A Foresight Study on the Adoption of Augmented Reality in the Entertainment Industry

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Abstract: Augmented Reality (AR) is a technology that connects virtual and physical reality while music is a whole-time entertainment for Malaysians regardless of their race and cultural background. Past studies on AR and music has been introduced with Malaysia Music Augmented Reality (MMAR) for helping children have fun while learning music. Study on the usage of AR technology in the music industry needs more recognition and acceptance from citizens and professionals as the context of Malaysia is still lacking. With AR technology adoption, it will help music industry to be promoted at higher level in the future. The aim of this study is to determine the key drivers of AR adoption and future scenarios of AR adoption in Malaysia. In this study, qualitative and quantitative approaches are mixed for data collection. Foresight analysis approaches, STEEPV also used in identifying the ten merged key drivers and issues for this study. SPSS software was used for data analysis from the 116 questionnaires answered with a 38.67% response rate. The future scenarios of AR adoption have been identified by using impact-uncertainty analysis with user experiences efficiency and system work effectiveness having the highest impact and uncertainty. At the end of this study, the four proposed scenarios were user-friendly technology, sustainable development of AR, sluggish technology, and improved comfort and experience.

Keywords: Augmented Reality, Entertainment industry, Music

1. Introduction

Fast-moving technology development can be seen when real objects can be converted into innovation easily (Kim, 2013). Augmented Reality (AR) is one of the technologies that have been created through constant research and development (Nick, 2022). AR has become a technology that been used in various countries to help the increasing domestic economic (Carmigniani *et al.*, 2011). With various ideas and creativity, AR technology can be the best thing to happen especially in an industry that requires constant technology development (Decesare & Wang, 2021). The usage of AR

technology in the entertainment industry has shown that the technology and the industry are completing each other such as helping the targeted audience get a new experience by enjoying the visuals and audio (Clement, 2021). The use of AR technology in music industry has helped music producer to engage with their audience especially in promoting their live concerts of music albums (Southern Utah University, 2021). With AR technology, they can attract audiences with creative albums and more beyond imagination live concerts as AR connects the virtual and physical worlds (Park, 2021).

In Malaysia, Malaysia Music Augmented Reality (MMAR) is introduced to help children learn music in a more fun way (Tan & Lim, 2018). MMAR is a mobile application developed for teaching children traditional musical instruments (Tan & Lim, 2018). Since the Covid-19 pandemic hit, the world has experienced social distancing norms and worldwide lockdowns which have inevitably resulted in increased usage of digital technologies. For music entertainment, live concerts must be canceled to stop the spread of the virus. With AR technology, live concerts can be held more safely since they will be in between the virtual and real worlds and viewers can feel the excitement of being in a real live concert even though they are only at home (Park, 2021). Other than that, AR technology in music entertainment can make the artist and their teams more creative with various special effects on stage (Decesare & Wang, 2021). This will spark more enjoyment for both artists and fans. Despite all the promising benefits, Malaysia still has low adoption of this technology. In these few years, only MMAR is the only AR application that is related to music in Malaysia but other industries such as education have been widely using AR technology (Kasinathan et al., 2018). Other than that, some people still did not know that AR technology can be used in the music industry. Last but not least, the security concern also being one of the problems with AR adoption when some people have doubts about using it. However, it is forecast to be a huge thing in the future of the Malaysian music industry. With that, this study is conducted to determine the key drivers that lead to AR technology adoption for the music industry in Malaysia and explore the future scenarios of AR technology adoption for the music industry in Malaysia.

2. Literature Review

A literature review is a written report of studies that describe, summarize, evaluate, and clarify the literature. Horizon scanning was used in this section to gather a wide range of information on emerging current issues and trends in the use of AR in Malaysia music industry. The STEEPV analysis was used to group the issues, drivers, challenges, and threats associated with AR in Malaysia music industry. Journals, conference proceedings, books, and websites are the primary sources for gathering relevant information.

2.1 Augmented Reality Technology

Augmented Reality is known as a new technology to becoming a real technology as the development of technology is moving really fast worldwide (Kim, 2013). However, AR technology has been thought about since the year 1990 by researcher Tom Caudell (Zineb et al., 2021). AR is the technology that connects virtual and real worlds but does not give the whole attention to the device used (Zineb et al., 2021). AR technology has been used worldwide in various industries such as education, manufacturing and more (Carmigniani et al., 2011). With AR, a simple thing can be entertaining and done easily (Arena et al., 2022). For example, home shopping for people who did not like being in a crowd can just use AR to see the position of the furniture they needed before buying online or outside for a short time (Nick, 2022). In education, teachers can attract student attention with interactive AR tools that can make characters in the book become live and interact with the student (Kasinathan et al., 2018). With this activity, students can enjoy the subject and be active at the same time having fun (Nick, 2022).

