Evaluating Taxi Passenger Satisfaction Using IPA and CSI: Implications for Competitive Strategy in Indonesia

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Abstract

In the last decade, the taxi industry in Indonesia has undergone significant changes with the arrival of app-based taxis such as Uber, Grab, and Go-Car (2014-2024). Changes in technology and information have driven a shift in people's lifestyles, making online taxi services more desirable due to cheaper fares, efficient services, and ease of access. The purpose of this research is to analyze the level of satisfaction of conventional taxi passengers with online taxis in Indonesia. The number of respondents in this study amounted to 250 taxi passengers across Jakarta, Bogor, Depok, Tangerang, and Bekasi City areas (Indonesia). The sampling method used was convenience sampling, and the questionnaire survey was conducted by benchmarking five large taxi companies in Indonesia, namely PT ABC (company initials), PT Blue Bird Tbk, PT Uber Technology Indonesia, PT GrabBike Indonesia, and PT Gojek Indonesia. The variables in this study were tangible, reliability, assurance, responsiveness, empathy, product quality, and perceived value. The results showed that the IPA analysis variable attributes, placed PT ABC taxis in quadrants I, II, and III. While the CSI analysis found that the online taxi passenger satisfaction index is higher than the conventional taxi.

1. Introduction

The development of the taxi industry in the last decade has generally experienced significant growth since the entry of app-based/online taxis into Indonesia in 2014. This has indirectly brought changes to the way of life and lifestyle in society, especially in the use of technology and information. This innovation from several major app-based taxi companies offers greater convenience and time efficiency compared to traditional taxi services, providing a competitive advantage in passenger satisfaction. This new service innovation provides convenience, both in terms of access to booking, effective and efficient in time when compared to the previous conventional taxi booking that must wait on the street/taxi shelter. The satisfaction of this innovative taxi service is a competitive advantage for app-based/online taxis.

Indirectly, the presence of online taxis has created a digital economic environment that leads to mobile transportation. With this mobile transportation trend, large conventional taxi companies in Indonesia are indirectly required to set the right strategy, especially in service satisfaction. Furthermore, the phenomenon of the presence of online taxis is a threat to conventional taxi companies globally. This means that this phenomenon is faced by taxi companies around the world, such as Yellow Taxicabs in the United States, Black Cabs in the UK, Hinomaru in Japan, and Premier Taxis in Singapore.

PT ABC, one of the largest conventional taxi companies in Indonesia, holds a 30% share of the national taxi market, with 97% of its passengers concentrated in the Jadetabek area (PT ABC, 2024). However, since the

emergence of app-based ride-hailing services in late 2014 and the impact of the COVID-19 pandemic in 2019, PT ABC has faced significant operational and financial challenges. According to the company's annual reports from 2019 to 2024, it has consistently recorded operating losses, declining revenues, increasing liabilities, and a reduction in asset values. These financial difficulties coincide with a broader shift in customer preferences toward online taxi services, which offer greater convenience, efficiency, and accessibility. The disruption caused by digital transportation platforms has severely affected the competitiveness of conventional taxi operators like PT ABC. Understanding passenger satisfaction has therefore become critical for the company to develop effective strategies to adapt, regain market relevance, and ensure long-term sustainability. The interconnection between declining customer satisfaction, financial instability, and competitive pressure creates a vicious cycle that is increasingly difficult to break (Chairina & Yusri, 2023).

The first is the decline in financial performance due to the drastic decline in driver deposits and the erosion of taxi market share by online taxi companies. This makes PT ABC experience a sharp decline in financial performance from 2020 to 2024, as shown in Table 1. Based on the financial statements in Table 1, the company's revenue from 2019 to 2024 tends to show a decline. The interesting thing to note is that revenue in 2020 experienced an average increase of 36% increase from previous years. This increase in revenue is precisely in line with online taxi companies in Indonesia.

Second, the productivity of taxi drivers and operations has declined due to technological competition. PT ABC's taxi operations declined sharply after 2014, primarily due to the rapid emergence of online-based transportation services such as Gojek and Grab. The company's once-dominant fleet shrank significantly, and by 2022 it had nearly ceased conventional operations. In 2024, PT ABC began introducing electric taxis as part of a strategic effort to adapt to environmental trends and revive its business.

The third is high fare competition and declining market share. The high level of fare competition makes PT ABC less competitive in terms of taxi fares, so drivers do not reach the standard deposit given to the company. The intense price competition among transportation service providers has significantly reduced PT ABC's competitiveness, particularly when compared to the lower and more flexible fares offered by online taxi services. The low fares of online taxis have indirectly caused passengers to switch from conventional taxis to online taxis. One of the impacts on conventional taxi companies is the low level of work productivity, where drivers do not reach the daily deposit as set by the company. The highly competitive level of the taxi fare war and keeping the market share from falling, PT ABC chose a collaboration strategy in 2016 (partnering with an online taxi company). PT ABC chose this collaboration as an effort to reduce company losses. In this collaboration, the determination of PT ABC's taxi fare follows the Uber car taxi fare, which is much cheaper. This is a dilemma for PT ABC. On the one hand, the driver's income has decreased due to low fares; on the other hand, the collaboration is carried out to reduce the company's continuous losses. Then, from the service side, both in terms of reliability, responsiveness, certainty, empathy, physical evidence, product quality, and price affect the company's performance.

Furthermore, in 2024, PT ABC is transforming by procuring and operating electric cars for taxi services to the public. Thus, it is important to assess passenger satisfaction so that PT ABC can win the taxi industry competition, amid the onslaught of online taxis in Indonesia. Furthermore, to measure the competition from the level part, this study uses an assessment of the form of taxi service satisfaction levels in the community. Furthermore, in 2024, PT ABC is transforming by procuring and operating electric cars for taxi services. Thus, it is important to assess passenger satisfaction so that PT ABC can remain competitive in the face of increasing pressure from online taxi services. To evaluate this, the study assesses taxi service satisfaction based on three dimensions: 1) service quality (including tangible evidence, reliability, responsiveness, assurance, and empathy), 2) product quality, and 3) perceived value.

2. Literature Review

2.1 The Taxi Industry Disruption

The rapid growth of online ride-hailing services such as Go-Jek and Grab has disrupted the conventional taxi industry. Compared to traditional taxis, online-based transportation services offer greater convenience, transparent pricing, faster booking via mobile apps, and frequent promotional discounts. These advantages have made online taxis more attractive to passengers, resulting in a declining market share for conventional taxi companies such as PT ABC. Studies by Cramer and Krueger (2016) and Clewlow and Mishra (2017) have confirmed the adverse impacts of technology-based disruptions on traditional transport operators, including reduced demand, pricing pressures, and changes in consumer expectations.

