**CORRESPONDING AUTHOR**

Bayu Ilham Pradana
Faculty of Economics and
Business,
Universitas Brawijaya,
Indonesia

**EMAIL**
bayuilham@ub.ac.id

# VALIDATING DIMENSIONS OF MOBILE SERVICE QUALITY E-COMMERCE CONSUMER TO CONSUMER (C2C) IN INDONESIA FROM SELLER'S PERSPECTIVE

**Bayu Ilham Pradana**
**Kardina Yudha Parwati**
**Faril Ardian**
Faculty of Economics and Business, Universitas Brawijaya, Indonesia
**Nancy Runnan Li**
The School of Business Administration, Guangzhou Institute of Science and Technology, China

**Abstract**: Along with technological advancement, many sellers in Indonesia have shifted to use digital platform like e-commerce, which is creating potential ecosystem for various e-commerce applications to grow and face intense competition in facilitating direct transactions between consumers (C2C). This study aims to confirm the mobile service quality dimensions of e-commerce on mobile applications. The study adopts a quantitative approach with sellers who are use of popular C2C mobile applications in Indonesia, such as Tokopedia, Shopee, Bukalapak, and TikTok Shop as the population. Sample selection using purposive technique resulted in a sample size of 313 respondents. Testing was conducted using Confirmatory Factor Analysis (CFA) to determine the proposed dimensions of e-commerce mobile application service quality from previous research. The results of the study confirm six factors of mobile service quality in e-commerce applications: Application Design, Reliability, Responsiveness, Trust, Efficiency, and System Availability. Testing with the modified model provides higher fit criteria. ANOVA was used to compare components in each dimension. E-commerce service providers can use the result to improve service quality. These improvements involve refining the application interface, ensuring reliability, responsiveness, security, efficiency, and system availability, aiming to boost user satisfaction, foster continued app usage, and fortify the service provider's reputation.

**Keywords**: Mobile Service Quality, E-Commerce, C2C, Sellers

## INTRODUCTION

The transformative impact of globalization and technological advancements in Indonesia involves a paradigm shift in economic aspects, consumer behavior, and the dynamics of C2C e-commerce businesses. The adoption of economic globalization causes adjustments to Indonesia's economic policies. At the same time, widespread internet advancements have a significant impact on changes in consumer behavior, particularly the growing trend of online shopping (Octaviani and Sudrajat, 2016). This transformation also alters the role of customers, turning them into partners and collaborators in the C2C digital marketplace (Sotomayor et al., 2022). Supported by the projected growth of e-commerce transactions reaching 572 trillion Indonesian rupiahs by 2023 (Naurah, 2023), this research aims to understand and optimize the impact of this phenomenon in the C2C e-commerce industry in Indonesia, with a focus on the influence of mobile service quality on business actors.

E-commerce encompassing electronic transactions and communication aspects significantly affects Indonesia's Consumer-to-Consumer (C2C) industry. Service quality and mobile service quality are key factors shaping the user experience within the C2C business ecosystem. The close linkage between e-commerce and the C2C industry underscores that developing service quality, including application design, reliability, responsiveness, trust, efficiency, and system availability, is imperative. In this context, the effective integration of mobile technology into C2C business activities will enhance competitiveness and provide a superior shopping experience for Indonesian consumers.

Tokopedia, Shopee, Bukalapak, and TikTokShop exhibit significant dominance in the Indonesian C2C e-commerce industry, supported by the iPrice Group's 2021 report, where Tokopedia led with 149.6 million monthly visitors, followed by Shopee and Bukalapak with 131.89 million and 29.88 million visitors, respectively (Dihni, 2022). Bukalapak, with a reported market share of US $2.43 billion, secured its position as the 5th largest retail company in Asia in 2021 (Roy, 2021). TikTokShop, a new entrant in the Indonesian C2C e-commerce, has also achieved success, attracting user expenditures, as evidenced by the TikTok GMV growth to 2.5 billion IDR in Q1 2023 (Dewi, 2023). The selection of these platforms for research is based on their substantial impact and relevance in portraying the dynamics of the C2C e-commerce industry in Indonesia.

This study is an advancement of several previous types of research with some differences in variables and research objects. The first study by Hadiwijaya et al. (2017) examined variables such as satisfaction, service quality, and recovery service quality in the context of C2C e-commerce in Indonesia. Subsequently, the research by Firmansyah and Ali (2019) focused on variables like satisfaction, e-service quality, and repurchase intention with Lazada as the research object. The third study conducted by Alfi and Moko (2022) explored variables including perceived usefulness, perceived ease of use, perceived price, free alternatives to paid apps, and willingness to subscribe to Netflix as the research object. The most recent previous study by Desmal et al. (2019) investigated variables related to e-service quality in m-commerce. The gaps identified with the research earlier encompass the introduction of new variables, covering six factors of mobile service quality in e-commerce applications: Application Design, Reliability, Responsiveness, Trust, Efficiency, and System Availability, as well as the addition of research objects, including mobile e-commerce apps like Tokopedia, Shopee, Bukalapak, and TikTok Shop.

This study aims to validate the mobile service quality of C2C e-commerce applications in Indonesia, focusing on platforms like Tokopedia, Shopee, Bukalapak, and TikTok Shop. The research identifies gaps by introducing new variables related to six factors of mobile service quality from the sellers' perspective. The study contributes theoretically to business management and provides practical insights into the provider of app-service quality for C2C among Indonesian mobile applications of e-commerce users, especially for sellers.

## LITERATURE REVIEW

### E-Commerce

Electronic commerce (e-commerce) encompasses various electronic transactions between businesses and stakeholders, including financial transactions, information, and services (Chaffey,

2009). E-commerce provides significant advantages in communication, such as product promotion and customer interaction (Abebe, 2014). E-commerce benefits individuals, particularly sellers, who play a crucial role in economic growth, efficiency, and job creation (Alroustan and Jones, 2016; MacGregor and Kartiwi, 2010). E-commerce has also influenced lifestyles by facilitating online shopping and overcoming barriers such as cost, time, and convenience (Sukkar and Hasan, 2005).