2.2 Music Industry

Music has been a social interaction medium for people (Shameen, 2018). Being a communication tool for certain people to being a worldwide entertainment making it as a culture for some country. For Malaysia, being a multiracial country gives the special advantage where every geographical path of Malaysia has their own tradition and entertainment like traditional music (Tajuddin *et al.*, 2021). Keeping with traditional aspects and combining with modern time make the music industry in Malaysia becoming more varied (Clement, 2021). With more exposure from the other side of the world, adding more interesting aspects in any musical performance (Decesare & Wang, 2021).

For the time being, music industry has been developing with the existed technology (Shameen, 2018). For example, audience in the past are using phonograph record, cassette, and CDs for listening to the music. They need a radio or player and sometimes it only can be at one place (Shameen, 2018). However, nowadays with streaming technology audience can listen to their favorite songs anytime, anywhere. With streaming technology, the piracy of songs can be reduced as people did not need to record the cassettes or burning CDs (Shameen, 2018). Other technology that has in music industry are computer software for creating music. With the software, music producer having easier task that help them produce more high-quality music for their artist (Southern Utah University, 2021).

2.3 AR in Music Industry

AR in industry music in the USA are starting with merchandise from albums (Decesare & Wang, 2021). It has been developed to be more when it is being used in live concerts. Other developing countries are also starting to use AR technology in their music industry. For example, South Korea, popular for K-Pop, has a variety of merchandise and is becoming the trend setter for certain merchandise used by worldwide artists (Park, 2021). There are scannable photocards that fans can use and scannable albums that bring fans to "another world" that is a concept of the artist (Park, 2021).

Being in an unpredictable pandemic in 2019 and 2020, lots of live events and concerts must be postponed and cancelled due to stop the spreading of the virus (Gasmi & Benlamri, 2022). For some countries that have entertainment as one of their economical sources, it is hard for them. However, some entertainment companies have found the solution of doing a virtual online concert for the fans. It is not only for the local fans but also the international fans can join. The usage of AR technology and communication through the internet gives the artist performing the experience like having the real audience in front of them and for the fans it feels like they are the venue themselves enjoying the concert (Park, 2021).

Starting with merchandise and concert with AR technology, the usage of AR in the music industry in developed countries have become a role model for other countries to follow the trend (Shameen, 2018). Adding AR technology in the music industry has become a turning point for certain countries especially when a pandemic happens in late 2019. At the beginning, AR only focused on the visual part of the industry such as music video, merchandise, and virtual concert. However, with more research and the right tool, it is not impossible for audio to be using the AR technology (Iart, 2020).

2.4 STEEPV Analysis

STEEPV analysis is a tool to forecast the future into six general scenarios, STEEPV is an acronym for Social, Technological, Environmental, Economic, Political, and Values is an internationally recognized tool for brainstorming commonly used in performing Technology Foresight worldwide. The STEEPV analysis is also used to identify drivers of AR adoption in Malaysia.

Table 1: Output of STEEPV Analysis

Factors	Total
Social	3
Technological	5
Economic	3
Environmental	2
Political	1
Values	3

2.5 Table of Merged Issues and Drivers

Table 2: Merged Issues and Drivers

No.	Issues and Drivers
1.	Explore new advanced technology
2.	Upgrade life standards
3.	User experiences
4.	Safety and health
5.	Social life
6.	Country development
7.	Keeping traditional culture
8.	Music quality
9.	System works
10.	Cyber safety

3. Research Methodology

The methodology is a collection of techniques or procedures used to conduct a thorough investigation to address a problem. The research methodology to carry out the study and accomplish the study goals is covered in this section. Both qualitative and quantitative methodologies were used in this study data analysis and interpretation. Social, Technology, Economic, Environmental, Political and Values (STEEPV) are use as foresight analysis approaches in this study (Minhas, 2011). This section have a research design, research flow chart, foresight process, diagnosis, data collection and instruments, and lastly Cronbach's Alpha are used for measuring pilot test and reliability test.