2.2 Passenger Satisfaction in Transport Services

Passenger satisfaction is a key determinant of service usage and customer loyalty in both public and private transportation. It reflects the perceived quality of the service provided. Man et al., (2019) is widely used to

measure service quality, focusing on five key dimensions: reliability, responsiveness, assurance, empathy, and tangibles. Satisfaction in the taxi service context is linked to the efficiency, comfort, safety, and professionalism delivered during the ride. High satisfaction levels have been shown to lead to customer retention and positive word-of-mouth (Afifudin *et al.*, 2024).

2.3 Importance of Pricing and Perceived Value

Pricing strategies significantly influence customers' perception of value and overall satisfaction. According to Afifudin et al., (2024). perceived value is the consumer's overall assessment of the utility of a product based on what is received and what is given. In the taxi industry, app-based services often use aggressive pricing strategies, such as discounts, surge pricing control, and promos, to attract and retain users. Such strategies enhance the perceived value, especially among price-sensitive consumers, contributing to higher satisfaction and repeated usage.

2.4 Use of IPA and CSI in Transport Research

Importance-Performance Analysis (IPA) and the Customer Satisfaction Index (CSI) are analytical tools commonly used to evaluate service quality. IPA helps identify which service attributes are important to customers and how well these attributes are being delivered. CSI, on the other hand, provides a quantifiable measure of overall customer satisfaction. Both tools have been applied in various transport studies to assess service gaps and prioritize improvement efforts. For example, Pradana et al (2022) used IPA to evaluate service performance in public transportation and identified critical service attributes requiring improvement. In this study, the authors applied the IPA method to assess the service quality of the Suroboyo Trans Semanggi Bus in Surabaya, Indonesia. They identified that attributes such as friendly service and ease of access were critical areas requiring improvement, emphasizing the need for comfortable and well-represented bus stops and better interconnection between transportation modes. This research is an example of how IPA and CSI can be utilized to evaluate service quality in public transportation systems, identifying service gaps and prioritizing areas for improvement.

The research by Agustina & Sahfitri (2022)examines user satisfaction with online transportation services in Palembang using the Customer Satisfaction Index (CSI) and Importance-Performance Analysis (IPA). With a CSI score of 77.28%, user satisfaction is categorized as "satisfied." However, IPA results highlight key service attributes—such as fare affordability, punctuality, and driver adherence to traffic rules—that require improvement due to their high importance but low performance. The study concludes that while overall satisfaction is adequate, targeted improvements in these areas are necessary to enhance service quality and user experience.

The research by Justitia et al., (2019) analyzes customer satisfaction with online taxi mobile applications in Surabaya, Sidoarjo, and Gresik using the Customer Satisfaction Index (CSI) and Importance-Performance Analysis (IPA) methods. The research evaluates five key variables: route detection, connection quality, interaction, content, and service quality. The CSI score achieved was 76.117%, indicating that users are generally satisfied, though improvements are still needed. The IPA results highlight several service attributes that fall into the "Concentrate Here" quadrant, signaling a need for focused enhancements in those areas to meet customer expectations more effectively.

3. Methodology

3.1 Research Design

This study employs a descriptive quantitative research design to evaluate passenger satisfaction with online taxi services. The approach is based on structured survey data analyzed using the Customer Satisfaction Index (CSI) and Importance-Performance Analysis (IPA) methods. Although initially labeled as mixed-method, the study solely utilizes quantitative techniques and does not include qualitative data such as interviews or open-ended responses.

3.2 Population, Sample Size, and Sampling Method

The population of this study includes users of online taxi services in several major Indonesian cities (Jakarta, Bogor, Depok, Tangerang, and Bekasi) who have used services provided by PT Gojek Indonesia, PT GrabTeknologi Indonesia, PT Uber Indonesia Technology, and PT Blue Bird Tbk. Since the total population size is unknown or considered very large (assumed to be infinite for this research), the sample size was determined using Slovin's formula with a 95% confidence level and a 5% margin of error. The Slovin formula is as follows:

$$\eta = \frac{N}{1 + Ne^2}$$

Where:
- n = required sample size
- N = estimated population size
- e = margin of error (0.05)

Assuming a large or infinite population (e.g., N = 100,000 or more), the sample size calculation results in 250 respondents:

$$\eta = \frac{100,000}{1 + 100.000(0.05)^2} \approx 250$$

Respondents were selected using non-probability convenience sampling based on their availability and willingness to participate. Although this sampling method facilitates data collection, it may limit the generalizability of the findings due to the potential for selection bias. The number of taxi passengers who were the respondents is shown in Appendix 1.

3.3 Data Collection – Quantitative Survey and Instrument Development

Data were collected via a structured questionnaire distributed through both offline (face-to-face) and online (Google Forms) channels. The questionnaire consisted of multiple closed-ended items designed to assess users' perceptions of service quality, customer expectations, and overall satisfaction. A six-point Likert scale (1 = Very Dissatisfied, 6 = Very Satisfied) was used to measure responses, allowing for finer granularity without a neutral midpoint.

3.4 Data Analysis – CSI and IPA Methods

The Customer Satisfaction Index (CSI) was used to measure the overall satisfaction level, calculated by comparing the weighted score of performance and importance ratings across key service attributes. The Importance-Performance Analysis (IPA) was used to map each attribute onto a two-dimensional grid, identifying which aspects of the service require improvement ("Concentrate Here"), which are performing well ("Keep Up the Good Work"), and which may be over- or under-emphasized.
The attributes evaluated include:
1. Tangible service quality – physical evidence, app interface, driver appearance.
2. Assurance and reliability – driver behavior, route accuracy, safety, punctuality.
3. Perceived value – price, convenience, service consistency.

Taxi passenger satisfaction research indicator variables are shown in Appendix 2.

4. Results

4.1 Respondent Profile

In this study, respondents consisted of various demographic categories, such as gender, age, education level, occupation, and monthly income. The majority of respondents were male (56.5%), while female (43.5%). Based on age, most respondents were in the 26-35 years range (47.8%), followed by 17-25 years old (30.4%). This shows that users of online taxi services in the city are dominated by productive and relatively young age groups, who are likely to be more familiar with digital technology.

