

Leveraging the Kano Model to Identify Key User Needs for RIOT:ID Application

Jay Idoan Sihotang

Fakultas Teknologi Informasi, Universitas Advent Indonesia
e-mail: jay.sihotang@unai.edu

Abstract

User needs for applications considering rapid technological advancements present unique challenges. In this context, the KANO method is employed to provide an overview of the required features and to depict user perception of needs and satisfaction levels. The application designed for the RIOT Indonesia running community offers 10 attributes/features: Attractive UI, Easy to Use, Informative, Data Security, App Performance, Notification Feature, Attendance Feature, Gamification Feature, Strava Integration, and Calendar of Activities. The distributed questionnaire is expected to yield results that map out each feature. In conclusion, this study successfully captured respondents' perceptions of feature requirements for the RIOT:ID application. Responses from participants helped categorize each feature, revealing that Data Security is a high-importance, One-dimensional feature, although it has a lower impact on satisfaction. Seven features, including Attractive UI, Ease of Use, and Strava Integration, fall under the Attractive category, indicating their significance and potential to enhance satisfaction. Conversely, Notification and Gamification features have minimal influence on user satisfaction.

Keywords: *Application Needs, Feature Mapping, Kano Model, Running Community*

Pemanfaatan Model Kano Dalam Mengidentifikasi Kebutuhan Utama Pengguna pada Aplikasi RIOT:ID

Abstrak

Kebutuhan pengguna terhadap aplikasi mengingat perkembangan teknologi yang pesat menghadirkan tantangan yang unik. Dalam konteks ini, metode KANO digunakan untuk memberikan gambaran mengenai fitur yang dibutuhkan dan untuk menggambarkan persepsi pengguna terhadap kebutuhan dan tingkat kepuasan. Aplikasi yang dirancang untuk komunitas lari RIOT Indonesia menawarkan 10 atribut/fitur: Antarmuka yang Menarik, Mudah Digunakan, Informatif, Keamanan Data, Kinerja Aplikasi, Fitur Notifikasi, Fitur Kehadiran, Fitur Gamifikasi, Integrasi Strava, dan Kalender Kegiatan. Kuesioner yang disebarluaskan diharapkan dapat memberikan hasil yang memetakan masing-masing fitur. Sebagai kesimpulan, penelitian ini berhasil menangkap persepsi responden terhadap kebutuhan fitur untuk aplikasi RIOT:ID. Tanggapan dari peserta membantu mengkategorikan setiap fitur, yang menunjukkan bahwa Keamanan Data adalah fitur dengan tingkat kepentingan yang tinggi dan bersifat satu dimensi, meskipun memiliki dampak yang lebih rendah terhadap kepuasan. Tujuh fitur, termasuk Antarmuka yang Menarik, Kemudahan Penggunaan, dan Integrasi Strava, termasuk dalam kategori Menarik, menunjukkan pentingnya dan potensi mereka untuk meningkatkan kepuasan. Sebaliknya, fitur Notifikasi dan Gamifikasi memiliki pengaruh minimal terhadap kepuasan pengguna.

Kata Kunci: Kebutuhan Aplikasi, Pemetaan Fitur, Model Kano, Komunitas Berlari

1. Introduction

The needs of users with the rapid development of technology have created its own challenges. Many companies or businesses are starting to try to develop applications or implement the latest technology in their ventures with the aim of meeting the needs of users [1]. In Indonesia itself, most of the users access the application system through mobile devices either through native applications or Web-based applications [2]. Meanwhile, there has been no research that really discusses the need for features from users, especially for running community applications. Especially an Application for Running Community: RIOT Indonesia. The Kano Model is a powerful tool for understanding and prioritizing user needs [3], particularly in the context of product development and design. It categorizes features based on how they impact user satisfaction, ranging from essential “must-have” features to attractive “nice-to-have” elements that delight users [4]. By differentiating between features that are critical for functionality and those that enhance user satisfaction, the Kano Model allows developers to strategically allocate resources to create a well-balanced product that meets user expectations [5].