3.1 Research Design

The qualitative method is used for this study to get information from analyzing data from past related studies such as article journals, academic books, and study papers. As a foresight study is a study that is related to a moving forward process which makes all information from the internet, news, press conference, video related to adoption of AR technology can be use as data for this study. References from other countries will be used in this study. The quantitative method will be conducted by making a form of questionnaire to get data from targeted respondents and the instruments that will be used is Google Form. The mixed methods refer to an emerging research methodology that promotes the precise combination of the qualitative and quantitative methods within a single investigation.

3.2 Data Collection

Data collection for this study will be using both primary and secondary data collection. Primary data are the data obtained directly from a targeted group of research and the questionnaire is the source of primary data collection for this study. Secondary data was obtained from various sources by reading

journals, books, articles, papers and also watching some education and conference videos. Both data are necessary in this study.

3.3 Population and Sampling

Population and sampling were used in this study. Population in research is a big group of people in the event or one place that is being targeted by researchers to investigate for a certain result (S.Rodzalan, 2021). From the population, this study also uses simple random sampling for the respondent of a distributed questionnaire. The target of this study was a music listener in Malaysia with a sample size of respondents.

3.4 Research Instruments

The research instruments are a tool used in the study for getting data of information needed from the targeted respondents. In this study, the research instruments used are reading from various platforms and sources and questionnaires. Questionnaire was reliable and easy to distribute, especially the online questionnaire. The sections in the questionnaire used involves 4 section which are Section A, Section B, Section C and Section D.

Table 3: Questionnaire's structure

Section	Item
A	Demographic information of the respondents.
B	The importance of factors/drivers towards adoption of AR in Malaysia
C	The impact of factors/drivers towards adoption of AR in Malaysia
D	The uncertainty of factors/drivers towards adoption of AR in Malaysia

3.5 Data Analysis

The primary data for this study are from the questionnaire. The results of the questionnaire will be analyzed using a few analysis methods. Data analysis was conducted to determine whether the study objectives were achieved and identify the findings of the research. All the data should be organized in an easy-to-understand and systematic shape.

To see percentages, average mean values, and frequency, descriptive analysis is used. The researcher will use descriptive analysis in this study to identify how to acquire population data from a sample. For this study's statistical analysis approach, the SPSS software is a tool that provides users with a variety of options for quickly examining data and putting scientific hypotheses to the test and was used to examine the data. Percentage and mean from drivers of AR adoption in Malaysia may be used in the research to clarify the study's basic results and facts.

A questionnaire with simple random sampling may give an uncertainty result of the data collected. The usage of SPSS software is to analyze data with statistical, large scale, text which will help researchers find and test important keys from the study conducted. Impact uncertainty analysis is construct using the list of drivers from the importance, impact, and uncertainty from driver of AR adoption in Malaysia. The highest impact and uncertainty level for two drivers is selected for future scenario analysis development.

Future scenario analysis was used in this study because there are still limited information and study of AR in the music industry in Malaysia has not much yet. The time expected for scenario analysis is between 5 to 10 years estimated. Scenario was created to see and do early analysis of consequences that can happen both bad and good. Recommendations will be construct for AR adoption in Malaysia based on strategic planning method.

4. Results and Discussion

4.1 Results

This part described the findings of data analysis conducted through the distribution of questionnaire surveys. The data was analyzed with SPSS to determine the overall demographics of the respondents as well as the mean of each issue and driver. The obtained mean was ordered in descending order from highest to lowest average. Ten were chosen for an impact-uncertainty study. Lastly, in the following section, the two most influential and uncertain drivers will be used to construct scenario analysis.

(a) Response rate

In this study, 300 respondents are selected randomly from Malaysians who listen to music. The questionnaire is distributed using Google Forms via email and social media platforms such as WhatsApp, Instagram, and Twitter. Table 4.1 below shows 116 valid surveys out of 300 were gathered. The response rate from this is 38.67 percent.

(b) Demographic information

The demographic background of the respondents who are random Malaysian that listening to music is described in this part. This part consists of the respondent's gender, age, races, their enjoyment to music and knowledge about AR technology. The frequency and percentage distributions were used to analyze the data of 116 respondents. Table and pie chart were used to summarize the data.

