

Decision Support System of Food and Beverage Franchise Business

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Abstract

With its various advantages and conveniences, the franchise business is a type of business that is in great demand by entrepreneurs today, especially the franchise business with the type of food and beverage, this makes many people who want to start a business interested in trying the franchise business, with many choices of food and beverage franchises. that exist, making many people feel confused about which franchise business is suitable according to the circumstances of prospective business actors. From these problems, the need for a decision support system that can help provide recommendations to prospective entrepreneurs about a suitable food and beverage franchise business. The criteria used for franchise data analysis are capital, outlets, bep, franchise fees, and profits. In this study, the data processing process uses the Simple Multi Attribute Rating Technique (SMART) method as a multi-attribute problem solving method. To determine the benchmark for the final result, the author made a questionnaire that had been filled in as many as 53, from the questionnaire there were 52 out of 53 or 98.1% of respondents who stated that the franchise business recommendation system really helped them to determine the type of business to be done, Then as many as 47 of 53 or 88.7% of respondents intend to seriously run a franchise business, and as many as 10 of 12 or 83.3% of respondents who have tried the application say this application is useful.

Keywords

Business, Decision Support System, SMART, Franchise

1. Introduction

Starting a business, of course, begins with an idea (Hardjono & Van Marrewijk, 2001). However, ideas often become obstacles when there is an intention to open a business (Vuontisjärvi, 2013). Sometimes prospective entrepreneurs feel that the intention is already there, but are confused about how to start and what kind of business they want (Burke & Clark, 2016). Currently, business opportunities are increasingly wide open with the proliferation of food and beverage franchises. Currently, the number of food and beverage franchise businesses is the most dominating partnership business compared to businesses in other fields (Najib & Kiminami, 2011). Therefore, as a beginner who wants to run a culinary business with a franchise system, there are many options for choosing the most potential food and beverage franchise products with varying price packages in Indonesia (Scheidel & Farrell, 2015).

The franchise business is a growing business and is in great demand by prospective entrepreneurs (Karamti & Grzybowski, 2010), because many provide franchise partnership businesses in Indonesia. This makes many prospective entrepreneurs feel confused when choosing a franchise business that is right for them. Based on the problems in choosing a franchise business, this research focuses on building a decision support system for choosing a franchise business. The decision support system uses the Simple Multi Attribute Rating Technique method approach, which is in

line with previous studies that it is easier to use, especially in decision support systems (Siregar et al., 2017) (Haddara, 2018).

2. Literature Review

The simple multi-attribute rating technique (SMART) is retrieval technique multi-criteria decisions are based on the theory that each alternative consists of several criteria that have several values, and each criterion has a different weight illustrates the importance of that criterion compared to other criteria. Weighting This is used to assess each alternative to produce the best alternative. SMART (Simple Multi – Attribute Rating Technique) is a method of taking multi-criteria decision developed by Edward in 1977 (Siregar et al., 2017).

SMART using a linear additive model to predict the value of each alternative. SMART is flexible method of decision making. SMART method is widely used because it is simpler to respond to all needs by decision makers by how to analyze responses. The analysis involved is transparent so this method provides a high understanding of the problem and can be accepted by the maker decision.

The order in using the Simple Multi Attribute Rating Technique (SMART) method is as follows:

1. Determine what criteria to use,
2. Determining the Criteria Weight for each criterion by using an interval of 1-100 for each criterion with the most important priority,
3. Normalization calculation of each criterion by comparing the value of the weight of the criteria with the total weight of the criteria using the formula:

$$\frac{w_j}{\sum w_j}$$

Where W_j is the weighted value of a criterion. While W_j is the total of the number of weighted criteria for each alternative

4. Assign Parameter value to each criterion for each alternative,
5. Determine the utility value by converting the value of the criteria on each criterion into standard data criteria values. The utility value is obtained by using equality:

$$u_i (a_i) = \frac{C_{out} - C_{min}}{C_{max} - C_{min}}$$

Where u_i is the utility value of the 1st criterion for the utility of the I criterion, C_{max} is the maximum criterion value, C_{min} is the minimum criterion value and C_{out} is the criterion value.

6. Determine the final value of each criterion by switching the value that is obtained from the normalization of the standard data criteria with the normalization of the criteria weights, then add up the multiplication values.