In terms of education, most respondents have a bachelor's degree (39.1%), followed by high school graduates (30.4%). This indicates that most users have a middle to higher education background. The employment status of respondents was dominated by private employees (34.8%) and students (21.7%). In terms of income, 39.1% of respondents earn between IDR3,000,000 and IDR5,000,000 per month, and 26.1% earn more than IDR5,000,000. A total of 21.7% of respondents do not have a regular income because they are still students.

4.1.1 Online Taxi Preferences and Usage Behaviour

Most respondents (82.6%) use online booking apps to book a taxi. The most commonly used app is Gojek (60.9%), followed by Grab (30.4%), and the rest use other apps. As many as 73.9% of respondents stated that they book online taxis for personal use, while the rest use the service for work or other purposes. In terms of frequency of use, 56.5% of respondents use online taxi services 1-3 times a week.

The preference for online taxis over conventional taxis is influenced by several factors, including ease of booking through applications, more transparent and competitive fares, as well as convenience and time efficiency. This finding is consistent with previous studies that show that advances in information technology have driven shifts in consumer behaviour in the transportation sector.

4.2 Customer Satisfaction Index (CSI)

CSI analysis is used to calculate how big the passenger satisfaction index is. The summary results of this CSI are in the form of a percentage of passenger satisfaction obtained after calculating the weighting factor and weighted score values, so that the CSI analysis of each taxi and the overall CSI average are obtained, as shown in Table 1 and Figure 1.

Table 1 *Customer satisfaction index (CSI) taxi passengers*

Taxi	Description	CSI Score	Description
PT ABC Taxi	Conventional taxis	0.688	Satisfied
PT ABC Taxi Collaboration with online taxi	Online taxis	0.743	Satisfied
Blue bird taxi	Conventional taxis	0.748	Satisfied
Blue bird-Go car taxi	Online taxis	0.767	Satisfied
Uber car taxi	Online taxis	0.825	Very satisfied
Grab car taxi	Online taxis	0.877	Very satisfied
Go car taxi	Online taxis	0.817	Very satisfied
Average		0.781	Satisfied

In Table 1, it can be analyzed that the level of satisfaction of PT ABC taxi passengers is lower than other taxis, which is 0.688 (satisfied). However, there was an increase in satisfaction after PT ABC collaborated with an online taxi company, with an index of 0.743. Overall, it can be concluded that the total CSI value obtained is 0.781. This means that the overall level of satisfaction of taxi passengers is satisfied with the performance of their taxi service, but it is still not maximized as a whole. The summary of CSI customer satisfaction is shown in Figure 1.
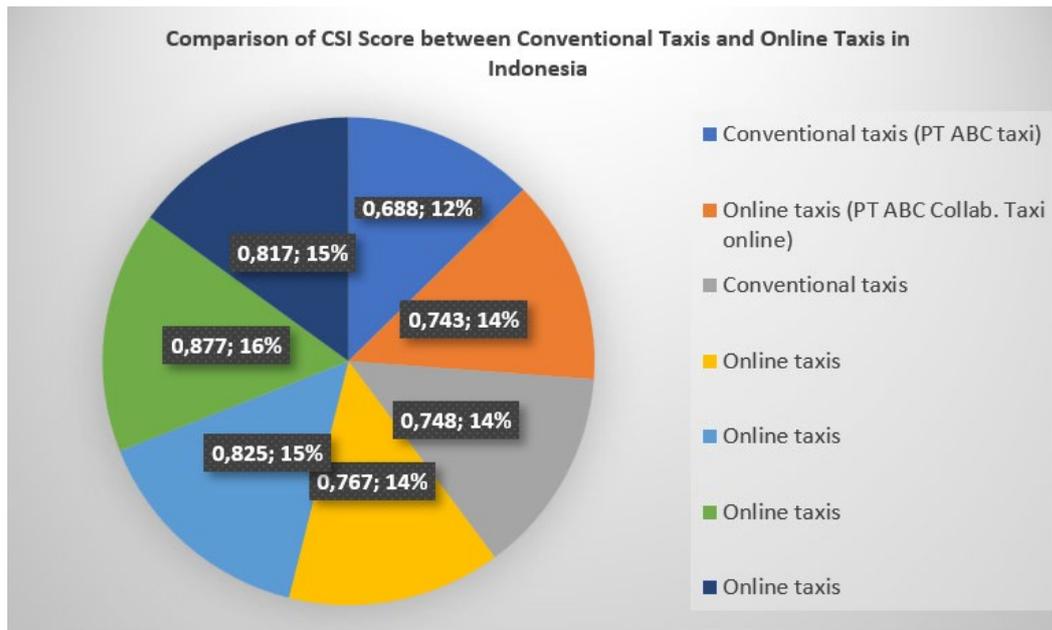

Fig. 1 *Comparison of CSI score between conventional taxis and online taxis*

Figure 1 displays a comparison of CSI Score between conventional taxis and online taxis, where conventional taxis have relatively stable scores around 0.817-0.825 (15%), while online taxis show greater variation, ranging from 0.688 (12%) to 0.877 (16%), with most scores ranging from 0.743-0.763 (14%). The percentages alongside the scores likely reflect the contribution or weighting of customer satisfaction, with online taxis dominating the number of entries but with less consistency than conventional taxis. So, while the CSI analysis found that the passenger satisfaction index of online taxis is higher than conventional taxis.

