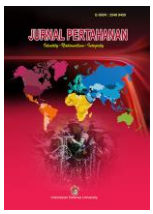
Jurnal Pertahanan

Media Informasi tentang Kajian dan Strategi Pertahanan
yang Mengedepankan *Identity*, *Nationalism* dan *Integrity*
e-ISSN: 2549-9459
http://jurnal.idu.ac.id/index.php/DefenseJournal



THE USE OF THE KANSEI ENGINEERING METHOD IN THE DESIGN OF THE MULTIVARIANCE MOUNT WEAPON WIRELESS CONTROL SYSTEM

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Article Info

Article history:
Received : October 12, 2022
Revised : November 17, 2022
Accepted : December 21, 2022

Keywords:
Indonesian Navy (TNI AL),
Kansei Engineering,
Multivariance,
Mount Weapon,
Wireless Control System

Abstract

The Frogman Forces Command or Kopaska (*Komando Pasukan Katak*) is one of the special forces owned by the Indonesian Navy (TNI AL). Kopaska unit often carries out covert operations such as Amphibious Operations, Special Operations, and other supports to expedite Indonesian Navy operations. To support the implementation of these tasks, the Kopaska unit needs to be equipped with special equipment to carry out operational tasks. Currently, the Kopaska unit does not yet have a weapon mount that can be controlled remotely. This study proposes a multivariance weapon wireless system control that is designed to be used remotely by using a mobile application through the internet. A Multivariance Mount Weapon Wireless System Control was designed using the Kansei Engineering method to provide alternative tools to support Kopaska tasks more effectively and efficiently and be able to minimize material and personnel losses. The average value of the level of user satisfaction with the tool design has reached a fairly good position, namely 3.17 from the initial value of 1.36 (scale 1 to 4), so this new product is ready as an alternative to be produced.

DOI:
http://dx.doi.org/10.33172/jp.v8i3.1850

INTRODUCTION

Following Law of the Republic of Indonesia Number 34 of 2004 Concerning the Indonesian National Army, the Indonesian Navy (TNI AL or *Tentara Nasional Indonesia*) is a force defending the Republic of Indonesia's seas. The Indonesian Navy performs maritime duties in the defense sector, upholds the law, and maintains security in the marine area of national jurisdiction by national law and ratified law. The Indonesian Navy is also tasked with carrying out the development and development of strength of the marine dimension. This task is challenging for the Indonesian Navy because it has to maintain the security of the sea area, which is 2/3 of the territory of the Republic of Indonesia.

As the core strength of the Indonesian Navy (TNI AL) in the context of carrying out security defenses at sea, Integrated Fleet Weapon System or SSAT (*Sistem Senjata Armada Terpadu*) is required to be able to face various threats and enemy disturbances at sea both from the surface and below the surface as well as threats that require a projection of power to land by the sea. The development of SSAT is prioritized on the modernization of defense equipment and must have reliable preparedness to support the main task of the Indonesian Navy in maintaining the territorial integrity of the Unitary State of the Republic of Indonesian or NKRI (*Negara Kesatuan Republik Indonesia*) at sea.

The Kopaska unit must be able to support the tactical and technical capabilities that the Indonesian Navy requires. In carrying out its duties, the Kopaska unit must be supported by adequate capabilities, skills, and equipment that can support the tasks it carries. The tasks of the Kopaska unit are carrying out special operations involving:

1. Sabotage/Anti-sabotage (terror).
2. Clandestine (subversive activity or movement, also known as underground movement).
3. Disaster management or SAR (Search and Rescue).
4. Mine Clearance Operations.
5. Send and Pick up Agent (spies)
6. Infiltration into the opponent's defense through sea, land, and air.

The Kopaska unit is equipped with several particular types of equipment to support their duties. During the preliminary research through observations and direct interviews with several Kopaska unit personnel obtained several complaints and obstacles in carrying out special operations tasks, including:

1. The absence of weapons that can be controlled remotely to improve personnel safety.
2. The opening of the shooting space for the enemy on the large-caliber gun crew in tactical vehicles.
3. Good communication was not established when observing and reconnaissance because they still used conventional methods, namely monitoring by radio communication which risked being discovered by the enemy.

One of the tools expected to answer these complaints is the Mount Weapon Wireless System Control when conducting surveillance or infiltrating enemy areas. Multivariance Mount Weapon Wireless System Control is essential for the Kopaska unit because it can provide a sense of comfort and safety when carrying out operations. After all, the position will not be known by the enemy. This position is helpful for planning and preparing attack patterns and operational plans to be carried out.

