International Journal of Multidisciplinary Research and Publications
ISSN (Online): 2581-6187

Utilization of Hand Anthropometry in Designing Handles for Women's Handbags

*Dwi Cahyadi[1], Ika Afriliana[1], Muh. Irwan[2], Afya Rizki Nabila[3]
[1]Design Department, Politeknik Negeri Samarinda, Samarinda, Indonesia-75113
[2]Chemical Engineering Department, Politeknik Negeri Samarinda, Samarinda, Indonesia-75113
[3]Visual Communication Design Department, Universitas Telkom, Bandung, Indonesia-40257
Email address: dwicahyadi@polnes.ac.id

***Abstract*—** *Handicraft products, namely bags made of leather and rattan in Indonesia that exist today, are developing along with the times. To get an optimal bag design, it must be considered factors such as the dimensions of the human body from anthropometry, both in static and dynamic positions. With the size of bags and functions being more developed at this time, an ergonomic bag handle design is needed to make it more comfortable to use. The latest anthropometric data size is needed in this design, especially for the type of handbag. This study was conducted to measure and obtain anthropometric data of women from Indonesia as a basis for determining the size of the bag handle. Data was taken from 164 women aged 17-25 years adjusted to the target market of the designed bag. Using statistical analysis, the data obtained through measurements is used in the design of handbags for women in Indonesia. The anthropometric data produced by this study can be used as a basis for designing other products that require anthropometric measurements of the length, width and height of the hand.*

***Keywords*—** *Anthropometry, handle, bag.*

I. INTRODUCTION

In designing products and work facilities, it is necessary to pay attention to ergonomic factors in the current design process so that these products and facilities are more comfortable, safe and can function optimally for their users [1-3]. The ergonomics will not be separated from the discussion of the size of the product that must be adjusted to the size of the user's body, In ergonomics, the size of the product that fits the user's body is known as anthropometry which is data from direct measurements on the dimensions of the human body [4-7] .

The term anthropometry comes from the word "anthropos" which means human and the word "metreinn" which means size or measure, definitively anthropometry can be stated as a study related to the measurement of the dimensions of the human body. Humans will basically have shapes, sizes (height, width, and so on), weight, and other things that are different from each other[7, 8].

Anthropometry is widely used as an ergonomic consideration in the product design process and work systems that will require human interaction[9].

To get an ergonomic product design, the things that must be considered are anthropometric factors in both static and dynamic positions. Several previous researchers have concluded that products that are adjusted to the dimensions of the human body can provide comfort for humans as users. The anthropometric data is used to determine the minimum or maximum size of the product that is suitable for the size of the user population[10]

The need to update anthropometric data is indeed highly recommended in the field of research and industry related to the latest anthropometric data. This is due to the dynamics of the development of human body size in a population from time to time. By getting the latest anthropometric data size, it will be more convincing and easier to design products that require measurements according to current users. For example, for the manufacture of handicraft products, the latest anthropometric data is required [11-13].

Handicrafts are creations by artisans to produce items that possess cultural traits and cultural heritage tied to the origin of both the artisan and the product. Handicraft items like apparel, cooking utensils, dining ware, and gardening implements are crafted to meet the practical needs utilized by individuals [14].

One example of handcrafted products in Indonesia that is developing today is a bag made of a combination of rattan materials. Handicrafts such as bags made of rattan materials that exist today are developing along with the times. In addition, the need for the usefulness of bags today is different from the bags that existed before[15].

Handbags, especially for the size of the handle, really need the latest anthropometric data so that the bag product matches the current size of the user's hand. Because the handle of the bag made of rattan material cannot be long or short if it is tied to the body of the bag [16, 17].

Bags made of rattan combination material have various shapes and types that are adapted to their function and show the local identity of Indonesia as the largest rattan producer in the world[18]

Rattan is a plant that falls under the category of palms that grows in the form of vines. Rattan is a variety of tree that thrives in tropical rainforest regions of Southeast Asia, including Indonesia [7].

The handicraft bags that exist today have evolved along with the times. In addition, the need for the usefulness of bags today is different from the bags that existed before. Variations of rattan bags are currently more visible and one of them is handbags for women. This type of bag has specifications where the handle of the bag is ergonomic with a size that suits the user.

With the size of bags and functions being more developed currently, it is necessary to design a bag handle from an

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ergonomic one to make it more comfortable to use. The latest anthropometric data size is urgently needed in this design.

Women's bags made from handicraft items in Indonesia usually take the shape of bags featuring a single strap, such as sling bags and totes. Many sling and tote bags have become a reference in developing bag product designs. A bag with one strap can be designed to be a bag that is comfortable to use if it is adjusted to the function and body size of the user [19].

