



INVESTIGATING SERVICE CONVENIENCES AS A HIGHER ORDER CONSTRUCT TOWARD CONTINUED ENGAGEMENT INTENTION TO USE ONLINE FOOD DELIVERY APPLICATIONS AMONG MALAYSIAN CONSUMERS

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Abstract

Online food delivery applications (OFDAs) make life convenient and become widely used in the Malaysian market. This study is to investigate the effect of service convenience (SC) toward continued engagement intention (CEI) with mediator online trust (ONTR). With the purposive sampling method, 298 valid online food consumers have purchasing experiences with OFDAs in this research. With the data analysis in SPSS and SmartPLS4.0, it is found that SC has a significant and positive impact on CEI, and online trust has a partial mediation on the relationship between SC and CEI. This study provides a sight of service convenience toward continued engagement intention and steps of data analysis in high order construct (HOC) in SmartPLS4.0.

Keywords: *Continued Engagement Intention, Service Convenience, Online Trust, High Order Construct*

1. Introduction

Online food delivery applications (OFDAs) are widely used in the Malaysian market, such as Food Panda and Grab Food, which are the two most used online food delivery applications in Malaysia (Statista Research Department, 2022). Besides the food quality concern (Yuchen, 2020), online food services are considered by consumers. Consumers just click a few buttons in OFDAs to make the order and payment in the platform Online food delivery applications (OFDAs), and they can receive online food ready to eat. Hence, OFDAs provide service convenience for consumers purchasing online food in Malaysia (Eu & Sameeha, 2021). Convenience was important for the delivery service quality as well as the speed, care, quality, and seamless experiences for online consumers (Uzir et al., 2021), and convenience played a decisive role in terms of applications accessibility, information searching, evaluations, and transaction in online food (Brewer & Sebby, 2021).

However, there were few service quality scales suitable for OFDAs services (Cheng et al., 2021). Hence, this research mainly focuses on the service convenience of OFDAs in Malaysia and studies service convenience (SC) in five dimensions. Besides this, lack of trust is also a problem in the online marketplace for online food delivery applications (OFDAs), because of the absence of face-to-face proximity in using online applications, leading to trust

formation impacted by this trust disposition (Luo et al., 2010; Raza et al., 2023). As a result, lack of trust becomes a major cause of consumers' reluctance to apply online food services and reduce the intentions and willingness to use OFDAs (Raza et al., 2023).

In this research, objectives are to investigate the impact of SC and ONTR toward continued engagement intention among consumers who have experiences in OFDAs usage, and the mediation effect of online trust between service convenience and continued engagement intention.

2. Literature Review

With literature review on online food delivery applications (OFDAs) studies in Malaysia, besides technology acceptance model (TAM) was widely used in OFDAs studies, other theories have been studied, such as service quality (SERQUAL) model (Koay et al., 2022), theory of planned behaviour (TPB) (Poon & Tung, 2023; Yeo et al., 2017), technology acceptance model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT) (Allah Pitchay et al., 2023), UTAUT2 (Rasli et al., 2020; Yapp & Kataraian, 2022). With the technology acceptance model, Chowdhury (2023) studied the perceived convenience and intentions to use OFDAs. In this study, under the technology acceptance model, it will be tested on the effect of SC (with 5 dimensions) on consumers' continued engagement intention (CEI) toward OFDAs in Malaysia.

2.1 Continued Engagement Intention (CEI)

Based on Kim et al. (2013), continued engagement intention can be separated into "continued engagement" and "intention", and continued engagement can be viewed as "post-adoptive driven lifestyle decision choices", and the intention was "likelihood of acting in a manner". Then, continued engagement intention was related to the consumer experiences which was the internal and subjective responses of consumers (Chen et al., 2019). Hence, the definition of CEI was as a consumer's psychological attachment to product providers and service providers, and also as the willingness of consumers to reuse the products and services with positive subsequent service preferences (Chen et al., 2019).