Previous research has demonstrated the effectiveness of the Kano Model in designing applications and systems by identifying and prioritizing user requirements based on their impact on satisfaction. For example, a study on e-learning platforms used the Kano Model to categorize features into must-haves, performance attributes, and attractive features, guiding the development of a system that balances essential functionalities with engaging elements for users [6]. Similarly, researchers applied the Kano Model to a healthcare management system, focusing on features that patients and healthcare providers deemed critical versus those that simply enhanced the experience [7]. The model allowed developers to focus on high-impact functionalities, such as data security and ease of use, while identifying less crucial yet desirable features like appointment reminders. Additionally, the Kano Model has been utilized in mobile app development, where it helped prioritize usability and connectivity features over aesthetic elements, ensuring that core functionalities were met first [8]. These studies highlight the model’s versatility and value across various domains, showing that it enables developers to strategically prioritize features to meet both baseline user needs and to explore areas for enhancing satisfaction [9].

In this study, we apply the Kano Model to identify key user needs for an application, analyzing which features are necessary, desirable, or indifferent from the users’ perspective. This approach provides insights into which features are fundamental for user satisfaction, and which could potentially differentiate the application based on user needs. By examining features through the lens of the Kano Model, we can determine not only what users expect as a baseline but also what could surprise and delight them. The findings are intended to guide product development, ensuring that the application addresses core user needs while also exploring areas for additional value, thus creating a more engaging and satisfying user experience.

2. Methodology

In carrying out this research, the following (Figure 1) are the stages of the research used:

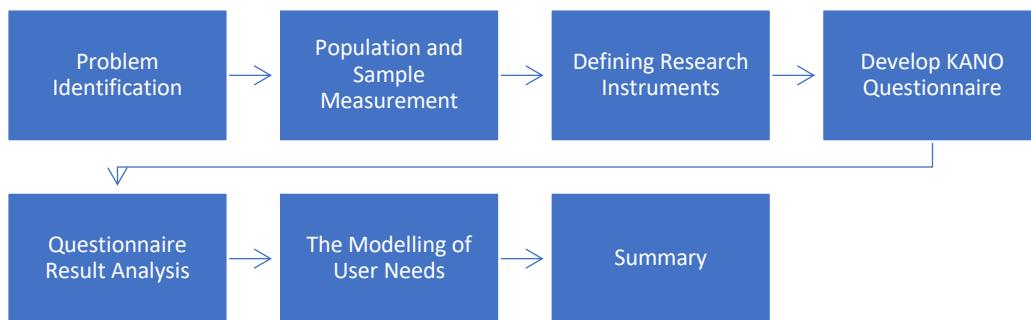


Figure 1 Research Stages

The identification of the problem has been discussed in the previous section and then the determination of respondents (samples) from the questionnaire is based on the population. The attributes in the research instrument are selected through the main parameters of Servqual and some other additional features. Furthermore, the questionnaire is designed based on the attributes that have been selected and divided into three dimensions: Functional, Dysfunctional, and Importance. The analysis of the questionnaire was carried out after the complete questionnaire was filled out and provided an overview of the results of modelling of user needs in the creation of the RIOT:ID application.

Population and Sample

The population of the study is 336 active members of RIOT Bandung. Based on the Slovin formula using a margin of error of 10%, it was found that the number of samples was 77 respondents. But for this research, we will have 80 respondents. Here is a sample calculation of the population using the Slovin formula [10].

$$n = \frac{N}{1+Ne^2} \tag{1}$$

$$n = \frac{336}{1 + (336 * 0,1)^2}$$

$$n = 77,064$$

Questionnaire Design

The questionnaire was designed using 5 Attributes adopted from the main dimensions of SERVQUAL and 5 elaboration of features that are commonly needed in the running community. Some of these attributes are Attractive UI, Easy to Use, Informative, Data Security, App Performance, Notification Feature, Attendance Feature (QR Code), Gamification Feature, Strava Integration, and Activity Calendar. The assessment of the Functional and Functional dimensions will use the following scales:

Table 1 KANO Functional and Dysfunctional Scale [11]

Scale	Weight	Functional	Scale	Weight	Dysfunctional
1	4	I Like It	1	-2	I Dislike It
2	2	I Expect It	2	-1	I Can Live With It
3	0	Neutral	3	0	Neutral
4	-1	I Can Live With It	4	2	I Expect It
5	-2	I Dislike It	5	4	I Like It

