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การเปรียบเทียบมิติคุณภาพบริการรถยนต์โดยสารสาธารณะและผู้ให้บริการผ่านแอปพลิเคชั่น: การเรียนรู้จากอดีตในกรณีศึกษาความเชื่อมั่นจากการเริ่มดำเนินการในประเทศไทย

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บทคัดย่อ

งานวิจัยนี้เจาะลึกถึงตัวขับเคลื่อนที่อยู่เบื้องหลังความพึงพอใจของลูกค้าในด้านคุณภาพการบริการสำหรับทั้งบริการรถยนต์โดยสารสาธารณะและผู้ให้บริการผ่านแอปพลิเคชั่นเจ้าแรกในประเทศไทย โดยจัดทำกรอบการความสัมพันธ์ระหว่างความไว้วางใจ คุณภาพการบริการ และความพึงพอใจของลูกค้าที่ใช้บริการ ในช่วงเวลาที่มีการเริ่มการใช้บริการผ่านแอปพลิเคชั่นเป็นครั้งแรกในประเทศไทยโดยทำการสำรวจผู้รับบริการที่เคยมีประสบการณ์ทั้งในรูปแบบดั้งเดิมและผ่านแอปพลิเคชั่น ผลการศึกษาชี้ให้เห็นว่าสิ่งที่จับต้องได้ เช่น รูปลักษณ์ การแต่งกาย และสิ่งที่จับต้องไม่ได้ในการบริการ เช่น ความน่าเชื่อถือ และความไว้วางใจ มีความสัมพันธ์เชิงบวกกับความพึงพอใจโดยรวมสำหรับรถยนต์โดยสารสาธารณะซึ่งมีการกำกับดูแลภายใต้กฎข้อบังคับของกรมการขนส่งทางบก ในขณะที่การบริการผ่านแอปพลิเคชั่น พบว่าสิ่งที่จับต้องได้ ความน่าเชื่อถือ และการตอบสนองต่อความต้องการของผู้โดยสารถือเป็นตัวทำนายความพึงพอใจที่สำคัญ อย่างไรก็ตาม การศึกษา พบว่าความไว้วางใจไม่ได้ส่งผลกระทบต่อการรับรู้คุณภาพการบริการผ่านแอปพลิเคชั่นอย่างมีนัยสำคัญในกรอบเวลาของการศึกษานี้ ข้อมูลเชิงลึกที่รวบรวมได้จากการศึกษานี้ไม่เพียงแต่ระบุช่องว่างด้านคุณภาพการบริการภายในอุตสาหกรรมยนต์โดยสารเท่านั้น แต่ยังช่วยให้เกิดความเข้าใจที่กว้างขึ้นเกี่ยวกับคุณภาพการบริการและความไว้วางใจภายในภูมิทัศน์ทั่วโลกของบริการผ่านแอปพลิเคชั่นที่การเปลี่ยนแปลงอย่างรวดเร็วในพลวัตรของเทคโนโลยีในปัจจุบันอีกด้วย

คำสำคัญ: การบริการขนส่งสาธารณะผ่านแอปพลิเคชั่น, คุณภาพบริการ, ผู้ให้บริการแอปพลิเคชั่น

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Comparing Service Quality Dimensions Between Traditional and Application-Based Taxi: Insights from a Case Study of Initial Perception of Trust in Thailand

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Abstract

This research explores the drivers behind customer satisfaction in service quality for both conventional taxi services and the first application-based taxis operating in Thailand. During the first introduction of application-based taxi in Thailand, this study is conducted among passengers who had experience with both conventional methods and app-based services. The research framework aimed at examining the interplay between trust, service quality, and customer satisfaction in the realm of taxi services. The multiple regression outcomes demonstrate that tangibles, reliability, assurance, and trust positively correlate with overall satisfaction for regular taxis, while for application-based taxis, tangibles, reliability, and responsiveness emerge as vital predictors of satisfaction. However, the study finds that trust does not significantly impact perceptions of service quality for application-based taxis in the period of this survey. The insights gleaned from this study not only pinpoint service quality gaps within the taxi industry but also contribute to a broader understanding of service quality and trust within the global landscape of rapid change dynamically in mobile application-based technology.