3. Methods

3.1 Research Methods

Based on the problems that have been described, the research is carried out in several stages, starting from problem identification to preparing research reports.

a) Identification of Problem

Researchers identified problems by conducting literature studies from previous research journals, then the authors made a questionnaire and 37 of 53 respondents or 69.8% expressed confusion in determining the type of business, and 52 of 53 respondents or 98.1% stated that a business recommendation system franchise will help them.

b) Data Collection

Data collection is done by looking for data about each existing franchise, data is taken from several sites providing information on franchise business such as franchise magazine, global franchise, franchiseku, and Ayowaralaba, as well as visiting the official website of each franchise where the data will be used in this research so that get clear and detailed data.

c) Literature Review

Literature study is carried out by collecting and studying all kinds of information related to the franchise business, Decision Making System, SMART method and all things related to the programming model.

d) System Design

In this stage, the author designs an application that will be made based on the results of the existing literature study. This Software Design includes software architecture, database design, display design, algorithm design and programming.

e) System Develop

The design of the application made will be implemented in a programming language.

TABLE 1. WEIGHT CRITERIA

No.	Cretarias	Weight	Normalization
1	c1	25	25/100 = 0.25
2	c2	10	10/100 = 0.10
3	c3	20	20/100 = 0.20
4	c4	15	15/100 = 0.15
5	c5	30	30/100 = 0.30
Sum		100	1

f) Testing and Evaluation

At this stage a test is carried out on the system to find errors in the program, the testing method used is black box and white box testing.

3.2 Proposed Method

The study used the Simple Multi Attribute Rating Technique (SMART) method as a decision-making method. The SMART method is a multi-criteria decision-making technique based on the theory that each alternative consists of a number of criteria having a weight that describes how important it is compared to other criteria (Fitriani et al., 2020), (Oktavianti et al., 2019). The techniques in the SMART method are (Haddara, 2018), (Njuguna Matheri et al., 2018):

1. Determine the criteria used
2. Give the weight of the criteria to each criterion by using an interval of 1-100 for each criterion with the most important priority.
3. Calculate the normalization of each criterion by comparing the weight of the criteria with the total weight of the criteria Using the formula:

$$\frac{w_j}{\sum w_j}$$

Note:

w_j : Weight of cretiaria

$\sum w_j$: Sum of Weight for criteria

4. Provide a criterion value for each alternative, the criterion value for each alternative can be in the form of quantitative data (numbers) or in the form of qualitative data. If the criterion value is in the form of qualitative, it is necessary to change to quantitative data.
5. Determine the utility value by depending on the nature of the criteria itself.

TABLE 2. CONFIGURATION OF SCORE

Criteria	Parameter	Score of Weight
Lolaylt Fee (c4)	Yes	1
	No	2

TABLE 3. SCORE OF ATTRIBUTE

No.	Criteria	Attribute
1	c1	cost
2	c2	benefit
3	c3	cost
4	c4	benefit
5	c5	benefit

For cost criteria that are “smaller is better”, use the equation:

$$u_i(a_i) = \frac{C_{max} - C_{out}}{C_{max} - C_{min}}$$

For benefit criteria that are “bigger is better”, use the equation:

$$u_i(a_i) = \frac{C_{out} - C_{min}}{C_{max} - C_{min}}$$

Note :

$u_i(a_i)$: score of utility criteria

C_{out} : score of criteria

C_{min} : minimum criteria

C_{max} : maximum criteria

6. Determine the final value using the equation.

$$u_i(a_i) = \sum w_j \cdot u_i(a_i)$$

Note :

$u(a_i)$: total score of alternatif

w_j : normalization weighth

$u_i(a_i)$: utility score

4. Results and Discussion

Based on several research methods that have been carried out, the results obtained are in the form of a decision support system using the SMART method.

4.1 Calculation of SMART Method

The following are the steps for calculating franchise criteria using the SMAR method.