Thus, this study was carried out with the aim of obtaining basic hand anthropometric data of ergonomic bag handle size standards. In addition, the anthropometric data obtained will be able to be used in various fields of expertise that require this data in determining the size/dimensions of the product.

The contribution of this research is to obtain the latest anthropometric data related to the design of ergonomic handle designs on products in general and bag handles in particular in Indonesia.

II. METHOD

The method used in this study is statistical analysis to obtain percentile data from the anthropometric size of Indonesian women's hands which will be used in the design of women's handbags from a combination of rattan materials later. Figure 1 is the steps of this research process.

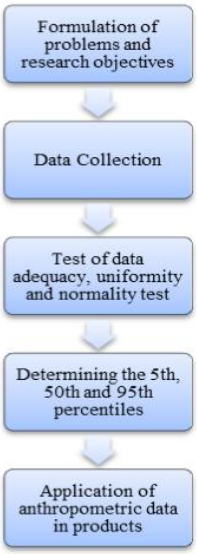

Fig 1. Research process

Data was taken from 164 Indonesian women aged 17-25 years who were adjusted to the target market for designing the bag. The anthropometric data taken were hand height, hand width and hand length. After obtaining data through direct measurement, the next step is to conduct a uniformity and data adequacy test.

If the data is sufficient and uniform, then a normality test is carried out. If the data has been distributed normally, then look for the percentile of the anthropometric data length, width, and height of the hand. The final step is to apply the anthropometric measure to the design of handbag products from rattan combination materials.

III. RESULT AND DISCUSSION

Data Measurement and Analysis

A total of 164 women aged 17-25 years in Indonesia were measured the length, width and height of their hands using a hand meter. Figures 2 and 3 are the measures sought for from anthropometric data, while figure 4 is one of the processes of measuring hand length.

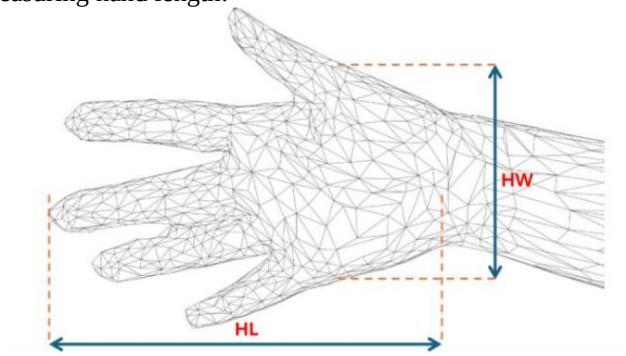

Fig 2. Hand length (HL) and hand width (HW)

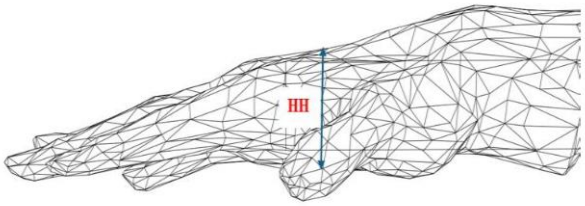

Fig 3. Hand height (HH)

After the measurement data is obtained, the next step is to test the adequacy and normality of the data. From all of these data, all must have sufficient and uniform data results. The adequacy test aims to determine whether the measurement data that has been carried out is sufficient or not, while the uniformity test aims to ensure that the data collected comes from the same activity.

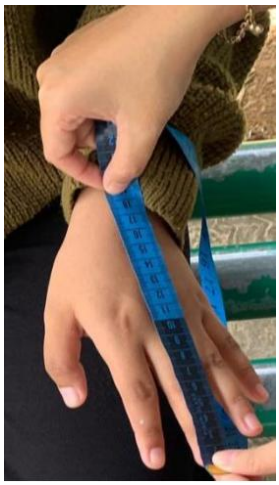

Fig 4. Measurement process

Furthermore, a normal distribution test process is carried out, this is intended so that the distribution of continuous random data is in the form of a bell and symmetrical, where

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the largest and average frequencies of the data are at the midpoint. All data obtained has a normal distribution. The normal distribution test is a test to measure whether our data has a normal distribution so that it can be used in parametric statistics (inferential statistics). An example of one of the results of the uniformity and normality test of the measurement of the width of the hand data in the figure below.