## Service Quality

Service quality is a high-quality activity or function when there are no errors or deviations in the operational management system (input-process-output) and ensuring that the output meets specified quality standards (Crosby, 1980). Customer reactions to a company's product are called service quality (Feigenbaum, 1991), while Juran and Godfrey (2000) explain it as meeting customer desires without loss. This concept is used to measure organizational performance in effectiveness and efficiency (Santos, 2003; Stamenkov and Dika, 2015) and has received widespread attention in various fields, especially in business and marketing. Service quality encompasses customer satisfaction based on the service provided (Rust and Oliver, 1994), measured by comparing current performance with user expectations (Parasuraman et al., 1988).

## Mobile Service Quality

E-commerce and online shopping bring opportunities, prompting many businesses to build websites as new channels for transactions, allowing customers to make purchases on the company's website. Such activities enable companies to enter the global market with low operational costs, provide detailed information, and deliver high-quality electronic services to customers through online interactions, enhancing competition among companies. Mobile Commerce (MC) is a dynamic business opportunity with unique features that enhance the transactions (Safieddine, 2017). Using smartphones drives the business sector to adopt m-commerce technology as an effective and efficient way to provide business services to end-users while saving costs and effort. Mobile commerce is supported by various advanced techniques such as

voice, live chat, and live video, which help business providers and customers be more interactive and portable. Parasuraman et al. (2005) define e-service quality as the extent to which a website offers efficient and effective shopping, purchasing, and delivery facilities. The definition further mentions that the concept of e-service quality moves from the pre-purchase phase (ease of use, product information, order information, and personal data protection) to the post-purchase phase (delivery, customer service, delivery, fulfillment, and return policies).

This study develops a measurement scale for mobile service quality based on the research by Desmal et al. (2019), namely application design, reliability, responsiveness, trust, efficiency, and system availability. Application design examines the overall display and functionality of the mobile application, considering aspects such as information architecture, interaction design, frameworks, and visual design. Reliability focuses on the dependability, consistency, and accuracy of services. Customers expect reliable service, and this dimension evaluates the service provider's responsibility to provide reliable services and respond to user concerns quickly. Responsiveness assesses the willingness and speed of businesses to respond to user needs and complaints. Quick issue resolution in mobile commerce indicates good responsiveness and positively affects users' perception of service quality. Trust is related to building a high level of confidence in electronic services, considering security and privacy. Trust is critical for supporting service quality and influences user acceptance of electronic services. Efficiency measures user satisfaction regarding the ease of accessing and using the website. Efficiency in mobile commerce enhances user experience by providing efficient processes with minimal input requirements. System availability describes the website's technical characteristics as part of electronic service quality. System availability is crucial to ensure the smooth functioning of the mobile application, affecting customer satisfaction and the service provider's reputation.

## HYPOTHESIS DEVELOPMENT
## Mobile Service Quality

This section discusses the theory and foundation for formulating the main hypotheses, which

aim to show the contribution of each dimension in measuring Mobile Service Quality. Previous research by Hadiwijaya et al. (2017) indicated that satisfaction in C2C e-commerce shopping in Indonesia is significantly influenced by service quality. It was also found recovery service quality does not influence that satisfaction. In a second prior study by Firmansyah and Ali (2019), trust was identified as a factor mediating the influence of satisfaction and e-service quality on customer repurchase intention in Lazada. Another prior study by Alfi and Moko (2022) demonstrated that one of the mobile app quality indicators, perceived usefulness, significantly affects the willingness of Netflix app users to subscribe. Subsequently, it was found that all three indicators of mobile app quality perceived ease of use, perceived price, and free alternatives to paid apps—significantly influence the willingness of Netflix app users to subscribe.

**Ha**: There is a relationship between Mobile Service Quality and their underlying construct variables: application design, reliability, responsiveness, trust, efficiency, and system availability.

**METHOD**

The approach used in this study is quantitative, an effort to collect data based on a representative sample from the population and then analyze the data to ensure accuracy, completeness, and suitability for further analysis (Sekaran and Bougie, 2016). The population in this study includes all members of the Indonesian seller forum on Facebook as the group of individuals or entities for the research. Sampling was conducted using a non-probability sampling method, where not all respondents are equally likely to be selected as samples. A purposive sampling technique was employed, where samples were selected based on specific characteristics desired according to the researcher's criteria. Determining the sample size used the Slovin formula, a statistical technique to determine the appropriate sample size for a specific population, targeting a total sample of 313 people with an Acceptable Margin of Error (e) of 0.05. The selection criteria for respondents included being a member of the Indonesian seller forum on Facebook and having a minimum age of 17.

The analytical method in this study includes data reduction, data presentation, and conclusions of the research results after data collection. The data processing process used Confirmatory Factor Analysis (CFA) supported by Amos 24 tools to assess the six-factor measurement model identified based on previous theory or research. CFA is part of structural equation modeling (SEM), which helps test the extent to which variables can be effectively measured in depicting the factors. CFA was conducted to test the goodness of fit of the research measurement variables. Factor analysis was used to determine the underlying structure among the construct variables in the study. The analysis process encompassed testing data validity (convergent validity, variance extracted, construct reliability, and discriminant validity), univariate and multivariate normality tests, and model fit (CFI, RMSEA, GFI, and TLI).

**RESULTS**

The questionnaire distribution results indicated the involvement of 313 respondents, meeting or exceeding the minimum required number. Respondent criteria included all members of the Indonesian seller forum on Facebook who were at least 17 years old. Respondent characteristics included gender, age, field of business, province of residence, monthly turnover, number of transactions per month, and the primary e-commerce platform.

The majority of respondents were female (55.59%), indicating that the majority of e-commerce sellers are female. The majority of active sellers were in the age range of 26-35 years (46.96%). The fashion sector dominated the field of business (27.16%), followed by beauty (24.28%), indicating the sellers' preference for these categories. Most respondents resided in West Java (18.85%). The majority of respondents had a monthly turnover of Rp 1,000,000-Rp 20,000,000 (67.09%) and a total of 10-100 transactions per month (56.87%). Shopee was the primary e-commerce platform with the highest number of respondents (37.70%).

The data interpretation provides an overview of the profile of e-commerce sellers, with the majority being women aged 26-35, focusing on the fashion business sector, residing in West Java, having moderate turnover and transaction numbers, and preferring Shopee as the primary selling platform. Each indicator's total number of state-

ments consists of 3 questions, resulting in 18 measurement instrument items. Respondents are instructed to fill in the 18 statement items based on scores on the Likert scale, ranging from 1 as strongly disagree to 5 points as strongly agree with the related statements (Bertram, 2006).