Small arms are weapons that can be used by one or two people and carried by a person. According to the United Nations Group of Government Experts in 1997, small arms are designed for single-person use. According to the United Nations Assembly Document No. A/52/298 issued on August 27, 1997, small arms are specially made to military specifications and designed for individual use. They are different from heavy weapons that require

several people to operate and maintain them (Hirawan, 2016).

The Indonesian Armed Forces soldiers (*Tentara Nasional Indonesia* or TNI) use SS-1 and SS-2, which are small arms and individual weapons, with various variants. This weapon is a domestic product made by PT. Pindad or Indonesian Army Industries Ltd (*Perindustrian Tentara Nasional Indonesia-Angkatan Darat*) is a manufacturer of weapons, ammunition, and other defense needs. SS-1 and SS-2 has not equipped with a remote control system yet.

The development of weapon systems globally has grown from previously only using makeshift tools until now, which have used a remote-controlled control system. Every country will look for the latest technology to be used in its own country. At present, remote control of tools is only in large caliber weapons. Based on this information, there is an opportunity to develop automatic controls for individual weapons or small-caliber weapons. This study will name the weapons as Multivariance Mount Weapon Wireless System Control. This additional equipment is controlled by using an android mobile phone. The whole process of control and firing is carried out using an android mobile phone.

This small caliber weapon support equipment is designed to be completely based on the evaluation results of similar tools that are already on the market and the collection of consumer desires (Voice of Customer). The ergonomic factor of this product is a crucial part, both in terms of user comfort and safety, where everyone has a different feeling of comfort and security. This comfortable and safe condition must be built based on the perspective of everyone who is directly related so that the role of the Multivariance Mount Weapon Wireless System Control can fully support every operation carried out by the TNI, especially the Kopaska unit.

Figure 1. SS-1 variants by PT. Pindad
Source: Hirawan, 2016

Figure 2. SS-2 variants by PT. Pindad
Source: Hirawan, 2016

Figure 3. Remote controls weapons variants
Source: Foss, 2016

Figure 4. Remote controls weapons variants
Source: Sharma, 2017

Remote control in gun turret using wireless communication system used to move the turret within long-range distance. An operator can explore the environment with a camera attached to a gun turret. The previous studies designed a gun turret that can be driven automatically from a remote distance (Sivanath, Muralikrishman, Thothadri, & Raja, 2012) and some of them use the camera to monitor the surrounding environment (Bisewski & Atrey, 2011). Another study also builds a turret weapon that uses a PID (Proportional – Integral - Derivative) controller to control the gun turret when tracking objects (Kuswadi, Tamara, & Wicaksono, 2017). Those studies have limitation that the turret cannot be attached to individual weapons or small-caliber weapons.

This study proposes a multivariance weapon wireless system control that designed to be used remotely by using the mobile application through internet. This study uses Kansei engineering to understand the consumer's needs and desires (Lokman, 2010). The Kansei Engineering method is used for translates the user's feelings into its design.

METHODS

Kansei Engineering is defined as a methodology for translating human psychological processes to an existing product or a new design concept (Schutte, 2002). Another definition of Kansei Engineering is a type of technology that translates customer feelings into design specifications (Nagamachi & Lokman, 2010). Kansei engineering method is already used in the diverse field such as manufacturing (Widodo & Novibrilliawan, 2018; Wu, Cheng, & Kang, 2016), robotic (Zhu, Wang, & Zhang, 2015), education (Hadiana, 2015; 2016), and IT Product (Hadiana, 2017). This study uses the Kansei Engineering Method due to its simplicity and wide use in many product developments (Lokman, 2009; Nagamachi & Lokman, 2010; 2015). Kansei Engineering has several types of problem-solving in different ways from each the type. The following are the types of Kansei Engineering (Schutte,2002):

1. Kansei Engineering Type-I Category Classification.
2. Kansei Engineering Type-II Kansei Engineering System (KES).
3. Kansei Engineering Type-III Hybrid Kansei Engineering System.
4. Kansei Engineering Type-IV Kansei Engineering Modeling.
5. Kansei Engineering Type-V Virtual Kansei Engineering.
6. Kansei Engineering Type-VI Collaborative Kansei Engineering Designing.

In this study, the Kansei Engineering Type-I Category Classification was used, which was translated into several stages, namely:

1. Mount weapon initial conditions.
2. Determination of Design Elements.
3. Identify Kansei words.
4. Making an Example.
5. Data/Trial Processing.
6. Technical response.
7. Making Design Prototypes.