Table 4: Demographic information

	Frequency (f)	Percentage (%)
Gender		
Male	40	34
Female	76	66
Total	116	100
Age		
20 years old and below	12	10
21 – 25 years old	68	59
26 – 30 years old	19	16
31 – 35 years old	4	3
36 – 40 years old	3	3
41 years old and above	10	9
Total	116	100
Race		
Malay	76	66
Chinese	23	20
Indian	12	10
Others	5	4
Total	116	100
Knowledge of AR		
Yes	69	60
No	36	31
Maybe	11	9
Total	116	100

c) Impact-uncertainty analysis

Impact-uncertainty is done for identifying the highest two drivers with high impact and uncertainty values. The chosen drivers will be used for scenario analysis development. The highest outcome from

impact-uncertainty analysis is D3 (4.2241, 3.8879) and D9 (4.0690, 4.0172) where D3 have the highest impact level and D9 have the highest uncertainty level for future adoption of AR in Malaysia. The drivers chosen as top drivers will be used to generate in the next section.

Table 5: Mean of the 10 Leading Drivers on Level of Impact and Uncertainty

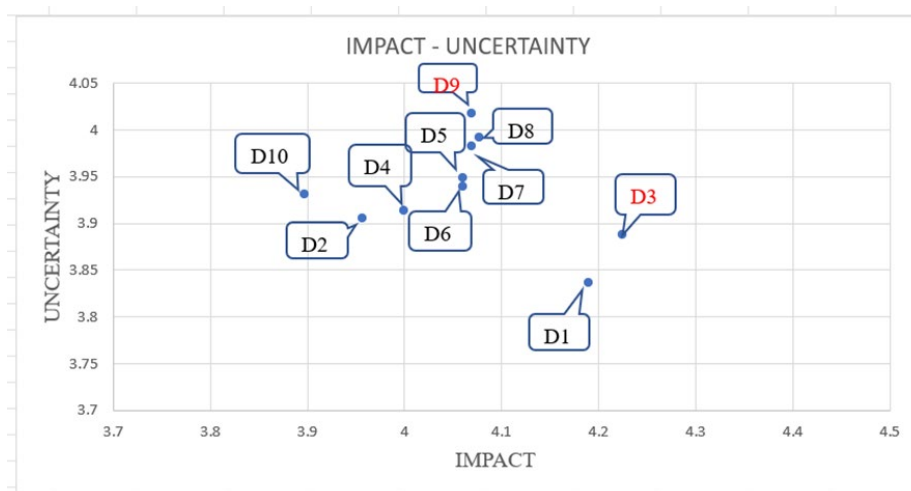| No.	Issues and Drivers	Mean	
		Impact	Uncertainty
1.	Explore new advanced technology	4.1897	3.8362
2.	Upgrade life standards	3.9569	3.9052
3.	User experiences	4.2241	3.8879
4.	Safety and health	4.0000	3.9138
5.	Social life	4.0603	3.9483
6.	Country development	4.0603	3.9397
7.	Keeping traditional culture	4.0690	3.9828
8.	Music quality	4.0776	3.9914
9.	System works	4.0690	4.0172
10.	Cyber safety	3.8966	3.9310

Figure 1: Impact-uncertainty Analysis

4.2 Discussions based on the First Research Objective.

Determine the key drivers of AR adoption in Malaysia is the first objective of this study. This objective was analyzed by using STEEPV method in order to be achieve. The issues and driver of AR adoption in Malaysia need to be identified as it can be a contribution to developers, management and users in the future. From the STEEPV analysis done, the drivers that influence the most start with technological, economic, value, environmental, social, and political.

4.3 Discussion based on the Second Research Objective

Tables Determining future scenarios of AR adoption in Malaysia is the second objective of this study. Future scenarios are done for looking the scenarios of AR adoption in Malaysia such as future market, environment, or developments. The top two drivers that have been found by using impact-

uncertainty analysis are used to discuss the impact of driver towards adoption of AR in music and the uncertainty of future development. The comparison done by comparing the highest level of impact and uncertainty.