Mobile service quality encompasses the effectiveness and efficiency of websites in providing facilities for shopping, purchasing, and delivering products and services to customers. The assessment of mobile service quality uses a scale that includes aspects such as application design, reliability, responsiveness, trust, efficiency, and system availability. In this study, data were analyzed using Confirmatory Factor Analysis (CFA) with the support of Amos 24 to evaluate the measurement model comprising six factors identified based on previous theories and research.
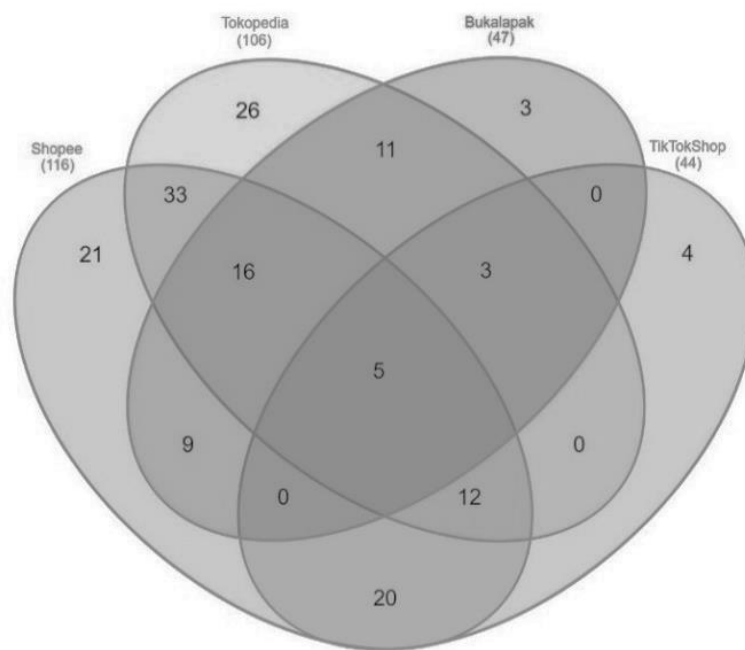


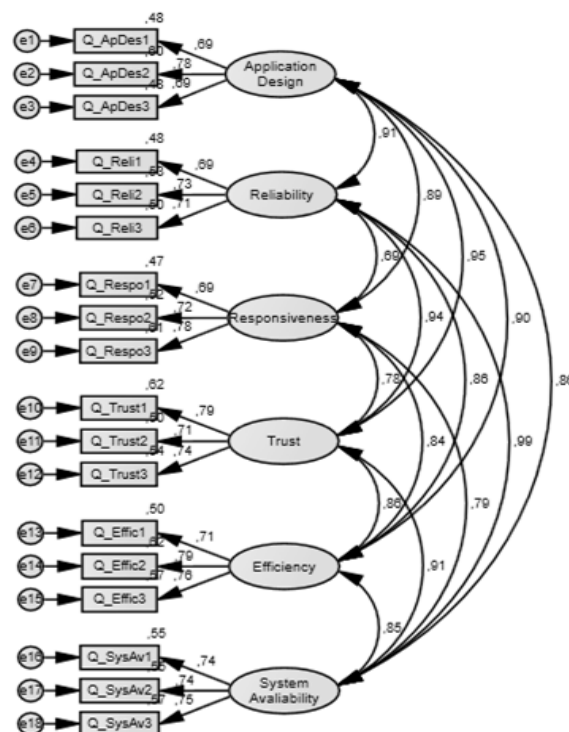Source: Primary Data Processing (2023)

**Figure 1. Results of Testing Respondent Characteristics**

**Table 1. Mobile Service Quality Measurement Scale**

| Dimensions of *Mobile Service Quality* | *M* | *SD* |
|---|---|---|
| **Application Design (Q_ApDes)** | | |
| Q_ApDes1: I use an e-commerce application with an attractive user interface. | 3.73 | .714 |
| Q_ApDes2: I use an e-commerce application with adequate graphic resolution. | 3.71 | .768 |
| Q_ApDes3: I use an e-commerce application that makes menu navigation easy. | 3.76 | .702 |
| **Reliability (Q_Reli)** | | |
| Q_Reli1: I use an e-commerce application that provides accurate information about the offered features. | 3.73 | .767 |
| Q_Reli2: I use an e-commerce application that runs smoothly without glitches. | 3.61 | .748 |
| Q_Reli3: I use an e-commerce application that consistently performs well. | 3.53 | .716 |

| Dimensions of<br>*Mobile Service Quality* | *M* | *SD* |
|---|---|---|
| **Responsiveness (Q_Respo)** | | |
| Q_Respo1: I use an e-commerce application that provides accurate information about the offered features. | 3.75 | .717 |
| Q_Respo2: I use an e-commerce application with a smooth-running process. | 3.71 | .731 |
| Q_Respo3: I use an e-commerce application with consistent performance. | 3.81 | .722 |
| **Trust (Q_Trust)** | | |
| Q_Trust1: I use an e-commerce application with adequate security features. | 3.74 | .713 |
| Q_Trust2: I choose an e-commerce application that mobile users widely download. | 3.70 | .703 |
| Q_Trust3: I use an e-commerce application with a high rating. | 3.71 | .738 |
| **Efficiency (Q_Effic)** | | |
| Q_Effic1: I use an e-commerce application that allows me to make transactions quickly. | 3.65 | .663 |
| Q_Effic2: I use an e-commerce application to interact with buyers anytime. | 3.77 | .767 |
| Q_Effic3: I use an e-commerce application that makes it easy for me to increase the number of transactions. | 3.69 | .699 |
| **System Availability (Q_SysAv)** | | |
| Q_SysAv1: I use an e-commerce application from a reputable official service provider. | 3.70 | .759 |
| Q_SysAv2: I use an e-commerce application that can be downloaded easily on mobile devices. | 3.63 | .852 |
| Q_SysAv3: I use an e-commerce application that provides regular technical updates. | 3.69 | .722 |

Source: Primary Data Processing (2023)



Source: Primary Data Processing (2023)

**Figure 2. Six-Factor Model with Standardized Path Coefficients**

## Validity Test

The function of CFA serves as a tool to assess the construct validity of the proposed measurement theory (Ghozali, 2017). Construct validity provides confidence that the sample's indicators depict the population's true values.