In the data collection process, data collection from users is done using the questionnaire method. Questionnaires were distributed to 150 Kopaska's unit soldiers who served in Kopaska Koarmada II (2nd Naval Indonesian Fleet) Surabaya. The data collected in the previous stage is then processed both qualitatively and quantitatively. There are two stages of the process in quantitative data processing, the results of the questionnaire. The first is testing the adequacy of the data carried out in determining the above sample. Then the second stage is testing the validity and reliability of the questionnaire data.

It is explained how a product is planned and designed by translating the user's feelings. This have to be done so that the product produced could fit to the user's wants and needs.

RESULT AND DISCUSSION

Mount Weapon Initial Conditions (1st Kansei Step)

The first step of this study was observed the activity of the soldiers when using Mount Weapons. Activities that are usually carried out by soldiers who using Mount Weapons are safeguarding vital objects, security using tactical combat vehicles, sniper training, etc.

Figure 5. Safeguarding Vital Objects
Source: Ireng, 2010

Determination of Design Elements (2nd Kansei Step)

In a product, some parts are a core part of the product. The core part is called the design element. Design elements help know the main functions of a product, where the product's manufacturing will be carried out on the design elements found on the current Mount Weapon. Design elements were obtained from direct interviews (focus group) with 150 soldiers of Kopaska's unit who have served in Kopaska unit for more than five years.

Table 1. Design Elements of Mount Weapon Wireless System Control

No.	Element Design
1.	Models and Materials
2.	Security
3.	Ease of Use
4.	Strength/Endurance

Source: Processed by the Authors, 2022

The explanation of the design elements are:

1. Model and Material: the shape and material criteria of the Mount Weapon.
2. Security: the level of security of personnel in using Mount Weapons.
3. Ease of Use: the level of ease of use of Mount Weapons.
4. Strength/Resistance: the level of strength/resistance that is not easily damaged in operation.

Figure 6. Security with a tactical combat vehicle
Source: Dunia Militer, n.d.

Figure 7. Sniper training
Source: Ziyadi, 2016

Identity Kansei words (3rd Kansei Step)

Kansei's words were obtained from the results of a survey conducted on Kopaska's unit soldiers who had served in the Kopaska unit for more than five years using in-person interviews. Kansei words make it easier to get information about the user's (Kansei) feeling about the operation. Based on data obtained from interviews with research objects, the initial Kansei words obtained are as follows:

Table 2. Kansei's words

No.	Kansei Words
1.	Troop morale decreased
2.	Fatalities
3.	The reaction is not fast enough
4.	No/lack of proper functioning of the weapon

Source: Processed by the Authors, 2022

The explanation for Kansei Words:

1. Because the risk that can arise in an operation is relatively high, the troops' morale can decrease when carrying out the operation.
2. The incidence of casualties in operations sometimes can occur and must be suppressed as low as possible.
3. The action is less rapid in operation because of the high risk that will be faced.
4. No/lack of proper functioning of weapons in operation due to tool damage.

Making an Example (4th Kansei Step)

An example is changing the negative words from the Kansei words to the simpler positive words or to the variables/attributes related to the Kansei words, which are then defined.

Table 3. Influential variables

No.	Variables
1.	Decreased troop morale = Convenience
2.	Casualties = Security
3.	Less fast reaction = Speed
4.	Lack of functioning weapon = Strength

Source: Processed by the Authors, 2022

These variables have different meanings. The definitions of the variables above are as follows:

1. Convenience. Convenience in operating the weapon system is expected therefore the troops will get a more comfortable feeling.
2. Security. Casualties in operation can sometimes occur and must be suppressed as low as possible.
3. Speed is how quick reactions can be done in the face of any development situation in operation.
4. Strength. The design of the product is expected not to be easily damaged and has reliable resistance.

In making an example as the fourth Kansei Step, there are some steps that should be done:

1. Questionnaire Data Collection
   Data collection from users is done using the questionnaire method. Questionnaires were distributed to 150 Kopaska's unit soldiers who served in Kopaska Koarmada II (2nd Naval Indonesian Fleet) Surabaya. The questions on the questionnaire include:
   - Convenience. The convenience of using the Mount Weapon so that it is hoped that in the implementation of the operation there will be no decrease in the morale of the troops, the use of these products provides a more comfortable feeling
   - Security. In every operation, the incidence of casualties must be kept to a minimum.
   - Speed. How fast the product can react to anticipate any developments in operating conditions.
   - Strength. Product function resistance in every operation.
2. Determination of Sample Adequacy
   Determination of sample adequacy is carried out to determine how many samples/data are required in a study. The amount of data obtained will qualify if it is greater than or equal to the amount of data that should be obtained or N.≥N '. An example of the calculation is as follows, for the assessment of the level of satisfaction from the results of the questionnaire obtained data, the average value = 1.43, Z = 1.645, standard deviation = 0.5, and k = 0.05, so:

$$N' = \left[\frac{1.645 \; x \; 0.50}{1.43 \; x \; 0.05}\right]^2$$

$$= 132.25 \approx 133$$

Because N (150) > N '(133), the convenience variable data is stated as Enough Data. For other variables, either the same formula carries out the level of satisfaction or importance.

