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# Design of Portable Cool Box Stand Frame to Facilitate Refueling

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**Abstract**
The SN Multi-Business Cooperative (KSU) is located in Getasan District, Semarang Regency. This cooperative collect cow's milk which is cooled to a certain temperature and sent to milk factories and restaurants and cafes. The problem that often arises is that milk that has been sent to the milk factory can be rejected for various reasons. To carry processed milk, every motorbike rider uses a basket bag made of thick cloth which is mounted on the back of the motorbike. Using this basket bag is less practical because if the driver wants to refuel, the basket bag must be removed first. The design of the portable cool box mounting frame makes it easier for drivers to refuel. The portable cool box's mounting frame is designed to transport milk more effectively, using a cooling stand that can be removed, which is more ergonomic, making it easier to refuel.
**Keywords:** *design of a portable coolbox, portable coolbox, cow's milk, multi-business cooperative*

**Abstrak**
Koperasi Serba Usaha (KSU) SN terletak di Kecamatan Getasan Kabupaten Semarang. Koperasi ini menampung susu sapi yang didinginkan hingga suhu tertentu dan dikirim ke pabrik-pabrik susu dan restoran serta kafe. Permasalahan yang sering muncul adalah susu yang sudah dikirim ke pabrik susu dapat ditolak dengan berbagai alasan. Untuk membawa susu olahan setiap pengendara motor menggunakan tas keranjang yang terbuat dari kain tebal yang dipasang di belakang sepeda motor. Penggunaan tas keranjang ini kurang praktis karena apabila pengendara akan mengisi bahan bakar maka tas keranjang harus dicopot terlebih dahulu. Perancangan rangka dudukan *cool box portable* agar memudahkan pengendara saat mengisi bahan bakar. Rangka dudukan *cool box portable* dirancang mengangkut susu lebih efektif, memakai dudukan pendingin yang dapat dicopot, lebih ergonomis sehingga memudahkan saat mengisi bahan bakar.
**Kata Kunci:** *rancangan rangka dudukan, coolbox portable, susu sapi, koperasi serba usaha*

## 1. Introduction

Koperasi Serba Usaha (KSU) Susu Nusantara is located in Getasan District, Semarang Regency. The milk collected in this cooperative is processed by cooling it to a certain temperature and sent to dairy factories and restaurants and cafes. The problem that often arises is the dependence of milk acceptance by milk factories. Milk that has been delivered to the dairy plant may be rejected by the dairy plant for various reasons. To carry the milk, each motorbike rider uses a basket bag made of thick cloth that is placed on the back. The cloth basket bag holds about 30 litres of milk, inside the bag is ice cubes to maintain the temperature of the processed milk. Using this basket bag is less practical because if the driver wants to refuel, the basket bag must be taken first. With the design of the portable cool box mounting frame, the design of the portable cool box mounting frame makes it easier to add or refuel. With the design of a portable tolbox, It is expected to increase the duration of milk storage time so that it can be longer to distribute dairy products and more distributed capacity[1] [2].

When fishing takes a long time, the quality of fish decreases which makes fishermen's income decrease. With this condition, an analysis was carried out with the HOQ method to make a Portable Cool Box to maintain the quality of fishermen's catches and help the process of loading and unloading catches [3][4]. The cooler box contains ice gel that keeps the temperature cool. The ice gel can keep the temperature cold for 3-4 hours. The design of the corn sheller machine is an improvement from the previous machine which was operated in a squatting position [5][6][7]. This cooler bag can make it easier for working mothers outside the room as a container or place to store breast milk so that it can maintain the temperature of breast milk so that it stays the same [8][9]. The refrigerator is made using Peltier modules with a thermoelectric working concept that is powered by electric current or batteries so that it can be carried on the way [10]. From the results of the analysis of work positions and through the Nordic Body Map questionnaire that has

been assessed, a score is obtained which is used for consideration of work posture improvement. Manufacture of a cooling system in a cooling box for sinovac vaccine storage with thermoelectric (TEC) 1-12706 that can keep the sinovac vaccine temperature in the temperature range [11]. [12] By using the RULA (Rapid Upper Limb Assessment) method approach, the results obtained with its ergonomics, do not cause complaints, fatigue, do not cause MSDs, and increase the comfort of workers who previously roasted melinjo seeds traditionally. Bacteria in fresh ASIP showed a higher number compared to ASIP stored in pasteurised cooler bags.[13] [14].