2.2 Service Convenience (SC)

SC referred to time saved and efforts saved by the consumers in purchasing or using the service, and SC can reflect overall intrinsic values that consumers can derive from the times and efforts in the three stages: before, during, and post the consumption stages (Roy et al., 2018). Based on Syachadi et al. (2021), service convenience was as the customer's ease and comfort feelings from the benefits of the services, and this kind of service convenience can help services gain customers' satisfaction, and willingness to buy. Saha et al. (2022) studied online service convenience and purchase intention and stated that service convenience became crucial for customers to avoid the concerns inherent during the process of online purchase, such as the payment approaches, checkout processes, product delivery, and the services after purchasing.

In this research, according to these five dimensions of SC by Roy et al. (2018), decision convenience (SCDC) was the time and effort saved by consumers in making their purchasing decisions or in selecting online food in OFDAs, access convenience (SCAC) was the time

and effort saved in starting to use OFDAs, and reaching the online food services; transaction convenience (SCTC) was the time and effort saved in completing the transaction with OFDAs; benefit convenience (SCBC) was the time and effort saved in getting core benefits from OFDAs; and post-benefit convenience (SCPC) was the time and effort saved in maintaining contacts with OFDAs or Customer Service Center, and in resolving issues related to online food delivery.

2.3 Online Trust (ONTR)

Based on Mohan & Kumar (2020), the definition of trust was as perceptions of a customer for trust mechanism being provided in online purchases, and online trust was the willingness to actions according to others' ability, performance, and controlling (Su et al., 2022). In this study, online trust is the consumer's willingness that online food delivery applications (OFDAs) can provide a high level of online food and services in the Malaysian market.

2.4 Research framework

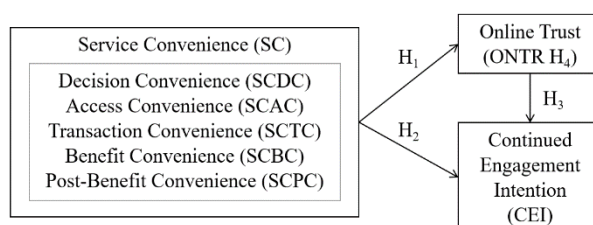


Figure 1 Research Framework

Within this research framework, there are four hypotheses:

- H1: SC has a significant and positive impact on ONTR.
- H2: SC has a significant and positive impact on CEI.
- H3 ONTR has a significant and positive impact on CEI.
- H4: ONTR has a mediation effect between SC and CEI.

3. Methodology

The quantitative research method is used to investigate the continued engagement intention toward online food delivery applications in Malaysia. With purposive sampling, the consumers are selected with the purchasing experiences, and there are 298 valid samples contributing to this online survey. In measurement, the higher order construct service convenience is measured with 5 dimensions adapted from Roy et al. (2018), online trust is measured with 4 items adapted from Su et al. (2022), and continued engagement intention was adapted from Chen et al. (2019). In data analysis, SPSS v25, and SmartPLS are used to test this model.

4. Data Analysis

4.1 Demographic Profile

With the data analysis is done primarily within SPSS, and the descriptive analysis has been conducted (As shown in Table 1 Demographic Profile). In Table 1, the gender, age, monthly income, and purchasing experiences are listed.