Table 4. Data adequacy test on the actual satisfaction level of the questionnaire

No.	Variables	N	N'	Conclusion
1	Convenience	150	133	**Enough data**
2	Security	150	142	**Enough data**
3	Speed	150	141	**Enough data**
4	Strength	150	141	**Enough data**

Source: Processed by the Authors, 2022

Table 5. Data adequacy test of the actual interest level of the questionnaire

No.	Variables	N	N'	Conclusion
1	Convenience	150	34	**Enough data**
2	Security	150	36	**Enough data**
3	Speed	150	31	**Enough data**
4	Strength	150	33	**Enough data**

Source: Processed by the Authors, 2022

The results of the recap of additional questions to respondents who filled out the questionnaire are presented in a pie chart, and an overview of the calculations is as follows:

a. Length of Respondent's Service

Table 6. Length of Respondent's Service

0 to 5 Years	5 to 10 Years	10 to 15 Years
24	76	50

Source: Processed by the Authors, 2022

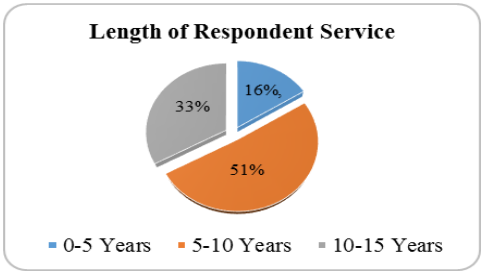

Figure 8. Graph of Length Respondent's Service
Source: Processed by the Authors, 2022

According to the data of respondents who have filled out the questionnaire, it can be seen that most respondents who were sampled had served for 5 to 10 years as much as 51%, 10 to 15 years as much as 33%, and 0 to 5 years as much as 16%. It can be concluded that the user has a long service experience as a Kopaska soldier.

b. Respondent Rank

Table 7. Rank of respondents

Commissioned Officer	Non Commissioned Officers (NCO)	Enlisted
30	52	68

Source: Processed by the Authors, 2022

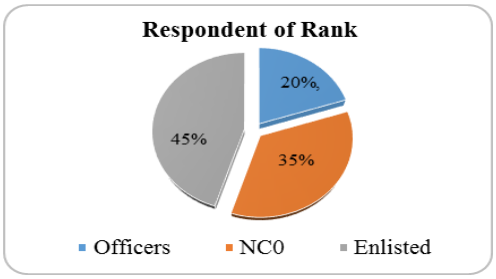

Figure 9. Graph of Respondents' Rank
Source: Processed by the Authors, 2022

From the 150 respondents, 20% were officers who served in Kopaska, 35% were Non-Commissioned Officers (NCOs), and 45% were enlisted officers.

c. Product Creation is Necessary or Not

Table 8. Whether manufacturing is necessary or not

Need	No Need
150	0

Source: Processed by the Authors, 2022

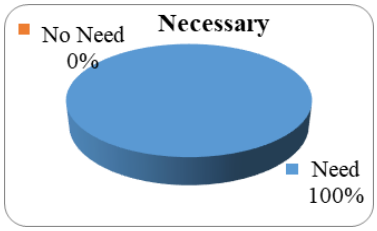

Figure 10. Graphics whether it is necessary to make or not
Source: Processed by the Authors, 2022

With the existing problems with Mount Weapon, 100% of respondents stated that it is necessary to manufacture these products to support operations.

3. Interpretation of Questionnaire Data
From the data collection results, data interpretation was carried out to get things related to the needs of the actors. The questionnaire shows the average level of satisfaction and interest of the perpetrators in the mechanism for using Mount Weapon. The average can be summarized in the Table 9.

Table 9. The average level of satisfaction and level of importance

Variable	Convenience (X_1)	Security (X_2)	Speed (X_3)	Strength (X_4)
Satisfaction	1.43	1.30	1.36	1.33
Importance	3.23	3.33	3.17	3.13
GAP	-1.80	-2.03	-1.81	-1.80

Source: Processed by the Authors, 2022

Figure 11. Gap graph of satisfaction level and importance level
Source: Processed by the Authors, 2022

From the data on the level of satisfaction and the importance level, it is known that there is a gap in Figure 11, the highest gap is the security (X_2), this shows that the level of security importance for operating needs is very high so that a product with a very high level of security is needed. While the lowest gap is comfort (X_1) and strength (X_4).

