Assessing the Performance of Mobile Payment: A Study on Sarawak Pay Using Fuzzy Importance-Performance Analysis

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Abstract
Mobile payment usage has grown rapidly in recent years with the establishment of the contactless society and also the government's agenda on Industrial Revolution 4.0 (IR4.0). However, the performance of the mobile payment services needs to be examined to increase the usage and also the user's satisfaction level towards the services offered by the mobile payment platform. The purpose of this study is to identify the criteria for the services offered by Sarawak Pay, a Fintech platform operated by the Sarawak government. Six aspects and 32 criteria were identified in this study. In addition, the importance and performance level of those criteria were evaluated using the fuzzy Importance-Performance Analysis (fuzzy IPA) to measure the current rankings of the aspects and criteria. A total of 105 valid responses from the Sarawak Pay's users were collected in this study through purposive sampling method. The fuzzy IPA findings revealed that transaction is the most important aspect and security is the most important criteria to assess the performance of Sarawak Pay. Regarding the performance level, the trust aspect and the criteria for payment confirmation notice after payment are the attributes that have the highest performance for Sarawak Pay. Moreover, the aspect of customer relationship together with the criteria such as loading speed, loyalty programme or reward point collection, and variety of services was the aspect that is required to be highly concentrated for further improvement. It means that the Sarawak Pay's operator should focus more on these aspects and criteria to get more satisfactory performance and encourage more people to adopt Sarawak Pay. This study provides the discussion on the managerial and practical implications and the suggestion for future study is also explained.
Keywords: Mobile Payment, Performance Evaluation, Fuzzy Importance-Performance Analysis, Sarawak Pay

Introduction

In this new technological era, the ways of business are conducted and consumer behaviour is moulded by digitisation and new technology. The development of the payment system is an old method of exchange by people before the 21st century, where they used the most ancient and simpler form of payment in their transactions. In this system, people exchanged their goods or services to get some other goods or services in return. After the 21st century, the payment system has upgraded to bank transfers, cheques, debit cards, and credit cards. However, with the rapid communication technology advancement, various types of mobile applications are introduced and implemented (Buyukozkan, 2009), including the mobile payment application. The high permeability of mobile phones in Malaysia and the convenience of mobile payment that people make payments at anytime and anywhere has driven the usage of mobile payment in Malaysia.

Moreover, the usage of e-wallets is increasing sharply among the people in Malaysia, as they are encouraged to achieve a cashless society. According to Hassan (2020), the three most popular mobile payment applications in Malaysia are Touch n Go, Boost, and Grab Pay. The volume of Grab application being downloading exceeded 20 million as recorded in the year 2020 (Hassan, 2020). On the contrary, Touch n Go had 5 million users, while Boost had about 4.8 million users. However, the usage of Sarawak Pay, which is the Fintech platform provided by the Sarawak state government was only around 440,000 users. This amount is considered low as it was only accounted for around 15% out of the total Sarawak population of 2.9 million. The reason for this poor adoption is still vague, and it might relate to the design, functionality, or security issues of the application. All these aspects must be concerned and investigated to find out the issue of poor adoption.

When looking at other mobile applications such as Touch n Go, it is important to have a great performance in navigation aspects, in which the users found that the application is easy and satisfied after completing their tasks. The other useful features that increase favouritism are the promotion offered on the platform such as cashback and rebates. However, unclear icons, text colour, difficulty to discover help instructions, and action order are the problems found in the Touch n Go application (Hussain *et al.*, 2021). Boost applications were also chosen by people due to various cash rebates, being accepted at 140,000 touchpoints of online and physical stores in Malaysia, easy access for parking payments, and bills of Astro, Telekom can be paid via the applications. One of the security issues for the applications was when a user had RM2,000 stolen through her mobile payment application (Keegan, 2019). Grab Pay becomes the most actively used application, as it integrates its ride-hailing, catering, delivery, and other functions into one application. Points can be collected from making payments and be converted for discounts, rewards and free rides, which is another attractive feature of the Grab Pay application (Andrews, 2019). Sarawak Pay is a mobile payment platform that is only applicable in Sarawak. However, the features on the application should be evaluated to access its performance, as the registered users are still in the low-income group compared to other mobile payment applications.