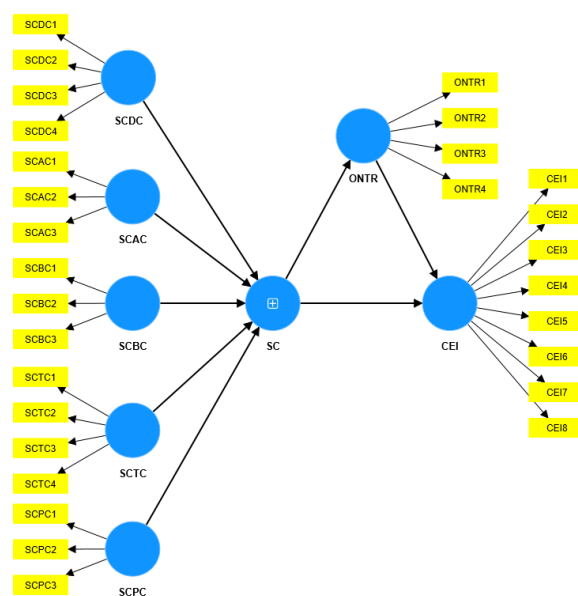
Table 1 Demographic Profile

| N=297 | Categories | Frequency | Percent |
|------------------------|-------------------|-----------|---------|
| Gender | Male | 129 | 43.4 |
| | Female | 168 | 56.6 |
| Age | 18-25 | 30 | 10.1 |
| | 26-30 | 63 | 21.2 |
| | 31-34 | 58 | 19.5 |
| | 35-40 | 60 | 20.2 |
| | 41-45 | 48 | 16.2 |
| | 46-50 | 14 | 4.7 |
| | 51-55 | 17 | 5.7 |
| | 56 and above | 7 | 2.4 |
| Monthly Income | RM2,000 and Below | 16 | 5.4 |
| | RM2,001 - RM3,000 | 52 | 17.5 |
| | RM3,001 - RM4,000 | 67 | 22.6 |
| | RM4,001 - RM5,000 | 72 | 24.2 |
| | RM5,001 - RM6,000 | 57 | 19.2 |
| | RM6,001 and above | 33 | 11.1 |
| Purchasing Experiences | 2 years and below | 74 | 24.9 |
| | 3-5 years | 128 | 43.1 |
| | 6-8 years | 63 | 21.2 |
| | Above 8 years | 32 | 10.8 |

4.2 Data Analysis in SmartPLS (Measure Model + Structural Model)

4.2.1 Model creation

In Partial least squares structural equation modelling (PLS-SEM), the model is built for model prediction, and SmartPLS4.0 will be used to analyse the PLS-SEM (Hair et al., 2017). In SmartPLS, the reflective formative model is built with a higher-order construct (variable: service convenience), because of the nature of indicators and constructs, those indicators or items are used to represent the first-order constructs (five dimensions of SC), and service convenience is composed of these 5 first-order constructs (Becker et al., 2023).



(Author Construction in SamrtPLS 4.0)

Figure 2 Model Creation in Reflective Formative Type

4.2.2 Guideline in Data Analysis in SmartPLS

In data analysis, (as shown in Table 2) the steps of analysis are listed on measurement model and structural model, and with a high-order construct, service convenience, the two-stage approach will be employed to test the first-order constructs and second-order construct in the measure model (Ramayah et al., 2018). In specific, in the measurement model, the test will consist of construct reliability, validity (convergent and discriminant validity), collinearity between indicators, and relevance of weight and significance; in the structural model, hypothesis testing, and the model will be evaluated with the explanatory power (R^2), predictive power, and model comparisons, based on Hair et al. (2022).

Table 2 R-F Model Analysis in Two Stage Approach*

| |
|--|
| Measure Model |
| Stage 1: First order constructs Tested. |
| Construct reliability & Convergent Validity |
| <i>Indicator loading, Cronbach's alpha, roh_A, composite reliability (CR), AVE</i> |
| Discriminant validity |
| <i>HTMT</i> |
| Collinearity between indicators |
| <i>Variance Inflation Factor (VIF)</i> |
| Stage 2: Second order construct Tested. |
| <i>Relevance of weight and significance</i> |
| Structural Model |
| Hypothesis testing |
| <i>Beta, t value, p value, LL & UL</i> |
| Explanatory power |
| <i>R square (R^2)</i> |
| Predictive power |
| <i>Indicators:</i> |

