Singme Music Entertainment Services Marketing Information System with Content-Based Filtering Method and TAM Testing

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ABSTRACT

With the times, the website used as marketing and sales media, which developed into E-Commerce. In 2019, there was 16,277 businesses used the E-Commerce concept, and also the value of Gross Domestic Product (GDP) was about 5.07%. Furthermore, because of the Coronavirus Disease (COVID) pandemic, the GDP decreased to -2.07% in 2020 and even impacted 10 out of 17 business sectors. Music entertainment business was also impacted by the pandemic, because during the pandemic, the government restricted certain public activities. Therefore, this system named Singme will help singers or music groups to market their services and provide related information for the public. Searching the services in Singme will be assisted by using Content-Based Filtering (CBF) method, it will give the recommendations of the services which have correlations with the keywords. Using Technology Acceptance Model (TAM) to test 122 feedback data about Singme with SmartPLS application v3.2.9. As the results, all hypotheses are acceptable because each t-statistic value > t-table value (1.981), and also each p-value < 0.05. Which PEOU influences PU by 34.3%, PU and POEU influence ATU by 50.7%, PU and ATU influence BITU by 56.1%, and BITU influences ASU by 52.3%.

INTRODUCTION

According to the Central Statistics Agency (BPS) [1], the development of business actors in the field of E-Commerce in Indonesia was 16,277 in 2019. This development was also supported by the magnitude of the Gross Domestic Product (GDP) of 5.02%. However, since the outbreak of Coronavirus Disease (COVID) in Indonesia, the GDP figure also experienced a significant change where the GDP figure in 2020 touched the figure of -2.07% as reported by BPS [2]. And based on the comparison of business sector GDP data in the third quarter of 2020 with the third quarter of 2019 as many as 10 of the 17 business categories experienced an economic decline.
recession (negative GDP), where one of them is another service category with a GDP of -5.55%.

Based on the 2020 Standard Classification of Business Fields (KLBI), the other service categories include the arts, entertainment, and recreation sectors [3]. In addition to indicators of changes in GDP figures, the ongoing COVID pandemic has also led to the changes or additions to regulations made by the central or regional governments. One of them is the Instruction of the Minister of Home Affairs Number 43 of 2021, which includes the Enforcement of Restrictions on Community Activities (PPKM), which among its contents mentions the restriction of artistic or social activities that can cause crowds and crowds [4].

The impact of these restrictions affects the means of promotion as well as the sources of income for artists such as singers and music groups. Thus, a system that can be used by singers and music groups to help market their services is an alternative solution. And with this system, it’s also able to assist prospective customers in finding more appropriate services and according to the desired criteria so that in the end they can help both parties in the transaction process.

Regarding the recommendation system by Wijaya and Alfian [7], the system that uses the Content-Based Filtering (CBF) method is faster in execution time than the Collaborative Filtering method. However, the execution time is also affected by the amount of data used during the process.

Another study by Larasati and Februariyanti [8] also explained that the CBF method is appropriate to use to compare products based only on the parameter title or product description. The test results of the method produced 10 recommendations with the highest similarity value (the level of match between product descriptions and keywords based on the CBF method) of 0.7195.

Another study by Muchayan and Kamisutara [9] which also focused on the CBF method, where researchers matched the results of recommendations using the system with survey results, and found the system's accuracy rate of 96.5%. The designed system also needs to be tested by the developer, so there is a study by Ikhlaasahi and Putro [10] make a compare the Equivalence Partitioning (EP) and Boundary Value Analysis (BVA) test method. As a conclusion, EP is used to explore possibilities based on criteria, while BVA is suitable to be applied to systems that focus on user input problems.

