

Selection Platform Music Service Cloud with Simple Multi-Attribute Rating Technique – User Service Application (SMART ALP)

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Abstract

SMART is a popular Multi-Criteria Decision Making (MCDM) method that helps make accurate decisions to solve problems and choose the best decision using a linear additive model to generate values for various alternatives. The SMART ALP used in this study is a development of the SMART method by providing three additional dimensions, application, service, and user, to emphasize the correlation with the corridors of the cloud music service Platform. The object of research: (1) Apple Music, (2) Deezer, (3) iHeartRadio, (4) JOOX, (5) Melon, (6) NetEase Cloud Music, (7) Qobuz, (8) SoundCloud, (9) Spotify, (10) Tidal, (11) TuneIn, and (12) YouTube Music. Convenience criteria and playlist management with 60.4% (29 of 48 respondents) and 58.3% (28 of 48 respondents) responses, respectively. Performance criteria and simplicity with 66.7% (32 of 48 respondents) and 68.8% (33 of 48 respondents) responses, respectively. Music quality criteria with an answer of 93.8% (45 out of 48 respondents). The study results show that Spotify, YouTube Music, Joox, Apple Music, and SoundCloud are the five best cloud music service Platforms with a total score of 8422 points, respectively, YouTube Music 6483 points, and Joox 3824 points, Apple Music 2039 points, and SoundCloud 1275 Points.

Keywords: Cloud music services, Music Platforms, Selection, Simple Multi-Attribute Rating Technique (SMART)

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1. Introduction

From a historical point of view, Music's production, distribution, circulation, and consumption underwent many changes and featured various interactions between artists, instruments, and consumers (Simon, 2019). Music and musical experiences are shared universally ((Sèves, 2013); (Wolff, 2015)) but are dependent on evolving consumption patterns, different forms of production and patronage, and the continued creation of instruments, about 12,000 (of whom 10,000 are non-European) according to The New Grove dictionary of musical instruments (Sadie, 1984).

How Music is stored, distributed, accessed, and perceived has changed rapidly in the last two decades. Music devices Portable, such as iPods and smartphones, have become increasingly common. While some users store music files on their home devices, others upload them to or purchase them directly on online storage services. Other users shun ownership entirely in favour of streaming media like Spotify and Pandora. Along with this change is a shift in the way listeners access and organize their music collections—a shift influenced and complicated by the content industry's move to a new paradigm of cloud-based digital media (Lee et al., 2017).

One of them is Music as a Service (MaaS). The current source of MaaS revenue is a combination of ad-based financing and a model referred to as "freemium." In freemium, it can use the service for free or with a paid subscription to get a premium. In the case of MaaS, the free version is also financed by advertising (Doerr et al., 2010). With so many subscription-based music services offering more Music than they can listen to in a lifetime, how do people choose the Platforms they use? If they use more than one Platform, what factors determine that?

Composite indicators are increasingly being recognized as valuable tools in policy analysis and public communication by providing simple unit comparisons that it can use to describe the complexities of our dynamic

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environment in areas such as competitiveness, governance, environment, press, development, peace, tourism, economy, university, etc. Composite indicator construction has been tackled from several angles. Several authors claim that the Multi-Criteria Decision Making (MCDM) technique is particularly suitable in a multidimensional framework when combining single indicators into a single composite because this process involves making choices when combining criteria of different nature and requires several steps in which decisions have to be made (El Gibari et al., 2019).

According to (Samudaya Nanayakkara et al., 2021) Simple Multi-Attribute Rating Technique (SMART) is a popular MCDM method that helps accurate decision-making to solve problems and choose the best decisions. SMART uses a linear additive model to generate values for various alternatives. In this method, each choice is evaluated by obtaining the assessed criteria and determining the weight of the selected criteria to determine the best option. Due to the simplicity of the method, uncomplicated calculations, and many other reasons, many studies have used SMART as a suitable MCDM method in decision making.

This study aims to understand how users choose and access Platforms music service cloud, both on devices and streaming. Based on the reasons and research opportunities that form the background of the research, the main problem to be solved through this study is how to analyse the 36 Platforms music service cloud. To clarify in more detail the formulation of the problem formulated, the research questions posed in this study are described as follows:

1. How do users choose the Platform to be used, and what factors motivate their decisions?
2. Music services cloud, and what are the main concerns of users?
3. What are the features of the Platform that have a positive influence on the quality of service aspect?
4. What are the features offered by each Platform?

So that the writing of this research can be more focused and focused and does not expand beyond the existing discussion, the following research limits are given. The questionnaire was distributed to the audio lover community on Facebook. Platform music service cloud used comes from technology articles published by Wired (Jancer, 2021), CNet (Pendlebury, 2021), Pcmag (Wilson, J. L, 2021). Based on these articles, 36 Platforms music service cloud were in this study, namely: 1) AccuRadio, 2) Amazon Music, 3) Anghami, 4) Apple Music, 5) Bandcamp, 6) Deezer, 7) Gaana, 8) hoopla, 9) iHeartRadio, 10) Jango, 11) JOOX, 12) KKBOX, 13) Line Music, 14) LiveXLive, 15) Melon, 16) MOOV, 17) Music Choice, 18) MyTuner Radio, 19) Napster, 20) NetEase Cloud Music, 21) Pandora, 22) Patari.pk, 23) Qobuz, 24) QQ Music, 25) ROXI, 26) JioSaavn, 27) Sirius XM, 28) SoundCloud, 29) Spotify, 30) Stingray Music, 31) Tidal, 32) TuneIn, 33) Boomplay, 34) Tunezeal, 35) Wolfgang's, and 36) YouTube Music.