## Convergent Validity

The construct validity can be measured by looking at the factor loading values. Significant factor loading can also have low values. Hence, the criterion emerged that the standardized loading estimate should be ≥ 0.50 or more, and it is ideal if it is equal to 0.70. Based on the standardized loading estimate output in Table 1, it can be said that all loading factors are statistically significant because they have loading factor values ≥ 0.50.

## Variance Extracted

The Average Variance Extracted (AVE) can be calculated using the standardized loading values with the formula below:

$$AVE = \frac{\sum_{i=1}^{n} \lambda i^{\ 2}}{\sum_{i=1}^{n} \lambda i^{\ 2} + \sum_{i=1}^{n} Var(\varepsilon i)}$$

The symbol λ represents standardized loading, and i is the number of items or indicators. The AVE value should be ≥ 0.50 to indicate good convergent validity. The AVE value is calculated for each latent construct, so in this case, AVE should be calculated for six latent constructs, namely ApDes, Reli, Respo, Trust, Effic, and SysAv. Below is the calculation for each AVE.

The overall latent constructs of the variable indicators, namely ApDes, Reli, Respo, Trust, Effic, and SysAv, have met the AVE criteria of ≥ 0.50. Additionally, all convergent validity values for the latent constructs ApDes, Reli, Respo, Trust, Effic, and SysAv have loading factor values ≥ 0.70.

## Construct Reliability

Reliability is one indicator of convergent validity. Several previous studies have used Cronbach's alpha as a measure of reliability, although in reality, Cronbach's alpha provides lower reliability compared to construct reliability. The calculation of Cronbach's alpha can be done using the formula below:

$$CR = \frac{\left[\sum_{i=1}^{n} \lambda i\right]^{\ 2}}{\left[\sum_{i=1}^{n} \lambda i\right]^{\ 2} + \left[\sum_{i=1}^{n} \delta i\right]}$$

The basis for construct reliability should be ≥ 0.70 to indicate good reliability, while reliability between 0.60 – 0.70 can still be accepted with the condition that the indicator validity in the model is good. The latent constructs as a whole have high reliability, including the latent constructs of ApDes, Reli, Respo, Trust, Effic, and SysAv, each of which has a value ≥ 0.70 (good).

## Discriminant Validity

This validity measures the extent to which one construct differs from another. High discriminant validity values indicate evidence that a construct is unique and can capture the measured phenomena. Testing can be done by comparing the square root of AVE (√AVE) with the correlation values between constructs.

**Table 2. The Correlation between Constructs and the Square Root of AVE**

|        | ApDes   | Reli    | Respo   |
|--------|---------|---------|---------|
| ApDes  | *0.722* |         |         |
| Reli   | 0.910   | *0.710* |         |
| Respo  | 0.889   | 0.694   | *0.731* |
| Trust  | 0.953   | 0.938   | 0.938   |
| Effic  | 0.904   | 0.859   | 0.859   |
| SysAv  | 0.860   | 0.990   | 0.990   |
|        | **Trust** | **Effic** | **SysAv** |
| ApDes  |         |         |         |
| Reli   |         |         |         |
| Respo  |         |         |         |
| Trust  | *0.743* |         |         |
| Effic  | 0.862   | *0.753* |         |
| SysAv  | 0.908   | 0.849   | *0.744* |

**Note: Bold and italicized numbers represent the square root of AVE values.**

Source: Primary Data Processing (2023)

Based on the table 2 above, it can be observed that only the overall constructs comprising

ApDes, Reli, Respo, Trust, and SysAv have the square root of AVE values that are not higher than the correlation values between constructs. These results show that although the AVE square values are not higher than the correlation values between constructs, these findings are acceptable based on the convergent validity testing.

## Normality Test

The kurtosis approach is a statistical test that evaluates the maximum likelihood possibility at specific levels based on the normal theory in multilevel structural equation models (Ryu, 2011). Skewness and kurtosis levels at each manipulated level in hierarchical data are examined for their effects on the maximum likelihood possibility statistics. The indication used for univariate normality analysis is that the data can be considered to meet normality if they fall within the range of -2 to 2 (Hair et al., 2010). On the other hand, for the testing of multivariate normality kurtosis, the magnitude of the value produced $\leq 7$ indicates no deviation from normality, while a value $\geq 7$ indicates a deviation from normality (Byrne, 2010).

The results of the univariate normality values, the study shows values ranging from -0.331 to -0.115, falling within the range of -2 to +2, showing that the research data meets the normal distribution (Hair et al., 2010). Meanwhile, the study has a value of 6.941 for multivariate normality, suggesting no deviation from normality (Byrne, 2010).

## Interpretation of Parameter Summary

Mobile service quality encompasses the effectiveness and efficiency of the website in providing facilities for shopping, purchasing, and delivering products and services to customers. The assessment of mobile service quality utilizes a scale that includes aspects such as application design, reliability, responsiveness, trust, efficiency, and system availability. This study analyzed data using Confirmatory Factor Analysis (CFA) with support from Amos 24 to assess the measurement model consisting of six factors identified based on previous theories and research.

The summary of the parameter results presents a model overview. Moving from the left to right, there are 36 regression weights, with 24 fixed and 12 estimated. Next, the 24 fixed regression weights include the first loading of 6 factors and 18 error terms. There are 15 covariances and 24 variances estimated. There are 75 parameters, out of which 51 are estimated.

## Results of Computation of degrees of freedom (Default model)

The analyzed model is overidentified. The number of data variances and covariances for observed variables is calculated based on the formula 'p(p+1)/2,' where p is the number of observed variables. There are 18 observed variables in this case, so the calculation is 18(18+1)/2 = 171 sample moments. The number of estimated parameters is 51, so the research has 171 – 51 = 120 degrees of freedom.

**Table 3. Notes for Model (Default model)**

| Computation of degrees of freedom (Default model) |
| --- |
| Number of distinct sample moments: 171 |
| Number of distinct parameters to be estimated: 51 |
| Degrees of freedom (171 - 51): 120 |

Source: Primary Data Processing (2023)

The analyzed model is recursive (no reciprocal regression relationships with latent variables) with a sample size 313. The results indicate the model is not a good fit. Therefore, alternative model fit measures, namely GFI, AGFI, and RMSEA, were examined. The Amos text output presents the values GFI = 0.930 and AGFI = 0.900, which meet the fit criteria.