Most of the empirical studies discuss the evaluation framework on websites. For instance, Niazi *et al* (2020) conducted a study on evaluating university websites and identified several important aspects. The criteria founded to evaluate the websites included usability, functionality, efficiency, reliability, content, web design, webometrics, page design, service

interaction quality, transaction quality and safety, heuristic cues, systematic cues, web credibility, and intrinsic information. Additionally, the research on evaluating mobile banking portals conducted by Zarifopoulos and Economides (2009) had revealed some important factors for effective mobile banking websites. The criteria consist of interface, navigation, content, services offered, reliability, and technical aspects. Baki (2020) listed the criteria for evaluating hotel websites, including trust, information quality, customer relationship, design, and cost that can be used as a reference in evaluating the Sarawak Pay application. However, the aspects of information quality and cost are found not appropriate in the application evaluation. Trust is the most important aspect to be concerned about in the evaluation. Customer relationship and design were taken into consideration to apply in our evaluation framework. These evaluation frameworks of websites and mobile applications are regarded as a reference to this research to examine the performance of mobile payment applications. Besides that, various criteria were added to develop a new evaluation framework to effectively find out the importance and performance of such features referring to the Sarawak Pay application.

Briefly, it was found that the literature review was less discussed on the mobile payment application performance evaluation, as the study was mostly done on websites and other mobile applications. Therefore, a study that examines the importance and performance level of the mobile payment application should be conducted to discover the relevant criteria on these mobile payment platforms, such as Sarawak Pay in this study. This is because the outcome of the study may identify the reasons for the lack of usage of the Sarawak Pay among the Sarawak residents. Pragmatically, this research will be beneficial to the business stakeholders who wish to expand their business. Additionally, users would gain more knowledge about mobile payment applications and help them in doing further research on a similar topic in the future.

Literature Review

In general, previous studies have looked at several aspects and criteria in relation to mobile applications and websites. However, none has been done associated with mobile payment applications. From the literature, a few aspects and criteria that are considered to be appropriate for mobile payment applications were used in this study. This study affirmed the attributes in the previous studies, and several aspects were identified suitable in a mobile payment application evaluation, namely trust, customer relationship, design, marketing, services, and transaction. Some new additional criteria were also added to the list for assessing mobile payment applications performance to increase the effectiveness of the evaluation. The full list of the aspects and criteria included in this study were provided in Appendix.

Among the proposed mobile payment application attributes, trust is believed to be the most concerning aspect of a mobile payment application. Assurance, privacy, security, and accuracy are all considered as valid criteria for the evaluation of mobile applications, as users normally hesitate to use online payment due to concerns on fraud (privacy, security) and any service error that can cause damage to them (assurance) (Baki, 2020). As the users intended to know clearly about the application and services provided, therefore, the information provided must be accurate to gain trust from them (accuracy) (Baki, 2020).

Customer relationship is another important aspect that needs to be focused on. From the study by Akincilar and Dagdeviren (2014), the aspect consists of seven criteria, which are fulfilment, personalisation, playfulness, customer retention, responsiveness, feedback, and contact information. Apart from feedback and contact information, the other criteria are excluded, as they are unsuitable for the evaluation of mobile payment applications in this study. Feedback is essential for reporting any issues to the application administrator (Rajapaksha & Fernando, 2016). Besides that, the contact information is also crucial for the customers to get in touch with the application administrator (Akincilar & Dagdeviren, 2014). The criteria such as frequently asked questions and customer support/service are newly added to the mobile application evaluation framework to assess a wider area of the application.

With regard to design aspect, loading speed was focused on determining the performance of a mobile application. The fast loading speed of the homepage as well as other images and icons were important to contribute to the design aspects (Al-Khalifa, 2014). Regarding the attractive attribute, it concerns making the users happy, enjoyable and pleasant when using the application (Barnes & Vidgen, 2002). The images that are utilised can match and serve their functional purposes related to the appropriateness of the application page design (Heimlich, 1999). Then, the colour criteria focused on the effective use of text colour and background colour on the website (Abanumy *et al.*, 2005). Concerning the criteria of image/sound/video, Signore (2005) mentioned that it should be used rarely or decrease the size of the image/sound/video because the large size of image/sound/video will slow down the download of the page that is not favoured by users. The text focused on the characteristics of the text included consistency, text font, headings, and space (Hasan & Abuelrub, 2011). Multilanguage means that the application provided different languages that are understandable and readable by all users with different cultures (Hasan & Abuelrub, 2011).

In marketing, services, and transaction aspects, the included criteria are all added to the mobile payment evaluation list, as those are important in assessing mobile application, not covered in the empirical research. In marketing aspect, special discounts and offers are added as an opportunity for Sarawak Pay to enhance its brand awareness. Special deals advertisements can gain people's attention on the application and they will be drawn to adopting the application to enjoy the discounts. In the effort to retain existing users and guarantee their continual use, loyalty programmes such as reward point collection and cashback rewards will be other important selling points. It is critical to increase user's lifetime value and track a long-term relationship with them by offering these rewards that can satisfy their desire. Promotional vouchers and codes are another way to increase brand loyalty. This is a great idea to portray to the users that the company continues to showcase added values on the application and benefit them.