2. Materials and Methods

This study introduces a model for the selection Platform music service cloud. There are three stages of research carried out in this study. First, identification and evaluation Platforms music service cloud, namely identifying Platforms music service cloud that will be the object of research. Second, ranking Platforms music service cloud, namely conducting the process of selecting, assessing, and ranking Platforms music service cloud using the SMART method. The ranking Platforms music service cloud carried out in four stages, identifying alternative options, identifying criteria, determining the weight of the criteria, and assessing each Platform music service cloud. Third, evaluate Platform music service cloud selected Figure 1 is a road map that serves as a reference in conducting this study.

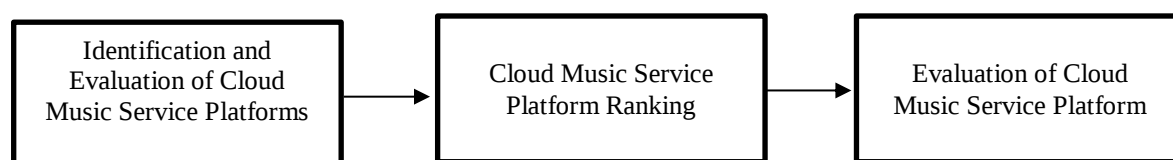


Figure 1. Research roadmap

2.1 Identification of the Cloud Music Service Platform

The first step is to identify the type of cloud music service Platform that exists. From the identification results, 36 Platforms were taken that will be the object of research in this study, namely: 1) AccuRadio, 2) Amazon Music, 3) Anghami, 4) Apple Music, 5) Bandcamp, 6) Deezer, 7) Gaana, 8) hoopla, 9) iHeartRadio, 10) Jango, 11) JOOX, 12) KKBOX, 13) Line Music, 14) LiveXLive, 15) Melon, 16) MOOV, 17) Music Choice, 18) MyTuner Radio, 19) Napster, 20) NetEase Cloud Music, 21) Pandora, 22) Patari.pk, 23) Qobuz, 24) QQ Music, 25) ROXI, 26) JioSaavn, 27) Sirius XM, 28) SoundCloud, 29) Spotify, 30) Stingray Music, 31) Tidal, 32) TuneIn, 33) Boomplay, 34) Tunezeal, 35) Wolfgang's, and 36) YouTube Music.

2.2 Ranking of Cloud Music Service Platforms

The results of the identification of Platforms that have been carried out will be the basis in the process of ranking the appropriate cloud music service Platforms to provide an overview of the popularity of each Platform. This process is carried out using the SMART ALP method.

2.2.1. Identification of Alternative Options

There are 36 current cloud music service Platforms have been identified. The assessment criteria are divided into three dimensions, namely, (1) Applications, (2) Services, and (3) Users.

2.2.2 Identification of Criteria

The second necessary step is to identify the criteria, which will be used to evaluate the alternative options identified in the first step. The criteria identified are listed in Table 3. However, too many criteria make evaluation of alternatives difficult. (Barfod & Leleur, 2014) argue that fifteen is too much, even eight is big enough. Furthermore, (Barfod & Leleur, 2014) states that if the weight given to each criterion is less than the criteria can be omitted. The reduction of criteria is carried out at the next stage, namely at the stage of giving weight to each criterion.

2.2.3 Determining Criteria Weights

This step is carried out to assign appropriate weights to each of the previously identified criteria. The weighting for each criterion was given by Mr. Glenn Latuheru and Mr. Ardian Septa Nugraha as resource persons. The resource persons were asked to fill out a score sheet containing a list of 36 cloud music service Platforms that were the object of this study's research along with the assessment criteria. The criteria that serve as indicators for the assessment Platforms music service cloud are listed in Table 1.

The weighting results are used to obtain the final criteria that will become indicators Platform music service cloud to determine the level of popularity of a Platform. Some of the things that were taken into consideration by the speakers in giving weight to each criterion were audio quality, support on various Platforms, easy to use, and the playlist. Table 1 presents the results of the weighting of each criterion.

Resource persons carry out the weighting using a level-of-importance. The criteria that are considered the most important owned by a Platform have the highest value. Criteria that have a value of less than 8 are considered not too important to be owned by a Platform music service cloud so that they will be eliminated in the next process, namely the assessment of each Platform based on the final criteria identified. Table 2 describes the final criteria that are indicators of the assessment of each Platform music service cloud.

2.2.4 Ranking of Cloud Music Services Platforms

Considering the quality of each Platform music service cloud, each criterion will be assigned a value. The weight of each criterion is given by considering each Platform. Resource persons give weight to each criterion. Furthermore, the criteria that have a weight of less than 8 will be eliminated so as to produce the final criteria used in the assessment Platforms music service cloud. (Samudaya Nanayakkara et al., 2021) After calculating the total score, Platforms music service cloud were ranked to identify the most popular Platforms among Platforms.

To calculate the value of the criteria, a survey was conducted on 13 respondents who have used cloud music service applications for at least two years by providing a questionnaire containing questions regarding the criteria for choosing a cloud music service and the advantages and disadvantages of the cloud music service being used. Of the thirteen respondents, the average value of the criteria was calculated so that the final value of a criterion was calculated. The value is calculated by the formula 4:

$$m_{d,k} = \frac{\sum_{j=1}^R \sum_{d=1}^3 \sum_{k=1}^n RX_{d,k}}{R} \quad (4)$$

Description:

m = average value of criteria,
d = dimensional serial number,
k = order number criteria,
j = serial number of respondents,
R = number of respondents,
N = number of criteria on a dimension,
RX = value of criteria by respondents.