I. LITERATURES REVIEW

In the previous study about promotion and management photo services system [5], the implemented system helps photo studio managers to photographers in terms of promotions and transaction report management. In addition, the system also makes it easier for the prospective customers to view the service offers and testimonials online. Similar studies by Faadhilla and Kurniadi [6] but in terms of make-up services, the system is applied to assist service providers in Padang city to promoting and organizing transaction data. Service users even can make the ordering process or view testimonials for make-up services more quickly than usual.
II. FRAMEWORK
Here’s the framework:

III. METHODS
CBF is a category of recommendation system that uses the attributes of a product description and user preferences as parameters in providing an alternative choice. Within CBF there are several techniques or algorithms that can be applied, such as; Terms Frequency Inverse Document Frequency (TF-IDF), Bayesian Classifiers, Cluster Analysis, Decision Trees, and Artificial Neural Networks [8]. In this study, the CBF method will use the TF-IDF algorithm which is divided into several stages, including:

1. Text Preprocessing
   This stage is divided into two processes; Tokenization Process (Changing keywords or product descriptions into arrays) and Stopword Removal Process (Removing words that are repeated or do not provide any important information, as well as symbols and punctuation in the array).

2. Terms Frequency (TF)
   The TF is carried out by assigning a value of 1 to each data that contains the keyword tokens.

3. Inverse Document Frequency (IDF)[11]
   \[ IDF(T_x) = \log \left( \frac{N(D)}{N(D,T_x)} \right) \]  
   Where:
   \( N(D) \) = The amount of data
   \( N(D,T_x) \) = The amount of data that contains the related words

   \[ TF-IDF(T_{xy}) = TF(T_{xy}) \times IDF(T_x) \]  
   Where:
   \( TF(T_{xy}) \) = TF value of the related word to y-th data
   \( IDF(T_x) \) = IDF value of the related word

After finding the TF-IDF value, then the sum of all TF-IDF values is carried out based on the grouping of the data (D).

Technology Acceptance Model (TAM) is one of the modeling concepts with the aim of describing external aspects of the behavior of information system users on system acceptance [12]. TAM basically has two basic perceptions, namely; Perceived Usefulness and Perceived Ease of Use [13] another research was carried out by [14][15][16] TAM can measure the level of acceptance of the system by the user. There are several stages on system acceptance testing using TAM method, including:

- Hypotheses
  1. \( H_1 \). Perceived Ease of Use (PES) Influences Perceived Usefulness (PUS)
  2. \( H_2 \). Perceived Ease of Use (PES) Influences Attitude Toward Using (ATU)
  3. \( H_3 \). Perceived Usefulness (PUS) Influences Attitude Toward Using (ATU)
  4. \( H_4 \). Perceived Usefulness (PUS) Influences Behavioral Intention To Use (BITU)
  5. \( H_5 \). Attitude Toward Using (ATU) Influences Behavioral Intent To Use (BITU)
  6. \( H_6 \). Behavioral Intention To Use (BITU) Influences Actual System Use (ASU)

- TAM testing
  1. Ease of use
  2. Work faster
  3. Fewer errors
  4. Less time

- System Development
  1. LMI design (Activity Diagram, Use Case Diagram, Class Diagram, etc.)
  2. Database development
  3. System development using PHP and CodeIgniter
  4. Implementing Context-based Routing (ICBR) or recommendation feature

- Goal Indicators
  1. Both websites can be run properly
  2. The CBR method can provide a recommendation based on the keywords
  3. The discussion process through message menu
  4. The recommendation process runs until the user is completed
  5. There’s a transaction report

- Data and Needs Analysis
  - Analysis of data and system requirements based on interviews with singers and music groups as well as literature studies.

- Proposed System
  - Model design (Activity Diagram, Use Case Diagram, etc.)
  - Database development
  - System development using PHP and CodeIgniter
  - Implementing Context-based Routing (ICBR) or recommendation feature

Figure 1. Framework
1. Questionnaire and the distribution

2. Convergent validity testing [18]

\[ AVE = \frac{\sum_{i=1}^{n} L_i^2}{n} \]  

Where:

\( AVE \) = Average Variance Extracted

\( n \) = Number of indicators on the tested variable

\( L_i \) = Factor loadings/outer loading value

3. Discriminant validity testing

4. Composite reliability testing [18]

\[ CR = \frac{\left( \sum_{i=1}^{n} L_i^2 \right) \left( \sum_{i=1}^{n} e_i \right)}{\left( \sum_{i=1}^{n} L_i^2 \right) + \left( \sum_{i=1}^{n} e_i \right)} \]  

Where:

\( CR \) = Composite Reliability

\( n \) = Number of indicators on the tested variable

\( L_i \) = Factor loadings/outer loading value

\( e_i \) = Error value (1 - \( L_i^2 \))

5. R Square (\( R^2 \)) testing

\( R^2 \) is used as a benchmark for the value of the variance of a latent variable that is influenced by other latent variables [19].

