

USER SATISFACTION INDEX OF E-HAILING SERVICES BASED ON CO-CREATION VALUE

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ABSTRACT

E-hailing is a service that allows users to book a journey online and provides a platform for users to interact with e-hailing companies. The interaction between users as service recipients and e-hailing companies as service providers creates a co-creation value concept. However, studies on user satisfaction with e-hailing services have received less attention. Therefore, a study conducts to measure the satisfaction index of e-hailing services based on the co-creation value. The study uses the co-creation value model, the DART model, as the basis for improving e-hailing services through user satisfaction. The DART model, which consists of four factors, namely dialogue, access, risk assessment, and transparency, is a determining factor in e-hailing service user satisfaction. A survey of 251 users of e-hailing services conducts through an online questionnaire survey, and data from the questionnaires were analyzed. The e-hailing user satisfaction index results of 78.34% indicate that users are satisfied with the e-hailing services provided. It hopes that this study can be a guide for quality e-hailing services.

Keywords: *E-Services, Transportation Services, Service Quality, Satisfaction Index, User Satisfaction Model, DART Model*

1. INTRODUCTION

The emergence of e-hailing brings an evolution in the transportation industry throughout the world, especially when Uber was introduced in 2009 and Lyft in 2012, thereby making e-hailing proliferate, popular and has gained a place in the hearts of the users [1]. The evolution of e-hailing services began in urban areas as urban dwellers were exposed to technological facilities and infrastructure development. Nowadays, e-hailing services successfully expanded all over the place due to the number of people using the internet is growing [2].

An E-hailing service is an online travel booking service that provides travel options to users [3][4]. E-hailing service is a new trend in the business industry nowadays as the growing network of e-hailing services leads to competition in the e-hailing business market [5][6]. Although e-hailing services are proliferating and are the primary choice of users nowadays, e-hailing services also face issues and challenges, especially technological aspects. User satisfaction is one of the issues in e-hailing services since the e-hailing companies need to plan

strategies to provide the latest technology. This issue needs to be identified because the e-hailing companies nowadays only focus on driver behaviour quality.

Competition between e-hailing companies is now intensifying to win the hearts of users [7]. The e-hailing system needs a suitable communication medium to facilitate interaction between users and companies [8]. The interaction between the company and the user creates a co-creation value concept that leads to increased user satisfaction [9][10]. E-hailing companies need to emphasize the use of co-creation values in forming relationships with the e-hailing users. Thus, the users can get satisfaction while using the services, and the e-hailing companies can provide quality services. The user satisfaction index can determine the quality level of e-hailing services as a reference for users in choosing a satisfactory service [11][12].

European Committee for Standardization is a board that determines the value of e-hailing-related indexes. However, it focuses only on identifying the user satisfaction index on the quality and conditions

of transport received [13]. Similarly, there is no research on the e-hailing user satisfaction index on e-hailing travel booking services in Malaysia. In Malaysia, e-hailing services began when Uber was introduced in January 2014 and Grab in May 2014 [14]. The Malaysian government has made e-hailing services one of the legal public transportation services [15]. Provision for the government to regulate the operation of e-hailing services is realized after the act of Land Public Transport (Amendment) 2017 and the act of Commercial Vehicles Licensing Board (Amendment) 2017 passed in the House of Commons on 27 July 2017 [16]. E-hailing services in Malaysia are Uber, Grab, MyCar, Dascee, Riding Pink, Eevom, and taxi services categorized as e-hailing services, namely Sunlight Taxi, EzCab, Comfort Taxi, and Easy Taxi [17]. As such, e-hailing services operating in Malaysia are the source of research. Research is focused on users using e-hailing services throughout Malaysia.

This study chooses service science as the main field for the research because it emphasizes aspects of system use, service policies, and strategies performed by companies to users by involving the opinions of leading experts from various service industries. Service science is needed to transform, improve the efficiency and quality of services, and create value in services. Service science uses approaches to understand, improve and measure systems provided by companies, and emphasize the analysis of such services' design, model, and operation [18]. Service is fundamental in the value of co-creation. Co-creation value is a concept in service science that explains the methods and provision of services by using existing resources to create value. Service science for co-creation value comprises four types of resources: individuals, technology, companies, and information [19].

Therefore, this study aims to calculate the user satisfaction index of e-hailing services based on the developed model. The study uses the co-creation value model as the basis for the development of the e-hailing user satisfaction model [20]. The study is contributed to the satisfaction of e-hailing service users through the context of service science. Studies on user satisfaction for e-hailing services providing travel booking systems are still underway. Most previous studies focus on transport condition and driver behaviours [21]. The study conducts the index value measurement to measure the satisfaction of e-hailing services in Malaysia as improvements in the quality of e-hailing services

led to improved public transport quality in Malaysia. Thus, the study obtains the user satisfaction index to determine the extent of user satisfaction with the e-hailing services. The study helps e-hailing companies identify strengths and weaknesses to improve the quality of e-hailing services. The study also provides a useful guide and reference to the transport company that plans to provide e-hailing services in increasing the reputation of the transportation industry and user satisfaction.