The stages in HOQ begin with identifying the needs and desires of consumers by determining Voice Of Customer (VOC), creating a planning matrix, determining the level of customers in competition, determining the technical description. [15] With this semi-automatic machine, the process of cleaning the intestines every one kilogram takes sixty minutes. In this design, it pays attention to the anthropometric aspects of labour and percentiles. In the development and design of this portable cool box holder frame, anthropometry or body dimensions used are the length of the forward span with a percentile of 50 so that all workers can use this tool.

## 2. Material and Methods

Data processing, data that has been collected, then processed / tested using:

1. Data sufficiency test

   Data sufficiency is calculated using the formula below:

$$N' = \left[ \frac{k / s\sqrt{(N\sum X^2) - (\sum X)^2}}{\Sigma X} \right]^2 \quad \text{…….. (1)}$$

2. Data uniformity test

   Data is said to be uniform if it is within BKA and BKB. The formula used to calculate BKA and BKB is as follows:

   Upper Control Limit (BKA) = + k

   Lower Control Limit (BKB) = - kPersentil

3. This data processing aims to determine the size of a product through the 5th, 50th, or 95th percentile. The object of observation is the employees of the marketing department of milk producers.

   The kth percentile: $\mu + z\,\alpha$ ..... (2)

The research flowchart is as **Figure 1.**

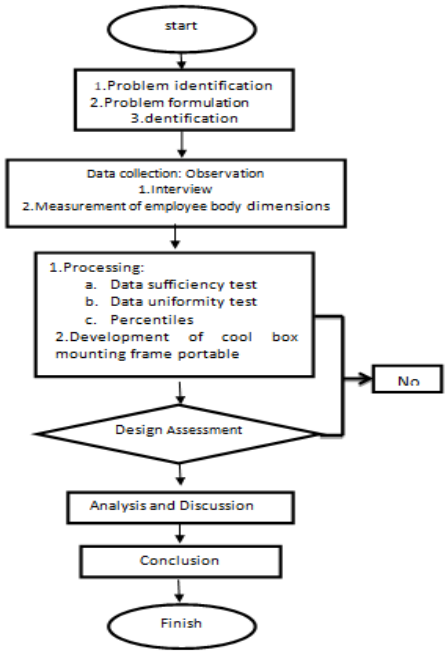


**Fig. 1**. Research Steps

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## 4. Results and Discussion

*Data Collection*

From observations for milk distribution and marketing milk to cafes using motorbike transportation using a basket placed on the back of the motorbike as shown below:

**Fig. 2**. Basket Bag

From the measurement of employee body dimensions related to upper arm length with the results in the following **Table 1.**

**Table 1**. Data from Measurement Results of Marketing Department Employees

| No. | Name | Gender | Body Dimensions |
|---|---|---|---|
| 1. | Dar | Male | 42 cm |
| 2. | Rind | Male | 40 cm |
| 3. | Hag | Male | 38 cm |
| 4. | Yed | Male | 41 cm |
| 5. | Ali | Male | 39 cm |

*Data Sufficiency Test*

Data sufficiency is used to determine whether the data obtained is sufficient or still lacking.
If N' < N then the data is sufficient
N'> N then the data is lacking and needs to be added
The level of confidence used (k) is 95%

