Designing Tray for Rasa Rasa Stand in D'Dieuland of Kawasan Wisata Punclut Based on Ergonomic Aspect

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Abstract: D'Dieuland is a thematic tourist area located in Pagerwangi Ciumbuleuit Village, Bandung, West Java. D'Dieuland has a large and terraced area, and mostly outdoor. D'Dieuland has various playground and food stands, one of that stands is Rasa Rasa which sells various Sundanese cuisine. Every day there is a process of food distribution from the stand to the dining area by bringing a sufficient number of plates for one serving. Based on observations, it is difficult for the waiter to distribute different types of food (wet and dry) together, and also consider food safety and stability when used. The method used in this ergonomic aspect research is Nordic Body Map questionnaire. The goal is to provide a new design in tray that can be used to serve various food in large terrace area, and comfortable to use.

Keywords Rasa Rasa, Food Distribution, Tray, Ergonomic Aspect

1. Introduction

Recreation in terms of play and culinary is one of the human needs in life after full activity. To find the needs, Bandung has several recretional areas as an alternative choice. One such recreation area is Kawasan Wisata Punclut in Ciumbuleuit. There are 6 thematic restaurant in it, one of which restaurant is D'Dieuland.

D'Dieuland has a land area of 5500m2 with contours of a terraced and steep land. There are various facilities which are arranged separately, such as indoor playground, outbond, family gathering room, cafe bar, selfie spot area, and food beverages stand. One of those food stand is RasaRasa stand that sells various Sundanese cuisine.

RasaRasa stand is the only stand at D'ieuland that offers food packages with a large combined menu that makes the waiter is difficult to distribute in a large area and terraces. Based on interviews and observations, the difficulty is in the quantity of food that varies (wet & dry food) during distribution, as well as the balance of the passengers during delivery.

Especially when entering peak season, which can load visitors twice the usual day. Therefore a food serving device is designed to be applied to the Rasa Rasa stand with consideration of outdoor, extensive, and terraced areas based on ergonomic aspects. The aim is to provide design design solutions that can protect food during distribution and comfortable for users to use.

2. Empirical Data

2.1 History of D'Dieuland

Before the construction of the Punclut Tourism Area, the Ciumbuleuit Peak area itself was a private field, garden, and cow pen, explained Mr. Gumilar as head of the Pagermaneuh hamlet. The land had changed hands 3x with the surrounding community until After that changed hands to people from Cimahi, and subsequently sold to a private company PT Karunia Abadi.

Figure 2.1 D'Dieuland Area in The Night

In 2016, the function of gardens, fields and cattle ranching began, and was completed in 2017. Kala was partially inaugurated. Development continues to be carried out until D'Dieuland is officially opened on December 28, 2017 with 10 food stand facilities available to support the tour.

2.2 Observation

Observations were conducted at D'Dieuland, Punclut Tourism Area on February 24, 2019. Rasa-Rasa is one of the food stands located in D'Dieuland area, by selling various Sundanese specialties and having a full package or family menu.

Figure 2.2 Rasa Rasa Stand

Figure 2.3 Tray for 4 Plates

For additional information on field data, the average distance track by a waiter is 63m for one way. Then the distance is multiplied by two to go back and forth once between. As well as the width of the area or road that is usually used by the waiter has the narrowest width of 1.5m.

There are various foods served at the Rasa Rasa D'Dieuland stand, the food data with the weight of the presentation are as follows:

Table 2.1 Food Weight per Unit

No.	Food	Berat / Bobot satuan	Ket.
1.	Nampan kosong	525 gram	inc. piring plastik
2.	1 ekor ayam	987 gram	"
3.	1 nasi	279 gram	"
4.	1 nasi liwet bakar	323 gram	"
5.	1 porsi cilok anyun	257 gram	"
6.	1 porsi seblak anyun	324 gram	"
7.	1 pc surabi coklat	123 gram	"

In bringing food with a large menu, the waiter can deliver two to three times. This was stated by the waiter because of the maximum capacity in one tray in collecting food. One factor is the size of the plate brought.

The size of the plate used by Rasa Rasa stand is divided into 4 types; 2 size plastic plates, 1 size cardboard container, and 1 size styrofoam bowl.

Table 2.2 Kinds of Plates

No.	Jenis Piring	Diameter	Panjang	Lebar
1.	Piring plastik besar	22 cm	-	-
2.	Piring plastik kecil	17,5 cm	-	-
3.	Wadah kardus persegi	-	10 cm	10cm
4.	Mangkok	10,5 cm	-	-

2.3 Documentation

Focus on how to bring the Rasa Rasa tray stand in the family menu package or when delivering a large menu. There are several arrangement of dishes to be effective in one transport, but the food is carried to the customer. The following are some of the ways in which dishes are arranged by Taste Sense:

Figure 3.3 Tray for 5-7 Plates

3. Nordic Body Map Methods

Nordic Body Map is a checklist of body parts with an index table of pain that users feel when doing something. In the questionnaire it contains areas or parts of the body in pieces and numbers 1-4 as a pain assessment.