TABLE 4. SAMPLE OF FRANCHISE

Franchis e	c1	c2	c3	c4	c5
Franchis e 1	9.900.00 0	26	3	Yes	180%
Franchis e 1	6.900.00 0	15	2	No	120%
Franchis e 1	8.500.00 0	18	2	No	100%

TABLE 5. CRITERIA SCORE

Franchise	c1	c2	c3	c4	c5
Franchise 1	9.900.000	261	3	1	180
Franchise 1	6.900.000	150	2	2	120
Franchise 1	8.500.000	188	2	2	100

1. Determination of Criteria for the first step, the writer determines the five criteria used in the decision support system, namely: Capital (c1), Outlets (c2), BEP (Break Event Point) (c3), Royalty Fee (c4), Profit (c5).
2. Criteria weighting. The author determines the appropriate weight value from the questionnaire data and has been calculated into the points that the author has made, where criteria c5 gets 24.6 points and becomes priority 1, c1 gets 24.3 points and becomes priority 2, c3 gets 24.4 points and becomes priority 3, c4 gets 23.1 points and becomes priority 4, and c2 gets 22.1 points and becomes priority 5.
3. Calculate normalization each weight will get a value according to priority and the value will be normalized. These results can be seen in Table 1.
4. Give the criteria value of all the criteria data, only the royalty fee has a qualitative value or letters, so it needs to be converted into quantitative or numerical form. The data can be seen in Table 2.
5. Determine the Utility Value. First determine the attribute value of each criterion, determining the value of this attribute is determined from whether the criterion is if the value is large it is better or a small value is better, if the criterion with a small value is better than it is given a cost attribute value, and if the value is greater it is better then the value of the benefit attribute is given. Attributes can be seen in Table 3.

To try the results of the calculation of the SMART method, the authors use sample data, the following authors enter three franchise data. The calculation results on the franchise sample can be seen in Table 4. Because the data still has criteria values that are qualitative or letter, it needs to be converted into quantitative form or numbers, so that it is easy to calculate them. Criteria value can be seen in Table 5.

Table 6. Utility Score Result

Franchise	c1	c2	c3	c4	c5
Franchise 1	0	1	0	0	1
Franchise 1	1	0	1	1	0.25
Franchise 1	0.47	0.34	1	1	0

TABLE 7. FINAL RESULT

Franchise	Result
Franchise 1	0.2
Franchise 1	0.55
Franchise 1	0.34

Then with the quantitative data calculate the utility value of each criterion by using the utility formula. And obtained the following results: Utility value can be seen in Table 6.

6. Determining the Result Value then to determine the final result, use the final result equation formula by entering the values from the utility calculation results. The following is the result value of the SMART method calculation in Table 7. From the results of these calculations, it can be seen that the best franchise is franchise 2 with a value of 0.55.

4.2 Software Architecture

1. Use Case Diagram. Use Case provides a brief description of the relationship between use cases, actors, and systems. there are two actors, namely admin and user, and several use cases in each actor. Use Case Diagram can be seen in Figure 1.

2. Class Diagram. Class Diagram is a visual of the structure of the program system in the groups that are formed, the class diagram is the flow of the database on the system (Novitasari, 2018). There are two parts of the class diagram in this system.

- Front End Class Diagrams

There are seven classes with variables and functions that exist in the front end system, where the State Management class becomes a class to accommodate all state data from other classes, and the AppNavigator class which becomes the controller by taking data from StateManagement and distributing it to other classes. The front-end class diagram image is shown in figure 2.

- Class Diagram Back End

There are nine classes with five controllers, and four models, where all controller classes are in charge of retrieving data from the model and sending it to the application view and the back-end class diagram is shown in figure 3.