In addition, several criteria are added to the services aspect to assess the performance of Sarawak Pay. They are important criteria that will influence the user to choose Sarawak Pay rather than other mobile payment platforms. Money withdrawal refers to the withdrawal of electronic money from the Sarawak Pay account to the bank account. It makes it the users who do not carry cash make payments easily by transferring funds through banking to the merchants that do not utilise Sarawak Pay. The top-up procedures and process, and minimum

and maximum amounts of top-up are essential. The users can access the information and make the recharge process easy and uncomplicated. Mobile payment application users are always concerned about the availability of fund transfers, as it is easier for them to transfer their electronic money to another user's account or to receive electronic money from another user's account. As a mobile payment application, the function of paying bills and the feature of bill splitting is vital to allow users make breakdown payment and share payment with other users Additionally, providing a filter to the transaction history is important to check and sort records that they are looking for. In examining the wide range payments, collaboration with international service providers is focused. It allows the users to make overseas payment easily and efficiently through an e-wallet. Other services such as insurance, investment, parking, toll, and games were also taken into consideration when evaluating the mobile application. They are important to determine how broad and complete the function of the application is to fulfil the demands and needs of the users.

Regarding the transaction aspect, ease of use when doing the payment is primarily focused. A simple and fast paying process is concerned so that the payment can be made quickly. Secured payment is also important to facilitate online fund transferrs, users' data and information securely and protect against security issues such as trojans, phishing, fraud, etc. If secured payment is guaranteed, users' trust can be gained and their continued use of the mobile payment application ensured. Lastly, payment confirmation notice after payment is made to confirm transferred funds to others. It improves users' experiences by accrediting transparency and affirmation that the fund has been transferred to the intended person. Therefore, based on the previous studies and researchers' judgment on using Sarawak Pay, these six aspects and 32 criteria were selected in evaluating the services' performance of Sarawak Pay.

Research Methodology
In this study, the primary responses from the targeted population, the Sarawak Pay's users in Sarawak were collected through online survey using the google form platform. The purposive sampling was adopted to select the respondents, while only Sarawak Pay's users are eligible to join this study. To ensure that the respondents fulfil the selection criteria, a screening question was asked at the beginning of the survey and they were only allowed to continue the survey if samples are Sarawak Pay's users. A total of 142 Sarawak Pay users took part in the study and filled the online survey but non Sarawak Pay users were eliminated for the final responses. According to Roscoe (1975), the sample size between 30 until 500 are sufficient for most behavioural studies. The 105 samples have met the suggestion and are considered sufficient to generate the findings. Through the review of literature, several related aspects and criteria were identified, although most of them were obtained from different research contexts, such as mobile applications and websites. These related aspects and criteria were adopted from Baki (2020), Akincilar and Dagdevirwn (2014), Al-Khalifa (2014), and Hasan and Abuelrub (2010). Besides that, a few criteria were also added due to the special features available in the Sarawak Pay platform. In total, six aspects and 32 criteria were included in this study to evaluate their performance using fuzzy importance-performance analysis (Refer to the Appendix for the full list of the aspects and criteria).

The five-point Likert scale was adopted to measure the importance and performance levels for each proposed aspect and criteria from very low (very poor performance) to very

high (very good performance). These scales were then converted into a comparable value using the triangular fuzzy number as shown in Table 1. The fuzzy IPA was then employed to analyse the importance and performance levels of each aspect and criteria and the outcome was then plotted in an IPA diagram using the two-dimensional matrix to show their current ranking and position.

Table 1
Corresponding Triangular Fuzzy Numbers

Scale	Illustrations for fuzzy IPA		Triangular fuzzy numbers
1	Very Low Important	Very Poor Performance	(0.00, 0.00, 0.25)
2	Low Important	Poor Performance	(0.00, 0.25, 0.50)
3	Medium Important	Medium Performance	(0.25, 0.50, 0.75)
4	High Important	Good Performance	(0.50, 0.75, 1.00)
5	Very High Important	Very Good Performance	(0.75, 1.00, 1.00)

Results

Table 2 shows the respondent's demographic profiles. The number of female respondents is higher than male respondents, as 64.8% of the total respondents are females and 35.2% are males. For the age distribution, the majority of the participated respondents are those aged between 21 and 30 years old, which accounted for 59%, followed by 28% of respondents who are 20-year-old and below, while the remaining respondents are age 31 and above. As shown in Table 2, 78 or 74.3% of the respondents with the highest education level at Certificate/Diploma/Bachelor Degree levels, and 14 and 12 respondents have a qualification of Master Degree/PhD and primary/secondary school, respectively. In addition, out of 105 respondents, 82 of them are students, followed by 15 respondents working as professionals, 3 self-employed respondents and 5 respondents' occupations categorised as others. Lastly, Table 2 also shows that 72 respondents have used Sarawak Pay between 1–10 times in the past 6 months. A total of 18 respondents have used Sarawak Pay 11–20 times, while six respondents used it 21–30 times in the past 6 months. Four respondents used Sarawak Pay 31–40 times, followed by five respondents who often used Sarawak Pay as their transactional medium, with more than 40 times in the past 6 months.