## Model Fit

**Table 4. RMSEA**

| Model | RMSEA | LO 90 |
| --- | --- | --- |
| Default model | .053 | .042 |
| Independence model | .250 | .243 |
| **Model** | **HI 90** | **PCLOSE** |
| Default model | .063 | ,327 |
| Independence model | .258 | .000 |

Source: Primary Data Processing (2023)

Efforts to determine the statistical significance test for SEM can be conducted using the model testing theory (Kline, 2005), which includes RMSEA, CFI, GFI, and IFI. This study uses a range in a broader interval. The RMSEA has a value of 0.053, so it can be said that the value meets the fit criteria because it is < 0.08.

### Table 5. RMR dan GFI

| Model | RMR | GFI |
|---|---|---|
| Default model | .017 | .930 |
| Saturated model | .000 | 1.000 |
| Independence model | .244 | .205 |
| **Model** | **AGFI** | **PGFI** |
| Default model | .900 | .652 |
| Saturated model | | |
| Independence model | .111 | .183 |

Source: Primary Data Processing (2023)

### Table 6. Baseline Comparisons

| Model | NFI Delta1 | RFI rho1 | IFI Delta2 |
|---|---|---|---|
| Default model | .929 | .909 | .966 |
| Saturated model | 1.000 | | 1.000 |
| Independence model | .000 | .000 | .000 |
| **Model** | **TLI rho2** | **CFI** | |
| Default model | .956 | .965 | |
| Saturated model | | 1.000 | |
| Independence model | .000 | .000 | |

Source: Primary Data Processing (2023)

The measurements for CFI and GFI (Bentler and Bonnet, 1980) use the threshold of acceptance ranging from 0.9 to 1 (good fit) and 0.8 to 0.9 (acceptable fit). Similarly, for IFI (Hu and Bentler, 1999), the threshold of acceptance is between 0.9 to 1 (good fit) and 0.8 to 0.9 (acceptable fit). TLI (Bentler and Bonnet, 1980) also states that the fit index ranges from 0 to 1 (acceptable fit) and 1 (perfect fit). Therefore, the obtained results are formally acceptable based on these criteria.

Based on the results in the table, it can be concluded that the CFI value of 0.965 is a good fit ($0.9 < 0.965 \le 1$), the GFI value of 0.930 is a good fit ($0.9 < 0.930 \le 1$), the IFI value of 0.966 is a good fit (0.9 to 1), and the TLI value of 0.956 is an acceptable fit ($0 < 0.956 \le 1$). Overall, the model is acceptable and can proceed to the analysis of parameter estimates.

**Modified Model**

The study adopted modifications to determine if a better model can be achieved (Young and Bryan, 2018). Based on the review of the 6-Factor Model with Standard Path Coefficients in Figure 3, the process correlated between related indicator pairs (e16-e17-e18). It was done because it was found that these indicators measure each other among other indicators within the same variable. Thus, the three indicators of that variable are related to each other in System Availability.

Based on correlating related indicator pairs (e16-e17-e18), these adjustments resulted in a better-fitting model, demonstrating a significant improvement in fit. The changes made led to a significant improvement in this model. The Goodness of Fit approach indicates an acceptable fit of the first-order 6-factor model. Subsequently, a comparison was made between the first-order model and the modified model. The statistical adjustments to the modified model showed a better fit to the data than the original 6-factor first-order model.

### Table 7. Fit Statistics of the Hypothesized First Order Model and Modified Model

| Factor Model | RMSEA | CFI | GFI |
|---|---|---|---|
| First order | 0.053 | 0.965 | 0.930 |
| Modified model | 0.046 | 0.974 | 0.938 |
| **Factor Model** | **IFI** | **TLI** | |
| First order | 0.966 | 0.956 | |
| Modified model | 0.974 | 0.966 | |

Source: Primary Data Processing (2023)
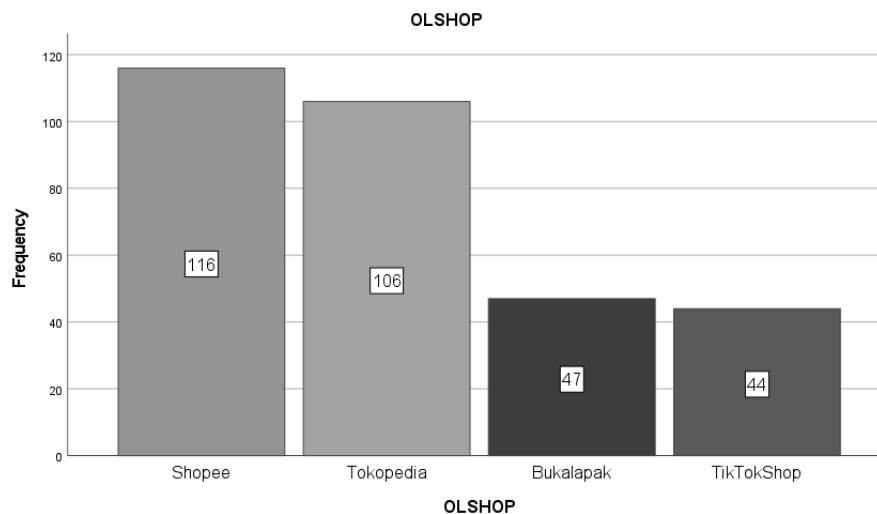
Source: Primary Data Processing (2023)

**Figure 3. Respondents' Main Preferences for C2C E-Commerce Applications**

Table 7 demonstrates a significant improvement in the model's fit. The goodness of fit shows an acceptable fit for the first-order 4-factor model. Adjustments to the first-order factor model data towards the modified model data resulted in a difference in the improvement of model fit in RMSEA, CFI, GFI, IFI, and TLI. The RMSEA value of 0.046 meets the fit criteria as it is less than 0.08. CFI yielded a value of 0.974 in the second order, indicating a good fit ($0.9 < 0.965 \leq 1$). The GFI value 0.938 is a good fit ($0.9 < 0.930 \leq 1$). IFI value of 0.974 is also a good fit ($0.9 < 0.974 \leq 1$), and the TLI value is 0.966, categorized as an acceptable fit ($0 < 0.956 \leq 1$). Based on empirical findings, the modified model provides a better fit than the previous model.