$PLS-SEM Q^2_{predict} > 0$
 $PLS-SEM_RMSE (MAE) < LM_RMSE (MAE)$

Model comparisons

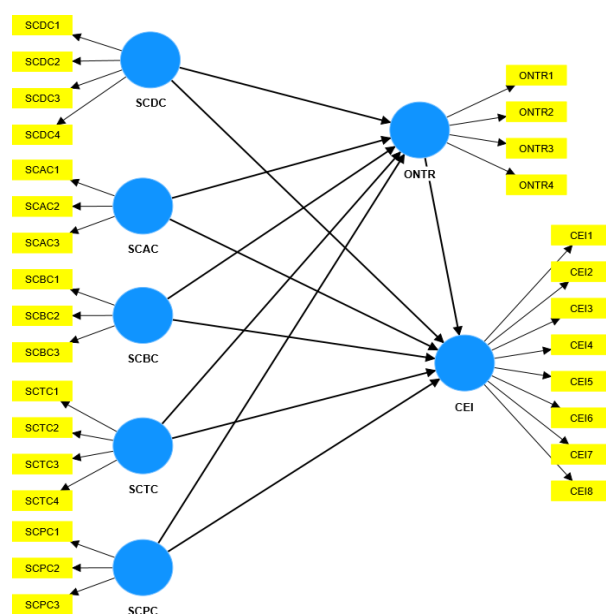
Bayesian Information Criterion (BIC)

*R-F Model, Reflective Formative Model

(Source: Hair et al., 2022)

4.2.3 Measure Model

In the measure model, stage one processes the first-order constructs with online trust and continued engagement intention (Shown in Figure 3).



(Author Construction in SamrtPLS 4.0)

Figure 3 Two Stage Approach (Stage 1)

With the result measure model in stage one, after removing three indicators (SCPC3, SCDC3 & SCDC4), according to the criteria of the measure model by Hair et al. (2022), this stage one presents good construct reliability (indicator loading over 0.5, α over 0.7, and CR over 0.7), a good convergent validity (average variance extracted, AVE, over 0.5), and out of collinearity issue (variance inflation factor of indicators, $VIF < 3.3$ or 5) (as shown in Table 3), and out of discriminant validity issue (heterotrait-monotrait ratio of correlations, $HTMT < 0.85$ or 0.9) (Table 4).

Table 3: Construct Reliability, Convergent validity and collinearity

| | Loading | VIF | Alpha | rho-A | CR | AVE |
|------|---------|-------|-------|-------|-------|-------|
| CEI | | | 0.897 | 0.900 | 0.917 | 0.580 |
| CEI1 | 0.729 | 2.421 | | | | |
| CEI2 | 0.779 | 2.709 | | | | |
| CEI3 | 0.792 | 2.546 | | | | |
| CEI4 | 0.759 | 2.502 | | | | |
| CEI5 | 0.836 | 3.453 | | | | |

| | | | | | | |
|-------|---------|--------|-------|-------|-------|-------|
| CEI6 | 0.812 | 2.362 | | | | |
| CEI7 | 0.694 | 1.779 | | | | |
| CEI8 | 0.679 | 1.763 | | | | |
| ONTR | | | 0.874 | 0.879 | 0.908 | 0.666 |
| ONTR1 | 0.804 | 1.955 | | | | |
| ONTR2 | 0.772 | 1.810 | | | | |
| ONTR3 | 0.840 | 2.968 | | | | |
| ONTR4 | 0.891 | 3.560 | | | | |
| ONTR5 | 0.766 | 1.814 | | | | |
| SCAC | | | 0.912 | 0.915 | 0.944 | 0.850 |
| SCAC1 | 0.901 | 2.405 | | | | |
| SCAC2 | 0.938 | 4.243 | | | | |
| SCAC3 | 0.926 | 3.975 | | | | |
| SCBC | | | 0.925 | 0.927 | 0.952 | 0.869 |
| SCBC1 | 0.936 | 3.581 | | | | |
| SCBC2 | 0.939 | 3.875 | | | | |
| SCBC3 | 0.921 | 3.253 | | | | |
| SCDC | | | 0.943 | 0.947 | 0.959 | 0.853 |
| SCDC1 | 0.889 | 3.040 | | | | |
| SCDC2 | 0.923 | 3.893 | | | | |
| SCDC3 | 0.942 | 5.298* | | | | |
| SCDC4 | 0.939 | 5.032* | | | | |
| SCPC | | | 0.831 | 0.847 | 0.922 | 0.855 |
| SCPC1 | 0.937 | 2.022 | | | | |
| SCPC2 | 0.912 | 2.022 | | | | |
| SCPC3 | -0.226* | -- | | | | |
| SCTC | | | 0.877 | 0.891 | 0.915 | 0.731 |
| SCTC1 | 0.888 | 2.678 | | | | |
| SCTC2 | 0.870 | 2.433 | | | | |
| SCTC3 | 0.892 | 2.639 | | | | |
| SCTC4 | 0.763 | 1.746 | | | | |

* SCPC3 removed due to low loading, SCDC3 & SCDC4 removed due to high VIF.