4. Determination of Order of Interest
Shows how much the importance level of each attribute for the user can be seen in Table 10.

Table 10. Average Value of Attribute Importance

Respondent	Variable			
	Convenience	Security	Speed	Strength
Average	3.23	3.33	3.17	3.13
Order of Importance	2	1	3	4

Source: Processed by the Authors, 2022

From the Table 10, it can be seen that the first level of importance is the safety factor, the second is the comfort factor, the third is the speed factor, and the fourth is the strength factor.

Data/Trial Processing (5th Kansei Step)

The data collected in the previous stage is then processed both qualitatively and quantitatively. There are two stages of the process in quantitative data processing, the results of the questionnaire. The first is testing the adequacy of the data carried out in determining the above sample. Then the second stage is testing the validity and reliability of the questionnaire data.

1. Testing Questionnaire Data
The data from the questionnaire will be tested using two tests: the validity test and the reliability test.
   a. Validity Test
   The validity test helps measure whether the questionnaire is s table, and accurate and whether the elements are homogeneous. If the validity obtained is higher, the test will target and show what should be displayed. The calculations use SPSS with the following steps:
      1) Entering questionnaire data, be it the level of importance questionnaire or the level of satisfaction and total score.
      2) Analyze→correlative→bivariate.
      3) Then enter all the variables and click OK.

If $r_{count} > r_{table}$, then the variable is valid. With the value of r_{table} = 0.159, if there is an invalid variable, then the variable is discarded. The data recap can be seen in the Table 11 until Table 13.

Table 11. Level Validity Test Results The satisfaction of 150 Respondents

Correlations

		Convenience	Security	Speed	Strength	Total Score
Convenience	PC	1	,143	,061	,204*	,654**
	Sign.		,080	,456	,012	,000
	N	150	150	150	149	150
Security	PC	,143	1	,126	-,025	,587**
	Sign.	,080		,123	,765	,000
	N	150	150	150	149	150
Speed	PC	,061	,126	1	,061	,493**
	Sign.	,456	,123		,456	,000
	N	150	150	150	149	150
Strength	PC	,204*	-,025	,061	1	,494**
	Sign.	,012	,765	,456		,000
	N	149	149	149	149	149
Total Score	PC	,654**	,587**	,493**	,494**	1
	Sign.	,000	,000	,000	,000	
	N	150	150	150	149	150

PC: Pearson Correlation
Sign.: Significant
*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
Source: Processed by the Authors, 2022

Table 12. Level Validity Test Results:150 Respondents' Interest

		Convenience	Security	Speed	Strength	Total Score
Convenience	PC	1	,294**	,207*	,034	,645**
	Sign.		,000	,011	,684	,000
	N	150	150	150	150	150
Security	PC	,294**	1	,308**	,116	,698**
	Sign.	,000		,000	,157	,000
	N	150	150	150	150	150
Speed	PC	,207*	,308**	1	,081	,644**
	Sign.	,011	,000		,323	,000
	N	150	150	150	150	150
Strength	PC	,034	,116	,081	1	,477**
	Sign.	,684	,157	,323		,000
	N	150	150	150	150	150
Total Score	PC	,645**	,698**	,644**	,477**	1
	Sign.	,000	,000	,000	,000	
	N	150	150	150	150	150

PC: Pearson Correlation
Sign.: Significant
*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
Source: Processed by the Authors, 2022

Table 13. Recap of The Actual Questionnaire Validity Test

No	Variable	Questionnaire Level				Conclusion
		Satisfaction		Importance		
		r_{table}	r_{count}	r_{table}	r_{count}	
1	Convenience	0.159	0.494	0.159	0.477	**Valid**
2	Security	0.159	0.493	0.159	0.644	**Valid**
3	Speed	0.159	0.587	0.159	0.698	**Valid**
4	Strength	0.159	0.654	0.159	0.645	**Valid**

Source: Processed by the Authors, 2022

From the table above, all variables are valid and have met the validity test.

b. Reliability Test

A reliability test is used to see the level of consistency of the respondents with existing variables so that the data obtained will tend to give the same results (consistent). The SPSS software was used to run this test, and the following procedures were followed:

1) Enter attribute data into the SPSS software, only for valid variables.
2) Click → analyze → scale → reliability → analysis → enter all variables → OK.
3) If alpha > $r_{table,}$ then it is reliable.