The study contains five sections: introduction, literature review, research methodology, research output, and conclusion. Section 1 provides the introduction, statement of problems, objectives, and scope of the study. Section 2 describes the literature review on the areas of study and theory involved, such as co-creation value, DART model, and user satisfaction index. Section 3 contains the research methodology on descriptions of the design of studies such as information about the population and sample studies, data collection, research instruments, and research framework. Section 4 explains the research outputs about sample size determination, data processing, and user satisfaction index. Section 5 discusses the research outputs thoroughly. Section 6 concludes the study by discussing the contribution of studies and further research of the study.

2. LITERATURE REVIEW

User satisfaction is paramount and impacts the success of a service [22]. User satisfaction needs to be studied through various aspects, especially from the system's aspect, because a well-designed and easily accessible system contributes towards user satisfaction [23]. Nevertheless, the previous studies on e-hailing mainly cover the quality aspects of e-hailing services in the social sciences that focus on user satisfaction towards e-hailing drivers' behaviour [21]. E-hailing companies focus on user satisfaction with service quality in transportation and driver behaviour [24]. It clearly shows that user satisfaction towards the e-hailing system is given less attention [25].

User satisfaction with e-hailing services is vital to help e-hailing companies provide quality, responsive and interactive travel booking system. E-hailing companies need to study user satisfaction through various aspects to make e-hailing services the best and constantly innovate. Thus, the competition between e-hailing companies is becoming increasingly fierce to win users' hearts

[26]. [27] stressed that to win users' hearts, available systems must have communication channels that facilitate interaction between users and the company. It makes e-hailing companies aware of the importance of the interaction relationship between companies and users. Company-user relationships through interactive platforms are known as co-creation value, and this concept is capable of leading to increased user satisfaction [9]. However, the concept of co-creation value is still poorly practised in existing user satisfaction studies, especially in the field of transportation [28]. To remain relevant and competitive in the growing transportation industry, e-hailing companies need to emphasize the use of co-creation values and the development of relationships with e-hailing users to influence user satisfaction.

2.1 Co-creation value

Co-creation value is a theory that involves user cooperation towards service development. Co-creation value is defined as the value created by the companies that provide services to the user who receives services that involve activities and interactions to integrate operations based on available resources to measure the quality of provided services [29]. The co-creation value interaction between companies and users occurs when both parties are active in creating value, interacting, influencing each other, and communicating directly in the available environmental technologies.

Previous studies have issued several arguments in determining the measurement of co-creation values. The study results found that through the context of service science, co-creation value can be measured through the system's ability to adapt to the environment [30]. The concept of co-creation value proposed by the service science community is essential because it prioritizes the user. The value determined is based on the user experience after using the service [31]. The success or effectiveness of service can also be measured through consumer satisfaction.

The co-creation value practice can increase user satisfaction when they can participate in the service and produce the value in service quality. Users play an essential role in improving a company's performance by telling others about their products, services, or brands, including new services to co-create experiences and values [32]. Each user has different expectations and levels of

readiness while participating in the co-creation value process. Furthermore, competition between companies leads to the need to determine the user satisfaction index of the services. The user satisfaction index helps improve the company's reputation and brand, shows the excellent standards of services and strengthens the company's relationship with the users. The user satisfaction index is measured based on factors determined according to the study. All factors contribute to user satisfaction, although each factor has a different function for the study [33]. The combination of all factors plays a role in influencing fluctuations in the level of overall user satisfaction.

Measuring user satisfaction is essential because improving the quality of services can guarantee consumer loyalty [34]. Feedback on user satisfaction collected can be used as a strategy to identify the buying patterns and consumer behavior in the future [35]. Thus, the company can use the user satisfaction index results as a benchmark and compare service quality with the competitors.

2.2 DART Model

This study focuses on the co-creation value model known as the DART model [36][37][38]. The study uses the DART model as the basis for developing the e-hailing user satisfaction model. DART model consisting of the dialogue, access, risk assessment, and transparency, is the co-creation value model uses as a guide in assessing and measuring user satisfaction and interaction between companies and users [39][40]. The description of the factors in the DART Model is as follows:

- i. Dialogue (D) is a process that involves interaction, interactivity, and a tendency to act. Dialogue is focused on listening to users alone, understands everything needed by users, and views from the point of emotional, cultural, and social experience. This factor focuses on the means of communication between companies and users.
- ii. Access (A) begins with information and tools that allow users to access data and information in the system. Access allows users to get access to the right information using the intermediate apparatus and the desired sources. This factor allows users to access the same information without being hindered by digital gaps.
- iii. Risk (R) assessment involves the user's actions and decisions after exposure to the possible dangers of using the service. Companies need to

alert users about the potential threats related to the event while using the services. Then the user has to decide whether or not to bear the risk of continuing the use of the service. This factor makes the user aware of the possible risks that must be faced if they want to use the service.

- iv. Transparency (T) is the company's direct action and strategy to gain users' trust and confidence. Therefore, the company provides detailed information to establish trust between the user and the company. At present, the company no longer hides information such as prices, costs, and profits to assure users that the information services provided are transparent and detailed.

