loom in Institute Kraf Negara, staff will be more comfortable to
demonstrate the weaving process and introduce parts and tools involved in the process [4]. Furthermore, visitor can easily understand the basic concept apply in the weaving production. This will attract more visitors to learn about fabric and tapestry production process.

5. Bibliography

Bibliographic writers
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