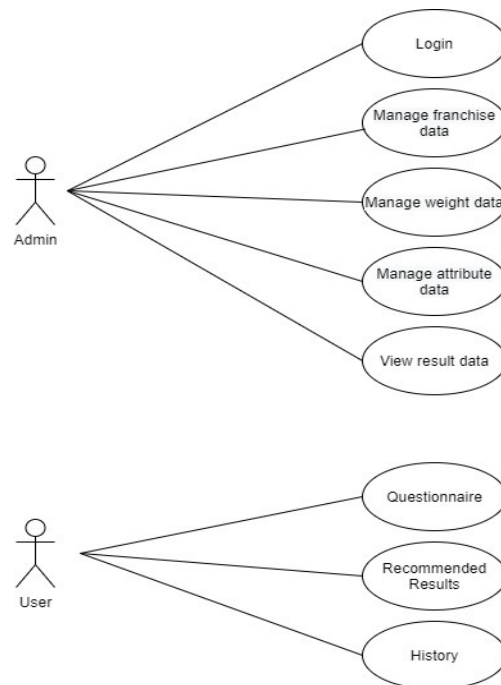


Figure 1. Use Case Diagram

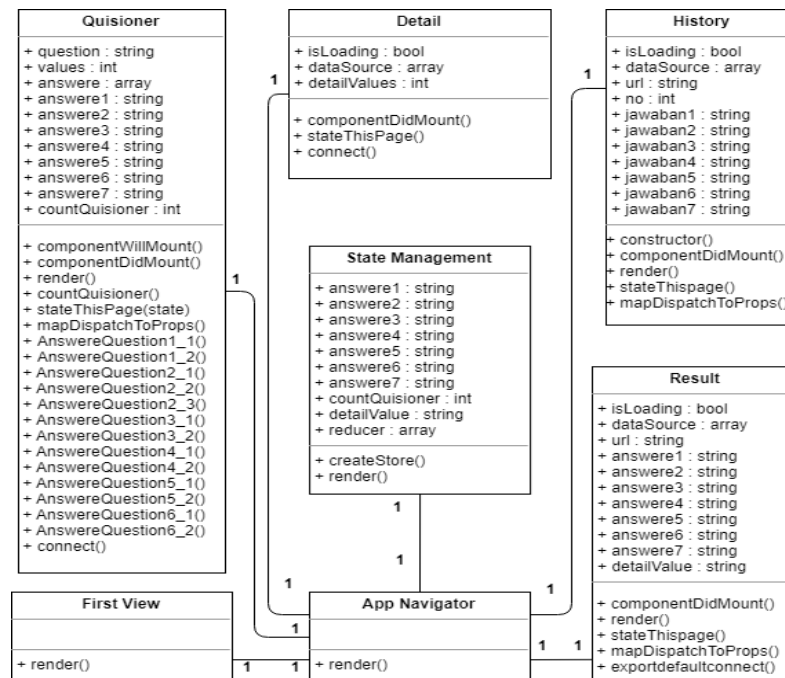


Figure 2. Class Diagram Front End

3. Database Design. In software engineering, an Entity Relationship Diagram (ERD) is a network model that uses an abstract arrangement of data stored in the system (Setiadi, 2017). In this system there are five tables in the ERD diagram, namely, users, franchise data, utility values, weights, and attributes depicted in figure 3.

4.3 User Interface

There are two UI parts in this system, namely back-end UI for web, and front-end UI for android.