Table 1. The results of the weighting of the initial criteria

Dimensions	Criteria	Weighting
D1	K1.1	8.5
	K1.2	6
	K1.3	8
	K1.4	9
	K1.5	8.5
	K1.6	7
D2	K2.1	6.5
	K2.2	6,5
	K2.3	8.5
	K2.4	8
	K2.5	8.5
	K2.6	6.5
	K2.7	6
	K2.8	8
D3	K3.1	8
	K3.2	8
	K3.3	6.5
	K3.4	8.5
	K3.5	8.5
	K3.6	9
	K3.7	7
	K3.8	6.5
	K3.9	7

Next to find out the final value of a Platform music service cloud as illustrated in Table 2, the formula 1:

$$NY_j = \sum_{i=1}^n NX_{j,i} \quad (2)$$

Description:

NY = final value of a dimension,
NX = final value of a criterion,
i = serial number of criteria,
j = Serial number of dimensions.

Table 2. Final criteria for evaluating cloud music service Platforms

ID	Dimensions	Criteria	Code	Weight
D1	Application	Simplicity	K1.1	8.5
		Level of support	K1.2	8
		Performance	K1.3	9
		Security	K1.4	8.5
D2	service	Music quality	K2.1	8,5
		Distribution channels	K2.2	8
		Mobile apps	K2.3	8.5
		Personalization	K2.4	8
		convenience	K3.1	8
D3	User	Accessibility	K3.2	8
		Use across devices	K3.3	8.5
		User interface navigation	K3.4	8,5
		Create and use playlists	K3.5	9

Then to get the total value of a Platform illustrated in Table 3, formula 2 is used:

$$NP = \sum_{j=1}^m NY_j \quad (3)$$

Description:

NP = the final value of a Platform,

NY = the final value of a dimension,

j = the serial number of the dimensions.

Table 3. Overview of the final assessment of the cloud music service Platform

Platform	...
Dimensions	dimension
D1	...
D2	...
D3	...
Platform value	...

After obtaining the value of each Platform, next yes, the ranking process is carried out. The ranking simulation is shown in Table 4.

Table 4. The description of the ranking of cloud music service Platforms

	Dimension D1	Dimension D2	Dimension D3	Total	Rank
Platform ...					

2.3 Evaluation of Cloud Music Service Platform

After getting Platform music service cloud most popular review detailed of the Platform. exploration of detailed features, services, user experience, and other related aspects.

2.4 Methodology Validation

The methodology introduced in this study requires review and exploration of the specific Platform selected through SMART ALP. Validation of the assessment criteria for the Platform music service cloud carried out by Mr. Glenn Latuheru, manager of a music school (sinfonia music school), violin teacher, owner of sinfonia music shop, portable audio reviewer and Mr. Ardian Septa Nugraha, IT Security Engineer. The division of tasks was carried out with Mr. Glenn giving an assessment that focused on the quality of the music provided. Meanwhile, Mr. Ardian gave an assessment that focused on aspects other than the quality of the music.

As for the validation of the top three Platforms music service cloud results of the selection using SMART ALP were fully carried out by Mr. Glenn due to his more suitable background. This process is carried out to get justification from the expert's point of view. In addition, it is also to see whether the Platform that occupies the top three positions from the SMART selection results is in accordance with the thoughts and experiences of the informants.

3. Results And Discussion

3.1. Data Collection

The data collection process was carried out by giving questionnaires to respondents. The questionnaire was distributed to the audio lover community on Facebook. However, out of a total of 76 thousand community members, questionnaire only 48 respondents returned to the Respondents were asked to answer several questions related to cloud that they have used, are currently, or plan to use. Based on the results of the questionnaire, a list Platforms music service cloud that are common or popular among respondents is obtained. The list of Platforms is listed in Table 5. While the other 24 Platforms did not receive a response, therefore these Platforms will be eliminated in the results and discussion section.

Table 5. Selection for each cloud music service Platform

No	Platform	Number of Responses
1	Apple Music	8
2	Deezer	3
3	iHeartRadio	2
4	Joox	15
5	Melon	1
6	NetEase Cloud Music	2
7	Qobuz	1
8	SoundCloud	5
9	Spotify	37
10	Tidal	4
11	TuneIn	1
12	YouTube Music	26

3.2. Rating of Each Platform

After obtaining a list Platforms, an assessment is carried out based on predetermined criteria. There are 13 criteria which are divided into three dimensions, namely: application, service, and user dimensions. The application dimension has the criteria of simplicity, level of support, performance, and security. The service dimension has criteria for music quality, distribution channel, mobile application, and personalization. The user dimension has criteria for convenience, accessibility, usage across devices, user interface navigation, and creating and organizing playlists.

The assessment was carried out by respondents giving scores against each criterion for each Platform that became preference. Furthermore, the value of the respondent is combined with the weight of the criteria previously determined by the resource person.