6. Hypothesis testing

IV. DISCUSSION AND RESULT

The system was built following the Waterfall Methodology [20] and using the PHP programming language with the CodeIgniter framework. The system is divided into two websites, that is Singme. Provided web for customers (service users) and the Admin. Singme web for members (service provider) and administrators.

Figure 2. TAM Construct[17]

Figure 3. Recommendation results display based on CBF method

So based on the TF-IDF value of the five data, sorting is done in descending order and chooses the top 3 values, that is: Data 1, Data 2 and Data 3.
Figure 4. Homepage for the customers

Figure 4. is the homepage of the Singme system for the service users.

Figure 5. Dashboard page for the members

Figure 5. is the dashboard page of the Singme system for the service providers.

Figure 6. Report and statistics page for the members

Figure 6. is the report and statistics page of the Singme system for the service providers.

System testing using the EP method with a success rate of 100%, while system acceptance testing uses the TAM method with the assistance of the SmartPLS v3.2.9 data processing application.

Figure 7. TAM construct using SmartPLS v3.2.9

At the final phase of TAM testing, hypothesis testing will be conducted which includes several hypotheses such as:

H₁: Perceived Ease of Use influences Perceived Usefulness,
H₂: Perceived Ease of Use influences Attitude Toward Using,
H₃: Perceived Usefulness influences Attitude Toward Using,
H1: Perceived Usefulness influences Behavioral Intention To Use,
H5: Attitude Toward Using influences Behavioral Intention To Use, and
H6: Behavioral Intention To Use influences Actual System Use.

The entire testing phase will be described as follows:

1. Questionnaire and the distribution
   The weight of the questionnaire assessment uses a Likert scale [21], that is: 1 (strongly disagree), 2 (disagree), 3 (average), 4 (agree), and 5 (strongly agree). The distribution of the questionnaires through social media applications (LinkedIn, Instagram) and messenger applications (WhatsApp, LINE) by utilizing the snowball sampling method, which distributes questionnaires through parties or groups that are most aligned with the target population [22]. As a result, 122 respondents had filled out the questionnaire.

<table>
<thead>
<tr>
<th>Table 3. Questionnaire</th>
<th>Statement</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>User feel happy with Singme App</td>
<td>ATU-1</td>
</tr>
<tr>
<td>2</td>
<td>The Singme App has met the user’s expectations</td>
<td>ATU-2</td>
</tr>
<tr>
<td>3</td>
<td>The Singme App can be used properly and comfortably</td>
<td>ATU-3</td>
</tr>
<tr>
<td>4</td>
<td>With the Singme App, it's easier for the user to find or market music entertainment services</td>
<td>PU-1</td>
</tr>
<tr>
<td>5</td>
<td>In general, user think the Singme App has various benefits</td>
<td>PU-2</td>
</tr>
<tr>
<td>6</td>
<td>In general, user think the Singme App is easy to use</td>
<td>PEOU-1</td>
</tr>
<tr>
<td>7</td>
<td>In general, user think the Singme App is easy to understand</td>
<td>PEOU-2</td>
</tr>
<tr>
<td>8</td>
<td>With the Singme App, user’s goal to find or market music entertainment services can be fulfilled</td>
<td>PEOU-3</td>
</tr>
<tr>
<td>9</td>
<td>The Singme App has features that can help the user</td>
<td>BITU-1</td>
</tr>
<tr>
<td>10</td>
<td>With the Singme App, user can add skills and information related to music entertainment services</td>
<td>BITU-2</td>
</tr>
<tr>
<td>11</td>
<td>User can share the experiences of using the Singme App with others</td>
<td>BITU-3</td>
</tr>
<tr>
<td>12</td>
<td>In the future, user will try to use the Singme App again</td>
<td>BITU-4</td>
</tr>
<tr>
<td>13</td>
<td>User can use the Singme App according to the stages</td>
<td>ASU-1</td>
</tr>
<tr>
<td>14</td>
<td>User will use the features in the Singme App more often</td>
<td>ASU-2</td>
</tr>
<tr>
<td>15</td>
<td>User will repeatedly use the Singme App to search for or market music entertainment services</td>
<td>ASU-3</td>
</tr>
</tbody>
</table>