2.3 Customer Satisfaction Index

Irawan user satisfaction index is used to measure e-hailing user satisfaction [41]. The following is a description of the method of calculating Irawan user satisfaction index adapted for the suitability of the study:

- i. Obtain a significant Mean Important Score (MIS), which is the overall mean important score for each factor.
- ii. Obtain a Mean Satisfaction Score (MSS), which is the overall mean satisfaction score for each factor.
- iii. Calculate the Weight Factor (WF) which is the weighting for MIS:

$$WF_i = \frac{MIS_i}{\sum_{i=1}^p MIS_i}$$

Which:

i = index- i , $i = 1, \dots, p$

p = number of factors

- iv. Calculate the Weight Score (WS), which is the value that represents the importance of the factor.

$$WS_i = WF_i \times MSS_i$$

- v. Calculate the customer satisfaction index (CSI):

$$CSI = \frac{\sum_{i=1}^p WS_i}{5} \times 100\%$$

The value of 5 in the CSI formula is the maximum value of the study's Likert scale. Irawan user satisfaction index was used for the study using

five Likert scales because the value of the index is derived from the overall value of the weighting score. The user satisfaction index should be calculated to avoid biased opinions and prioritize the overall opinions. Table 1 shows the interpretation of the user satisfaction index.

Table 1 The interpretation of the user satisfaction index

Index value (%)	User satisfaction category
81 - 100	Very Satisfied
66 - 80.99	Satisfied
51 - 65.99	Quite Satisfied
35 - 50.99	Less Satisfied
0 - 34.99	Not Satisfied

Once the index is calculated through the given formula, the value needs to be interpreted to give a clear picture of user satisfaction with the services. The user satisfaction index is important because the value obtained is an overview of user satisfaction with the services [35].

3. RESEARCH METHOD

The study refers to the scientific design research methodology in information systems developed by [42]. The research method from [42] is adapted to suit the study's context and consists of four (4) phases: problem analysis phase, proposal phase, development phase, and evaluation phase, as shown in Fig. 1. This methodology was chosen as a reference because each phase's activities are interrelated with the study conducted. According to each phase, the division of activities is carried out to ensure that the study's objectives can be met.

Figure 1 Research methodology

3.1 Population and Sample Determination

The study involves e-hailing services operating throughout Malaysia. The study population consists of the e-hailing community in Malaysia, namely registered users and using e-hailing services. E-hailing users in Malaysia are identified through groups or communities of e-hailing users on social media sites such as Facebook, Twitter, Instagram, and Whatsapp. The sampling technique used is a simple random sampling method. Therefore, selecting study samples is random to provide equal opportunity for all individuals who are registered and using the e-hailing services.

3.2 Data Collection

The questionnaire was conducted online. Questionnaire links are distributed online through

the community of e-hailing users in Malaysia. The random sampling method gives all the individuals who are in the e-hailing community had the opportunity to give feedback and engage voluntarily. The questionnaire also personally be given randomly to the e-hailing users through the e-hailing company social media sites. Respondents need to click the given link to respond to the questionnaire.

3.3 Research Instrument

Questionnaires were used as the instrument for the study. The study's questionnaire was designed based on four factors from the DART model: dialogue, access, risk assessment, and transparency [20][39][43]. The questionnaire consists of three parts: Part A: The demographics of respondents, Part B: User satisfaction determinant factors, and Part C: User satisfaction. Table 2 shows the factors and items for the study using a Likert scale from "strongly disagree" with a scale of 1 to "strongly agree" with 5.

Table 2 Questionnaire content for user satisfaction determinants

3.4 Research Framework

The framework of the study is, as shown in Fig. 2. The factors are from the DART model, which is dialogue, access, risk assessment, and transparency. Each factor has items that describe the relevant factors appropriate to the study [44]. The results of the questionnaire were used to measure the user satisfaction index. Measurement of the user satisfaction index can establish the user satisfaction criteria and improve e-hailing service quality.

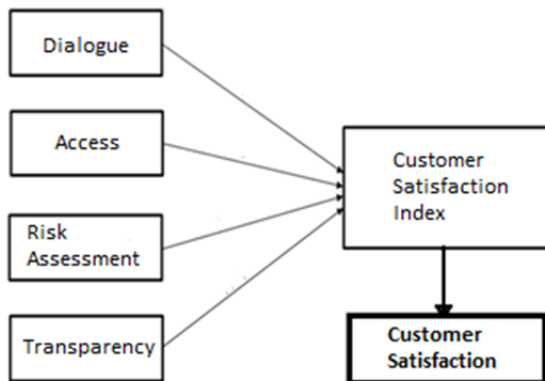


Figure 2 The framework

4. RESEARCH OUTPUT

4.1 Sample Size Determination

The sample size is the number of individuals required in the sample. The sample size for the study was determined using GPower. GPower is a software used to calculate sample sizes that cover extensive statistical study designs [45]. Through GPower calculations, the sample size for the study of e-hailing is at least a total of 129 samples. However, the study obtained a total of 251 respondents to answer the questionnaire. Fig. 3 shows the calculation of the sample size through the GPower software.