3.2.1. Apple Music

Table 6. The final results of the apple music assessment Apple Music

Platform	Apple Music
The <i>Dimensions</i>	The final value of the dimension
(D1) Application Dimension	654
(D2) Service Dimension	580
(D3) User Dimension	805
Platform value	2039

3.2.2. Deezer

Table 7. Final result of deezer

Platform	Deezer
Dimension	The final value of the dimension
(D1) Application dimension	245
(D2) Service dimension	218
(D3) User dimension	302
Platform value	765

3.2.3. iHeartRadio

Table 8. The final result of iHeartRadio

Platform	iHeartRadio
Dimension	The final value of the dimension
(D1) Application Dimensions	163
(D2) Service Dimensions	145
(D3) User Dimensions	201
Platform value	510

3.2.4. Joox

Table 9. The final result of the Joox

Platform	JOOX
Dimension	The final value of the dimension
(D1) Application Dimension	1226
(D2) Service Dimension	1088
(D3) User Dimension	1510
Platform value	3824

3.2.5. Melon

Table 10. Final results of Melon

Platform	Melon
Dimensions	The final value of the dimension
(D1) Application Dimensions	82
(D2) Service Dimension	73
(D3) User Dimension	101
Platform value	255

3.2.6. NetEase Cloud Music

Table 11. Final score of NetEase Cloud Music

Platform	NetEase Cloud Music
Dimension	The final value of the dimension
(D1) Application Dimension	163
(D2) Service Dimension	145
(D3) User Dimension	201
Platform value	510

3.2.7. Qobuz

Table 12. The final result of the Qobuz

Platform	Qobuz assessment
Dimension	The final value of the dimension
(D1) Application Dimension	82
(D2) Service Dimension	73
(D3) User Dimension	101
Platform value	255

3.2.8. SoundCloud

Table 13. Final soundcloud assessment results

Platform	SoundCloud
Dimensions	The final value of the dimension
(D1) Application Dimension	409
(D2) Service Dimension	363
(D3) User Dimension	503
Platform value	1275

3.2.9. Spotify

Table 14. Final Spotify Assessment Results

Platform	Spotify
Dimension	The final value of the dimension
(D1) Application Dimension	2669
(D2) Service Dimension	2119
(D3) User Dimension	3633
Platform value	8422

3.2.10. Tidal

Table 15. Final assessment result of Tidal

Platform	Tidal
Dimension	The final value of the dimension
(D1) Application dimension	327
(D2) Service dimension	290
(D3) User dimension	403
Platform value	1020

3.2.11. TuneIn

Table 16. TuneIn assessment result

Platform	TuneIn
Dimension	The final value of the dimension
(D1) Application dimension	82
(D2) Service dimension	73
(D3) User dimension	101
Platform value	255

3.2.12. YouTube Music

Table 17. The final assessment result of youtube music

Platform	YouTubeMusic
Dimension	The final value of the dimension
(D1) Application Dimension	2124
(D2) Service Dimension	1742
(D3) User Dimension	2617
Platform value	6483

3.3. Determining the Ranking of the Cloud Music Service Platform

After the final score for each Platform is obtained, then ranking is carried out to get Platform based on respondents' ratings. The results of the assessment Platforms music service cloud presented in Tables 71, 72, 73, and 74. Table 71 presents the results of the overall ranking Platforms music service cloud. Then Tables 72, 73, and 74 present the

ranking results based on dimensions. The Platform with the highest score will get the highest ranking. Other hand, the Platform with the lowest score will get the lowest ranking. Ranking is done by calculating the Platform based on the final dimension value using the formula 3:

$$NP = \sum_{j=1}^m NY_j \quad (3)$$

Information:

NP = the final value of a Platform,
 NY = the final value of a dimension,
 j = dimensional serial number.

Table 18. Platform ranking results cloud music service

Platform	Dimensions			Total	Rank
	D1 Application	D2 Service	D3		
Apple Music	654	580	805	2039	4
Deezer	245	218	302	765	7
iHeartRadio	163	145	201	510	8
Joox	1226	1088	1510	3824	3
Melon	82	73	101	255	10
NetEase Cloud Music	163	145	201	510	8
Qobuz	82	73	101	255	10
SoundCloud	409	363	503	1275	5
Spotify	2669	2119	3633	8422	1
Tidal	327	290	403	1020	6
TuneIn	82	73	101	255	10
YouTube Music	2124	1742	2617	6483	2

Table 19. Platform ranking results based on application dimensions

Platform	D1 Apps	Rank
Apple Music	654	4
Deezer	245	7
iHeartRadio	163	8
Joox	1226	3
Melon	82	10
NetEase Cloud Music	163	8
Qobuz	82	10
SoundCloud	409	5
Spotify	2669	1
Tidal	327	6
TuneIn	82	10
YouTube Music	2124	2

Table 20. Platform ranking results at form by service dimensions

Platform	D2 Service	Rank
Apple Music	580	4
Deezer	218	7
iHeartRadio	145	8
Joox	1088	3
Melon	73	10
NetEase Cloud Music	145	8
Qobuz	73	10
SoundCloud	363	5
Spotify	2119	1
Tidal	290	6
TuneIn	73	10
YouTube Music	1742	2

Table 21. Platform ranking results based on user dimensions

Platform	D3 Users	Rank
Apple Music	805	4
Deezer	302	7
iHeartRadio	201	8
Joox	1510	3
Melon	101	10
NetEase Cloud Music	201	8
Qobuz	101	10
SoundCloud	503	5
Spotify	3633	1
Tidal	403	6
TuneIn	101	10
YouTube Music	2617	2

Based on Table 18, Spotify, YouTube Music, JOOX, Apple Music, and SoundCloud are in the top five Platforms music service *cloud*. With a value of 8422 points, 6483 points, 3824 points, 2039 points, and 1275 points, respectively. The five Platforms also rank the same in the ranking process based on the dimensions presented in Tables 19, 20, and 21. Table 19 presents the results of ranking Platforms based on application dimensions, Table 20 presents ranking results based on service dimensions, and Table 21 presents ranking results based on user dimensions.