4.3 Importance-Performance Analysis (IPA)

In this section, the mapping of performance (x) and importance (y) values is discussed; from these results, an IPA Cartesian diagram consisting of four quadrants is obtained. Each quadrant describes the priority scale in implementing company policy. The average assessment of the level of performance and importance is from the data of Blue Bird Taxi passengers, Blue Bird-Go car, PT ABC Taxi, PT ABC Taxi Join Online Taxi, Uber car, Grab car, Go car. The results of the IPA diagram analysis on each taxi passenger are as follows (Figure 2):
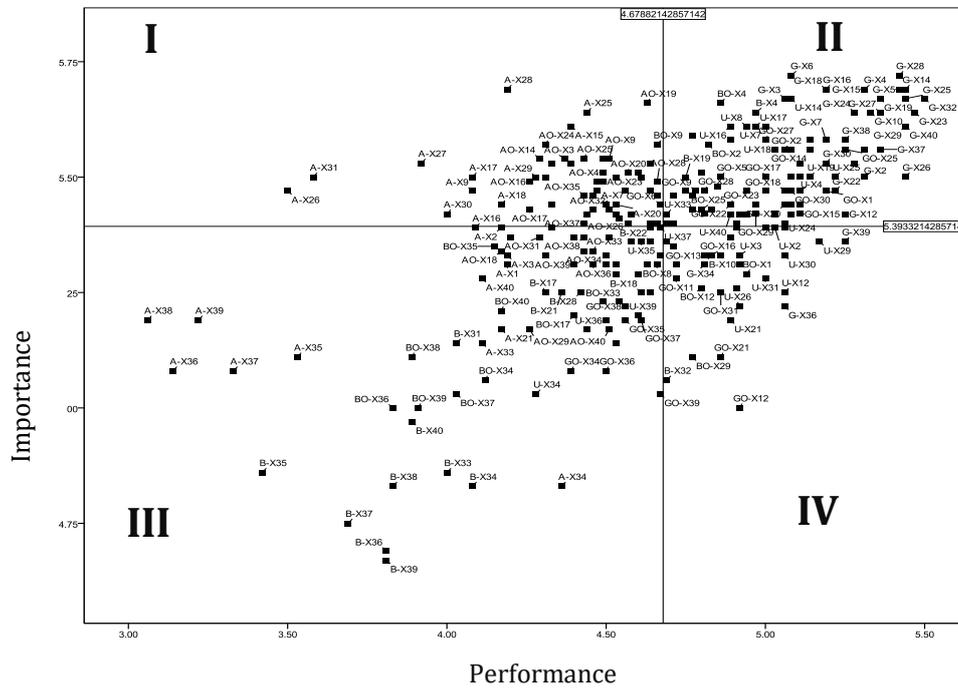

Fig. 2 *IPA Quadrant map*

Description:
    A = PT ABC Taxi
    AU = PT ABC Taxi Collaboration with online taxi
    B = Blue Bird Taxi
    BG = Blue Bird- Go car taxi
    G = Grab car taxi
    Go = Go car taxi

   In Figure 2 above, the level of distribution and position of each taxi company in each quadrant and its accompanying attributes can be interpreted as follows:

Quadrant I (Top Priority)

Quadrant I contains attributes that are considered important by passengers, but in reality, these attributes are not in accordance with the interests of passengers. Thus, the attributes contained in this quadrant must be further improved in order to satisfy passengers. The research findings show that in this attribute, not all taxi companies in the object population are included in this quadrant. The taxis included in this attribute are PT ABC Taxi, PT ABC Taxi Join Online Taxi, Blue Bird, Blue Bird-Go car, and Grab car. The number of attributes of PT ABC Taxi in quadrant I consists of 22 attributes. Meanwhile, the PT ABC Taxi Join Online Taxi car totals 26 attributes. In Blue Bird taxis totaling 5 attributes, and Blue Bird-Go car totaling 5 attributes. While Grab car 1 attribute. I (such as fare accuracy and ease of booking), while Collaborative Online Taxi (PT ABC Join Online Taxi) showed a wider variety of scores (0. 688-0.877) with 26 priority attributes in Quadrant I (including complaint responsiveness and passenger safety), while other taxis such as Blue Bird and Grab have fewer critical attributes (5 and 1 attributes respectively). Based on the number of attributes, it can be concluded that PT ABC Taxi and PT ABC Taxi Collaboration with online taxi have the highest priority level of improvement than other taxis. Therefore, the company needs special handling (refer Appendix 3)

Quadrant II (Maintain Achievement)
The attributes in quadrant II have a high level of importance and performance. This shows that these attributes are important and have high performance. This quadrant must be maintained because it is considered very

important / expected and the results are satisfactory. In quadrant II, the taxi companies that made it in are PT ABC Join Taxi Online Taxi (1 attribute), Blue bird (6 attributes), Blue bird-Go car (15 attributes), Uber car (23 attributes), Grab car (36 attributes), and Go car (26 attributes). In quadrant II, it can be concluded that Grab car taxis have the highest number of attributes (36). This means that taxi passengers are more satisfied with the performance of Grab car taxis.

Furthermore, looking at this quadrant, PT ABC Taxi Collaboration with online taxi (after cooperation with Uber car), there is an improvement in company performance, namely the ease of ordering a taxi (X5). This indicates that the ease of ordering a taxi through an online application can improve the performance and satisfaction of taxi passengers. The following is an explanation of each taxi name and its accompanying attributes in Appendix 4.

Quadrant III (Low Priority)
The attributes/statements contained in quadrant III are considered less important by passengers, and their performance is not too special/mediocre. This means that the attributes in this quadrant have a low level of importance, and their performance is also considered poor by passengers. Improvements to the attributes included in this quadrant need to be reconsidered, as well as to prevent these attributes from shifting to quadrant I. In quadrant III, the names of taxis included are PT ABC Taxi (18 attributes), PT ABC Taxi Join Online Taxi (13 attributes), Blue Bird (23 attributes), Blue Bird-GoCar (14 attributes), Uber car (6 attributes), Go car (6 attributes). The following is a complete list of taxi names and their accompanying attributes in Appendix 5.

Quadrant IV (Excessive)
This quadrant of attributes/statements that affect passenger satisfaction is considered excessive in its implementation. This is because passengers consider it not too important or less expected, but the implementation is done very well by the company. In this quadrant, the names of taxis that enter are Bluebird taxis (6 attributes), Bluebird-GoCar (6 attributes), Uber Car (11 attributes), Grab Car (3 attributes), and GoCar (8 attributes). The following are the names of taxis and their accompanying attributes in Appendix 6.

In summary, PT ABC as the taxi operator is generally in the position of quadrant I (top priority), quadrant II (maintain achievement), and quadrant III (low priority). The three existing charts, in particular, the company must pay attention to the attributes of quadrants I and III. Improvement in quadrant I is the key to PT ABC's success in winning the taxi industry competition in Indonesia.

4.4 Attribute Priority Through Conformity

Conformity analysis is used to determine the priority order of improvement of the attributes based on the percentage comparison between the performance value and the level of importance of the product/service quality. Conformity analysis is also used to determine the scale of service priorities and improvement priorities to achieve passenger satisfaction. Broadly speaking, to win the competition, taxi companies must prioritize competing on service quality. Companies that compete with a focus on service quality will be able to win the competition in the Indonesian taxi industry, as shown in Appendix 7.