**ANOVA**

The subsequent step in CFA involves examining the correlation between the factor scales in Mobile Service Quality to evaluate convergent validity evidence. The study assessed mean differences in each Mobile Service Quality scale based on e-commerce platforms, namely Shopee, Tokopedia, Bukalapak, and TikTok Shop, using one-way analysis of variance (ANOVA).

Many of the 313 respondents obtained used more than 1 C2C application. For this reason, they need to answer the question of what application is their main preference in using C2C e-commerce. The result was that 116 chose Shopee, 106 chose Tokopedia, 47 Bukalapak, and 44 chose TikTok-Shop (Figure 3).

**Table 8. Application Design**

| Model | n | M | SD |
|---|---|---|---|
| Shopee | 116 | 3.81 | 0.58 |
| Tokopedia | 106 | 3.85 | 0.53 |
| Bukalapak | 47 | 3.50 | 0.65 |
| Tiktok Shop | 44 | 3.51 | 0.65 |

Source: Primary Data Processing (2023)
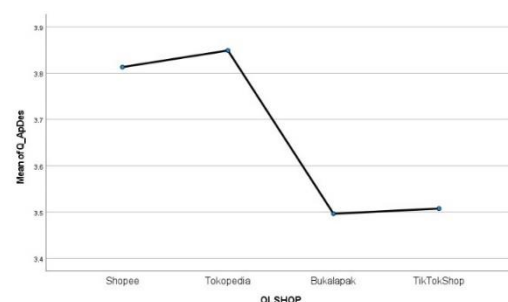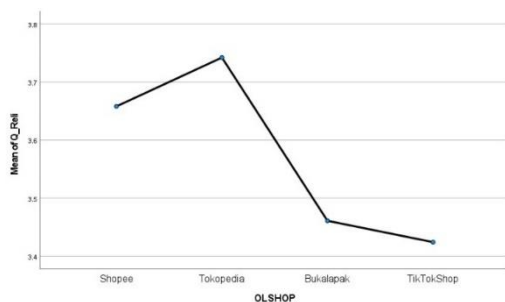


Source: Primary Data Processing (2023)

**Figure 4. Application Design Indicator**

Based on Table 8 and Figure 4, it is observed that in terms of indicator contributions to each e-commerce platform, Tokopedia stands out as the superior e-commerce with the highest contribution in application design at a value of 3.85.

**Table 9. Reliability**

| Model | n | M | SD |
|---|---|---|---|
| Shopee | 116 | 3.66 | 0.56 |
| Tokopedia | 106 | 3.74 | 0.60 |
| Bukalapak | 47 | 3.46 | 0.62 |
| Tiktok Shop | 44 | 3.42 | 0.66 |

Source: Primary Data Processing (2023)
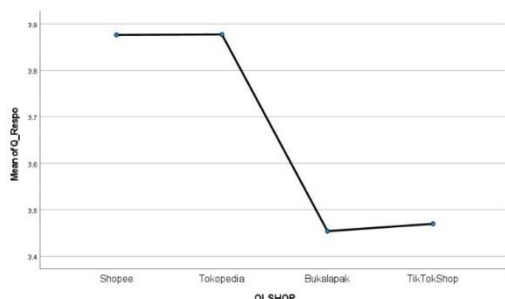


Source: Primary Data Processing (2023)

**Figure 5. Reliability Indicator**

Based on Table 9 and Figure 5, it can be observed that Tokopedia also excels in the reliability indicator, with the highest value depicted at 3.74.

**Table 10. Responsiveness**

| Model | n | M | SD |
|---|---|---|---|
| Shopee | 116 | 3.88 | 0.54 |
| Tokopedia | 106 | 3.88 | 0.56 |
| Bukalapak | 47 | 3.45 | 0.62 |
| Tiktok Shop | 44 | 3.47 | 0.62 |

Source: Primary Data Processing (2023)
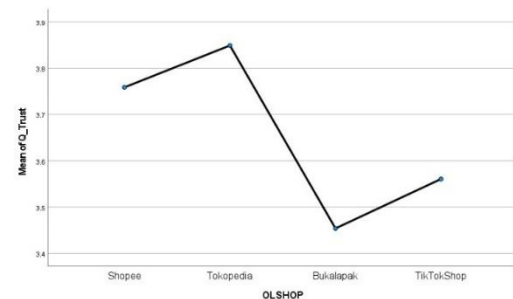


Source: Primary Data Processing (2023)

**Figure 6. Responsiveness Indicator**

Table 10 and Figure 6 above show that Tokopedia and Shopee are the two e-commerce platforms with the same advantage in responsiveness as the highest indicator, with the same value of 3.88.

**Table 11. Trust**

| Model | n | M | SD |
|---|---|---|---|
| Shopee | 116 | 3.76 | 0.52 |
| Tokopedia | 106 | 3.85 | 0.53 |
| Bukalapak | 47 | 3.45 | 0.76 |
| Tiktok Shop | 44 | 3.56 | 0.67 |

Source: Primary Data Processing (2023)



Source: Primary Data Processing (2023)

**Figure 7. Trust Indicator**

Based on Table 11 and Figure 7, it can be observed that Tokopedia maintains its advantage in the trust indicator, having the highest value with a score of 3.85.

**Table 12. Efficiency**

| Model | n | M | SD |
|---|---|---|---|
| Shopee | 116 | 3.75 | 0.56 |
| Tokopedia | 106 | 3.85 | 0.52 |
| Bukalapak | 47 | 3.43 | 0.68 |
| Tiktok Shop | 44 | 3.54 | 0.67 |

Source: Primary Data Processing (2023)

Based on Table 12 and Figure 8, it can be seen that Tokopedia has an advantage in the efficiency factor as the highest among other e-commerce, with a value of 3.85.
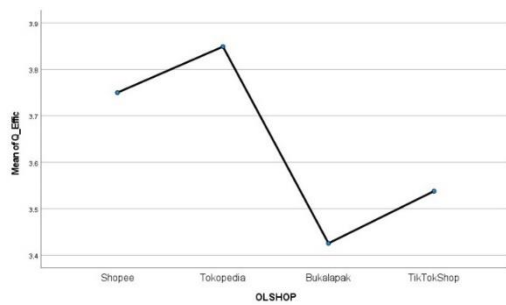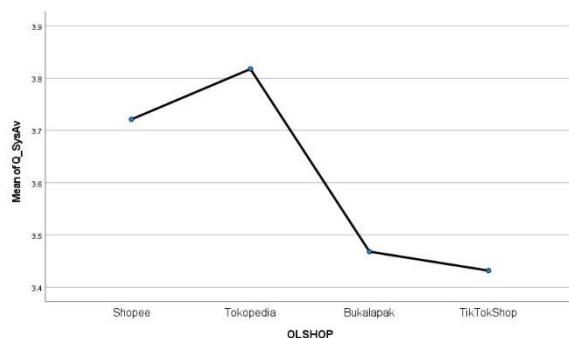
Source: Primary Data Processing (2023)