While the other 24 Platforms, namely: (1) AccuRadio, (2) Amazon Music, (3) Anghami, (4) Bandcamp, (5) Gaana, (6) hoopla, (7) Jango, (8) KKBOX, (9) Line Music, (10) LinuXLive, (11) MOOV, (12) Music Choice, (13) MyTuner Radio, (14) Napster, (15) Pandora, (16) Patari.pk, (17) QQ Music, (18) ROXI, (19) Jio Saavn, (20) Sirius XM, (21) Stingray Music, (22) Boomplay, (23) Tune Zeal, and (24) Wolfgang's could not be assessed because they did not get a response from the respondents. This happens because the respondents have never used or do not have brand awareness of the Platform.

Furthermore, the Platforms that occupy the top three positions, namely: Spotify, JOOX, and YouTube Music, will be validated by sources. This is to find out how far the ranking results that have been carried out using the SMART ALP method are in accordance with the thoughts of the informants on each of Platforms top five.

3.3.1. Decisions in Platform Selection and Factors That Motivate Respondents

The section will answer the research question 1: “How do users choose *the* Platform to be used, and what factors motivate their decisions.” The factors that are considered by respondents in choosing Platform music service *cloud* that will be or are being used: from the user dimension, convenience criteria and playlist management became the most important factors in choosing *a* Platform with a response value of 60.4% (29 of 48 respondents) and 58.9% (28 of 48 respondents). From the application dimension, performance criteria and simplicity became the most important factors in choosing *a* Platform with response values of 66.7% (32 of 48 respondents) and 68.8% (33 of 48 respondents). From the service dimension, music quality criteria became the most important factor in choosing a Platform with a response value of 93.8% (45 out of 48 respondents).

3.3.2. Weaknesses of current music management applications (including cloud music services), and the main concern of users

The section will answer the research question 2: “Music services *cloud*, and what are the main concerns of users?.” Based on the responses from the respondents, the factors that become their main concern which are the weaknesses Platform music service *cloud* are: too long and duration or too frequent ad frequency in free mode, the need for audio quality improvement and the choice of audio quality level, The interface navigation is expected to be able to be applied when the music is on and by displaying song lyrics on the screen bar, applications that suddenly crash, large storage requirements, AI capabilities that are still lacking in providing song recommendations, song collections from certain segments (example: indie) which is still lacking, and too many extra features beyond music.

Based on the results of these responses, it can be concluded that most of the weakness factors of Platform music service *cloud* current meanwhile, from the service dimension, the number and frequency of advertisements in free mode and audio quality are the main concerns of respondents.

3.3.3. Identified cloud music service Platform features have a positive influence on service quality aspects

The section will answer the research question 3: “what are the features of the identified cloud music service Platform that have a positive influence on the quality of service aspect?”. Criteria selection that serve as indicators for evaluating Platform music *cloud*, namely music quality, distribution channels, mobile applications, and personalization. As many as 45 out of 48 respondents or 93.8% chose music quality as a feature of Platform music service *cloud* which has a positive influence on aspects of service quality. On the other hand, only 20.8% or ten out of 48 respondents chose the personalization feature as a feature that has a positive aspect to the quality of *cloud*.

Respondents also think that Platform music service *cloud* has too many features that are not related to or outside of music. They hope that in the future the developers of Platform music service *cloud* current As well as limiting or reducing features that are not related to music.

3.3.4. Features offered by each available cloud music service Platform

The section will answer the research question 4: “what features does each of the available cloud music service Platforms offer?”. Apple Music (Kabir, K, 2021), in terms of applications, offers various device features, view album information for currently playing songs, view artist information, access explicit songs, storage, sort songs by criteria, shuffle and repeat mode, like songs, EQ adjustment, discover new music, search for music by genre, In terms of services, it offers features for listening to music offline, viewing music offline, integration with Shazam, Siri integration, and lyrics. Deezer (Kabir, K, 2021) in terms of application, offers simple, neat, and reliable performance features. In terms of services, it provides features from audio formats to hi-fi, integration on various devices, and spatial audio on multiple devices. From a user perspective, it offers an extensive song catalogue feature.

Joox (S Lim, 2020) in terms of services, offers multi-Platform personalization based on location and local channels. In terms of applications, it provides offline and karaoke features. In terms of users, it offers features to watch live broadcasts, share a collection of favourite songs, and create live broadcasts and lyrics.

SoundCloud (Sargent, 2017), in terms of services, offers features for storing audio and music and uploading and podcasting. In terms of applications, it provides elements of Platform open and transparent Platforms for music offline. From a customer perspective, it offers communication features between artists and fans.

Spotify (Svetlik, 2021), in terms of service, offers a choice of audio quality levels, low (24kbps), medium (96 kbps), high (160 kbps) or very high (320 kbps), offline, multi-Platform, integration with multiple devices, create playlists, search by filters, personalize playlists according to your music listening habits, and listen to podcasts. In terms of the application, it offers features of transferring music from other services, statistical data, setting the queue of songs playing, searching for favourite songs from a personal catalogue, keyboard shortcuts, building a private record, and adding pieces that are not yet available on Spotify, recovering deleted playlists, and other options. Clear song filters.

In terms of service, YouTube Music (Langridge, 2020) offers features for personalizing music from selected artists, audio quality level options from low, medium, high, and consistently high, and audio quality level options based on an internet connection offline, and multi-Platform. The application features the most extensive collection of catalogues (including music, official artist remixes, and covers), worldwide access available, restricted modes to reduce explicit songs, and simple design. From the customer point of view, it offers user data transfer features from discontinued playlists and stations, likes music, personal playlists, playlists by category, and mode switching from song to video.