The Nordic Body Map questionnaire becomes a reference method of discussion about food distribution because these activities are not activities that are carried out continuously or repeatedly.

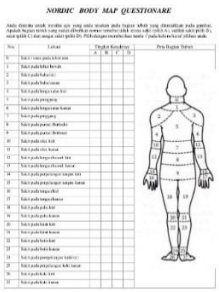


Figure 3.1 Nordic Body Map Quetionaire

Simulation tests were carried out on 15 men to lift a weight of 4 kg by exposing the palm of the hand up and
holding it for 2 minutes (average distribution time), and holding it downward for 2 minutes.

No.	Lokasi Bagian Tubuh	Pain Index			
		A	B	C	D
1.	Pain in the upper neck		8		
2.	Pain in the lower neck	7	3		
3.	Pain in the left shoulder				
4.	Pain in the right shoulder	13	2		
5.	Pain in the left upper arm		2		
6.	Pain in the back		4		
7.	Pain in the right upper arm	12	3		
8.	Pain in the waist		3	5	
9.	Pain in the bottom		2	5	
9.	Pain in the bottom				
10.	Pain in the left elbow				
11.	Pain in the right elbow	12	3		
12.	Pain in the left forearm				
13.	Pain in the right forearm	14	1		
14.	Pain in the left hand wrist				
15.	Pain in the right hand wrist	4	7	2	
16.	Pain in the left hand				
17.	Pain in the right hand	9	6		
18.	Pain in the left thigh				
19.	Pain in the right thigh		2	5	
20.	Pain in the left knee				
21.	Pain in the right knee	2	3	5	
22.	Pain in the left calf				
23.	Pain in the right calf		4	2	
24.	Pain in the left ankle				
25.	Pain in the right ankle	2	5		
26.	Pain in the left foot				
27.	Pain in the right foot	2	6		
Total		**77**	**64**	**24**	

Table 3.1 Pain Index Carrying Loads by L Shape

Table 3.2 Pain Index Carrying Loads by Held Down

No.	Body Parts	Pain Index			
		A	B	C	D
1.	Pain in the upper neck		4	5	
2.	Pain in the lower neck		5		
3.	Pain in the left shoulder				
4.	Pain in the right shoulder	10	3	2	
5.	Pain in the left upper arm				
6.	Pain in the back		2	6	
7.	Pain in the right upper arm	7	5	3	
8.	Pain in the waist	1	2	5	
9.	Pain in the buttock		3		
9.	Pain in the bottom		2		
10.	Pain in the left elbow				
11.	Pain in the right elbow	11	2	2	
12.	Pain in the left forearm				
13.	Pain in the right forearm	12	1	2	
14.	Pain in the left hand wrist				
15.	Pain in the right hand wrist	5	3	4	
16.	Pain in the left hand				
17.	Pain in the right hand	9	6		
18.	Pain in the left thigh				
19.	Pain in the right thigh		2	5	
20.	Pain in the left knee				
21.	Pain in the right knee	2	3	5	
22.	Pain in the left calf				
23.	Pain in the right calf		4	2	
24.	Pain in the left ankle				
25.	Pain in the right ankle	2	5		
26.	Pain in the left foot				
27.	Pain in the right foot		7	1	
Total		**59**	**59**	**42**	

The results show that carrying loads with the hand held down is easier and more comfortable. The burden feels lighter when the angle between the body and arms is not far apart. This is a major consideration in the design of this serving device.

4. Analysis

The primary aspect consists of a discussion of physiology and anthropometry. This discussion is the main topic because it deals with humans, the needs, impacts, and ideal size in humans.

4.1 Primary Aspects

The primary aspect of the discussion of the serving tool at D'Dieuland considers the main things that are examined in terms of how to bring the product and the ideal human size as a product size reference.

Table 4.1 Product Analysis Measured by Physiology Aspects

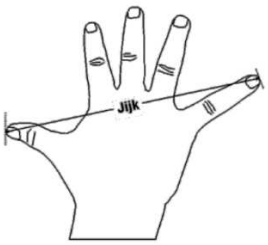
No.	Analysis	Physiology
1.		-Feel heavy weight with the use of a solid shape
2.		-Food arrangement vertically, giving security to the unit -Using the upper arm muscles, forearm, and the power to hold the fingers and palms.
		-The pedestal dominates in one hand -Must have its own ability (strength and balance) in the field -Many rely on the left hand muscle (biceps & triceps)
5.		- Difficult to use in areas that are narrow or crowded - Position the right strength at the maximum human strength in lifting weights

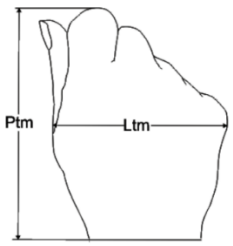
In terms of physiological aspects, the maximum burden that can be borne is between the neck and the waist. Humans can hold the weight of an object around 20-25kg.

The form of a product that is suitable to be easily carried in a terraced area is that which can be carried in a carried way, because it rests on the balance on the arm. And can be operated with one hand. The aim is to increase the effectiveness and stability of food distribution. Products designed emphasize easy to carry in terraces and can contain maximum quantities, arranged stacking.