**Figure 8. Efficiency Indicator**

**Table 13. System Availability**

| Model | n | M | SD |
|---|---|---|---|
| Shopee | 116 | 3.72 | 0.56 |
| Tokopedia | 106 | 3.82 | 0.64 |
| Bukalapak | 47 | 3.47 | 0.69 |
| Tiktok Shop | 44 | 3.43 | 0.77 |

Source: Primary Data Processing (2023)



Source: Primary Data Processing (2023)

**Figure 9. System Availability Indicator**

Based on Table 13 and Figure 9, it can be concluded that Tokopedia is the e-commerce platform with the highest score in system availability, with a value of 3.82. Overall, it can be stated that Tokopedia has the highest mean scores compared to other e-commerce platforms like Shopee, Bukalapak, and TikTok Shop.

**DISCUSSION**

This study aimed to analyze mobile service quality in C2C e-commerce applications by entrepreneurs in Indonesia. Based on the results of pre-

vious research and hypothesis testing, it can be concluded that the hypotheses were supported. The hypotheses stated that the dimensions of application design, reliability, responsiveness, trust, efficiency, and system availability can measure mobile service quality from sellers' perspectives. The findings of this study align with previous research by Desmal et al. (2019), which indicates application design, reliability, responsiveness, trust, efficiency, and system availability can explain mobile service quality. The better these dimensions are, the better the mobile service quality provided to consumers.

Application design has become essential for sellers in evaluating the quality of service from mobile applications. An attractive user interface, good graphics, and easy-to-use navigation menus will make it easier for non-professional sellers to use them in C2C e-commerce applications and make their stores appear more professional. According to Schwob et al.'s research (2023), C2C e-commerce users are not limited to professional merchants. The reliability and responsiveness of C2C mobile apps are factors sellers consider when perceiving service quality. Yrjölä and Saarijärvi (2019), in their study on seller experiences with C2C e-commerce, explain that sellers are highly engaged in actively managing their stores. It includes facilitating information searches by end consumers by providing product descriptions, product photos, pricing, and searching for potential consumers using the platform's various targeted ad service schemes. It also involves transaction and post-transaction activities, such as addressing buyer complaints or returns. Therefore, sellers will choose a platform to develop services capable of reducing the seller's workload in-store management. A study by Lee et al. (2018) also suggests that sellers require a reliable and responsive application to serve sellers in real time and respond to consumers needing after-sales service or product refunds. The application's ability to provide accurate information, seamless usability, and consistent application performance will facilitate sellers in various store management activities, thus leading to the perception of good service quality for the C2C mobile app platform.

The level of trust sellers have in the mobile app is also something sellers evaluate in determining service quality. Buying and selling transac-

tions are vital in the C2C platform, so the mobile app must be able to design transaction mechanisms that minimize risks for both sellers and buyers (Yrjölä and Saarijärvi, 2019). A mobile app that can provide protection for personal data and privacy will be perceived as having good quality. Ratings and the number of people downloading the application will indicate that the C2C mobile app is trustworthy and widely used. Furthermore, service quality and seller trust are also supported by system availability. Sellers will trust the system's quality, owned by the C2C mobile app if it comes from a reputable official service provider.

## IMPLICATIONS

This study confirms strategies to enhance service quality in mobile e-commerce applications such as Tokopedia, Shopee, Bukalapak, and Tiktok Shop. These strategies encompass the development of application interface and functionality, service reliability, responsiveness to user needs, security and privacy, efficiency of user experience, and robust system availability. Implementing these strategies is expected to enhance user satisfaction, promote sustained app usage, and strengthen the service provider's reputation.

## RECOMMENDATIONS

Recommendations for future research include using multi-group CFA to analyze the effects and present the values for each sample group. Practical recommendations for e-commerce service providers like Shopee, Bukalapak, and Tiktok Shop are to enhance the supportive factors of Mobile Service Quality, such as application design, reliability, responsiveness, trust, efficiency, and system availability. Furthermore, practical recommendations for e-commerce service providers that excel in the supportive factors of Mobile Service Quality, such as Tokopedia, would be to strengthen their existing strengths and develop supporting factors to enhance services, aiming to reach consumers and improve user loyalty.

The limitations of this study include the sample limitation, which may affect the generalizability of the findings because of the focus on members of seller forums on Facebook. Even though construct validity has been considered, there is still the potential for bias or tendencies in the results because not all goodness-of-fit index pro-

vide the best values. The specific context of e-commerce C2C in Indonesia also limits the generalizability of these findings. Some external aspects and factors might not have been covered in this research. Understanding these limitations is crucial for interpreting the results and planning future research.

## CONCLUSIONS

This study examined how well mobile apps perform for selling stuff in Indonesia. We found things like how the app looks, how reliable it is, and how quickly it responds matter a lot to sellers. When these things are good, sellers feel better about using the app, and customers get a better experience.

For instance, a good-looking app with easy navigation makes sellers' stores look more professional. And if the app is reliable and quick to respond, sellers can manage their stores better and help customers faster. Trust is also crucial – sellers want to know their data is safe and that the app is widely used and trusted by others.

To improve these apps, developers should focus on making them easier to use, more reliable, and secure. It will keep sellers and customers happy and build trust in popular e-commerce platforms. Ultimately, it's about creating an environment where sellers feel good about selling online in Indonesia.

## REFERENCES

Abebe, M. 2014. Electronic Commerce Adoption, Entrepreneurial Orientation and Small- and Medium-Sized Enterprise (SME) Performance. *Journal of Small Business and Enterprise Development*, pp. 100-116.

Alfi, L. and Moko, W. 2022. Pengaruh Mobile App Quality terhadap Willingness to Subscribe pada Layanan Video on Demand Aplikasi Netflix. *JMPPK*, pp. 1-12.