Keywords: Application Service Providers, Mobile Application-Based Transportation, Service Quality

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Introduction

Public transportation services in Thailand encompass a diverse range of options, including buses, rapid transit systems, and commuter trains, serving both urban and suburban areas. The Bangkok Mass Transit System (BTS) and the Mass Rapid Transit (MRT) are prominent features of the capital city's public transit, offering convenient and efficient modes of travel. Additionally, intercity trains connect major cities, while tuk-tuks, songthaews, and motorbike taxis provide flexible local transport solutions. Thailand's public transportation system plays a crucial role in addressing mobility needs, reducing traffic congestion, and enhancing connectivity for residents and visitors across the country. Among the array of options, taxis hold significant popularity, with over 126,000 taxicabs accessible to passengers daily in Bangkok (Amrapala & Choocharukul, 2019). These taxis operate under the regulatory oversight of the Division of Land Transport's Ground Transportation (Rondinelli & Berry, 2000). Nonetheless, the use of traditional taxis has experienced a decline due to competition from Transportation Network Companies (TNCs), such as UBER and Grab, which operate through ride-sharing applications. TNCs made their entry into Thailand around mid-2014, and UBER alone reported attracting more than 2 million users within its initial three years of operation (Khozen et al., 2021; Suriyamongkol, 2016)

UBER, a prominent Transportation Network Company (TNC), introduced its ride-sharing service in Thailand around mid-2014. Operating through a mobile application, UBER quickly gained popularity, amassing over 2 million users within its first three years of operation. The service offered an alternative mode of transportation to traditional taxis, allowing passengers to conveniently hail rides and make payments through the app. However, UBER also faced regulatory challenges and competition from other TNCs in the local market. UBER promotes vehicle fleets characterized by cleanliness, comfortable seating, and courteous drivers. Travelers have the option to download the UBER application to reserve rides and provide feedback after using the service. However, upon its introduction to Thailand in November 2014, UBER encountered legal challenges, being deemed unlawful by the Ministry of Transport due to issues surrounding vehicle licensing, driver registrations, and preferential treatment for credit card payments (Bashir et al., 2018). Similar concerns about the legality of such application-based taxi services emerged in other regions like Oregon, Bulgaria, Denmark, Hungary, and parts of Germany. Despite facing fines of 4,000 Thai Baht from the Thai government for drivers spotted by police on the streets, UBER continued to operate illegally in Thailand from 2014 to 2018. These instances of sharing economy platforms, including UBER and Airbnb, have sparked debates on the need for government regulation and the factors influencing passengers' preferences for these innovative services over traditional alternatives.

Studying Transportation Network Companies (TNCs) in Thailand is crucial as it offers insights into the evolving landscape of urban transportation and the impact of digital platforms on traditional modes of commuting. With the emergence of TNCs like UBER and Grab, understanding their adoption, regulatory challenges, and effects on local transportation systems is essential for policymakers, industry stakeholders, and researchers. Examining TNCs in Thailand can shed light on the dynamics between innovative technological solutions, regulatory frameworks, consumer preferences, and the overall sustainability of urban mobility, facilitating informed decision-making for future transportation planning and policy

development. From the perspective of Transportation Network Companies (TNCs), an open market should allow emerging firms to compete on equal footing with established industries operating globally (Li et al., 2019; Schaller, 2021). Governments in various countries have called for app-based companies to adhere to existing regulations, often aimed at safeguarding fair pricing practices. However, these regulations might hinder competition within a free-market economy that ideally empowers passengers to make informed choices based on cost and service quality (Rauch & Schleicher, 2015; Thelen, 2018). Taxis in the Bangkok metropolitan area have garnered a reputation for subpar services, including complaints about refusals, excessive charges, unsafe driving practices, and inadequate vehicle conditions. This study examines the competition between taxi services in Thailand and compares key aspects of both UBER and regular taxis to uncover service disparities. The findings of this analysis aim to provide insights for regulators and policymakers to identify factors that distinguish superior services from substandard ones.

Literature Review

The literature on taxi service quality highlights the significance of factors influencing passenger satisfaction and preferences. Studies underscore the importance of attributes such as driver behavior, vehicle cleanliness, comfort, safety, reliability, and fare transparency in shaping passengers' perceptions and overall service experiences. Research has revealed that service quality dimensions directly impact customer satisfaction, loyalty, and willingness to recommend the service to others. Comparative assessments between traditional taxi services and app-based alternatives like UBER have illuminated differences in service quality perceptions, with app-based services often being favored for their convenience, ease of payment, and perceived higher standards. Additionally, regulatory frameworks, technological advancements, and changing consumer expectations are acknowledged as pivotal factors shaping the evolving landscape of taxi service quality. Parasuraman (Parasuraman et al., 2002) introduced a widely recognized gauge for evaluating service quality, known as SERVQUAL, encompassing five dimensions: tangibles, reliability, responsiveness, assurance, and empathy. This metric has been extensively employed to assess customer satisfaction (Alomari, 2021; Ladhari, 2009; Shi & Shang, 2020) and establish links between perceived value and purchase intentions (Chen et al., 2019; Novitasari, 2022; Pham et al., 2020). Numerous studies have affirmed the positive impact of service quality on organizational competitiveness (Aburayya et al., 2020; Álvarez-García et al., 2019), while the direct correlation between customer experience and company image has also been noted. In the realm of transportation, prior research has predominantly focused on delineating service quality across various modes of public transportation (Li & Shang, 2020; Moslem et al., 2020; Nguyen-Phuoc et al., 2020; Uzir et al., 2021), yet limited attention has been devoted to examining disparities within the same mode, such as premium versus low-cost services, as well as differences between conventional and app-based services. The primary focus of this study is to examine the factors that distinguish the quality of services between traditional taxi services and Transportation Network Companies (TNCs), with a specific emphasis on assessing the impact of trust on overall satisfaction of taxi service from both traditional and app-based features. The evaluation of service quality seeks to uncover the elements that contribute to the disparity between superior and subpar services (De & Singh, 2023; Zhong & Moon, 2020)