Figure 3 Sample size calculation using GPower

The collected data is analysed through demographic analysis and multiple regression analysis. The software uses to analyse the data is SPSS version 22. Demographic analysis is carried out to identify the distribution of the respondent's population. Demographic analysis is presented in frequency and percentage based on gender, age group, frequently used e-hailing applications, duration of being a registered user of e-hailing, and e-hailing use frequency. Multiple regression analysis is carried out to obtain verification of the e-hailing user satisfaction model.

4.2 Data Processing

A pilot study for the study was conducted on 30 respondents. The questionnaire's reliability ensures that the questionnaire is always consistent, stable, and equivalent because reliability is a concept used to reduce errors during the actual study analysis. The questionnaire should show an accurate or almost accurate result score. Cronbach's Alpha test was conducted to determine the reliability of the study questionnaire. The reliability values of the questionnaires received were from 0.70 to 0.99 [46]. The reliability value should not be less than 0.60, as such values indicate that the questionnaire is inconsistent. Table 3 shows the item reliability analysis for the pilot study.

Table 3 Item reliability analysis for the pilot study

Factor	Cronbach's Alpha
Dialogue	0.853
Access	0.838
Risk Assessment	0.826
Transparency	0.822

The pilot study results and reliability show that the Cronbach Alpha value for dialogue, access, risk assessment, and transparency is above 0.70. This indicates that the questionnaire items for dialogue, access, risk assessment, and transparency

have a high reliability and consistency level and show that the user understands the study's function.

4.3 Demographic Analysis

A total of 251 respondents were involved in the e-hailing user satisfaction survey. Demographic analysis was conducted because the respondents' demographics are the basic information that needs to be obtained in the survey to give a specific picture of the respondents' personalities and interests [47]. The respondents' demographic information for the study is shown in Table 4, which is presented in frequency and percentage distribution. The study respondents' demographic information was based on gender, age group, frequently used e-hailing applications, duration of being a registered user of e-hailing and frequency of use.

Table 4 Statistical distributions of respondent demographics

Respondent's demographic		Frequency (%)
Gender	Male	63(25.1)
	Female	188(74.9)
Age group	18 to 22 years	69(27.5)
	23 to 37 years	159(63.3)
	38 to 53 years	22(8.8)
	54 years and above	1(0.4)
E-hailing apps frequently used	Grab	224(89.2)
	MyCar	17(6.8)
	Uber	9(3.6)
	Riding Pink	1(0.4)
Period as a registered user of e-hailing	Less than 1 year	100(39.8)
	1 to 3 years	133(53.0)
	More than 3 years	18(7.2)
Frequency of e-hailing use	At least once a month	132(52.6)
	2 to 4 times per month	65(25.9)
	More than 5 times per month	54(21.5)

4.4 User Satisfaction Index

This study on e-hailing user satisfaction index calculation refers to the Irawan user satisfaction index method [48]. The method of calculating the user satisfaction index begins by obtaining the MIS value, which is the overall mean of the dialogue, access, risk assessment, and transparency. Next, the study obtained the value of MSS, the mean satisfaction score for dialogue, access, risk assessment, and transparency. MSS values were obtained from the overall satisfaction section of the factors in the questionnaire. The satisfaction part of the questionnaire emphasizes users' satisfaction in line with the factors studied

and helps researchers identify the cause if users are not satisfied with the service [34]. After obtaining the values of MIS and MSS, WF's value, which is MIS's weight, is obtained. The formula for calculating WF involves the MIS value for each factor divided by the total MIS for all factors. Then, the value of WS, which is the weighting score, is obtained. The formula for calculating the weighting score involves the product of WF and MSS. The MIS, MSS, WF, and WS value calculation procedures for each factor are shown in Table 5. The calculation of the user satisfaction index is shown in the form of a simple and easy-to-understand table.

Table 5 Calculation of user satisfaction index of e-hailing services

Factor	MIS	MSS	WF	WS
Dialogue	3.97	3.86	0.2537	0.9793
Access	3.93	3.98	0.2511	0.9994
Risk Assessment	3.95	3.87	0.2524	0.9768
Transparency	3.80	3.96	0.2428	0.9615
Total	15.65			3.917

Based on Table 4, the value of the user satisfaction index is calculated. All WS values were then added and divided by five, the Likert scale's maximum value in the questionnaire. Through the stated formula, the results of calculating the value of the e-hailing user satisfaction index as follows:

$$CSI = \frac{3.917}{5} \times 100\% = 78.34\%$$

Based on the calculations, the total user satisfaction index of e-hailing services is 78.34%. The index value of 78.34% is in the range of 66% to 80.99%, which is categorized as satisfied [48]. Refer to Table 1. The findings of the user satisfaction index value of 78.34% indicated that users were satisfied with the e-hailing services. However, calculating the value of the user satisfaction index is calculated only in total and does not go through the breakdown according to each e-hailing company. Thus, the study's findings clearly show that e-hailing users' satisfaction is at a satisfactory level. The results show that the user satisfaction index is essential as the feedback given by e-hailing users indicates the level of user satisfaction. The results also aid in improving the image and reputation of e-hailing companies.