After performing the steps above, the SPSS software will produce the output below:

1) Level of Satisfaction

Table 14. Reliability Test Results at the Satisfaction Level

Case Processing Summary

		N	%
Cases	Valid	150	100,0
	Excluded	0	,0
	Total	150	100,0

Reliability Statistics

Cronbach's Alpha	N of Items
,460	4

Source: Processed by the Authors, 2022

2) Level of Importance

Table 15. Reliability Test Results at the Level of Important

Case Processing Summary

		N	%
Cases	Valid	149	99,3
	Excluded	1	,7
	Total	150	100,0

Reliability Statistics

Cronbach's Alpha	N of Items
,299	4

Source: Processed by the Authors, 2022

Conclusion:

1. The level of satisfaction, Cronbach's alpha value is **0.460**
2. The level of importance, the value of Cronbach's alpha is **0.299**

The value of the r_{table} = **0.159** because the value of Cronbach's alpha is greater than the value of the r_{table}, it can be concluded that the data is **Reliable**.

Technical Response (6th Kansei Step)

Of all the variables contained in the questionnaire, a technical response was carried out to the needs of each of these variables. The technical response aims to meet the needs of the Kopaska unit soldiers. Through an observational study/survey, the technical response for each variable was obtained as can be seen in Table 16.

Table 16. Response to technical attributes

No.	Variable	Technical Response
1	Convenience	The operation of the weapon system is more comfortable
2	Security	In the operation of the weapon system is safer
3	Speed	The speed of the product in anticipation of the development of the operating field situation
4	Strength	The weapon system has resilience in operation

Source: Processed by the Authors, 2022

Making Design Prototypes (7th Kansei Step)

Following the respondent's assessment and selection of the alternative material, it is recommended that the chosen mount weapon material design in the comfort, safety, speed, and strength variables be iron but not too heavy and equipped with a steel cover. After obtaining several respondents from extracting information, the Multivariance Mount Weapon Wireless System Control product was created. The shape of the Mount Weapon is adjusted to the existing conditions so that the prototype appears as can be seen in Figure 12 and Figure 13.

Figure 12. Prototype Mount Weapon Design*Source:* Processed by the Authors, 2022

Figure 13. The prototype of Mount Weapon, Weapon, and Telescope Design
Source: Processed by the Authors, 2022

1. Prototype Testing
   After the user sees the new product prototype, the product is tested to compare it with the manual Mount Weapon and gets suggestions and criticism for developing the prototype into the final product. This step was carried out by using questionnaire according to the next following tables.

Table 17. Satisfaction Level Questionnaire for the New Design

No	Variable	Satisfaction with the New Design			
		1 Not Satisfied	2 Quite Satisfied	3 Satisfied	4 Very Satisfied
1	Convenience				
2	Security				
3	Speed				
4	Strength				

Source: Processed by the Authors, 2022

Table 18. Results of Satisfaction Level Validity Test on the New Design

Correlations						
		Convenience	**Security**	**Speed**	**Strength**	**Total Score**
Convenience	PC	1	,193*	,095	,196*	,676**
	Sign.		,018	,247	,017	,000
	N	150	150	150	149	150
Security	PC	,193*	1	,162*	-,033	,620**
	Sign.	,018		,048	,692	,000
	N	150	150	150	149	150
Speed	PC	,095	,162*	1	-,009	,494**
	Sign.	,247	,048		,916	,000
	N	150	150	150	149	150
Strength	PC	,196*	-,033	-,009	1	,451**
	Sign.	,017	,692	,916		,000
	N	149	149	149	149	149
Total Score	PC	,676**	,620**	,494**	,451**	1
	Sign.	,000	,000	,000	,000	
	N	150	150	150	149	150

PC: Pearson Correlation
Sign.: Significant
*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
Source: Processed by the Authors, 2022

Table 19. Recap of Questionnaire Validity Test Results Against New Designs

No	**Variable**	**Questionnaire Level**		**Conclusion**
		Satisfaction		
		r_{table}	r_{count}	
1	Convenience	0.159	0.451	**Valid**
2	Security	0.159	0.494	**Valid**
3	Speed	0.159	0.620	**Valid**
4	Strength	0.159	0.676	**Valid**

Source: Processed by the Authors, 2022

Table 20. Results of the Satisfaction Level Questionnaire for the New Design

No	**Variable**	**Satisfaction Average**	
		Manual	**By Product**
1	Convenience	1.33	3.10
2	Security	1.37	3.14
3	Speed	1.30	3.28
4	Strength	1.43	3.16
	Total Average	**1.36**	**3.17**

Source: Processed by the Authors, 2022

Some of the tables above show some performance improvements. In the questionnaire, there were also some suggestions and criticisms from the respondents regarding the prototype so that later it could be used as input

for further development. Some of the recommendations and criticisms summarized in this questionnaire are as follows:

a. The control system used to control weapons from a distance must be compatible
b. Android phones used for control and shooting must be wholly connected to the weapon and cannot be hacked
c. Ergonomic factors in this product must be prioritized in terms of user comfort and safety.