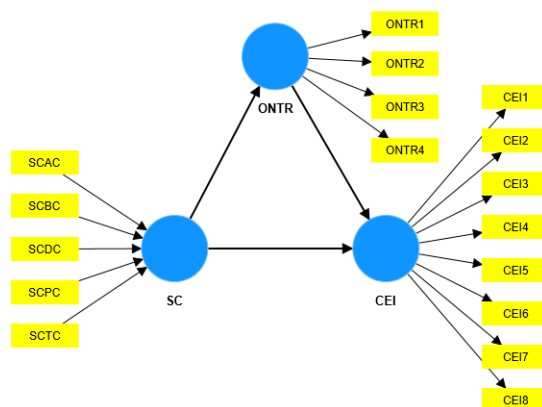
*Loading (> 0.5), VIF < 3.3 or 5 ; $\alpha, \rho_A, CR > 0.7$; AVE > 0.5 (Hair et al., 2022).

Table 4: HTMT*

| | CEI | ONTR | SCAC | SCBC | SCDC | SCPC | SCTC |
|------|-------|-------|-------|-------|-------|-------|------|
| CEI | | | | | | | |
| ONTR | 0.833 | | | | | | |
| SCAC | 0.489 | 0.507 | | | | | |
| SCBC | 0.462 | 0.479 | 0.811 | | | | |
| SCDC | 0.493 | 0.503 | 0.823 | 0.679 | | | |
| SCPC | 0.594 | 0.542 | 0.310 | 0.345 | 0.254 | | |
| SCTC | 0.649 | 0.647 | 0.748 | 0.850 | 0.660 | 0.469 | |

*HTMT < 0.85 or 0.9 (Hair et al., 2022)

In the measure model, stage two, higher-order construct service convenience (SC) is tested with online trust (ONTR) and continued engagement intention (CEI) (as shown in Figure 4), and the significance and weight of high-order construct is tested (as shown in Table 4).



(Author Construction in SamrtPLS 4.0)

Figure 4: Two Stage Approach (Stage 2)

In stage two, the weight, loading and p values are tested in the formative model (first-order constructs toward second-order construct (shown in Table 5). As shown in Table 4, p values are all less than 0.05 and the loading of each first-order construct is over 0.5, and VIF is less than 3.3, so these first-order constructs are valid used to measure this high-order construct, service conveniences.

Table 5: Outer Weight and Significance

| FOC -> SOC | Weight | T value | p | Loading | VIF |
|------------|--------|---------|-------|---------|-------|
| SCAC -> SC | 0.131 | 9.652 | 0.000 | 0.681 | 3.148 |
| SCBC -> SC | -0.184 | 9.429 | 0.000 | 0.643 | 3.065 |
| SCDC -> SC | 0.219 | 7.570 | 0.000 | 0.632 | 2.143 |
| SCPC -> SC | 0.479 | 15.109 | 0.000 | 0.752 | 1.201 |
| SCTC -> SC | 0.608 | 29.084 | 0.000 | 0.871 | 2.588 |

P values < 0.05, loading > 0.5; VIF < 3.3 or 5 (Hair et al., 2022)

4.2.4 Structural Model

In the structural model, the hypothesis testing has been completed as shown in Table 6. As it is shown in Table 5, t values are over 1.96, VIF values are less than 3.3, p values are less than

0.05, no zero between the lower level (LL) and upper level (UL) of the confidence interval, f square value are all over 0.02, so based on guidelines of Hair et al. (2022), these hypotheses can be supported in this model. For instance, SC has a significant and positive impact on online trust (beta, 0.609; t, 17.527; p, 0.000); SC has a significant and positive impact on continued engagement intention (beta, 0.214; t, 4.703; p, 0.000); online trust has a significant and positive impact on continued engagement intention (beta, 0.67; t, 17.056; p, 0.000); and online trust has mediation effect between service convenience and continued engagement intention (beta, 0.408; t, 12.691; p, 0.000). These hypotheses can be supported by the data result of this research.