2. Convergent validity testing

<table>
<thead>
<tr>
<th>Table 4. The results of AVE</th>
<th>Variable</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Usefulness (PU)/X1</td>
<td>0.61</td>
<td></td>
</tr>
<tr>
<td>Perceived Ease of Use (PEOU)/X2</td>
<td>0.58</td>
<td></td>
</tr>
<tr>
<td>Attitude Towards Using (ATU)/Y1</td>
<td>0.61</td>
<td></td>
</tr>
<tr>
<td>Behavioral Intention to Use (BITU)/Y2</td>
<td>0.58</td>
<td></td>
</tr>
<tr>
<td>Actual System Use (ASU)/Y3</td>
<td>0.68</td>
<td></td>
</tr>
</tbody>
</table>

A variable can be said to be convergently valid if the AVE value ≥ 0.50 [18].

3. Discriminant validity testing

<table>
<thead>
<tr>
<th>Table 5. The results of Fornell-larcker Criterion</th>
<th>Variable</th>
<th>X1</th>
<th>X2</th>
<th>Y1</th>
<th>Y2</th>
<th>Y3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0.78</td>
<td>0.59</td>
<td>0.65</td>
<td>0.66</td>
<td>0.58</td>
</tr>
<tr>
<td>X2</td>
<td>0.59</td>
<td>0.76</td>
<td>0.78</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y1</td>
<td>0.65</td>
<td>0.62</td>
<td>0.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y2</td>
<td>0.66</td>
<td>0.67</td>
<td>0.76</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y3</td>
<td>0.58</td>
<td>0.57</td>
<td>0.68</td>
<td>0.72</td>
<td>0.82</td>
<td></td>
</tr>
</tbody>
</table>

Using the results of the Fornell-Larcker Criterion by comparing the square root value of the AVE of a latent variable with another, where the value must be the largest overall [18], then the variable can be said to be discriminately valid.
4. Composite reliability testing

The value of CR must be in the range 0.70 to 0.95, then the variable can be said to be reliable. In general, reliability testing uses Cronbach's Alpha values, however, CR is better than Cronbach's Alpha because CR can weigh individual indicators into its calculations [18].

5. R Square ($R^2$) testing

Based on the TAM construct, $X_2$ influences $X_1$ by 34.3%, $X_1$ and $X_2$ influence $Y_1$ by 50.7%, $X_1$ and $Y_1$ influence $Y_2$ by 56.1%, and $Y_2$ influences $Y_3$ by 52.3%. While the rest of the other influence percentage values are the influence of other variables that are not defined.

6. Hypothesis testing

Based on the table above, all hypotheses can be accepted because they have met the requirements that the value of t-statistic > t-table (1.981) and the p-value < 0.05, and is supported by the results of the R Square calculation where all the R Square value > 0.

V. CONCLUSION

Based on the results of system acceptance testing, it can be concluded that:

1. All Hypothesis can be accepted because they have met the requirements that the value of t-statistic > t-table (1.981) and the p-value < 0.05, and is supported by the results of the R Square calculation where all the R Square value > 0.

2. The system helps service providers in marketing their services which can be interpreted by the PU variable. Where according to the results of hypothesis testing, $H_4$ can be accepted with a PEOU influence value of 34.3%.

3. The system can provide service package information and provide recommendations using the CBF method. This is represented by the BITU variable, which according to the results of hypothesis testing $H_4$ and $H_5$, can be accepted with the influence value of PU and ATU of 56.1%.

4. The system can facilitate the transaction process of both parties represented by the ASU variable. Where according to the results of hypothesis testing, $H_6$ can be accepted with the BITU effect value of 52.3%.
REFERENCES


**BIOGRAPHY**

**Ivander Darmawan**, currently working as a Programmer at PT. KlipPlastik Indonesia and has completed his Bachelor studies in the field of Information System with a GPA of 3.91 at Buddhi Dharma University in 2022.

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