Meanwhile, in assessing the Functional dimension, a scale of 0-9 is used. The following is a breakdown of the Attributes/Features used along with each question:

Table 2 Attributes and Dimensions of KANO Questionnaire

Code	Attribute	Attribute Decryption	Functional Questions (Exist)	Dysfunctional Questions (None)	Importance
F1	Attractive UI	UI (User Interface) describes the application as having an attractive appearance with an easy-to-read theme selection	If the RIOT app had an attractive UI, how would you feel?	If the RIOT app doesn't have an attractive UI, how do you feel?	How important is it for you to have an attractive look for the RIOT app?
F2	Easy to Use	The app has ease of use, easy-to-access buttons, and a clear flow of the app	If the RIOT app is easy to use (UX), how would you feel?	If the RIOT app isn't easy to use (UX), how would you feel?	How important is it to you that the RIOT app is easy to use?
F3	Informative	Each information displayed shows the details of each piece of information. Example: In the activity, there is information on location, time, and others.	How would you feel if the information in the RIOT app was displayed in full?	How would you feel if the information in the RIOT app wasn't	How important is it for you that the RIOT app displays clear and complete information?

				displayed completely?	
F4	Data Security	The stored data and information are encrypted using a secure database. By determining Governance and Authentication in data access	If the RIOT app had good data security, how would you feel?	If the RIOT app doesn't have good data security, how do you feel?	How important is it for you that the RIOT app has good data security?
F5	App Performance	The RIOT app is always accessible and responsive.	If the RIOT app had good access performance, how would you feel?	If your RIOT app doesn't have good access performance, how do you feel?	How important is it for you that the RIOT app has good access performance?
F6	Notification Feature	Providing information related to selected activities, activity, monthly reports of activities and others.	If the RIOT app had a Notifications feature, how would you feel?	If the RIOT app doesn't have a Notifications feature, how would you feel?	How important is it for you that the RIOT app has a Notifications feature?
F7	Attendance Feature	Attendance from RIOT-organized activities, attendance reports, use of QR in attendance base, and more	If the RIOT app had an Attendance feature, how would you feel?	If the RIOT app doesn't have an Attendance feature, how would you feel?	How important is it for you that the RIOT app has an Attendance feature?
F8	Gamification Features	The activity motivation feature by giving points per activity, and ranking titles per user that are unique and become achievements in themselves.	If the RIOT app had a Gamification feature, how would you feel?	If the RIOT app doesn't have a Gamification feature, how would you feel?	How important is it for you that the RIOT app has a Gamification feature?
F9	Strava Integration	Integration with Strava accounts in obtaining activities, and meeting challenges in activities based on Strava data.	If the RIOT app had an integration feature with Strava, how would you feel?	If the RIOT app doesn't have an integration feature with Strava, how would you feel?	How important is it for you that the RIOT app has Strava integration?
F10	Calendar of Activities	A complete Calendar of RIOT activities, or special events/training programs that are expected to be integrated with Strava.	If the RIOT app had an activity/workout calendar feature, how would you feel?	If the RIOT app doesn't have an activity/workout calendar feature, how would you feel?	How important is it for you that the RIOT app has an activity/practice calendar feature?

Questionnaire Analysis

The analysis of the questionnaire is conducted after the required number of respondents has been fulfilled. The Kano model has the advantage of assessing the presence or absence of a feature. This can illustrate whether the feature is truly necessary, merely desired, or something else in the eyes of the respondents. The evaluation of the functional and dysfunctional dimensions from the questionnaire results can be mapped as follows [3]:

Functional	Dysfunctional				
	I Like It	I Expect It	Neutral	I Can Live With It	I Dislike It
I Like It	Q	A	A	A	O
I Expect It	R	Q	I	I	M
Netral	R	I	I	I	M
I Can Live With It	R	I	I	Q	M
I Dislike It	R	R	R	R	Q

Figure 2 Questionnaire Evaluation And Classification [12]