Alroustan, M. and Jones, E. 2016. Conceptual Model of Factors Affecting E-Commerce Adoption by SME Owner/Managers in Jordan. *Int. J. Business Information Systems*, pp. 269-308.

Bentler, P. and Bonnet, D. 1980. Significance Test and Goodness of Fit in the Analysis of Covariance Structures. *Psychological Bulletin*, 88(3), pp. 588-606.

Bertram, D. 2006. Likert Scales are the Meaning of Life. *CPSC,* 681, pp. 1-11.

Byrne, B. M. 2010. *Structural Equation Modeling with AMOS Basic Concepts, Applications, and Programming*. 2 ed. New York: Taylor and Francis Group, LLC.

Chaffey, D. 2009. *E-Business and E-Commerce Management: Strategy, Implementation and Practice*. England: Pearson Education Limited.

Crosby, P. B. 1980. *Quality is Free: The Art of Making Quality Certain*. Paperback.

Desmal, A. J., Othman, M. K., Hamid, S., and Zolait, A. 2019. Proposing a Service Quality Framework for Mobile Commerce. *Emerging Technologies in Computing*, pp. 203-212.

Dewi, I. R. 2023. *Dua Raja Ecommerce RI Bersaing Ketat Dikejar TikTok*. Jakarta: CNBC Indonesia.

Dihni, V. A. 2022. *Situs E-Commerce dengan Jumlah Pengunjung Terbanyak di Indonesia 2021*. Databoks.

Feigenbaum, A. V. 1991. *Total Quality Control*. McGraw-Hill Companies.

Firmansyah, N. and Ali, H. 2019. Consumer Trust Model: The Impact of Satisfaction and E-Service Quality toward Repurchase Intention in E-Commerce. *Saudi Journal of Humanities and Social Sciences*, pp. 552-559.

Ghozali, I. 2017. *Model Persamaan Struktural Konsep dan Aplikasi dengan Program Amos 24*. 7 ed. Semarang: Badan Penerbit Universitas Diponegoro.

Hadiwijaya, H., Rini, E. S., Ginting, P., and Sembiring, B. K. F. 2017. Impact of E-commerce Service Quality, Recovery Service Quality, and Satisfaction in Indonesia. *Conference on Sustainable Information Engineering and Technology (SIET)*, pp. 35–40.

Hair, J., Black, W. C., Babin, B. J., and Anderson, R. 2010. *Multivariate Data Analysis*. 7 ed. New Jersey: Pearson Educational International.

Hu, L.-T. and Bentler, P. 1999. Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria versus New Alternatives. *Structural Equation Modeling*, 6(1), pp. 1-55.

Juran, J. M. and Godfrey, A. B. 2000. *Juran's Quality Handbook*. McGraw-Hill Professional.

Kline, R. 2005. *Principles and Practice of Structural Equation Modeling*. New York: The Guilford Press.

Lee, S., Ryu, M. H., Lee, S. Y., and Kwak, D. H. 2018. *Where Do You Sell Your Products Online? A Seller Perspective on Online Shopping Platforms*.

MacGregor, R. C. and Kartiwi, M. 2010. Perception of Barriers to E-Commerce Adoption in SMEs in a Developed and Developing Country: A Comparison between Australia and Indonesia. *Journal of Electronic Commerce in Organizations*, pp. 61-82.

Naurah, N. 2023. *5 Website E-commerce Terpopuler di Indonesia 2022*. GoodStats.

Octaviani, L. and Sudrajat, A. 2016. Fenomena Perilaku Belanja Online sebagai Alternatif Pilihan Konsumsi di Kalangan Mahasiswa. *Paradigma*, pp. 1-6.

Parasuraman, A., Zeithaml, V., and Berry, L. 1988. SERQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality. *J. Retail*.

Parasuraman, A., Zeithaml, V., and Malhotra, A. 2005. E-S-Qual: A Multiple-Item Scale for Assessing Electronic Service Quality. *Journal of Service Research*, pp. 213–233.

Roy. 2021. *Cek Jawara e-Commerce RI, Bukalapak and Lazada Nomor Berapa*. Jakarta: CNBC Indonesia.

Rust, R. and Oliver, R. 1994. Service Quality: Insights and Managerial Implication from the Frontier. *Service Quality: New Directions in Theory and Practice*, pp. 1-19.

Ryu, E. 2011. Effects of Skewness and Kurtosis on Normal-Theory Based Maximum Likelihood Test Statistic in Multilevel Structural Equation Modeling. *Behav Res*, Volume 43, pp. 1066–1074.

Safieddine, F. 2017. M-Commerce. *In: Innovations in E-Systems for Business and Commerce*.

Santos, J. 2003. E-Service Quality: A Model of Virtual Service Quality Dimensions. *Managing Service Quality: An International Journal*, pp. 233–246.

Schwob, A., de Kervenoael, R., Kirova, V., and Vo-Thanh, T. 2023. Casual Selling Practice:

A Qualitative Study of Non-Professional Sellers' Involvement on C2C Social Commerce Platforms. *Information Technology and People*, 36(2), pp. 940-965.

Sekaran, U. and Bougie, R. 2016. *Research Methods for Business*. West Sussex: John Wiley and Sons Ltd.

Sotomayor, S. C., Cornejo, N. G., and Zubiria, M. L. L. 2022. C2C e-Marketplaces and How Their Micro-Segmentation Strategies Influence Their Customers. *Data Descriptor*, Volume 8, pp. 1-11.

Stamenkov, G. and Dika, Z. 2015. A Sustainable E-Service Quality Model. *Managing Service Quality*, 25(4).

Sukkar, A. A. and Hasan, H. 2005. Toward a Model for the Acceptance of Internet Banking in Developing Countries. *Information Technology for Development*, pp. 381-398.

Young, A. A. and Bryan, J. A. 2018. The School Counselor Leadership Survey: Confirmatory Factor Analysis and Validation. *Measurement and Evaluation in Counseling and Development*, Volume 0, pp. 1-15.

Yrjölä, M. and Saarijärvi, H. 2019. The Seller's Experience in Consumer-to-Consumer E-Commerce. *In Advances in National Brand and Private Label Marketing: Sixth International Conference*, 2019, pp. 145-153. Springer International Publishing.