2. Finalizing the Design
The results of this design, it is made in the form following the suggestions and criticisms in the previous questionnaire in the forms in Figure 14 until Figure 17.

Figure 14. Mount Weapons and SS-1 PT. Pindad Weapons
Source: Processed by the Authors, 2022

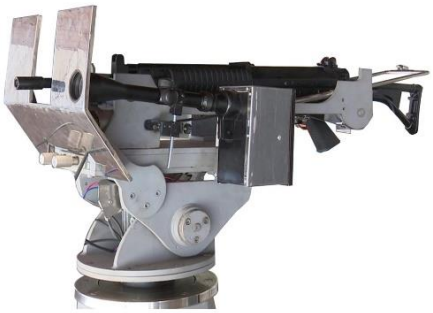

Figure 15. Mount Weapon, SS-1 PT. Pindad Weapon and Telescope
Source: Processed by the Authors, 2022

Figure 16. Mount Weapons with M-16 Weapons
Source: Processed by the Authors, 2022

Figure 17. Mount Weapon with AK-47 Weapon
Source: Processed by the Authors, 2022

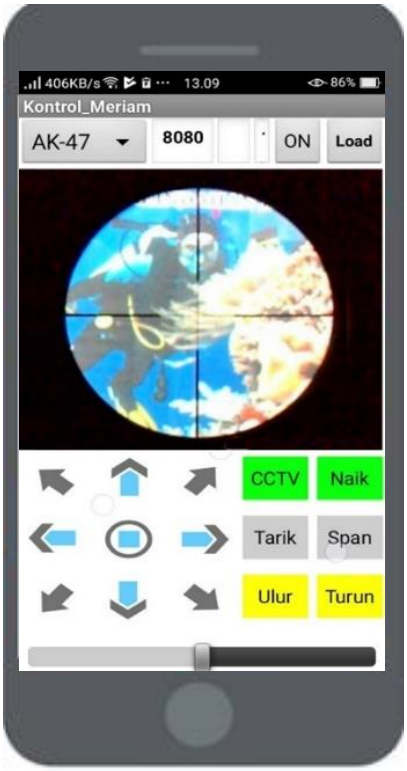

Figure 18. Display on Mobile Phone Control
Source: Processed by the Authors, 2022

Figure 19. How the whole system works
Source: Processed by the Authors, 2022

The Whole System Works

Figure 19 shows how the implementation of the Kansei Engineering steps, and how the whole system works. From this way of working, the research aims to provide an alternative weapon to support Kopaska tasks more effectively and efficiently and be able to minimize material and personnel losses that can be realized.

CONCLUSIONS, RECOMMENDATION, AND LIMITATION

Based on the results of the study, it can be concluded that the design of this Multivarian Mount Weapon Wireless System Control product is indispensable to supporting the Operations of the Kopaska unit in security activities and warfare. In the experiments that have been carried out, it was found that with the help of this Multivarian Mount Weapon Wireless System Control product, the security of the Kopaska unit will be more guaranteed when aiming at targets or firing weapons. Also, when controlling weapons is more comfortable and less draining, and less mental. The fighting morale of the Kopaska unit will be maintained. The average value of the level of user satisfaction with the Multivariance Mount Weapon Wireless System Control design, so that this new product is ready as an alternative to be produced.

There are several suggestions for future research. To obtain more optimal product design results, it is necessary to collect data on other units so that it will further increase the accuracy of decision-making. It is necessary to conduct experiments using weapons of a larger caliber to obtain product design results that are more in line with the hopes and desires of various units. It is necessary to do intensive training on using and controlling the Multivarian Mount Weapon Wireless System Control

product to obtain optimal results and accuracy.

The object of this study was personnel from the Surabaya Koarmada II Kopaska unit with the average value of user satisfaction reaching a fairly good position, namely 3.17. These results will not always be the same if tested on other units. It can be higher but it can also be lower.

ACKNOWLEDGEMENTS

The authors greatly acknowledge the support from the Department of Physic, Faculty of Science and Technology, Airlangga University, Surabaya, Indonesia, for providing the necessary resources to carry out this research work and the reviewers and journal editorial board for their many insightful comments, which have significantly improved this article.