Another primary aspect of the discussion is the anthropometry of the human body. The size of the product designed is adjusted to the size of the human body. This is done so that the product has the right use.

Table 4.2 Product Analysis Measured by Anthropometry Aspects

No.	Analysis	Anthropometry
1.		- Arm length from elbow to fingertip is 47.3 cm - Referring to the existing design, the max size of 35 cm is ideal as the product width
2.		- For a range of flat area handles or holding heavy items weight - Maximum maximum finger size widening finger size is 27 cm (persentil 50 pria) - The position of the hand is usually under the tray or beside (if the serving device has

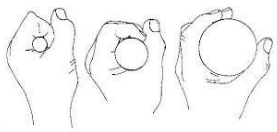
		volume)
3.		- To carry a tray that has a handle on the side, carried by lifting on both sides - Ptm size is 13 cm (50 percent percentile) - Ltm size is 10 cm

Based on the analysis table above, the size of the product designed has a width of no more than 35 cm x 45 cm x 60 cm, to facilitate food distribution, helping when passing through narrow areas and when visitors are crowded. As well as being a determinant of the width of the open section on the plate support so that the size is appropriate.

4.2 Secondary Aspects

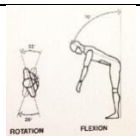
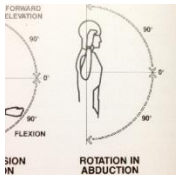
The ergonomics aspect is the area of discussion about user comfort, the right size of product, grip, and tangent to the appropriate form so as not to cause fatigue in the body (achy). Prioritizing the comfort and safety of its users.

Table 4.3 Product Analysis Based on Ergonomic Aspects

No.	Analysis	Ergonomi
1.	 1-2cm 3-4cm 5-6cm	-Maximum strength of a grip for adult men 3-4 cm in diameter. - For full grip and support the recommended weight is 38mm

The grip or handle size used has a diameter of 3 to 4 cm to provide maximum strength in carrying food carrying loads. Based on interviews and Indonesian male percentiles are generally closer to 3 to mid, so they are comfortable to use. In addition to the security when holding the grip must be textured to produce more tight friction or with material handling.

Table 4.4 Product Analysis Measured by Biomechanic Aspects

No.	Analysis	Biomechanic
1.		- Posture bends, spinning can occur while serving customers
2.		-In this position, normally can lift weights 20-25 kg (area between chest and knees)
3.		- To carry a tray that does not have a handle - Loads of weight on the arm muscles

In the operation of stacked shelf products, a number of body attitudes can be performed by the user as above. For the food distribution section can be described in numbers 2 and 3.

4.3 Tertiery Aspects

Based on the function aspects with parameters that are easy to carry in the terraced area, it can contain a large quantity (package family in Rasa-Rasa), maintained food quality during food distribution, is easily stored, then the table is made as follows as an assessment.

Table 4.5 Product Analysis Based on Function Aspects

No.	Analysis	Function
1.		-Bring a lot of food - Easy to carry in terraces - Easy to carry in narrow areas and crowded - Simple maintenance
2.		- Simple maintenance - Easy storage

		- No food safety
3.		- Safe from slipping during food distribution - Safe from contamination of surrounding conditions, splashes, etc. (hygiene)

Products that are designed to meet the functional requirements can be carried in the terraces area, and can bring a large amount of food to reduce the user's burden (back and forth), making it more effective at work.

Tabel 4.6 Product Analysis Measured by Condition Aspects

No.	Analysis	Condition
1.		- Used in large areas and has contours of terraced land - Consists of stairs with various sizes and shapes
2.		- Outdoor use - Can withstand heat and rain - Waterproof, as part of treatment

4.4 *Term of Reference* (TOR)

4.4.1 Design Considerations

1. Alternative forms with more closed products as consideration for more hygienic food
2. Adjusted with consideration of male servant users with 50 percentiles
3. Recommended dimensions do not exceed 45 cm x 35 cm x 60 cm
4. Has a 3-4cm diameter handle
5. Can be carried one hand
6. Can bring wet and dry types of food at once
7. Has a security on each plate

4.4.2 Design Goals

1. To simplify the family package food distribution process at D'Dieuland Rasa-Rasa stand
2. Increase safety from slipping and safety from contamination during food distribution
3. Relieve the work of the waiter in serving visitors in a large area and terraces by increasing user comfort

5. Conclusion

Based on the results of the research and observations, the utensils used by the Rasa Rasa stand in the D'Dieuland area were less closed so that they could easily be contaminated with air. In addition, with a flat shape that has a way of carrying it must have a high balance so as not to slip, because it does not have a special safety on each plate. As well as areas with outdoor, broad, and terraced features are a challenge for servants.

So the designer will change the shape of the tray by considering how to carry it, food safety by adding safety and covers. It is intended that the food does not slip easily, and becomes an effort to avoid dirt during the distribution process from the kitchen to the eating place. The designer takes into account the size according to user needs such as the size of the hand, the distance between foods, the size of the product to be comfortable to wear.

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