Seeing the state of PT ABC's financial performance which is experiencing a crisis, it is therefore necessary to have a sharp sense of crisis thinking for its improvement. The right step to fix the downturn is to make improvements that have minimal financial expenditure, namely focusing on improving service quality in Appendix 7 in priority, there are five main attributes that are vital to pay attention to. The first priority is in terms of friendliness, namely the driver's willingness to respond well to passengers when ordering a taxi.

Second, the physical condition of the car (interior/exterior) is good and well-maintained. In this case, the company must pay attention to the physical form (tangible) of the taxi used. Third is an easy taxi booking/online taxi application that is easy to use and not complicated. A passenger in taking a taxi prioritizes convenience when ordering a taxi, not experiencing difficulties, and time efficiency. This means that convenience is vital for passengers. Fourth, the accuracy of the travel route/according to GPS. Passengers need to be sure of the destination of their trip. The accuracy of the travel route is very important to support passengers in reaching their destination. This means that passengers do not want to be disadvantaged because their travel route does not reach their destination. For online taxis, applications equipped with GPS systems must pay attention to this attribute. Fifth, in any situation (rain/heat/afternoon/evening), passengers will still be served well. This means that taxis want flexibility in time and are willing to serve any situation.

5. Discussion

Based on the results of the analysis of Important Performance Analysis (IPA) in total, PT ABC must focus on improvements in quadrants I and III. These quadrant attributes are the key to the success of taxi companies in winning the taxi industry competition in Indonesia. Meanwhile, the Customer Satisfaction Index (CSI) analysis found that the online taxi passenger satisfaction index is higher than the of conventional taxi.

Furthermore, there was an increase in the passenger satisfaction index after PT ETU partnered with other online taxis in terms of ease of ordering taxis. Furthermore, for PT ABC to win the competition in the taxi industry in Indonesia is necessary to increase driver training and skill development by paying attention to the guidelines on quadrant I and III attributes on the total IPA diagram. This is the key to the success of a reliable taxi service quality. Then open office channeling and add taxi shelters in several strategic locations of offices, shopping, and entertainment venues, such as in Indomaret, cafes, malls, and others. Then, increase the diversity of youth taxi products. As an example of realization, the company can work on the youth segment in young professionals (young executives, young businessmen), students, and others who are highly active.

6. Conclusion

Based on the results of the analysis conducted, the analysis of the total IPA concludes that the focus of improvement occurs in quadrants I and III. These quadrant attributes are the key to the success of taxi companies in winning the taxi industry competition in Indonesia. While the CSI analysis found that the online taxi passenger satisfaction index is higher than the conventional taxi. Furthermore, there was an increase in the passenger satisfaction index after PT ABC partnered with an online taxi company in terms of ease of ordering taxis. The implication is that PT ABC must collaborate with several strategic parties in the digital era, namely online taxi companies other than online taxi companies, e-commerce, fintech, and potential local start-ups in the field of information and technology. Furthermore, PT ABC must look for alternative funding sources other than bank loans to finance taxi operations, for example, the issuance of bonds, rights issues, and others.

6.1 Limitations of the Study

The study is limited to assessing the level of passenger satisfaction at one of the largest taxi companies in Indonesia and is limited to the level of major cities in Indonesia. Further research can be done by expanding the range of respondents at the provincial level, such as East Java, Central Java, West Kalimantan, North Sumatra, North Maluku, and East Papua Provinces. It is hoped that the level of taxi passenger satisfaction will be more accurate and in-depth with the same indicators and variables.

6.2 Implications of the Study

Based on the analysis of the IPA and CSI matrices, the company's priority implementation in calming the competition is that PT ABC must focus on improvements in quadrants I and III. These quadrant attributes are the key to the success of taxi companies in winning the taxi industry competition in Indonesia. The strategy in Quadrants I and III is to improve driver training and skill development through training in serving passengers, courtesy, friendliness, and a good attitude. The CSI analysis found that the passenger satisfaction index of online taxis is higher than conventional taxis. Furthermore, there was an increase in the passenger satisfaction index after PT ABC partnered with an online taxi company in terms of ease of ordering taxis, as well as adding a fleet that saves operational expenses, one of the right options is to increase the Electric taxi fleet, which can reduce operational costs and is environmentally friendly.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of the paper.

Author Contribution

The author confirms contribution to the paper as follows: **study conception and design**: *Ahmad Saifi Athoillah;* **data collection**: *Ahmad Saifi Athoillah;* **analysis and interpretation of results**: *Ahmad Saifi Athoillah;* **draft manuscript preparation**: *Ahmad Saifi Athoillah. The author reviewed the results and approved the final version of the manuscript.*

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Appendix 1: Number of Taxi Passenger Respondents

Taxi operator	Number of taxi passengers	
	n	%
PT ABC Taxi	36	14.4%
PT ABC Taxi Joins Online Taxi	35	14.0%
Blue bird taxi	36	14.4%
Blue bird-Go car taxi	35	14.0%
Uber car taxi	36	14.4%
Grabcar Taxi	36	14.4%
Gocar Taxi	36	14.4%
Total	**250**	**100%**

Appendix 2: Research Variables of Taxi Passenger Satisfaction

Code	Latent variable	Indicator Variable
X1	Tangible	The physical condition of the car (interior/exterior) is good and well maintained.
X2		Clean taxi car
X3		Taxi drivers keep up
X4		Taxi facilities are available and work well.
X5	Reliability	Easy taxi booking
X6		Taxi arrival accuracy
X7		Promptness in delivering passengers to their destination
X8		Availability of passenger travel distance destinations
X9		Management reliability
X10	Responsiveness	Driver response after booking
X11		Willingness to help passengers
X12		Willingness to respond favorably to passengers.
X13		Responsiveness of management response.
X14	Assurance	Fares are according to the trip meter.
X15		Payment certainty
X16		Good road route knowledge
X17		Certainty of delivering passengers.
X18		Certainty in the travel process.
X19	Empathy	Driver friendliness

Note: The column "Service quality" spans vertically across X1–X19 as an outer grouping of the latent variables.