Table 2
Demographic Profiles of Respondents

Characteristics	Frequency	Percentage
Gender		
Male	37	35.20
Female	68	64.80
Age		
20 year old and below	29	27.62
21 – 30 year old	62	59.05
31 – 40-year-old	8	7.62
41 – 50-year-old	4	3.81
51 year old and above	2	1.90
Highest Education Level		
Primary / Secondary School	12	11.43
Certificate / Diploma / Bachelor Degree	78	74.29

Master Degree / PhD	14	13.33
Others	1	0.95
Occupation		
Students	82	78.09
Working Professional	15	14.29
Self-Employed	3	2.86
Others	5	4.76
Frequency Use Sarawak Pay in the Past 6 Months		
1 – 10 times	72	68.57
11 – 20 times	18	17.14
21 – 30 times	6	5.72
31- 40 times	4	3.81
More than 40 times	5	4.76

Table 3 provides the result of fuzzy IPA based on their respective importance and performance's value and rankings. Based on the result shown in Table 3, the transaction aspect (A6) has the highest importance value of 0.8135, ranked at first place among other aspects, followed by trust (A1) and services (A5) with the importance value of 0.7865 and 0.7635, respectively. The fourth place is customer relationship (A2), followed by marketing aspect (A4). Lastly, design (A3) is ranked sixth with the lowest importance value of 0.6913. Besides that, the aspect that ranks first based on the performance value is trust (A1), with the highest performance value of 0.7635, followed by the transaction (A6) and services (A5). While customer relationship (A2) and marketing (A4) are ranked at fourth and fifth, design (A3) has the last ranking within the six aspects as the lowest performance value of 0.6730. In addition, the average value of importance level for aspects in the overall sample is 0.7529, while the average value for the performance level is 0.7214. As presented in the last column in Table 3, all (I-P) values are shown positive, meaning that all aspects are highly important, but the performance is considered poor and improvement is needed. A higher (I-P) value implies that more effort should be done to improve the performance of the aspect and get higher satisfaction. The aspect that needed to be highly concerned of is transaction (A6), as it has the highest value of (I-P) at 0.0508, followed by customer relationship (A2) and services (A5).

Table 3
Result of Fuzzy IPA for Aspects

Code	Aspects	Importance Value	Ranking of Importance Level	Performance Value	Ranking of Performance Level	(I-P)
A1	Trust	0.7865	2	0.7635	1	0.0230
A2	Customer Relationship	0.7595	4	0.7111	4	0.0484
A3	Design	0.6913	6	0.6730	6	0.0183
A4	Marketing	0.7032	5	0.6968	5	0.0063

Code	Aspects	Importance Value	Ranking of Importance Level	Performance Value	Ranking of Performance Level	(I-P)
A5	Services	0.7635	3	0.7214	3	0.0421
A6	Transaction	0.8135	1	0.7627	2	0.0508
	Average	**0.7529**		**0.7214**		

Next, the result of fuzzy IPA for the criteria is presented in Table 4, which showed that security (C3) is the most important criteria, followed by security during the payment (C31) and ease of use when doing payment (C30). Accuracy (C4), privacy (C2), and payment confirmation notice after making payment (C32) are also classified as the most important criteria among other criteria. It is followed by bill payment (C25), transaction history filter (C27), fund transfer (C24), and top-up procedures and process (C22). Meanwhile, promotion vouchers/code (C19), being attractive (C10), and colour (C12) are found not important as compared to other criteria. The ranking of criteria based on the performance value is also presented in Table 4, whereas the payment confirmation notice after making payment (C32) gives the highest performance value of 0.7802 and ranked first, compared to the other 31 criteria. It is followed by privacy (C2), ease of use when making payment (C30), and security (C3). Besides, the criteria that give good performance value included security during the payment (C31), assurance (C1), accuracy (C4), together with bill payment (C25), transaction history filter (C27), and fund transfer (C24). Concurrently, collaboration with international service providers (C28), special discounts and offers (C17), and promotion vouchers/code (C19) get the last three places in the ranking as poor performance values as compared to other criteria. The last column of Table 4 further provides the result of fuzzy IPA for criteria by using the (I-P) value. The positive (I-P) values indicate that the criteria are highly important but the performance is not satisfying. As shown in Table 4, all criteria give a positive value of (I-P), except colour (C12) and text (C14). This signifies that these two criteria are overperformed, as performance value is greater than the importance value. Meanwhile, the criteria that give the highest value of (I-P) is loading speed (C9), meaning that it should be focused on and improvements must be made to enhance the performance. Moreover, loyalty programmes or reward point collection (C18), and special discounts and offers (C17) should also be concerned as the high (I-P) value.