Table 6 Hypothesis Testing

| H | O | t | p | VIF | f ² | LL | UL | Result |
|----|-------|--------|-------|-------|----------------|-------|-------|--------|
| H1 | 0.609 | 17.527 | 0.000 | 1.000 | 0.589 | 0.542 | 0.679 | Yes |
| H2 | 0.214 | 4.703 | 0.000 | 1.589 | 0.088 | 0.127 | 0.305 | Yes |
| H3 | 0.670 | 17.056 | 0.000 | 1.589 | 0.855 | 0.588 | 0.744 | Yes |
| H4 | 0.408 | 12.691 | 0.000 | -- | -- | 0.348 | 0.474 | Yes |

R² is 0.678 (substantial) for CEI and 0.422 (moderate) for ONTR (Chin, 1998).

Effect Size: Large (f² ≥ 0.35), medium (f² ≥ 0.15), small (f² ≥ 0.02), and no effect (f² < 0.02) (Cohen, 1988).

On the coefficient of determination, R square is 0.678 (substantial) for continued engagement intention (CEI) and 0.422 (moderate) for online trust (ONTR), substantial and moderate coefficients respectively, according to Chin (1998), and effect size is 0.088 (small) from service convenience (SC) toward continued engagement intention (CEI), 0.589 (large effect size) from service convenience (SC) toward online trust (ONTR), and 0.855 (large effect size) from the online trust (ONTR) toward continued engagement intention (CEI), according to Cohen (1992).

In model predictive power, the analysis is processed, based on Shmueli et al. (2019) and Hair et al. (2022). Table 7 indicates that Q²_{predict} becomes positive for all indicators for PLS-SEM, then, RMSE values in PLS-SEM are all smaller than RMSE in LM, so there is high predictive power in this model.

Table 7 PLS Predict

| | Q ² _{predict} | PLS-SEM_RMSE | LM_RMSE |
|-------|-----------------------------------|--------------|---------|
| CEI1 | 0.250 | 0.729 | 0.733 |
| CEI2 | 0.238 | 0.779 | 0.787 |
| CEI3 | 0.233 | 0.759 | 0.766 |
| CEI4 | 0.259 | 0.717 | 0.724 |
| CEI5 | 0.272 | 0.738 | 0.745 |
| CEI6 | 0.275 | 0.685 | 0.690 |
| CEI7 | 0.217 | 0.816 | 0.822 |
| CEI8 | 0.248 | 0.754 | 0.760 |
| ONTR1 | 0.212 | 0.818 | 0.822 |
| ONTR2 | 0.249 | 0.753 | 0.760 |
| ONTR3 | 0.326 | 0.775 | 0.778 |

| | | | |
|-------|-------|-------|-------|
| ONTR4 | 0.334 | 0.732 | 0.736 |
|-------|-------|-------|-------|

**All indicators for PLS-LM_RMSE < LM_RMSE, this model has a high predictive power (Shmueli et al., 2019; Hair et al., 2022).*

In model comparisons, Bayesian Information Criterion (BIC) is employed to compare with different models and lower BIC is preferred in selecting a more predictive model (Hair et al., 2022). In this research, two models are compared: Model 1 is as shown in Figure 3 (the first-order constructs directly go to online trust and continued engagement intention), and Model 2 is as shown in Figure 4 (service convenience is tested with 5 dimensions toward online trust and continued engagement intention). In this case, the BIC is -298.102 in model 1, larger than BIC (-320.047) in model 2 for continued engagement intention (CEI), and the BIC is -130.023 in model 1, larger than BIC (-152.584) in model 2 for online trust (ONTR), so model 2 is preferred with lower BIC.