Code	Latent variable	Indicator Variable
X20		Management friendliness
X21		Driver's attention to passengers
X22		Commitment to building the best reputation.
X23		Any situation (rain/heat/day/night) is still served
X24		Drivers provide information on delays/obstacles & provide alternative routes
X25	Product Quality	Driver convenience with facilities
X26		Drivers obey the rules of signs
X27		Passengers are safe and avoid crime
X28		Driver returns passenger's luggage
X29		Accurate/GPS-compliant taxi routes.
X30		Travel route information always reassures passengers.
X31		Driver provides taxi receipt
X32		Easy taxi booking/ Easy-to-use and uncomplicated taxi app.
X33		Easy and flexible payment methods (both cash and credit).
X34		Rates that match the quality of the taxi service.
X35		Every day taxi fares are fixed.
X36	Perceived Value	Charges when canceling a taxi.
X37		Discount
X38		Promo
X39		Voucher
X40		Cheaper taxi fares

Appendix 3: Taxis and Atributes in Quadrant I:

1) **PT ABC Taxi**

At PT ABC Taxi, the attributes in quadrant I are as follows:

X4 = Taxi facilities are available and functioning properly.
X5 = Ease of taxi booking.
X7 = Punctuality in delivering passengers.
X9 = Management reliability in taxi booking.
X13 = Management responsiveness in responding to passenger complaints.
X14 = The fare is in accordance with the meter.
X15 = Driver's cooperative attitude in accepting taxi fare payments.
X17 = Certainty of delivering passengers.
X18 = Certainty in the travel process.
X19 = Driver friendliness.
X20 = Management friendliness.
X22 = The company's commitment to building the best reputation
X23 = Any situation (rain/heat/day/night) passengers are still well served.
X24 = Provide information on delays/obstacles & provide alternative routes.
X25 = Convenience of taxi facilities.
X26 = Driver adherence to traffic rules.
X27 = Passenger safety from crime.
X28 = The driver returns the passenger's luggage.
X29 = The accuracy of the travel route / according to GPS.
X30 = Convincing travel route information.
X31 = Providing proof of taxi payment transaction.
X32 = Ease of ordering/easy-to-use application features.

2) **PT ABC Taxi Collaboration with online taxi**

The following are the attributes in quadrant I:

X1 = The physical condition of the car (interior/exterior) is good and well maintained.
X2 = Clean taxi vehicles.
X3 = Neatness of the driver's appearance.
X4 = Taxi facilities are available and functioning properly.
X6 = Punctuality of taxi arrival.
X7 = Punctuality in delivering passengers.

X8 = Driver's willingness to serve for the purpose of mileage.
X9 = Management reliability in taxi booking.
X10 = Responsiveness / good response attitude of the driver after booking.
X11 = Driver's willingness to help passengers.
X13 = Management responsiveness in responding to passenger complaints.
X14 = The fare is in accordance with the meter.
X15 = Driver's cooperative attitude in accepting taxi fare payments.
X16 = Good Road route knowledge.
X17 = Certainty of delivering passengers.
X19 = Driver friendliness.
X20 = Management friendliness.
X22 = The company's commitment to building the best reputation.
X23 = Any situation (rain/heat/day/night) is still served well.
X24 = Provide information on delays/obstacles & provide alternative routes.
X25 = Convenience of taxi facilities.
X26 = Driver adherence to traffic rules.
X28 = The driver returns the passenger's luggage.
X32 = Ease of ordering/easy application features to use.
X35 = Consistency of taxi fares.
X37 = Discounted taxi fare taxi fare

3) Blue bird taxi
The following are the attributes in quadrant I:
X6 = Punctuality of taxi arrival.
X9 = Management reliability in taxi booking.
X15 = Driver's cooperative attitude in accepting taxi fare payments.
X24 = Provide information on delays/obstacles & provide alternative routes.
X30 = Convincing travel route information.

4) Blue bird-Go car taxi
The following are the attributes in quadrant I:
X6 = Punctuality of taxi arrival.
X9 = Reliability of management in taxi booking in handling complaints.
X10 = Responsiveness / good response attitude of the driver after booking.
X16 = Good Road route knowledge.
X22 = The company's commitment to building the best reputation.

5) Grab car taxi
The following are the attributes in quadrant I:
X6 = Punctuality of taxi arrival.

Appendix 4: Taxis and Attributes in Quadrant II:

1) PT ABC Taxi Joins Taxi
The following are the attributes in quadrant II:
X5 = Ease of taxi booking.

2) Blue bird taxi
The following are the attributes in quadrant II:
X2 = Clean taxi vehicles.
X3 = Neatness of the driver's appearance.
X4 = Taxi facilities are available and functioning properly.
X5 = Ease of taxi booking.
X13 = Management responsiveness in responding to passenger complaints.
X19 = Driver friendliness.

3) Blue bird-Go car taxi
The following are the attributes in quadrant II:
X2 = Clean taxi vehicles.
X4 = Taxi facilities are available and functioning properly.
X5 = Ease of taxi booking.
X7 = Punctuality in delivering passengers
X13 = Management responsiveness in responding to passenger complaints.
X14 = The fare is in accordance with the meter.
X15 = Driver's cooperative attitude in accepting taxi fare payments.

X23 = Any situation (rain/heat/day/night) is still well served.
X24 = Provide information on delays/obstacles & provide alternative routes.
X25 = Convenience of taxi facilities.
X26 = Driver adherence to traffic rules.
X27 = Passenger safety from crime.
X28 = The driver returns the passenger's luggage.
X30 = Convincing travel route information.
X32 = Ease of ordering/easy-to-use application features.

4) Uber car taxi
The following are the attributes in quadrant II:
X4 = Taxi facilities are available and functioning properly.
X5 = Ease of taxi booking.
X6 = Punctuality of taxi arrival.
X7 = Punctuality in delivering passengers
X8 = Driver's willingness to serve for the purpose of mileage.
X9 = Management reliability in taxi booking
X10 = Responsiveness / good response attitude of the driver after booking.
X11 = Driver's willingness to help passengers.
X13 = Management responsiveness in responding to passenger complaints.
X14 = The fare is in accordance with the meter.
X15 = Driver's cooperative attitude in accepting fare payments.
X16 = Good Road route knowledge.
X17 = Certainty of delivering passengers.
X18 = Certainty in the travel process.
X19 = Driver friendliness.
X20 = Management friendliness.
X22 = The company's commitment to building the best reputation.
X23 = Any situation (rain/heat/day/night) is well served.
X25 = Convenience of taxi facilities.
X27 = Passenger safety from crime.
X32 = Ease of ordering/easy-to-use application features.
X33 = Ease of payment for taxi fares.
X40 = Perception that taxi fares are cheaper than other taxis.