The results of the classification of respondents' answers that fall into the Questionable (Q) category indicate contradictory responses between functional and dysfunctional aspects. Meanwhile, the One-dimensional (O) classification represents features that are truly needed. This is evidenced by respondents responding with "I Like It" in the Functional aspect and "I Dislike It" in the Dysfunctional aspect. Features

included in the Must-be (M) category show respondents’ dissatisfaction if the feature is not available, but they can tolerate its availability in the Functional dimension. The Attractive (A) category illustrates a condition where respondents like a feature that is not within their expectations. In this case, a feature is liked functionally, but respondents can tolerate it when the feature is almost absent in the dysfunctional dimension. Finally, the Indifferent (I) category indicates that respondents are neutral about the availability or unavailability of a feature.

After classifying each respondent’s answers for each feature, a mapping of user satisfaction/dissatisfaction is then carried out using two categories: Better and Worse [13] The formula for calculating Better and Worse uses the classification parameters of respondents’ answers as shown in Figure 2.

$$Better = \frac{A+O}{A+O+M+I} \tag{2}$$

$$Worse = - \frac{M+O}{A+O+M+I} \tag{3}$$

The difference between the “better” and “worse” values is referred to as the total satisfaction index. Using this index, attributes can be ranked according to their calculated satisfaction scores. If the total satisfaction index is negative, it indicates that failing to meet a specific attribute will lead to dissatisfaction, while a positive index shows that meeting an attribute will create satisfaction. Additionally, attributes with higher values on the satisfaction index have a stronger impact on overall satisfaction. Attributes in the one-dimensional category have a linear relationship with customer satisfaction, meaning they should be met at least to a basic standard. Since attributes in the one-dimensional and indifferent categories have low values on the total satisfaction index, ranking them is not particularly meaningful.

3. Results and Discussion

Based on the results of the questionnaire that has been distributed to 80 respondents on the perception of feature needs in the design of the RIOT application, an assessment and weight of each answer item is carried out. This weighting is based on Table 1 for functional and dysfunctional questions, while for Importance it uses a scale of 0-9. Table 3 below is the result of the questionnaire.

Table 3 Questionnaire Analysis (KANO)

Code	Feature Name	Dysfunctional (X)	Functional (Y)	Importance (Z)
F1	Attractive UI	1,33	3,49	7,97
F2	Easy to Use	2,09	3,52	8,42
F3	Informative	1,89	3,49	8,48
F4	Data Security	3,14	3,75	8,63
F5	App Performance	2,38	3,60	8,46
F6	Notification Feature	1,25	2,53	7,46
F7	Attendance Feature	1,63	3,13	8,04
F8	Gamification Features	1,00	2,38	7,10
F9	Strava Integration	1,10	3,44	7,68
F10	Calendar of Activities	1,53	3,40	8,05

The results of the questionnaire above form a diagram containing a mapping of Features based on the X (Disfunctional) and Y (Functional) axes [14]. While the value of Importance will represent the range of importance of the feature. Each feature will be color-coded in Figure 3 below:

RIOT:ID - FEATURE CATEGORIES

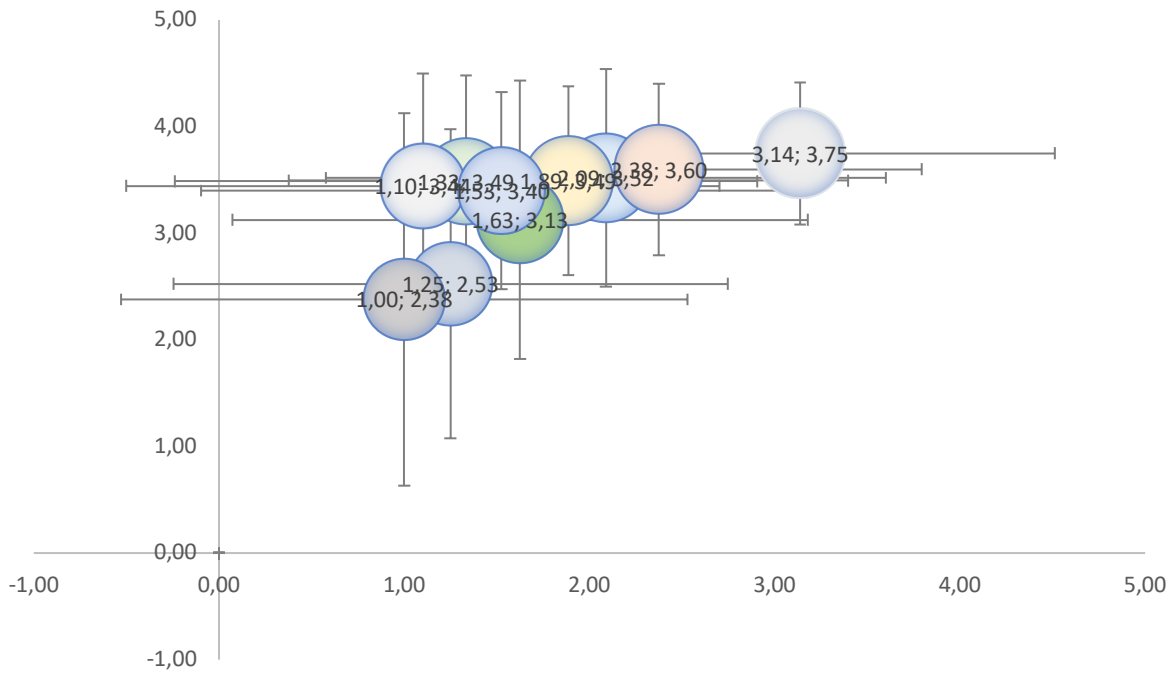


Figure 3 Feature Mapping by Functional, Disfunctional, and Importance

Based on table 3 and figure 3 above, it can be concluded that all features have a high level of importance (above 7). Where the feature with the highest Importance value falls to Data Security (Feature 4) with a score of 8.63. And through the feature mapping to the x and y axes above, data security features fall into the One-Dimensional category, where Data Security is an absolutely needed feature. Meanwhile, the feature that respondents consider as the feature with the lowest Importance value is the Gamification Feature. The Gamification feature with a score of 7.10 and based on axes X and Y is included in the Direct category. Further explanation of the categorization of axes X and Y refers to the explanation of KANO analysis in the previous section. Table 4 below is an assessment of each category of each Feature based on the classification of One-Dimensional (O), Attractive (A), Must-be (M), Indirect (I), Reverse (R) and Questionable(Q).

Table 4 Feature Analysis and Categorization

Code	Feature Name	M	O	A	I	R	Q	Total	Category
F1	Attractive UI	0	13	47	18	0	2	80	A
F2	Easy to Use	0	22	40	16	1	1	80	A
F3	Informative	0	19	40	20	0	1	80	A
F4	Data Security	0	54	16	10	0	0	80	O
F5	App Performance	1	27	37	15	0	0	80	A
F6	Notification Feature	1	11	23	45	0	0	80	I
F7	Attendance Feature	0	17	34	28	1	0	80	A
F8	Gamification Features	1	10	25	42	1	1	80	I
F9	Strava Integration	0	14	46	19	0	1	80	A
F10	Calendar of Activities	0	18	38	24	0	0	80	A

For 10 features that are categorized as needs of users, there is a mapping of 3 categories, namely One Dimensional (O), Attractive (A), and Indifferent (I). The first category, One-dimensional, describes a category that is very important and is expected to receive priority in application development because attribute performance is linearly related to the perception of satisfaction from respondents. The feature that falls into the One-dimensional category is Feature 4: Data Security.

The second category is Attractive (A), which indicates that a feature/attribute is included in the category that needs attention/importance. Because the perception of the satisfaction level of the respondents will be very high with the increase in the performance of the feature. Although it will not cause a decrease in perception of the level of satisfaction. Some of the features that fall into the Attractive category are: 1) Attractive UI, 2) Easy to Use, 3) Informative, 4) Application Performance, 5) Attendance Feature, 6) Strava Integration, and finally 7) Activity Calendar.

The last category, Indifferent (I), describes a category that users pay less attention to. So that the presence or absence of these features will not affect the increase or decrease in user satisfaction levels. There are 2 features that fall into this category. Among them are the notification feature and the gamification feature.