5. Discussion and conclusion

In this research, the high order construct, service convenience (SC) has a significant and positive impact on online trust and continued engagement intention toward OFDAs, and this research is similar to Chowdhury (2023). In consumers' perceptions of convenience in OFDAs, they will have continued engagement intention to use OFDAs in Malaysia. Online trust among consumers has a significant and positive impact on continued engagement, and a partial mediation on service convenience and continued engagement intention toward online food delivery applications (OFDAs). This is similar to Su et al. (2022), and online trust can mediate the relationship between the technology acceptance model factor (perceived usefulness) and loyalty to online food delivery applications (OFDAs). Hence, service convenience can improve online trust and continued engagement intention among consumers and online trust has a partial mediation between service convenience (SC) and continued engagement intention (CEI) to OFDAs in Malaysia.

This result will give suggestions on OFDAs to be designed with more service convenience features. In particular, when consumers have any issues with online food delivery, OFDAs can also provide customer service person for consumers in Malaysia, more post-benefit convenience in OFDAs should be improved in the future.

With purposive sampling, this result becomes difficult to generalization for the total population in Malaysia, and probability sampling is recommended in future research. With a trend of UTAUT (Allah Pitchay et al., 2023), and UTAUT2 (Rasli et al., 2020; Yapp & Kataraiian, 2022) being studied in Malaysia, more valuable constructs can be studied in future research, like habit, purchasing experiences, and usage frequency among consumers in Malaysia.

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Appendix: Measurement of Constructs

Service Convenience (SC)

Access Convenience (SCAC)

SCAC1 Online food delivery applications (OFDAs) were available when I needed them.

SCAC2 online food delivery applications (OFDAs) are accessible.

SCAC3 Hours of online food delivery applications (OFDAs) were convenient.

Decision Convenience (SCDC)

SCDC1 Information received from online food delivery applications (OFDAs) made it easy to choose what to buy.

SCDC2 Making up my mind about what to buy was quick and easy.

SCDC3 Information that I received was very clear and easy to read.

SCDC4 Online food delivery applications (OFDAs) let me know exact cost or special offers.

Transaction convenience (SCTC)

SCTC1 I found it easy to complete my purchase with online food delivery applications (OFDAs).

SCTC2 I was able to complete my purchase quickly.

SCTC3 It takes little time to pay for my purchase.

SCTC4 Online food delivery applications (OFDAs) offer convenient payment options.

Benefit convenience (SCBC)

SCBC1 I was able to get the benefits from online food delivery applications (OFDAs) with little effort.

SCBC2 The time required to receive the benefits was reasonable.

SCBC3 Online food delivery applications (OFDAs) solved my needs without creating other problems.

Post-benefit convenience (SCPC)

SCPC1 Online food delivery applications (OFDAs) quickly resolved any problems I had with online food delivery.

SCPC2 It was easy for me to obtain after sale service.

SCPC3 When I had questions about online food, the online food delivery applications (OFDAs) can provide the contact of customer service group to solve my problems.

Online Trust (ONTR)

ONTR1 The online food delivery applications (OFDAs) are trustworthy.

ONTR2 The online food delivery applications (OFDAs) instill the confidence in customers.

ONTR3 The online food delivery applications (OFDAs) fulfill the promises and commitments with customers.

ONTR4 Using the online food delivery applications (OFDAs) will not have risks.

Continued Engagement Intention (CEI)

1 I will purchase online foods from online food delivery applications (OFDAs) again.

2 I would recommend online food delivery applications (OFDAs) to my friends.

3 I will continue to focus on the latest news regarding online food delivery applications (OFDAs).

4 Whenever I want to buy any foods, I will first consider online food delivery applications (OFDAs).

5 Online food delivery applications (OFDAs) are my first choice.

6 I have a positive impression of online food delivery applications (OFDAs).

7 I am satisfied with online food delivery applications (OFDAs).

8 I will be loyal to online food delivery applications (OFDAs).