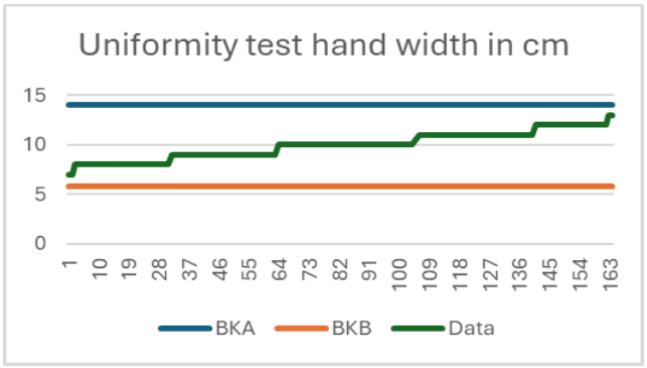

Fig 5. Uniformity test hand width

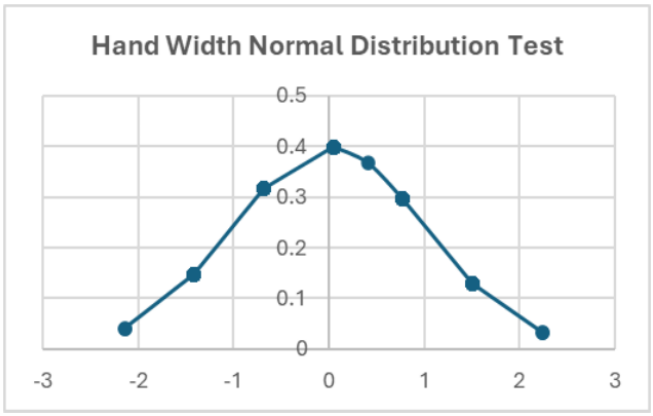

Fig 6. Data normality test hand width

After all the data had been assessed for adequacy and consistency of the information and followed a normal distribution, the data was subsequently utilized to establish the percentile as the foundation of the most recent anthropometric data. From the results of statistical calculations, the following percentile data are obtained:

TABLE 1. Antropometric data

No	Anthropometric Data	Percentile		
		5th	50th	95th
1	Hand Height	2.15	3	4
2	Hand Width	8	10	12
3	Hand Length	15.15	17	19

Application of Anthropometric Data in Product Design

In this section, one of the uses of hand anthropometric data used in designing and making ergonomic women's bag handle designs will be explained. The anthropometric data used is processed according to user needs. The following is an example of a description of the types of anthropometries used in designing bag products.

In figure 7 is the size of the bag product made of rattan and leather. A and B are the measures of the length of the handrails on the bag.

This value was obtained from anthropometric data on the width of Indonesian women's hands taken from the 50th percentile in table 1, which is 10 cm. C is the size of the width of the bag handle obtained from the anthropometric data in table 1, namely the length of the hand by taking from the 5th percentile with a size of 15.15 cm.

This size is the maximum size of the width of the bag handle, because this bag is designed with a handbag model, so the size of the width of the bag used in the product is 4 cm according to the function and shape of the small bag.

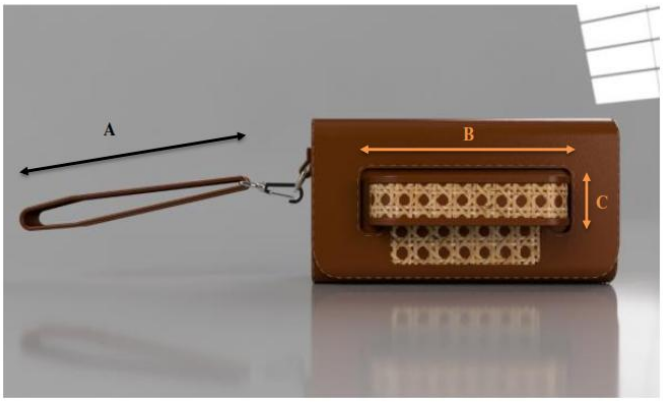

Fig 7. The length and width of the bag handle

In figure 8, D is the measure of the depth of the bag's grip area which provides convenience and flexibility when holding the bag comfortably. This value was obtained from the anthropometric data of the height of the hand.

From table 1 the height of the hand is 4 cm of the 95th percentile, which is the minimum height of the bag handle, in the design of this product the maximum area of the bag handle is 5 cm.

Fig 8. Height of the bag handle area

Figure 9 is the result of a bag product made from rattan and leather produced in this research.

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Fig 9. Product prototype

By using the latest anthropometric data, it makes it easy for the bag craft industry to be able to adjust the size of current users, so that in the end the product can provide safety and comfort when used.

IV. CONCLUSION

Anthropometric data is a measure used as a reference to make a more ergonomic product by paying attention to the user's size. Updating anthropometric data in the field of research and industry is needed so that products are designed according to the current body size of users. One of the anthropometric data used in bag design is hand anthropometry. Hand anthropometric data in this study can be used to determine the size of the length, width, and height of the ergonomic handbag handle.

ACKNOWLEDGMENT

Acknowledgments to the Institute for Research and Community Service of Samarinda State Polytechnic for the support provided for assistance in this research.

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