5) Grab car taxi
The following are the attributes in quadrant II:
X1 = The physical condition of the car (interior/exterior) is good and well maintained.
X2 = Clean taxi vehicles.
X3 = Neatness of driver's appearance
X4 = Taxi facilities are available and functioning properly.
X5 = Ease of taxi booking.
X7 = Punctuality in delivering passengers.
X8 = Driver's willingness to serve for the purpose of mileage.
X9 = Reliability of management in taxi booking in handling complaints.
X10 = Responsiveness / good response attitude of the driver after booking.
X11 = Driver's willingness to help passengers.
X12 = The driver's willingness to respond well to passengers.
X13 = Management responsiveness in responding to passenger complaints.
X14 = The fare is in accordance with the meter.
X15 = Driver's cooperative attitude in accepting taxi fare payments.
X16 = Good Road route knowledge.
X17 = Certainty of delivering passengers.
X18 = Certainty in the travel process.
X19 = Driver friendliness
X20 = Management friendliness
X21 = Driver's attention to passengers.
X22 = The company's commitment to building the best reputation.
X23 = Any situation (rain/heat/day/night) is still well served.
X24 = Drivers provide information on delays/obstacles & provide alternative routes.
X25 = Convenience of taxi facilities.
X26 = Driver adherence to traffic rules.

X27 = Passenger safety from crime.
X28 = The driver returns the passenger's luggage.
X29 = The accuracy of the travel route / according to GPS.
X30 = Convincing travel route information
X31 = Providing proof of taxi payment transaction.
X32 = Ease of ordering/easy-to-use application features.
X33 = Ease of payment for taxi fares.
X35 = Tariff consistency
X37 = Discounted taxi fares
X38 = Promo fare
X40 = Perception that taxi fares are cheaper than other taxis.

6) **Go car taxi**

The following are the attributes in quadrant II:
X1 = The physical condition of the car (interior/exterior) is good and well maintained.
X2 = Clean taxi vehicles.
X3 = Neatness of the driver's appearance.
X4 = Taxi facilities are available and functioning properly.
X5 = Ease of taxi booking.
X6 = Punctuality of taxi arrival.
X7 = Punctuality in delivering passengers.
X8 = Driver's willingness to serve for the purpose of mileage.
X9 = Management reliability in taxi booking.
X10 = Responsiveness / good response attitude of the driver after booking.
X14 = The fare is in accordance with the meter.
X15 = The driver's cooperative attitude in accepting payment of taxi fares.
X17 = Certainty of delivering passengers.
X18 = Certainty in the travel process.
X19 = Driver friendliness.
X20 = Management friendliness.
X22 = The company's commitment to building the best reputation.
X23 = Any situation (rain/heat/day/night) passengers are still well served.
X24 = Provide information on delays/obstacles & provide alternative routes.
X25 = Convenience of taxi facilities.
X27 = Passenger safety from crime.
X28 = The driver returns the passenger's luggage.
X29 = The accuracy of the travel route / according to GPS.
X30 = Convincing travel route information.
X32 = Ease of application features
X33 = Ease of payment for taxi fares.

Appendix 5: Taxis and Attributes in Quadrant III:

1) **PT ABC Taxi**

The following are the attributes in quadrant III:
X1 = The physical condition of the car (interior/exterior) is good and well maintained.
X2 = Clean taxi vehicles.
X3 = Neatness of the driver's appearance.
X6 = Punctuality of taxi arrival.
X8 = Driver's willingness to serve for the purpose of mileage.
X10 = Responsiveness / good response attitude of the driver after booking.
X11 = Driver's willingness to help passengers.
X12 = The driver's willingness to respond well to passengers.
X16 = Good Road route knowledge.
X21 = Driver's attention to passengers.
X33 = Ease of payment for taxi fares.
X34 = Taxi fares are in line with the quality of service provided.
X35 = Consistency of taxi fares.
X36 = Charges when canceling a taxi.
X37 = Discounted taxi fares.
X38 = Promo fare
X39 = Taxi voucher

X40 = Perception that taxi fares are cheaper than other taxis.

2) PT ABC Taxi Collaboration with online taxi

The following are the attributes in quadrant III:

X12 = The driver's willingness to respond well to passengers.

X18 = Certainty in the travel process.

X21 = Driver's attention to passengers.

X27 = Passenger safety from crime.

X29 = The accuracy of the travel route / according to GPS.

X30 = Passenger travel route information is always convincing.

X31 = Providing proof of taxi payment transaction.

X33 = Ease of payment for taxi fares.

X34 = Taxi fares are in line with the quality of service provided

X36 = Charges when canceling a taxi.

X38 = Promo fare

X39 = Taxi voucher

X40 = Perception that taxi fares are cheaper than other taxis.

3) Blue bird taxi

The following are the attributes in quadrant III:

X7 = Punctuality in delivering passengers.

X8 = Driver's willingness to serve for the purpose of mileage.

X11 = Driver's willingness to help passengers.

X14 = The fare is in accordance with the meter.

X16 = Good Road route knowledge.

X17 = Certainty of delivering passengers.

X18 = Certainty in the travel process.

X20 = Management friendliness.

X21 = Driver's attention to passengers.

X22 = The company's commitment to building the best reputation.

X23 = Any situation (rain/heat/day/night) is still well served.

X26 = Driver adherence to traffic rules.

X28 = The driver returns the passenger's luggage.

X29 = The accuracy of the travel route / according to GPS.

X31 = Providing proof of taxi payment transaction.

X33 = Ease of payment for taxi fares

X34 = The fare is in accordance with the quality of service that Blue bird taxis provide.

X35 = Tariff consistency.

X36 = Charges when canceling a taxi.

X37 = Discounted taxi fares

X38 = Promo fare

X39 = Taxi voucher

X40 = Perception that taxi fares are cheaper than other taxis.

4) Blue bird-Go car taxi

The following are the attributes in quadrant III:

X8 = Driver's willingness to serve for the purpose of mileage.

X11 = Driver's willingness to help passengers.

X17 = Certainty of delivering passengers.

X18 = Certainty in the travel process.

X21 = Driver's attention to passengers.

X31 = Providing proof of taxi payment transaction.

X33 = Ease of payment for taxi fares.

X34 = The fare is in accordance with the quality of service that Blue bird taxis provide.

X35 = Tariff consistency.

X36 = Charges when canceling a taxi.

X37 = Discounted taxi fares

X38 = Promo fare

X39 = Taxi voucher

X40 = Perception that taxi fares are cheaper than other taxis.

5) Uber Taxi

The following are the attributes in quadrant III:

X34 = Taxi fares are in line with the quality of service provided.