3.4. Evaluation

In this section, a review process is carried out on selected cloud music service Platforms, especially Platforms that occupy the top 3 positions, namely: Spotify, YouTube Music, and JOOX. The three Platforms are evaluated by seeking further information regarding each Platform based on news, articles, or research papers.

3.4.1. Spotify Based

On the ranking results Platforms music service cloud using the SMART method and Table 71, it can conclude that Platform is the best Platform chosen by the respondents with the highest score of 8422 points. After further review, Spotify provides the most features compared to other cloud music service Platforms currently available. There are about 33 features (Svetlik, 2021) offered by Spotify in terms of services, applications, and customers. Spotify was founded on April 23, 2006, in Stockholm, Sweden, with Daniel Ek as CEO and co-founder and Martin Lorentzon as co-founder. Statistical data (Iqbal, 2021) shows that in 2020 Spotify has recorded a revenue of 7.85 billion euros with an operating loss of 581 million euros. In terms of users, Spotify is a Platform music service cloud worldwide, with 365 million people using the application once a month, and 165 million of them are customers. Based on the region of Spotify users, in 2021, there will be 121 million users in Europe, 85 million users in North America, 78 million users in Latin America, and 71 million subscribers in other regions. As for subscribed users, in 2021, there will be 66 million users in Europe, 48 million in North America, 33 million in Latin America, and 18 million on other regions.

Compared to the number of users of Platforms music service cloud, namely Apple Music, Amazon Music, and YouTube Music, from 2016 to 2020, the number of Spotify users experienced a significant increase. In 2016 Spotify had 36 million users, apple music had 20 million users, amazon music had 8 million users, and youtube music had 3 million users. In 2017 Spotify had 59 million users, Apple Music had 27 million users, Amazon Music had 16 million users, and YouTube Music had 2.8 million users. In 2018 Spotify had 83 million users, apple music had 40 million users, amazon music had 24 million users, and youtube music had 10 million users. In 2019 Spotify had 108 million users, apple music had 50 million users, amazon music had 32 million users, and youtube music had 18 million users. In 2020 Spotify had 138 million users, apple music had 72 million users, amazon music had 55 million users, and youtube music had 30 million users. Spotify has more than 70 million songs, with 60 thousand pieces added daily. For podcasts, Spotify has a catalogue of 2.9 million podcasts.

However, the Spotify application still has shortcomings in terms of user experience. A study conducted in 2020 (Assefa, 2020) which discussed the Spotify user experience, showed that users did not like the personalization feature of the playlists created automatically by the application. Users want better personalization features. In addition to the playlist personalization feature, the ease of exploring new music is also less of a value than Spotify. Many users are using other Platforms as a companion to Spotify, such as YouTube Music and SoundCloud. Users say that exploring new music is easier on youtube music or Soundcloud. However, there is some music released exclusively on both Platforms. Then another factor that is of concern to Spotify users is their need to create playlists that can be done based on the criteria of similarity in music/vibe and find new music that suits their preferences. Due to the current

condition, sorting the piece in the user's song collection and on Spotify takes a long time. The song recommendations provided by Spotify do not always match the user's preferences.

3.4.2. YouTube Music

YouTube Music was announced in 2018, streaming a relatively new music. With YouTube Music, users can listen to official songs, albums, playlists, radio artists, remixes, live versions of songs, and watch music videos. Services Premium is also available to remove ads, allow users to listen in the background on mobile devices (so users can exit the app and continue listening) and allow downloading songs for offline playback (Langridge, 2020).

In recent months, YouTube Music has seen a lot of tweaks that improve the app but don't fundamentally change the experience (Li, 2021). Highlights are below, and this is a positive development from the YouTube Music team. The continuous change in recent months has shown users that streaming services are still being developed with a focus on improving usability. While most don't expect a radical update, the lack of communication calls into question Google's commitment. 1) Users of Smart TVs or game consoles other than Android TV can now enjoy an improved audio player interface that offers a clearer view of tracks with album art. 2) Premium users who listen to YouTube Music on Sonos speakers can now start listening to radio stations based on songs in the Sonos app. Doing so is easy. Select an option from the three-dot menu (aka Info View) from the Browse or Now Playing in the Sonos app. 3) Mod Mixes will now incorporate a more detailed analysis of music history to find the most suitable content for Mixes. This means Mixes (including Supermix + Clustered Mixes) will better reflect users' musical tastes. 4) If a user uses YouTube Music to listen to songs from India or Brazil – where user-generated content (UGC) is viral – one will see how radio song recommendations will now include UGC. We do this to display the desired, high-quality content (which is unique to the region). Note – UGC content from the other areas is still filtered in song radio recommendations.

Unlike other streaming Platforms, audio customization is limited (L, 2021). There is an EQ option under settings, but it depends on the user's phone sound quality options. For example, the Samsung Galaxy S10e allows users to activate Dolby Atmos and choose between dubious EQ pre-sets. Users can't create custom EQs for YouTube Music. When it first announced the service, there was no official documentation on the sound quality, but it has since been added to the YouTube Music help page. Users can choose between several different sound quality settings:

- Low: 48 kbps AAC (uses the minor data).
- Normal: 128 kbps AAC (default setting).
- High: 256 kbps AAC (highest quality setting).

Always high: 256 kbps AAC (maintains this even when the connection is terrible). (Wagoner, A, 2020) Spotify has over 50 million songs in its catalogue. While YouTube Music doesn't provide exact numbers for the songs in its catalogue, that's fine as it will only count official songs that YouTube Music performs through its deals with record labels. And there are many more YouTube Music options besides that. YouTube Music has official songs and albums from record labels but also offers official music and live concert videos. Both Spotify and YouTube Music have lyrics available for some songs. Not every piece on either service will show it, but the latter also has the option to view the music video for the song. While a song is playing, if available, you can select the video at the top of the screen to jump to the exact spot in the music you're currently playing in the video — then jump right back to the song with just one tap. In short: Spotify may have more official songs, but YouTube has far more actual music available to listen to.