Table 4
Result of Fuzzy IPA for Criteria

Code	Criteria	Importance Value	Ranking of Importance Level	Performance Value	Ranking of Performance Level	(I-P)
C1	Assurance	0.7516	13	0.7381	6	0.0135
C2	Privacy	0.7968	5	0.7714	2	0.0254
C3	Security	0.8119	1	0.7571	4	0.0548
C4	Accuracy	0.8008	4	0.7365	7	0.0643
C5	Feedback	0.7317	17	0.6595	23	0.0722
C6	Contact information	0.7413	16	0.6913	16	0.0500
C7	Frequently asked questions	0.6841	27	0.6500	27	0.0341
C8	Customer support/ service	0.7254	21	0.6905	17	0.0349
C9	Loading speed	0.7611	11	0.6421	29	0.1190
C10	Attractive	0.6659	31	0.6627	22	0.0032
C11	Appropriateness	0.7286	19	0.6929	14	0.0357
C12	Colour	0.6492	32	0.6524	25	-0.0032
C13	Image	0.6746	29	0.6675	19	0.0071
C14	Text	0.6849	26	0.6929	15	-0.0079
C15	Visual Appearance	0.6770	28	0.6651	21	0.0119
C16	Multilanguage	0.7222	22	0.6508	26	0.0714
C17	Special Discount and offers	0.7119	25	0.6143	31	0.0976
C18	Loyalty program or reward point collection	0.7524	12	0.6437	28	0.1087
C19	Promotion vouchers/code	0.6722	30	0.6000	32	0.0722
C20	Cashback reward	0.7476	15	0.7127	11	0.0349
C21	Money Withdrawal	0.7310	18	0.6651	20	0.0659

Code	Criteria	Importance Value	Ranking of Importance Level	Performance Value	Ranking of Performance Level	(I-P)
C22	Top up procedures and process	0.7643	10	0.7008	13	0.0635
C23	Amount of Top-up	0.7254	20	0.7087	12	0.0167
C24	Fund transfer	0.7643	9	0.7270	10	0.0373
C25	Pay Bill	0.7667	7	0.7333	8	0.0333
C26	Split Bill	0.7198	23	0.6754	18	0.0444
C27	Transaction History filter	0.7659	8	0.7302	9	0.0357
C28	Collaboration with international service providers	0.7175	24	0.6325	30	0.0849
C29	Variety of Services	0.7484	14	0.6556	24	0.0929
C30	Ease to use when doing the payment	0.8032	3	0.7571	3	0.0460
C31	Security during the payment	0.8079	2	0.7500	5	0.0579
C32	Payment confirmation notice after payment	0.7944	6	0.7802	1	0.0143
	Average	**0.7375**		**0.6908**		

The result of fuzzy IPA in Table 3 was further used to plot the current position of each aspect into a four-quadrant matrix using their importance and performance values as demonstrated in Figure 1. The aspects placed at Quadrant II include trust (A1) and transaction (A6), which indicate that both aspects have a relatively high value for both importance and performance levels, and the good work should be kept up and maintained. Design (A3) and marketing (A4) are located at Quadrant III, which is a low priority area and not important. Customer relationship (A2) stands at Quadrant I, and this suggests that it should be focused more, as the level of importance is high, but the performance level is low. Services (A5) falls in between Quadrant I and Quadrant II, which implies that it is highly important and the performance is still acceptable, with the average performance value.
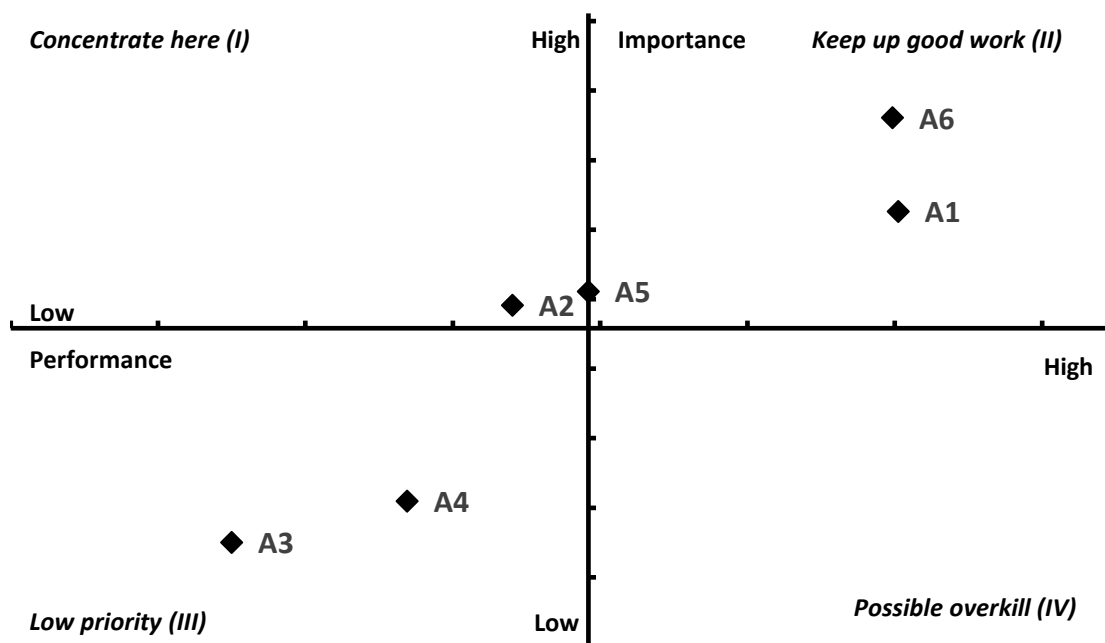
Figure 1: IPA Plot for Aspects