5. DISCUSSION

The study contributes to e-hailing companies in Malaysia in identifying the level of user satisfaction. Through the breakdown of

questionnaire items, e-hailing companies need to ensure that dialogue is always available in the service by providing various communication channels to facilitate communication between users and e-hailing companies [49]. E-hailing companies need to ensure that access is always available in the service by providing complete and useful information access facilities related to e-hailing [50]. For risk assessment, e-hailing companies need to ensure that consumers need to be prepared for possible risks. E-hailing companies need to plan strategies to lower the risk of system failure to give users confidence [51]. E-hailing companies also need to ensure that transparency is always available in the service by safeguarding users' data and always providing reliable information [52]. The implementation of dialogue, access, risk assessment, and transparency in the service leads to increased user satisfaction, making e-hailing companies thrive.

Therefore, the development of the e-hailing user satisfaction model is in line with the government's policy of making e-hailing one of Malaysia's public services and operating legally under the Land Public Transport (Amendment) Bill 2017 [16]. Measuring the e-hailing user satisfaction index in Malaysia can improve the quality of the e-hailing service, leading to improved public transport quality in Malaysia. The level of user satisfaction with e-hailing services needs to be measured by calculating index values to strengthen e-hailing companies' position so that the e-hailing services business can thrive and remain competitive [26].

The study uses the satisfaction index method of [41] to obtain the e-hailing user satisfaction index. The study needs to get MIS which is the overall mean for the factor; MSS, which is the mean value of satisfaction for the factor as a whole; calculate WF, which is the weighting for MIS; and WS, which is the weighting score as the formula for calculating the user satisfaction index. The results showed that the e-hailing user satisfaction index was 78.34% which was interpreted by [41] as a sign of user satisfaction with existing e-hailing services. E-hailing companies can also identify weaknesses and improve services by finding the user satisfaction index. In this regard, the study can also be a reference for established transport companies that want to move towards e-hailing to keep pace with the development of the transport industry in Malaysia.

6. CONCLUSION

The practice of co-creation value can increase user satisfaction when people can participate in service and likely generate value in the context of a benchmark the quality of service [53]. Users can improve companies' performance and value through the experience gained during the use of a service. The study is conducted to measure user satisfaction of e-hailing services in Malaysia as the improvement in the quality of e-hailing services led to improved quality of public transport in Malaysia. E-hailing companies can identify weaknesses and improve services through the findings of the user satisfaction index. The study could also be a reference for conventional transport companies that want to move towards the e-hailing services to advance along with Malaysia's transport industry.

However, this study needs to be improved because the user satisfaction index calculation is calculated as a whole and not according to each e-hailing company. Through the demographic analysis, the majority of respondents, which is 89.2% use e-hailing services provided by the Grab. The study's findings show that e-hailing companies other than Grab face constraints to dominate service operations in Malaysia [54]. Therefore, other e-hailing companies need to refer to the Grab Company to remain competitive in the digital transportation industry and obtain user satisfaction [55]. Measurement of the consumer satisfaction index should involve the calculation of the index according to each e-hailing company. Thus, the study of e-hailing user satisfaction based on the co-creation value and user satisfaction index is expected to guide e-hailing companies in improving the quality of e-hailing services.

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REFERENCES:

- [1] National Association of City Transportation Officials, Ride-hailing services: Opportunities & challenges for cities, *NACTO*, 2016: June, pp. 1-11.
- [2] S. S. Sakaran, Harifah Mohd Noor & Eboy, O. V., Socioeconomic factors that affect usage of Grabcar services in Kota Kinabalu city, Sabah, *Malaysian Journal of Business and Economics*, Vol. 5, No. 2, 2018, pp. 65-77.