3.4.3. JOOX

The music streaming service owned by Chinese entertainment giant Tencent, Joox launched in 2015, racked up more than 50 million downloads in 2017 and recorded more than two billion streams in the same year (S Lim, 2020). Its audience base primarily comprises users from Asia (excluding China) - particularly in Hong Kong, Indonesia, Malaysia, Myanmar and Thailand. The Platform has also established a presence in South Africa, the brand's first non-Asian market. Available as an app accessible from both mobile and desktop, the Platform is a freemium service with a library of around 30 million free songs, some of which are only available to premium users. There is a wide variety of songs available in multiple languages to cater to the local market, apart from English songs. To appeal to users' different tastes and preferences, Joox has initiated innovative partnerships in certain Asia Pacific markets. For example, since 46.1% of music streaming users in Malaysia use Joox, the Platform announced the launch of Joox Originals in the country in 2020. The Platform is the largest music streaming app in Thailand, Hong Kong, Malaysia and Indonesia. It accounts for more than half market share in Thailand (56%) and Hong Kong (54.7%), showing significant scale and growth in the short time since launch in January 2015. (Lin, L, Yun-Hee, 2016) Number of

music streaming users in Hong Kong, Macau, Malaysia, Thailand, Myanmar and Indonesia are expected to reach 87 million by 2020.

JOOX allows users to find a diverse and complete music collection compared to other streaming music applications (Halim, 2015). Users can find all favourite artists, tracks and genres. On JOOX, there are Top Charts, Top Downloads, New Releases, Recommended, Feature Artists, Radio, Editor's Picks, Hot Genres, Hot Tracks, and Local Flavours. These features are beneficial for music lovers as they will find more songs all over the world. Users can stay up to date with music with the New Releases feature. If users are confused about finding songs, users can use the JOOX Radio feature to explore songs chosen by professional editors. feature of JOOX eye-catching is Lyrics.

Lyrics are helpful for people who love Karaoke and sometimes forget the lyrics of the song they are listening to. How Lyrics work is by highlighting each phrase individually. JOOX's user interface is not monotonous. There is a theme gallery where users can choose the preferred theme. Users can set a timer for the playlist so that JOOX will stop playing songs. This feature is useful for people who fall asleep while listening to music. Not only the songs that users can play but also the music videos. Users can access music videos for free but need a faster internet connection for a smoother experience.

3.5. Validation

This validation process is carried out on Platforms that occupy the top three positions, namely Spotify, YouTube Music, and JOOX. This is also in line with the opinion of the informant who said that for now the three applications are the applications that are most often used. The assessment of the three is carried out using the premium in order to assess all the features offered, because in the free version of each Platform there are several limitations that can reduce the credibility of the validation results. The validation was fully carried out by one of the speakers, namely Mr. Glenn because of his background in the music world. The resource persons validated from three aspects, namely: subscription packages, features offered and audio quality. Broadly speaking, from the number of songs, Spotify has the highest number of songs, followed by YouTube Music and JOOX, which are considered to have the least number of songs from the top three Platforms. However, for local Indonesian songs, JOOX has a large collection of songs.

3.5.1. Spotify

From the subscription plans spotify offers the most diverse subscription plans. There are three types of basic subscription packages, consisting of student personal premium, family premium, and premium. In addition to the three basic packages, Spotify also offers subscription packages whose payments can be made in terms of per day, per month, per three months, per six months, and per year. This is what makes Spotify unique in terms of ease of subscription compared to Platforms.

Spotify has the advantage of an algorithm, the more often users listen to songs, spotify will know the types of songs that are often listened to and will provide song recommendations according to the style or pattern genre song that the user hears. This algorithm will generate an automatic playlist that is given a name or title according to the type of song that the user often listens to (eg daily mix 1, daily mix 2, etc.). On Spotify, users can also use third-party applications such as Musixmatch, which can display song lyrics.

Then on audio quality, the highest level that is owned by spotify is "Very High" with 320kbps MP3 format. Although the specifications are very good, the interviewees considered that spotify is one of the Platforms at the lowest level for audio quality. Although the interviewees emphasized that this goes back to the preferences of each user. Clarity, detail, and resolution are audio criteria which according to sources are the weaknesses of Spotify. This deficiency is more clearly felt when listening to songs that have high frequencies such as the sound of guitar strumming in acoustic songs that sound less "clean". Then gain / power is a little weak so it makes the song seem to have a small volume.

3.5.2. YouTube Music

YouTube Music offers 3 types of subscription packages, namely: family individual premium, premium, and premium student. Unfortunately, the three packages only have one payment option which is done on a monthly basis.

YouTube Music has the advantage that users can choose to see official videos from their favourite artists or only listen to the audio. Then the search system, according to sources, is a Platform that has the best music search system. Users can not only search for songs or videos from favourite artists but can also search for lyrics from favourite songs. Songs live recording than Platforms other big three.

For audio quality, on YouTube music there is an option up to "High" with 256kbps AAC format. The informant considered that although the bit rate offered was smaller, the AAC format used was able to provide better audio quality than the 320Kbps MP3 format. gain/power of the currently playing song becomes stronger. Clarity becomes more pronounced so the song sounds more "clean". This puts YouTube Music's audio quality slightly above Spotify's, although sources reiterate that this comes down to individual user preferences.