REFERENCES

Bisewski, R., & Atrey, P. K. (2011). Toward a Remote-Controlled Weapon-Equipped Camera Surveillance System. *International Conference on Tools with Artificial Intelligence*. Boca Raton: IEEE Xplore. https://doi.org/10.1109/ictai.2011.185

Dunia Militer. (n.d.). Kendaraan Taktis Militer Indonesia. Retrieved November 20, 2022, from http://perkembanganmiliter.blogspot.com/2012/06/kendaraan-taktis-militer-indonesia.html

Foss, C. F. (2016, June 17). Eurosatory 2016: KMW Launches New FLW500 Weapon Station. Retrieved October 25, 2022, from https://thaimilitaryandasianregion.wordpress.com/2016/06/18/eurosatory-2016-kmw-launches-new-flw500-weapon-station/

Hadiana, A. (2015). Web Based E-Learning System Analysis Using Kansei Engineering. *3rd International Conference on Information and Communication Technology*. Bali: IEEE Xplore. https://doi.org/10.1109/icoict.2015.7231485

Hadiana, A. (2016). Kansei Analysis of Interface's Elements for Mobile Commerce Application. *4th International Conference on Information and Communication Technology*. Bandung: IEEE Xplore. https://doi.org/10.1109/icoict.2016.7571895

Hadiana, A. (2017). Kansei Based Interface Design Analysis of Open Source E-Learning System for High Education. *International Conference on Computer, Control, Informatics and Its Applications: Recent Progress in Computer, Control, and Informatics for Data Science*. Tangerang: IEEE Xplore. https://doi.org/10.1109/ic3ina.2016.7863029

Hirawan, N. (2016). *Advanced Military Weapons Made in Indonesia Worldwide, Indonesia Interesting*.

Ireng, E. (2010). *Indonesian Navy Frog Troop Command Sniper Team (Kopaska): Photo between*.

Kuswadi, S., Tamara, M. N., & Wicaksono, D. N. H. (2017). Gun Turret Automatic Weapon Control System Design and Realization. *International Symposium on Electronics and Smart Devices*. Bandung: IEEE Xplore. https://doi.org/10.1109/isesd.2016.7886687

Law of the Republic of Indonesia Number 34 of 2004 concerning the Indonesian National Army. , Pub. L. No. Pasal 2 dan Pasal 5.

Lokman, A. M. (2010). Design & Emotion: The Kansei Engineering Methodology. *Malaysian Journal of Computing*, *1*(1), 1–14.

Lokman, A. M. (2009). *Emotional User Experience in Web Design: The Kansei Engineering Approach*. Universiti Teknologi Mara,

Malaysia.

Nagamachi, M., & Lokman, A. M. (2010). Innovations of Kansei Engineering. In *Innovations of Kansei Engineering*. Florida: Taylor & Francis. https://doi.org/10.1201/ebk1439818664

Nagamachi, M., & Lokman, A. M. (2015). *Kansei Innovation: Practical Design Applications for Product and Service Development*. Florida: Taylor & Francis.

Sharma, S. (2017, December 7). Strong and Steady Progress in India-Israel Relations. Retrieved October 31, 2022, from https://www.bharatdefencekavach.com/news/dr_do/strong-and-steady-progress-in-india-israel-relations/61268.html

Sivanath, S. K., Muralikrishman, S. A., Thothadri, P., & Raja, V. (2012). Eyeball and Blink Controlled Firing System for Military Tank using Labview. *International Conference on Intelligent Human Computer Interaction*. Kharagpur: IEEE Xplore.

Widodo, I. D., & Novibrilliawan, H. Z. (2018). Wristwatch Development Based On Kansei Engineering. *5th International Conference on Industrial Engineering and Applications, ICIEA 2018*. Singapore: IEEE Xplore. https://doi.org/10.1109/iea.2018.8387140

Wu, Y., Cheng, J., & Kang, X. (2016). Research on The Functional Relation Between Kansei Evaluation and Smart Watch. *8th International Symposium on Computational Intelligence and Design, 1*. Hangzhou: IEEE Xplore. https://doi.org/10.1109/iscid.2015.238

Zhu, Y., Wang, T., & Zhang, H. (2015). Form Design of Home Service Robot Based On Kansei Engineering. *International Conference on Cyber Technology in Automation, Control, and Intelligent Systems*. Shenyang: IEEE Xplore. https://doi.org/10.1109/cyber.2015.7288233

Ziyadi, A. (2016, September 5). Ragam Senapan Runduk TNI, dari Buatan Pindad sampai Afrika. Retrieved from https://militermeter.com/ragam-senapan-runduk-tni-dari-buatan-pindad-sampai-afrika/