Furthermore, the result of fuzzy IPA in Table 4 was also used to plot the position of the criteria in the IPA plot. Figure 2 displays the IPA plot for all 32 criteria and shows that Quadrant II included the criteria that are important and give high performance, such as assurance (C1), privacy (C2), security (C3), accuracy (C4), contact information (C6), cashback reward (C20), top-up procedures and process (C22), fund transfer (C24), bill payment (C25), transaction history filter (C27), ease to use when making payment (C30), security during the payment (C31), and payment confirmation notice after making payment (C32). Quadrant IV consists of four criteria that are of low importance but well-performed, which are considered as a waste of resources. The criteria include customer support/service (C8), appropriateness (C11), text (C14), and amount of top-up (C23). Moreover, Quadrant III contains feedback (C5), frequently asked questions (C7), being attractive (C10), colour (C12), image (C13), visual appearance (C15), multilanguage (C16), special discount and offers (C17), promotion vouchers/code (C19), money withdrawal (C21), split bill (C26), and collaboration with international service providers (C28). Quadrant I comprises of the criteria that are highly important but give poor performance, including loading speed (C9), loyalty programme or reward point collection (C18), and variety of services (C29). Therefore, these three criteria should be focused on, as they are the key to the success of third-party payment services.
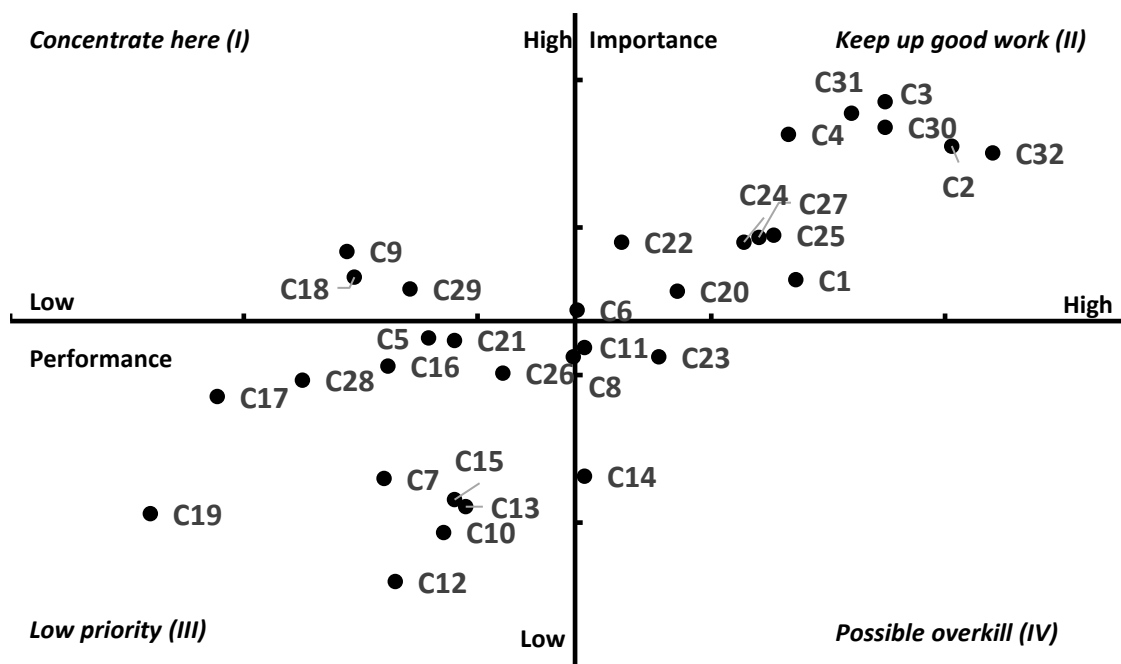
Figure 2: IPA Plot for Criteria

Discussion and Implication
Several implications were offered by referring to the findings of the study. For the theoretical implication, this research aimed at discovering the criteria in assessing the performance of mobile payment service and the importance and performance level for the Sarawak Pay's service criteria. Therefore, the identified six aspects and 32 criteria were collected from the literature. The finding showed that the most important aspects to assess Sarawak Pay service's performance are transaction, trust, and services.