3.5.3. JOOX

JOOX offers two types of subscription packages, namely: family individual premium and premium. For premium there are payment options ranging from daily, weekly, monthly, up to 12 months or one year. As for the premium family package, there is only a monthly payment option.

JOOX has the advantage of karaoke features that are registered automatically when users subscribe to the premium package. This karaoke feature also comes with a coin system where users can collect these coins and exchange them for money. In addition, JOOX also offers radio features, although the shape is more towards a playlist, but users can choose according genre/mood to the desired radio JOOX has the most attractive appearance among Platforms top three Users can change the appearance /theme of the application as desired. JOOX also comes with a timer feature that allows users to determine how long the music player application lasts.

In terms of audio quality, the interviewees considered that JOOX has the highest quality among YouTube Music and Spotify. This is because JOOX has a "Hi-Fi" option in audio quality which provides a music listening experience in FLAC format of 1,411kbps or equivalent to CD audio quality. This makes JOOX a favourite resource person among Platforms top three. The differences felt by speakers when using JOOX include soundstage a wider gain/power, clarity, and much better resolution. The resource person also added that this process was carried out without using the DTS (Digital Theater System) which is able to provide a much better music listening experience.

4. Conclusion

After conducting the ranking process Platforms music service cloud using the SMART ALP (Applications, Services, and Users) method, it is concluded that Spotify is the best cloud music service Platform today. SMART ALP is a SMART method that is given additional dimensions, namely the dimensions of applications, services, and users, to clarify further the relationship with the corridors Platform music service cloud. From the application dimension, the criteria that become the assessment indicators are simplicity, level of support, performance, and security. From the service dimension, the requirements that become the assessment indicators are the quality of music, distribution channels, mobile applications, and personalization. From the user dimensions, the assessment indicators are convenience, accessibility, use across devices, user interface navigation, and creating and managing playlists.

From the user dimension, convenience criteria and playlist management became the most critical factors in choosing a Platform, with a response value of 60.4% (29 of 48 respondents) and 58.3% (28 of 48 respondents). From the application dimension, performance criteria and simplicity became the most important factors in choosing a Platform with response values of 66.7% (32 of 48 respondents) and 68.8% (33 of 48 respondents). From the service dimension, music quality criteria became the most important factor in choosing a Platform with a response value of 93.8% (45 out of 48 respondents).

The factors that are a weakness Platform music service cloud are: the duration of the ad is too long or the frequency of the ad is too frequent in free mode, the need to improve audio quality and the choice of audio quality level, the navigation interface is expected to be able to be implemented in a state of music on and with displaying song lyrics on the screen bar, applications that suddenly crash, large storage requirements, insufficient artificial intelligence (AI) capabilities in providing song recommendations, song collections from certain segments (example: indie) that are still lacking, and too many additional features beyond music.

Based on the study results, Spotify got the highest score with a value of 8422 points. Meanwhile, competitor Platforms, namely YouTube Music, are in second place with a value of 6483 points, Joox is in third place with a value of 3824, Apple Music is in fourth place with a value of 2039, and SoundCloud is in fifth place with a value of 1275 points. As for the Platforms AccuRadio, Amazon Music, Anghami, Bandcamp, Gaana, hoopla, Jango, KKBOX, Line Music, LinuXLive, MOOV, Music Choice, MyTuner Radio, Napster, Pandora, Patari.pk, QQ Music, ROXI, Jio Saavn, Sirius XM, Stingray Music, Boom Play, Tune Zeal, and Wolfgang's could not be assessed because they did not get a response from the respondents. This happens because the respondents have never used or do not have brand awareness of the Platform.

The evaluation results from Platforms that occupy the top three positions, namely: Spotify, YouTube Music, and JOOX, show that Spotify has the highest number of users with a total of 138 million users in 2020. Meanwhile, YouTube Music has 30 million users and JOOX is expected to reach 87. million in 2020. Currently Spotify has more than 70 million songs, with 60 thousand songs added daily. Meanwhile, JOOX has 30 million songs in its catalog. While YouTube Music doesn't provide exact numbers for the songs in its catalog, that's fine as it will only count official songs that YouTube Music performs through its deals with record labels.

Meanwhile, the results of the validation of sources against the top three Platforms show that in terms of the number of songs, the three Platforms are considered similar even though Spotify is recognized as having a higher number of songs in its catalogue. Meanwhile, JOOX is considered to have the most miniature collection of songs. However, this changes when the interviewees assess the sound quality. JOOX is the Platform with the best sound quality, followed by YouTube Music and Spotify. Overall, even though in terms of sound quality, Spotify is the Platform with the worst sound quality among YouTube Music and JOOX, sources assess Spotify as Platform best cloud music service, so it can conclude that Spotify is Platform music service cloud today.

Spotify comes with many features that make many people interested in using it. Spotify provides at least 33 features to its users. Starting from personalized playlists, playlists are created automatically by Spotify according to certain criteria, to the level of audio quality that the user can select. However, even though it comes with many features, the user experience felt by Spotify users is still considered lacking. The main thing that Spotify users spotlight is that the playlists automatically created by Spotify don't match their preferences, and music recommended by Spotify doesn't always match the user's preferences. Artist's indie which are still considered not good enough. Some of the complaints submitted by respondents were: "Please don't take long advertisements", "More improvement in terms of music quality and type of choice", "audio quality, AI which is more qualified in recommending songs/playlists", "1) Music selection the more. 2) simple appearance and features (not too many additional features outside of music)", "expand the collection of indie label songs."

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