From the analysis, users experience has the highest level of impact with (4.2241, 3.8879). AR technology can increase user experience in entertainment as it is can be an interactive activity that need user engagement (Iart, 2020). In order to achieve this, music industry in Malaysia and high technology developer need to consider the implementation of AR in music industry. Next, the driver with highest level of uncertainty were system works with the mean (4.0690, 4.0172) where respondents have a doubt about the easy level of learning AR adoption in music. Some of the technology takes time to learn how to use it but most of AR technology were built for self-learning applications and this can help user follow the instruction easily (Del Rio-Guerra *et al*., 2019). However, there are people who need a proper learning for new technology and to make sure people accept the AR adoption in music, the authorities must have good strategies to promote the technology.
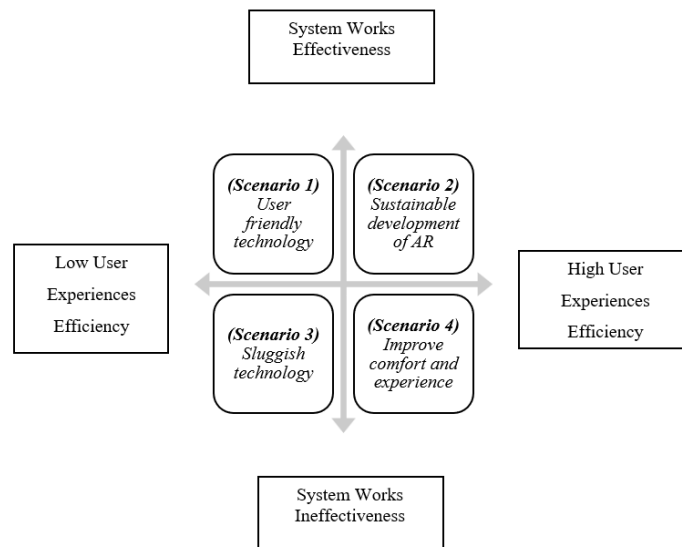

Figure 2: Four alternative scenarios

a) *Scenario 1 (User friendly technology)*

The first scenario start with the effectiveness of the systems works but low in user experiences efficiency. This is not the best scenario but not the worst as the AR can be used and learn easily by user but the promising user experiences in music with AR technology does not achievable. The bad side of this scenario is when user did not enjoy using AR technology in their entertainment.

The low user experiences efficiency might give negative impact to the adoption of AR in Malaysia. User might find the software or application to enjoy their music with AR boring and lack of interesting content for their entertainment. However, there are still adjustment can be made to increase user experiences as allowing user to download the content in the apps so that the AR features did not have to always use Wi-Fi to operates. User can choose their favorites songs or content to enjoy. The systems work effectiveness being the favorite by user as they did not need a long time to understand how the AR works for them to enjoy their entertainment.

b) Scenario 2 (Sustainable development of AR)

In this second scenario, it is the best scenario can happen in the future as it is having high user experience efficiency and system works effectiveness. This happens when the AR adoption is acceptable to the societies.

High user experiences are achieved when user get the promising excitement when using the software or application of AR in music. Users get to enjoy their favorite content to the fullness without any major problems. System works effectiveness means user get to use an easy to learn software or applications of AR adoption, The sustainable development of AR will be giving comfort to users in maximized their entertainment experiences and enjoy more. With the successfulness of AR adoption in music, Malaysia might be one of the progressive developing countries with an active research and development in high technology.

c) Scenario 3 (Sluggish technology)

The third scenario develop from the impact-uncertainty analysis is the worst scenario created. This is because the user experiences are at low efficiency while the system works is ineffective. This major failure might slow down the AR adoption in Malaysia as the societies did not accept the technology as it is giving worst experience to the societies.

People release stress with entertainment but with negative impact of the technology use in entertainment, people might get more stressed. For example, user need to wait for a long time for the software or application of AR to be used. Users will get frustrated and stop using the technology. Other than that, user might face the complicated system of the software or application making they got a bad experience in using the technology. With the worst scenario, developers need to make more research to replace or increase the usefulness of the AR adoption in Malaysia.

d) Scenario 4 (Improve comfort and experience)

The last scenario is giving high user experience efficiency but also system works ineffectiveness. This scenario still can be improved with some adjustment. User is getting the maximum user experience while using the AR technology, but it may take sometimes for user to learn and adjust while using the software or application.

High user efficiency but system works ineffectiveness is an unpredictable situation where user of the AR technology might keep increasing or can be decreasing anytime as some people who love to explore new technology might having more fun using the AR adoption that will make the user keep increasing but for people that love simple things will leave the AR adoption after experience some struggle while using the technology. However, with a good developer this problem can be handle as the research and adjustment keep working on the AR adoption.

5. Conclusion

In conclusion, the key drivers and future trends of AR adoption in Malaysia have been this study objective. The future trends of AR adoption in Malaysia will develop until Malaysia get the technology to use AR in music to enhance their user's entertainment experience. Both objectives of this study are being achieve as two top drivers and four alternatives future trends has been found. Even though there are negative and positive results from the study, it can be used as future research references for a better study and better results. Developing technology is not an easy task and need support from every sectors especially for Malaysia to keep developing in the future.

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