The transaction seems to be the most important aspect, as it can be said to be the major function of a mobile payment application. Simple steps of transaction help users to save their time when making payment and sourcing for the payment information during the transaction process can increase the security of payment and put an end to fraud. Users often look at the safety part of a particular application before they adopt it. Therefore, trust is another significant aspect that is always taken into consideration. People need to trust each other to verify any developed currency system. Due to this reason, Sarawak Pay should be concerned about the security part of the application to increase people's confidence when they make transactions and feel safe to use the application so that they will adopt it continually. In addition, the services aspect is another important factor in assessing Sarawak Pay. A mobile payment application was not designed for money transferring and payments merely, but the variety of services should also be considered to increase people's convenience. A mobile payment application that offers different sorts of services can increase users' satisfaction, as they can gain the benefits of time-saving. Therefore, this finding signified that these three aspects were the most crucial for Sarawak Pay's users to adopt the Sarawak Pay as their payment platform.

Besides that, the results of Fuzzy IPA showed that customer relationship had a low performance but carried a high level of importance. In this case, this means that the performance of Sarawak Pay in terms of customer relationship received low satisfaction from

the users. Sarawak Pay operator should put more effort into understanding the current needs of the users and gaining the solutions to meet their demands. Increasing customer engagement can be a way to improve customer relationships. The services aspect also had a high level of importance. Based on the findings, the performance level of the services aspect is still acceptable. However, it can be improved and strengthened to enhance the overall performance of Sarawak Pay and increase people adoption of Sarawak Pay. It can be done by providing a wider range of services with not a fix to payment purposes merely. From the current investigation on the services on Sarawak Pay, it is weaker as compared to other applications such as Touch n Go and Boost. Therefore, the operator can improve the platform by referring to the services of those applications and widen the services offered by Sarawak Pay.

Moreover, the finding shows that although the loading speed is considered a very important criterion, it gives poor performance currently. It means that the Sarawak Pay operator must put more effort to solve this problem because this can be the major considering point of the users to adopt and use the application continuously. A lengthy loading speed will cause users to be frustrated and they might switch to other mobile payment applications. Sarawak Pay operators should deal with this issue seriously. Moreover, the Sarawak Pay operator should emphasise more on the loyalty programme or reward point collection, as it did not give a satisfactory performance. This is because it is another important factor to attract new users and retain the current ones. As observed, the big challenge for Sarawak Pay is poor adoption of the application by the Sarawak people. Therefore, stressing on offering an attractive loyalty programme and reward point collection is another way to increase the usage of Sarawak Pay. This kind of programme can raise users' interest to get the offer deals and rewards, and hence encourage users' interactivity with Sarawak Pay.

Variety of services is another important criteria that people look thoroughly into but Sarawak Pay performs poor in this respect. This was due to the lack of services offered by Sarawak Pay currently as compared to other mobile payment applications. For example, services such as parking, toll, and gaming is not available in Sarawak Pay although it is available on other applications. It caused a decline in users' satisfaction and brand reputation. This is because the users are unable to enjoy a comprehensive service in one application and the expectations of convenience is not reached and fulfilled. In this case, the operator should survey the user's needs on the type of services through a survey form on their demand in the application to collect their ideas, so that they can add other services to the application and meet the user's needs. All of the practical implications could be considered by the Sarawak Pay's operator to improve their platform's service performance and then encourage more Sarawakians to use this platform.

Conclusion and Limitations

The main purpose of this study is to identify the criteria of mobile payment and particularly on Sarawak Pay to examine their importance and performance levels of these criteria. This is due to the poor adoption of Sarawak Pay, so this study intends to detect the problem that caused this poor adoption and provide recommendations to improve the performance of Sarawak Pay. Six aspects and 32 criteria were collected from empirical research to be used in this study and further to collect responses from the Sarawak Pay users as the targeted respondents. The quantitative study was conducted by gathering all primary data from

Sarawak Pay users through the self-administered online survey and further analysis using the fuzzy IPA. From the finding, transaction (A6), trust (A1), and services (A5) are the top three most important aspects, while the most important criteria included security (C3), security during the payment (C31), ease of use when making payment (C30), accuracy (C4), and privacy (C5). Based on the performance value, trust (A1), transaction (A6), and services (A5) are ranked as the top three, while payment confirmation notice after making payment (C32), privacy (C2), ease of use when making payment (C30), security (C3), and security during the payment (C31) are the five criteria that obtain the highest performance value among other criteria. Next, the fuzzy IPA revealed that the customer relationship (A2) is the only aspect that required further improvement while loading speed (C9), loyalty programme or reward point collection (C18), and variety of services (C29) are the three criteria that performed poorly but they provided a high importance level. Therefore, more efforts should be focused and concentrated on these aspects and criteria to get more satisfactory performances.