- [3] O. Flores, & Rayle, L., How cities use regulation for innovation: the case of Uber, Lyft and Sidecar in San Francisco, *Transportation Research Procedia*, Vol. 25, 2017, pp. 3756-3768.
- [4] A. S. Jais, & Marzuki, A., E-hailing services in Malaysia: current practices and future outlook, *Planning Malaysia*, Vol. 18, No. 13, 2020, pp. 128-141.
- [5] X. Wang, Research on development of China e-hailing industry, In *SHS Web of Conferences*, Vol. 61, EDP Sciences, 2019, pp. 01032.
- [6] N. F. Elias, Jenal, R., Mohamed, H., Hanawi, S. A., Amin, H. M., Yeganegi, R., & Idros, N. A. N. B. M., E-Service innovation through Malaysian consumer perspectives: Case studies of e-hailing and e-hypermarket, In *Business Innovation with New ICT in the Asia-Pacific: Case Studies*, Springer, Singapore, 2020, pp. 305-323.
- [7] M. Ashraff, Kee, D. M. H., Hazimah, N., & Syafiqah, N. A., Key success factors of organizational success: A study of MULA Car International. *International Journal of Accounting & Finance in Asia Pasific (IJAFAP)*, Vol. 3, No. 2, 2020, pp. 46-56.
- [8] C. R. Wang, & Jeong, M., What makes you choose Airbnb again? An examination of users' perceptions toward the website and their stay, *International Journal of Hospitality Management*, Vol. 74, 2018, pp. 162-170.
- [9] P. O. Boadi, Guoxin, L., & Antwi, P., Customer satisfaction, co-creation intentions and diligent business response, *Human Systems Management*, Vol. 36, No. 3, 2017, pp. 251-257.
- [10] S. Balbi, Misuraca, M., & Scepi, G., Combining different evaluation systems on social media for measuring user satisfaction, *Information Processing & Management*, Vol. 54, No. 4, 2018, pp. 674-685.
- [11] I. Fečiková, An index method for measurement of customer satisfaction, *The TQM Magazine*, Vol. 16, No. 1, 2004, pp. 57-66.
- [12] U. Jothimani, & Jeya-Gowri, C., A study on consumer satisfaction towards online purchasing in flipkart with special reference to Kurichi in Tirunelveli city, *International Journal of Engineering Applied Sciences and Technology*, Vol. 5, No. 8, 2020, pp. 153-157.
- [13] A. S. Jais, & Marzuki, A., Urban mobility using e-hailing in the historic city of Melaka, Malaysia: Preliminary findings, In *Seventh International Conference on Built Environment in Developing Countries*, 2018, Kuching Sarawak, Malaysia.
- [14] A. Ahmad, *Regulating Uber and Grab Drivers*, New Straits Times, 20 August 2017, pp. 1.
- [15] Nazura Ngah, Hazwan Faisal Mohamad & Fahmy Azril Rosli, *RUU sahkan khidmat e-hailing, Uber, Grabcar lulus*, Berita Harian, 27 Julai 2017, pp. 1.
- [16] Parlimen Malaysia, *Rang Undang-Undang Akta Pengangkutan Awam Darat (Pindaan) 2017*, Fasal 30 Pindaan Jadual Pertama Akta 715, 15, 2017, pp.1-22.
- [17] K. Khan, *Rideshare/e-hailing in Malaysia. Slaid*, 2017, Malaysia, Funkada.
- [18] X., Wang, Bao, G. & Jia, X., A brief study on the research of service science theory, International Conference on Service Sciences, 2010, pp. 248-252.
- [19] P. P. Maglio, & Spohrer, J., A service science perspective on business model innovation, *Industrial Marketing Management*, Vol. 42, No. 5, 2013, pp: 665-670.
- [20] N. A. N. M. Idros, Mohamed, H., & Jenal, R., Customer satisfaction of e-hailing: an item development, *International Journal of Management (IJM)*, Vol. 11, No. 11, 2020, pp. 1157-1165.
- [21] I. Balachandran, & Hamzah, I. B., The influence of customer satisfaction on ride-sharing services in Malaysia, *International Journal of Accounting and Business Management*, Vol. 5, No. 2, 2017, pp. 184-196.
- [22] G. Ling, M., Fern, Y. S., Boon, L. K. & Huat, T. S., Understanding customer satisfaction of internet banking: A case study in Malacca, *Procedia Economics and Finance*, 2016, pp: 80-85.
- [23] A. M. K. Ahmad, & Al-zu'bi, H. A., E-banking functionality and outcomes of customer satisfaction: An empirical investigation, *International Journal of Marketing Studies*, Vol. 3, No. 1, 2011, pp: 50-65.
- [24] A. M. M. Adriano, & Su, C. C. S., Out with the old, in with the new: A study on the vehicle hailing preferences of Filipino taxi riders based on participation intent, *International Journal of Real Estate Studies*, Vol. 11, No. 1, 2017, pp: 75-81.
- [25] S. Dhawan, & Yadav, P., E-cab hailing: A study on consumer behavior, *ELK Asia Pacific Journal of Marketing and Retail Management*, Vol. 9, No. 3, 2018, pp: 1-17.