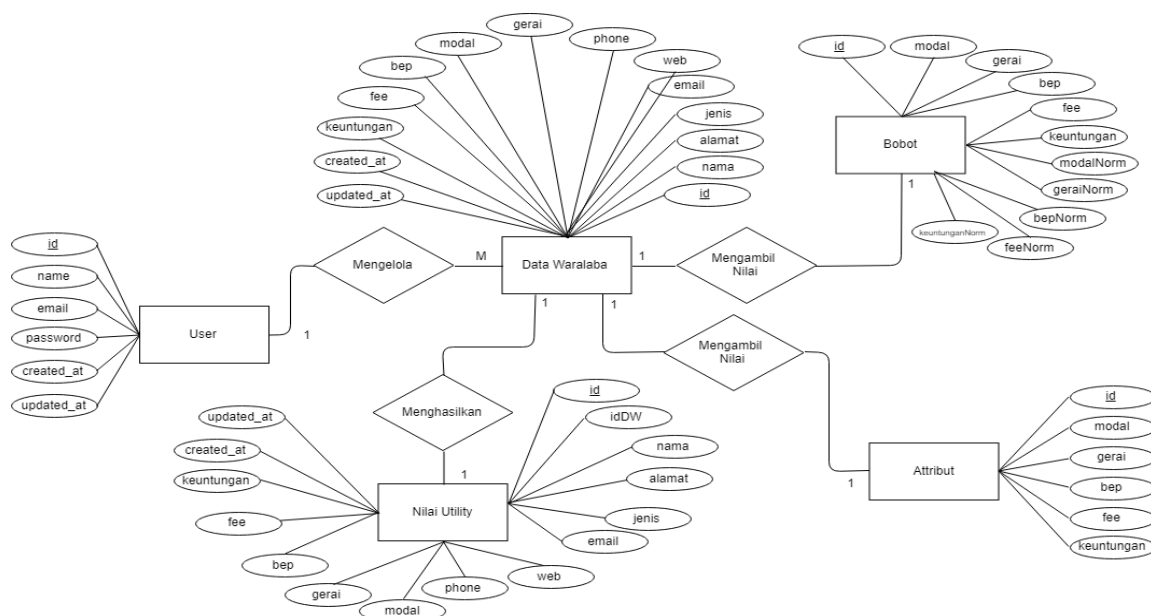


Figure 3. Entity Relationship Diagram

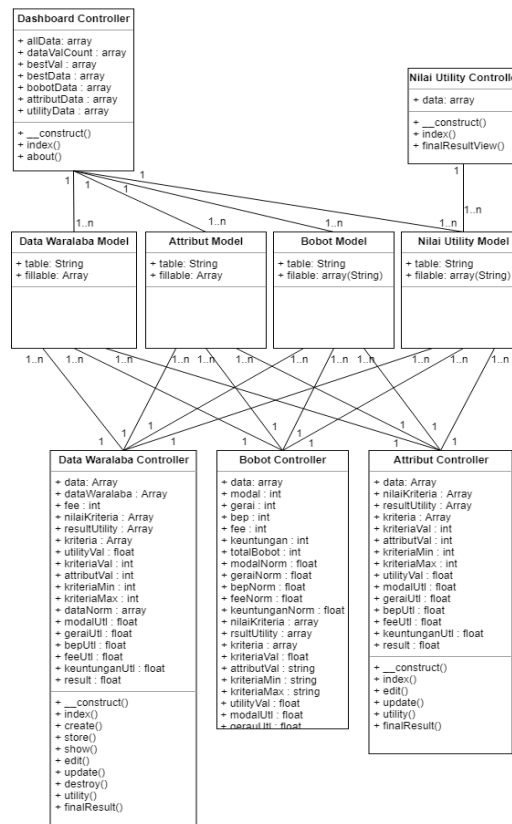


Figure 4. Class Diagram Back End



What type of franchise do you want?

- ☒ Food
- ☐ Drink
- ☐ Both of them

Next

Figure 5. User Interface Survey

1. Front End User Interface

Questionnaire. This questionnaire page functions as a page to fill out several questions for users to fill out, where each of these questions has a value and will later be calculated and affect the recommendation results. The interface display for the questionnaire page can be seen in Figure 5.

Recommended Results. The recommendation results page is used to get the results from filling out the previous questionnaire, in this display there is a list of franchise names that are recommendations for users. The interface display for the recommendation results page can be seen in Figure 6.