Every study has its limitations, including this study. First of all, there is no specific theory to be used as a guideline in this study. This is because currently there is no theory established from this type of study to act as a foundation in this research. Therefore, the criteria were collected from the previous studies, solely. It caused difficulty in determining and selecting the most appropriate criteria to be applied in this study. Another apparent limitation of this study is regarding the sample size. A total of 105 respondents participated in this study. Future research are advised to increase the total sample size in their research. This is to ensure that the generalisability of the findings and the representativeness of the research population can be represented accurately. Corresponding to that, the respondents of this study are mostly students and the merchants are less targeted. It could cause less effect on the findings of this study for Sarawak Pay to be improved. Therefore, future studies should target and include more merchants to provide more informative and useful responses. This is to defeat the limit of target respondents so that the missing of helpful information can be avoided and assist in contributing to the study. Apart from that, the responses gathered from Sarawak Pay users are based on the old version of the application. Sarawak Pay has been updated to the new version currently and renamed as S Pay Global. It means that the user's feedback on the application to be contributed to a meaningful study will be inaccurate due to the updating of Sarawak Pay. For that reason, future researchers should collect responses from their respondents based on the newest version of Sarawak Pay, named S Pay Global. Future research are advised to be conducted a few months or years after so that the users are given more time to experience the new version of Sarawak Pay and find out any of the shortcomings that lower their satisfaction with the application. It is relatively important to make sure that the findings of this research will be accurate, effective, and useful to their study as well as the future research.

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Appendix
List of aspects and criteria with sources.

Aspects	Criteria	Description	Sources
Trust	Assurance	Guarantees to cover losses that may arise during the shopping	Baki (2020)
	Privacy	Protects customers' personal and financial information	
	Security	Secures online purchasing	
	Accuracy	Providing real information on the website	
Customer Relationship	Feedback	Giving feedback to the user for the inquiries	Akincilar & Dagdeviren (2014)
	Contact information	Giving the necessary contacts such as mail address, telephone and fax number, etc.	
	Frequently asked questions	Provides frequently asked questions on the platform for customers understanding	Self-added
	Customer support/service	Provides customer support or service	
Design	Loading speed	The loading speed of the platform is very fast	Al-Khalifa (2014)
	Attractive	The interface is attractive	Hasan & Abuelrub (2011)
	Appropriateness	The design of the interface is appropriate	
	Colour	The colour of the platform is appropriate	
	Image/ Sound/ Video	The image/ sound or video in the platform is relevant	
	Text	The text size of the platform is appropriate.	
	Visual Appearance	The platform is the visual appeal	Akincilar & Dagdeviren (2014)
	Multilanguage	The platform information is available in a different language	Hasan & Abuelrub (2011)
Marketing	Special Discount and offers	Offers special discounts or offer for the user	Self-added
	Loyalty program or reward point collection	Provides a good loyalty program and reward point collection for user	
	Promotion vouchers/code	Offers several promotion vouchers or codes for the user	

Aspects	Criteria	Description	Sources
Services	Cashback reward	The user able to get cashback rewards from their payments on the platform	
	Money Withdrawal	Users can withdraw their money from the platform to their bank account.	
	Top up procedures and process	Top up procedures and processes are easy and convenient.	
	Amount of Top-up (Minimum and Maximum amount)	The minimum and maximum top-up amount in the platform is appropriate.	
	Fund transfer	The user can send electronic money to another user.	
	Pay Bill	The user can pay their bills using the platform.	
	Split Bill	The user can split the bill with other users through the platform.	
	Transaction History filter	Filtering the previous transaction make users easier to check back.	
	Collaboration with international service providers	The platform has collaborated with international services provided such as UnionPay, Alipay, etc.	
	Variety of Services	There have enough services provided on the platform such as insurance, investment, parking, toll, games, etc.	
Transaction	Ease to use when doing the payment	The user only has to make payments easily by scanning the QR code displayed.	
	Security during the payment	PIN or fingerprint is required during the payment.	
	Payment confirmation notice after payment	Payment confirmation notice is shown on the platform after payment.	