- [26] M. N. Khuong, & Dai, N. Q., The factors affecting customer satisfaction and customer loyalty: A study of local taxi companies in Ho Chi Minh City, Vietnam, *International Journal of Innovation, Management and Technology*, Vol. 7, No. 5, 2016, pp: 228–233.
- [27] C. R. Wang, & Jeong, M., What makes you choose Airbnb again? An examination of users' perceptions toward the website and their stay., *International Journal of Hospitality Management*, Vol. 76, 2018, pp: 162-170.
- [28] A. A., Nunes, Galvão, T. & Cunha, J. F. E., Urban public transport service co-creation: Leveraging passenger's knowledge to enhance travel experience, *Procedia - Social and Behavioral Sciences*, 2014, pp: 577–585.
- [29] T. Zhang, Lu, C., Torres, E., & Cobanoglu, C., Value co-creation and technological progression: a critical review, *European Business Review*, Vol. 32, No. 4, 2020, pp. 687-707.
- [30] S. L. Vargo, & Akaka, M. A., Value cocreation and service systems (re) formation: A service ecosystems view, *Service Science*, Vol. 4, No. 3, 2012, pp. 207-217.
- [31] M. N. Ismail, Yahya, Y., & Mukhtar, M., Nilai cipta-sama sistem pengurusan pembelajaran, *Sains Humanika*, Vol. 60, No. 1, 2013, pp. 21-29.
- [32] R. J. Brodie, Hollebeek, L. D., Jurić, B., & Ilić, A., Customer engagement: Conceptual domain, fundamental propositions, and implications for research, *Journal of Service Research*, Vol. 14, No. 3, 2011, pp. 252-271.
- [33] D. Paddeu, Fancello, G., & Fadda, P., An experimental customer satisfaction index to evaluate the performance of city logistics services, *Transport*, Vol. 32, No. 3, 2017, pp. 262-271.
- [34] R. P. Rajendran, & Arun, C. J., Evolution of customer satisfaction index as a performance metric: A comprehensive review, *Journal of Xi'an University of Architecture & Technology*, Vol. 11, No. 12, 2019, pp. 536-550.
- [35] K. Ilieska, Customer satisfaction index—as a base for strategic marketing management, *TEM Journal*, Vol. 2, No. 4, 2013, pp. 327.
- [36] C. K. Prahalad, & Ramaswamy, V., Co-creating unique value with customers, *Strategy & Leadership*, Vol. 32, No. 3, 2004, pp. 4–9.
- [37] R. Jenal, Mukhtar, M., Yahya, Y., Hanawi, S. A., Mohamed, H., Elias, N. F., & Nor, N. M., Model kepuasan pengguna mySMS berdasarkan nilai cipta-sama, *Sains Humanika*, Vol. 4, No. 1, 2015, pp. 47-53.
- [38] H. Mohamed, Elias, N. F., Mukhtar, M., Yahya, Y., Hanawi, S. A., Jenal, R., & Ahmad, W. A. Z. W., Model nilai cipta-sama dalam sistem pengukuran prestasi, *Jurnal Pengurusan (UKM Journal of Management)*, Vol. 45, 2015, pp. 155-163.
- [39] W. A. Z. W. Ahmad, & Mukhtar, M., A social content management model based on the DART model, *American Journal of Applied Sciences*, Vol. 14, No. 1, 2017, pp. 25-33.
- [40] O. O. Christian, Chibuikwe, N. B., & Nnamdi, A. V., Using the DART model of value co-creation to predict customer loyalty in pension fund administration in Nigeria, *British Journal of Management and Marketing Studies*, Vol. 2, No. 3, 2019, pp. 13-26.
- [41] H.D. widi, *Indonesian customer satisfaction: Membedah strategi kepuasan pelanggan merek pemenang ICSA 2003*, Elex Media Komputindo.
- [42] W. Kuechler, & Vaishnavi, V., A framework for theory development in design science research : Multiple perspectives, *Journal of the Association for Information Systems*, Vol. 13, No. 6, 2012, pp: 395–423.
- [43] N. A. N. M. Idros, Mohamed, H., & Jenal, R., The use of expert review in component development for customer satisfaction towards E-hailing, *Indonesian Journal of Electrical Engineering and Computer Science*, Vol. 17, No. 1, 2020, pp. 347-356.
- [44] N. A. N. M. Idros, Mohamed, H., & Jenal, R., Determinant factors of customer satisfaction for e-hailing service: A preliminary study, In *International Conference of Reliable Information and Communication Technology*, 2018, June, pp. 803-811, Springer, Cham.
- [45] E. McCrum-Gardner, Sample size and power calculations made simple, *International Journal of Therapy and Rehabilitation*, Vol. 17, No. 1, 2010, pp. 10-14.
- [46] K. S. Taber, The use of Cronbach's alpha when developing and reporting research instruments in science education, *Research in Science Education*, Vol. 48, No. 6, 2018, pp. 1273-1296.
- [47] J. Ponto, Understanding and evaluating survey research, *Journal of The Advanced Practitioner in Oncology*, Vol. 6, No. 2, 2015, pp: 168-171.
- [48] W. H. Utomo, & Wijaya, A. F., Customer satisfaction analysis to health service by servqual 5 dimensions method and customer satisfaction index *International Journal of*

- Computer Applications*, Vol. 70, No. 12, 2013, pp. 17-21.
- [49] O. O. A. Korelina, The influence of customer engagement in value co-creation on customer satisfaction: searching for new forms of co-creation in the Russian hotel industry, *Worldwide Hospitality and Tourism Themes*, Vol. 8, No. 3, 2016, pp: 1–21.
- [50] O. B. Maduka, Effects of customer value co-creation on customer loyalty in the Nigerian service industry, *International Journal of Business and Management*, Vol. 11, No. 12, 2016, pp: 77–82.
- [51] K., Solakis, Peña-Vinces, J. C. & López-Bonilla, J. M., DART model from a customer's perspective: An exploratory study in the hospitality industry of Greece, *Problems and Perspectives in Management*, Vol. 15, No. 2, 2017, pp: 536–548.
- [52] J. Banyte, & Dovaliene, A., Relations between customer engagement into value creation and customer loyalty, *Procedia - Social and Behavioral Sciences*, 2014, pp: 484–489.
- [53] W. D. Hoyer, Chandy, R., Dorotic, M., Krafft, M., & Singh, S. S., Consumer co-creation in new product development, *Journal of Service Research*, Vol. 13, No. 3, 2010, pp. 283-296.
- [54] M. Z. A. Suhami, Talib, S. A., Bachok, S., & Saleh, M. M., Service attributes, customer satisfaction and return usage: A case of Uber Malaysia, *Journal of Tourism, Hospitality & Culinary Arts*, Vol. 10, No. 2, 2018, pp. 81-103.
- [55] A. Ruangkanjanases, & Techapoolphol, C., Adoption of e-hailing applications: A comparative study between female and male users in Thailand, *Journal of Telecommunication, Electronic and Computer Engineering (JTEC)*, Vol. 10, No. 1-10, 2018, pp. 43-48.