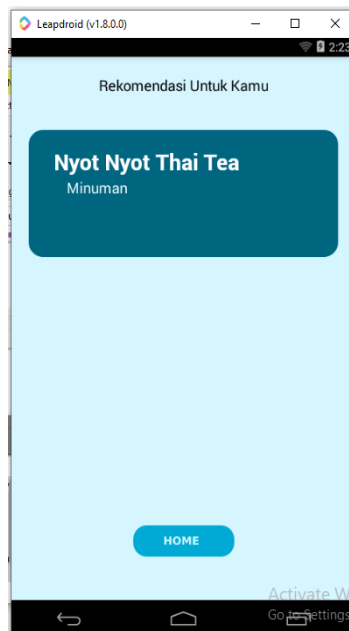


Figure 6. User Interface Recommendation Result

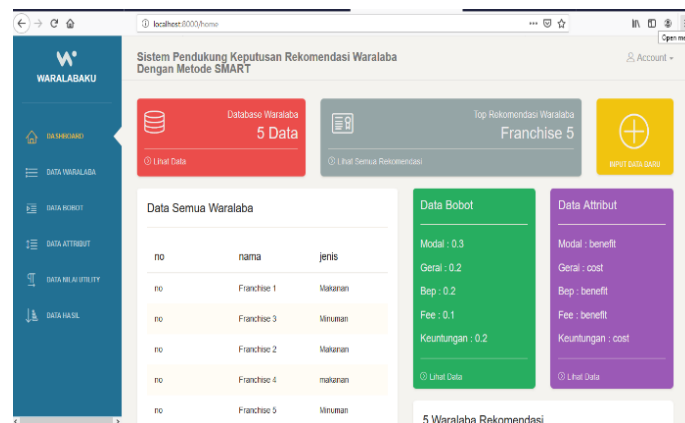


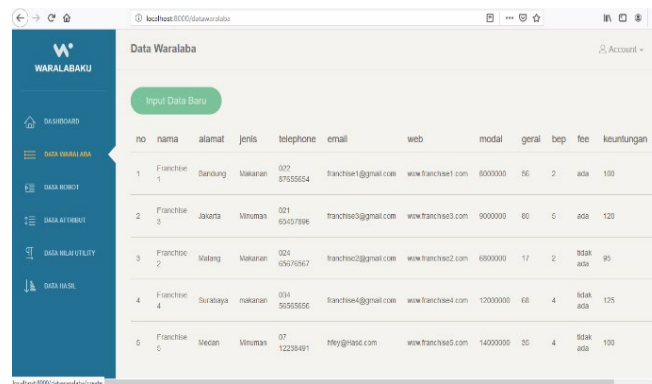
Figure 7. User Interface of Dashboard

2. User Interface Back End

Dashboard. This dashboard page provides an overview of the information in the system, such as the amount of data, weight values, attribute values, franchises with the highest recommendation values, and others. On this page there is also a summary of the application which will include brief information regarding the amount of data and criteria. On this page also the main menu for managing reference data can be accessed. The dashboard interface can be seen in figure 7.

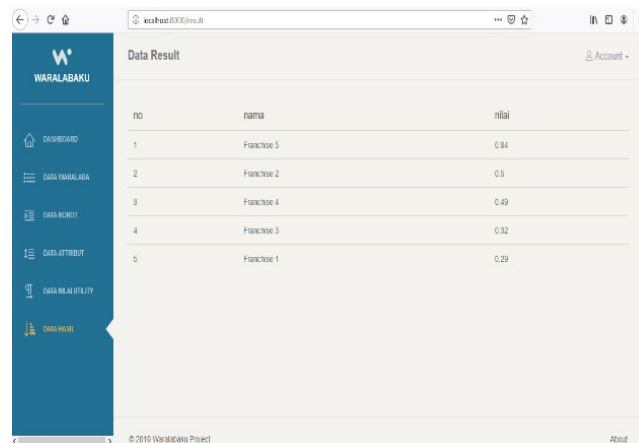
Franchise Data. Data franchise displays detailed information on all franchise data in a table, where in this view there are buttons for adding data and buttons for editing and deleting data. Users can add other franchise data if needed to be taken into account by the application. And can delete franchise data that is considered no longer relevant. The interface display for the franchise data page can be seen in figure 8.

Result Data. The result data display displays the value of each franchise from the SMART method calculation, where this data has been sorted from the highest value to the lowest value. This result data page is obtained from the calculation of the SMART method for each franchise against predetermined criteria and weights. The interface display for the results data page can be seen in figure 9.



no	nama	alamat	jenis	telephone	email	web	modal	geral	bep	fee	keuntungan
1	Franchise 1	Bandung	Makanan	027 8755554	franchise1@gmail.com	www.franchise1.com	8000000	60	2	ada	100
2	Franchise 3	Jakarta	Minuman	021 63457896	franchise3@gmail.com	www.franchise3.com	9000000	60	6	ada	120
3	Franchise 2	Bandung	Makanan	021 6567897	franchise2@gmail.com	www.franchise2.com	6000000	17	2	tidak ada	90
4	Franchise 4	Surabaya	Makanan	031 5050856	franchise4@gmail.com	www.franchise4.com	12000000	60	4	tidak ada	125
5	Franchise 5	Medan	Minuman	07 12238491	franchise5@gmail.com	www.franchise5.com	14000000	50	4	tidak ada	100

Figure 8. User Interface Franchise Dashboard



no	nama	nilai
1	Franchise 5	0.84
2	Franchise 2	0.5
3	Franchise 4	0.49
4	Franchise 3	0.32
5	Franchise 1	0.29

Figure 9. User Interface Recommendation Final

5. Conclusions

Based on the research that has been done, it can be concluded that the system built can provide information about food and beverage franchise business recommendations for prospective entrepreneurs in accordance with the questionnaires filled out by application users. The author has obtained 53 respondents who have filled out the questionnaire that the author made, from In the questionnaire there were 52 out of 53 or 98.1% of respondents who stated that the franchise business recommendation system really helped them to determine the type of business to be done, Then from the questionnaire that the author made as many as 47 of 53 or 88.7% of respondents intend to seriously undergo franchise business after getting franchise recommendation information from the system.

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