$$N' = \left[\frac{40\sqrt{40050 - 40000}}{200}\right]2$$

$$N' = \left[\frac{40\sqrt{50}}{200}\right]2$$

$$N' = \left[\frac{40(1{,}414)}{200}\right]2$$

$$N' = 2$$

N' < N then the data is sufficient

*Data Uniformity Test*

Upward arm length dimension

$$\sigma = \left[\sqrt{\frac{\Sigma(\overline{X} - Xi)^2}{N-1}}\right]$$

a. Standard Deviationn $\sigma = 2{,}5$
b. Upper Control Limit
BKA = + k

BKA = 40 + 3 (2.5)
BKA = 47.5

c. Lower Control Limit
BKB = $\bar{x}$ – k$\sigma$
BKB = 40 – 3(2,5)
BKB = 32,5

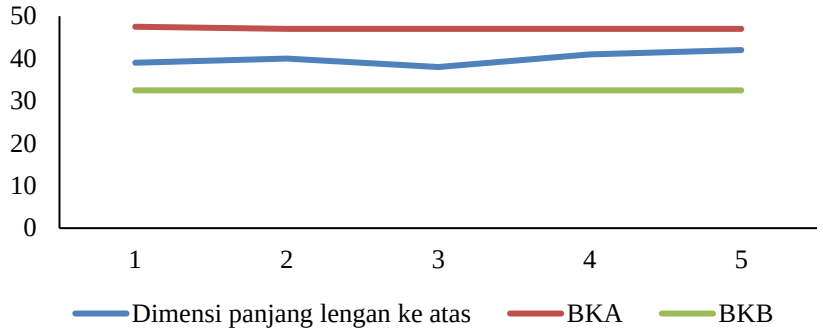


**Fig. 3.** Data Uniformity Graph

*Percentiles*

The selection of the 50th percentile means that measurements are taken on 50% of the average-sized population. The size of the portable toolbox uses the 50th percentile so that all employees can reach the height of the portable toolbox.

*Development of Seat Frame*

The data that has been obtained and processed, then determine the size based on anthropometric data. Dimensions per box with a capacity of 32 litres have a length of 40 cm, a width of 25 cm, and a height of 33 cm. The following is an image of the portable coolbox mounting frame:

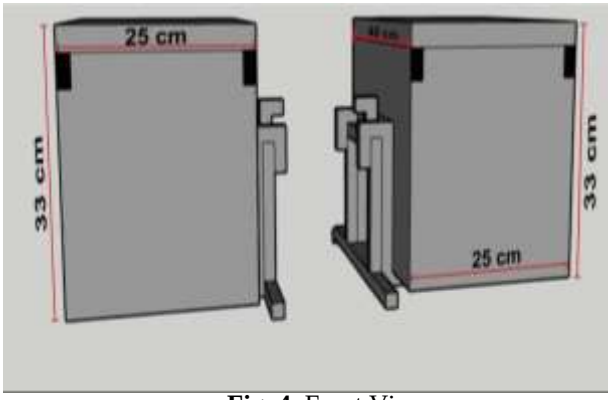


**Fig. 4**. Front View

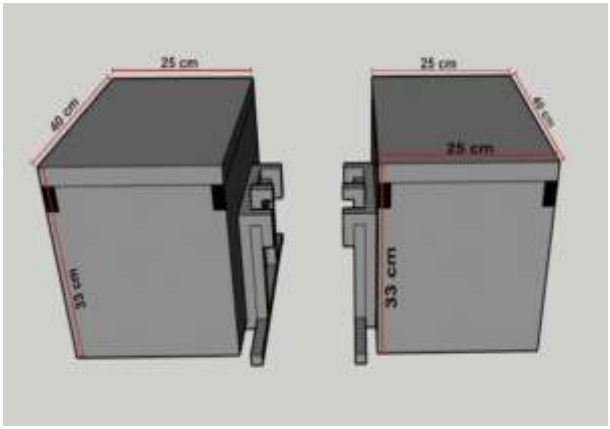


**Fig. 5**. Top View

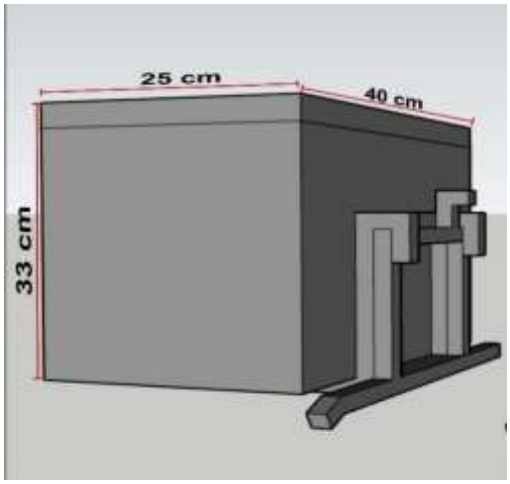


**Fig. 6**. Side View

When installed on a motorbike, if you want to fill up with petrol, you don't need to remove it because the installation of this cool box is attached to the screws on the motorbike and is installed on the right and left of the motorbike as shown at **Figure 7.**

**Fig. 7.** Mounting frame mounted on motorbike

## 4. Conclusion

The design of the portable coolbox stand frame can transport milk more effectively, the design of a removable cooling stand frame or portable coolbox that is ergonomically and to make it easier to add or refuel. The cool box mounting frame can be removed so that it does not interfere with the driver, especially when it comes to adding or refueling.

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