X35 = Consistency of taxi fares.
X36 = Charges when canceling a taxi.
X37 = Discounted taxi fares
X38 = Promo fare
X39 = Taxi voucher

6) Go car taxi
The following are the attributes in quadrant III:
X34 = Taxi fares are in line with the quality of service provided.
X35 = Tariff consistency.
X36 = Charges when canceling a taxi.
X37 = Discounted taxi fares
X38 = Promo fare
X39 = Taxi voucher

Appendix 6: Taxis and Attributes in Quadrant IV:

1) Blue bird taxi
The following are the attributes in quadrant IV:
X1 = The physical condition of the car (interior/exterior) is good and well maintained.
X10 = Responsiveness / good response attitude of the driver after booking.
X12 = The driver's willingness to respond well to passengers.
X25 = Convenience of taxi facilities.
X27 = Passenger safety from crime.
X32 = Easy and uncomplicated taxi booking.

2) Blue bird-Go car taxi
The following are the attributes in quadrant IV:
X1 = The physical condition of the car (interior/exterior) is good and well maintained.
X3 = Neatness of the driver's appearance.
X12 = Driver's willingness to respond to passengers.
X19 = Driver friendliness.
X20 = Management friendliness.
X29 = The accuracy of the travel route / according to GPS.

3) Uber car taxi
The following are the attributes in quadrant IV:
X1 = The physical condition of the car (interior/exterior) is good and well maintained.
X2 = Clean taxi vehicles.
X3 = Neatness of the driver's appearance.
X12 = Driver's willingness to respond to passengers.
X21 = Driver's attention to passengers.
X24 = Provide information on delays/obstacles & provide alternative routes.
X26 = Driver adherence to traffic rules.
X28 = The driver returns the passenger's luggage.
X29 = Travel route accuracy / according to GPS
X30 = Passenger travel route information is always convincing.
X31 = Providing proof of taxi payment transaction.

4) Grab car taxi
The following are the attributes in quadrant IV:
X34 = Taxi fares are in line with the quality of service provided.
X36 = Charges when canceling a taxi.
X39 = Taxi voucher

5) Go car taxi
The following are the attributes in quadrant IV:
X11 = Driver's willingness to help passengers.
X12 = Driver's willingness to respond to passengers.
X13 = Management responsiveness in responding to passenger complaints.
X16 = Good Road route knowledge.
X21 = Driver's attention to passengers.
X26 = Driver adherence to traffic rules.
X31 = Providing proof of taxi payment transaction.
X40 = Perception that taxi fares are cheaper than other taxis.

Appendix 7: Level of Conformity of Performance Measurement Indicators to Overall Importance

No.	Variables	Attribute Description	Performance (Xi)	Interests (Yi)	Conformity (Tki) (%)	Priority Scale
X12	Responsiveness	The driver's willingness to respond well to passengers.	4.81	5.29	90.93	1
X1	Physical form	The physical condition of the car (interior/exterior) is well maintained.	4.88	5.39	90.54	2
X32	Product quality	Ease of ordering/easy-to-use application features (features).	4.88	5.46	89.38	3
X29	Product quality	Travel route accuracy/according to GPS.	4.79	5.37	89.20	4
X23	Product quality	Situation (rain/heat/day/night) passengers are still served well (performance)	4.87	5.46	89.19	5
X19	Empathy	Driver friendliness	4.92	5.52	89.13	6
X20	Empathy	Management friendliness	4.85	5.45	88.99	7
X5	Reliability	Easy booking	4.91	5.52	88.95	8
X25	Product quality	Convenience with facilities	4.92	5.55	88.65	9
X10	Responsiveness	Responsiveness/attitude Responsiveness/attitude Good response from the driver after ordering a taxi	4.84	5.46	88.64	10
X2	Physical form	Clean taxi vehicles	4.83	5.46	88.46	11
X22	Empathy	The company's commitment to building the best reputation.	4.79	5.42	88.38	12
X15	Certainty	The driver's cooperative attitude in accepting payment of taxi fares.	4.83	5.50	87.82	13
X13	Responsiveness	Management's responsiveness in responding to passenger complaints.	4.76	5.42	87.82	14
X21	Empathy	Driver's attention to passengers.	4.61	5.25	87.81	15
X4	Physical form	Taxi facilities are available and work well.	4.89	5.57	87.79	16
X27	Product quality	Safety of taxi passengers.	4.78	5.47	87.39	17
X3	Physical form	Neatness of driver's appearance	4.75	5.44	87.32	18
X30	Product quality	Convincing travel route information	4.73	5.43	87.11	19
X24	Product quality	Delays/obstacles and alternative travel solutions	4.77	5.48	87.04	20
X11	Responsiveness	Driver's willingness to help passengers.	4.67	5.38	86.80	21

X33	Product quality	Easy way to pay for taxi fares.	4.58	5.28	86.74	22
X7	Reliability	The punctuality of the driver delivering passengers.	4.76	5.49	86.70	23
X28	Product quality	Return of passenger's luggage.	4.78	5.52	86.59	24
X40	Price	Perceived taxi fares that are cheaper than other taxis than other taxis.	4.58	5.29	86.58	25
X26	Product quality	Driver compliance with traffic rules.	4.64	5.37	86.41	26
X34	Price	Taxi fares are commensurate with the quality of service provided.	4.37	5.07	86.19	27
X18	Certainty	Certainty in the travel process.	4.69	5.45	86.06	28
X8	Reliability	Driver's willingness to serve for the purpose of mileage.	4.69	5.45	86.06	29
X14	Certainty	The fare is according to the meter.	4.78	5.56	85.97	30
X9	Reliability	Management reliability in taxi booking in taxi taxi booking.	4.68	5.50	85.09	31
X31	Product quality	Providing proof of taxi payment transaction.	4.51	5.33	84.62	32
X6	Reliability	Punctuality of taxi arrival.	4.65	5.51	84.39	33
X17	Certainty	Certainty of delivering passengers.	4.59	5.44	84.38	34
X16	Certainty	Good road route knowledge.	4.61	5.48	84.12	35
X39	Price	Taxi cab voucher.	4.26	5.11	83.37	36
X37	Price	Discount taxi fares fares	4.30	5.22	82.38	37
X36	Price	Charges when canceling a taxi.	4.18	5.08	82.28	38
X38	Price	Tariff rate promo.	4.23	5.22	81.03	39
X35	Price	Taxi fare consistency.	4.26	5.27	80.83	40
The average of the mean scores of Xi and Yi			**4.68**	**5.40**	**86.68**	
Total			**187.22**	**215.93**		