Table 2 Questionnaire content for user satisfaction determinants

Section B: User Satisfaction Determinant Factors		1	2	3	4	5
1.	Dialogue: Two-way communication and interaction that occurred between the company and e-hailing users to understand users' emotions, experiences, issues, and solve e-hailing matters together using various methods of communications.					
a.	I can contact e-hailing customer service if there is any problem.					
b.	I can ask questions about e-hailing personally.					
c.	I receive fast feedback from e-hailing.					
d.	I can submit satisfaction feedback regarding my experience using e-hailing.					
e.	E-hailing uses text language that is easy for users to understand.					
f.	E-hailing customer service is provided to understand the specific needs of the customer.					
2.	Access: The company displays useful information by providing an accessible interactive website or apps as a platform for e-hailing users to access the information and service most easily.					
a.	E-hailing provides an accessible platform for all users.					
b.	Booking e-hailing vehicles can be done easily through the navigation button provided.					
c.	E-hailing has designed a user-friendly system with easy access.					
d.	The information in e-hailing is useful for the users.					
e.	The travel information provided by e-hailing is complete.					
f.	E-hailing is accessible at any time without system failure.					
g.	I can access to e-hailing anywhere without any problem.					
3.	Risk assessment: The company will notify e-hailing users about the potential risks before, during, and after using e-hailing. Users must be well prepared to deal and bear the risk if they want to continue using e-hailing.					
a.	I am aware that e-hailing might have a system failure.					
b.	I understand the possible risk of providing my personal information to an e-hailing company.					
c.	I am responsible for the information that has been given to the e-hailing company.					
d.	I can foresee the implications of e-hailing usage in the future.					
e.	I have decided to use e-hailing even after knowing the possible risks.					
4.	Transparency: Trust is established between users and e-hailing companies to protect users' data privacy and ensure that the company will deliver trusted information.					
a.	I use e-hailing based on the company's reputation.					
b.	I trust that the payment method for e-hailing is secure.					
c.	I am confident with the safety measures provided when I surf e-hailing.					
d.	I trust that an e-hailing company will work to protect the user's data.					
e.	E-hailing promises the booking of the vehicle provided is as chosen by the user.					
f.	E-hailing provides travel information by displaying the travel map.					
g.	The information about travel time is as expected.					
h.	The information about the ride fee is reasonable.					

Figure 1 Research methodology

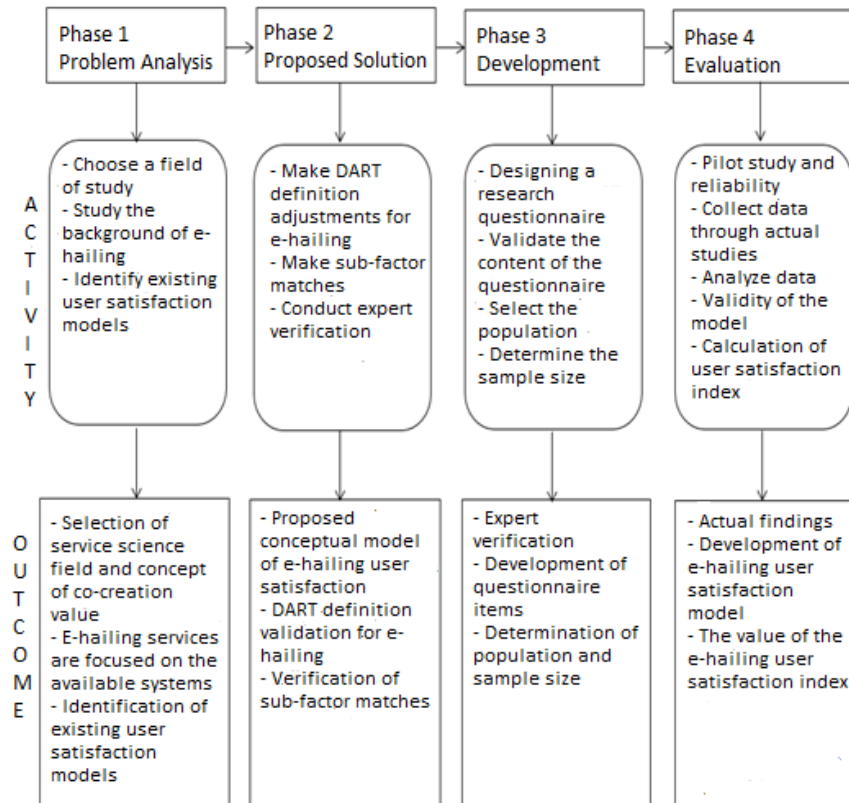


Figure 3 Sample size calculation using GPower