Ranking of Features

Kano categorizations follow a clear hierarchical order based on the impact of attributes on customer satisfaction or dissatisfaction. For instance, the *must-be* category is the most impactful, followed by *one-dimensional*, *attractive*, and finally *indifferent*, with the *indifferent* category having the fewest impactful attributes. Therefore, it is essential to consider all responses when assessing and categorizing attributes. A newer adaptation of the Kano model [13], which incorporates the total satisfaction index based on Kano responses, was applied for this purpose. In this matter, the formula (2) and (3) were used to generate feature rankings based on the value of Better or Worse. The Better value indicates how much customer satisfaction increases if we provide its features (A&O). Worse indicates how much customer satisfaction decreases if we don't provide the feature (O&M). The calculation on both formulas will refer to table 4 above. Here is the ranking calculation of each feature:

Table 5 Feature Ranking

Feature	Feature Name	M	O	A	I	R	Q	Better	Worse	Total Satisfaction Index	Ranking
F1	Attractive UI	0	13	47	18	0	2	0,750	-0,163	0,588	1
F9	Easy to Use	0	22	40	16	1	1	0,750	-0,175	0,575	2
F2	Informative	0	19	40	20	0	1	0,775	-0,275	0,500	3
F3	Data Security	0	54	16	10	0	0	0,738	-0,238	0,500	4
F10	App Performance	1	27	37	15	0	0	0,700	-0,225	0,475	5
F5	Notification Feature	1	11	23	45	0	0	0,800	-0,350	0,450	6
F7	Attendance Feature	0	17	34	28	1	0	0,638	-0,213	0,425	7
F8	Gamification Features	1	10	25	42	1	1	0,438	-0,138	0,300	8
F6	Strava Integration	0	14	46	19	0	1	0,425	-0,150	0,275	9
F4	Calendar of Activities	0	18	38	24	0	0	0,875	-0,675	0,200	10

Based on the table above, it can be concluded that the feature that has an impact on the perception of customer satisfaction is the Attractive UI with a value of 0.588. Where users feel that they will have their own satisfaction with a good display and this is supported by the ease of use of the application in feature 2, and informative in feature 3. Meanwhile, Strava Integration, a platform that is routinely used by runners, has a strong attraction to the perception of satisfaction from users. Application developers need to pay attention to the integration of Strava's API in increasing the potential for customer satisfaction. Several other features such as Attendance, Gamification, and Notifications are not felt to have much impact on

contributing to user satisfaction. And the interesting thing is Data Security which ranks at the bottom even though it has a One-dimensional category. This is a form of realization that the Data Security feature must be present and considered in the system even though it does not have a high impact on the perception of satisfaction. All features have a positive indexation value, and can be interpreted as contributing to satisfaction. The large and small numbers of indexation show the impact of the contribution. And quoting from previous section *"Since attributes in the one-dimensional and indifferent categories have low values on the total satisfaction index, ranking them is not particularly meaningful"*.

4. Summary

In conclusion, this study aimed to capture respondents' perceptions of feature requirements in the development of the RIOT:ID application, and it has yielded positive results. This is illustrated by the responses from 80 participants, who provided insights into the categorization of each feature. Data Security is classified as a One-dimensional feature with high importance, although it ranks lower in terms of satisfaction perception. A total of seven features (Attractive UI, Ease of Use, Informativeness, Application Performance, Attendance Feature, Strava Integration, and Event Calendar) fall under the Attractive category, indicating that their presence is important and could potentially increase satisfaction perceptions. On the other hand, Notification and Gamification features are considered to have no significant influence on increasing or decreasing user satisfaction perception.

This study is expected to provide guidance for application developers in enhancing each feature, ensuring that the final product meets users' expectations and perceptions. The next development plan is to create a responsive web-based application using the Next.js framework and MongoDB as the database. Further recommendations for future research include using other methods to assess the adoption level of the application (e.g., TAM [15]) or evaluating the overall quality of the web application (WEBQUAL) or service quality (SERVQUAL) and IPA (Importance Performance Analysis) [16]. And also the research of user actual Satisfaction level using PIECES [17], CSI, etc.

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