Studying service quality insights is essential for modern hail riding services due to several reasons. Firstly, service quality directly affects customer satisfaction and loyalty. Understanding and improving service quality can lead to higher customer retention and positive word-of-mouth, which are crucial for the success and growth of hail riding platforms. Secondly, in a competitive market, service quality can serve as a differentiator. Companies that consistently offer superior service quality are likely to attract more customers and gain a competitive edge over their rivals. Thirdly, analyzing service quality insights can highlight areas for improvement and optimization in the service delivery process. This can lead to operational efficiencies, cost savings, and enhanced overall customer experience. Lastly, in the era of online reviews and social media, negative service experiences can quickly spread, impacting the reputation of the service provider. By focusing on service quality insights, modern hail riding services can proactively address potential issues and maintain a positive public image. Contemporary ride-hailing applications for taxi services offer passengers the convenience of exploring transportation options, features, and service characteristics through mobile devices. While existing literature has primarily focused on assessing service quality during the actual transportation experience, some studies propose that evaluations should occur post-experience (Hoyer et al., 2020). Both traditional taxis and Transportation Network Companies (TNCs) share similarities in service dimensions, but differences emerge in user demographics, waiting times, and trip frequency. However, only a limited number of studies have compared the two types of services from the perspective of individual passengers, both during and after the service. Some scholars argue that conventional taxis may face challenges in providing superior quality due to regulatory constraints in various countries, where regulators play a key role in ensuring passenger safety and controlling transportation operations (Czerny et al., 2021; Wang et al., 2020). Classic literature suggests that the optimal level of service quality can be influenced by factors like demand elasticity (Besanko et al., 2003; Laffont & Tirole, 1994; Mussa & Rosen, 1978; Spence, 1976). Regulatory authorities often establish a minimum threshold that maximizes passenger welfare, as highlighted by Lewis and Sappington (1992), who emphasize that the effectiveness of regulatory approaches relies on the controllers' ability to monitor service providers' activities and quality. This study seeks to distinguish between regular taxis and TNCs by examining the impact of regulated and non-regulated activities mandated by governmental bodies (Li et al, 2019; Morovat et al., 2019; Xie et al., 2019).

Background Theory and Research Framework

Understanding the relationship between service providers and regulators is essential for ensuring the delivery of safe, high-quality services to consumers. This understanding enables effective collaboration, transparency, and accountability, leading to the development of well-informed regulatory frameworks. By fostering a cooperative environment, it enhances public trust, encourages innovation, and enables policymakers to make informed decisions that balance industry growth with consumer protection, ultimately contributing to a thriving and responsible business ecosystem. The SERVQUAL model employs a set of five dimensions, namely tangibles, reliability, responsiveness, assurance, and empathy, to assess customer satisfaction in relation to their expectations. Tangibles encompass the perception of physical attributes and the environment's state (e.g., cleanliness or organization of interior decoration). Reliability pertains to the capacity to execute a service accurately and precisely. In the realm of transportation,

reliability hinges on precise navigation and drivers' adeptness in reaching the correct destination via the most efficient route. Responsiveness entails a willingness to promptly address requests and offer swift service. Taxi drivers should exhibit keenness in attending to passenger requests or concerns and providing solutions aligned with those requests (Sharma & Das, 2017). Assurance encompasses service providers' confidence and competence in delivering services with credibility and security (Van Iwaarden et al., 2003; Tadesse et al., 2014). Empathy denotes how service providers genuinely care for customers, comprehend their needs, and pay attention to intricate details (Yao & Ding, 2011).

In the context of transportation services within the Bangkok metropolitan area, this research narrows its focus to the competition between conventional private taxis and mobile application-based services such as UBER, EasyTaxi, or GrabTaxi. UBER entered Thailand's taxi market in early 2014, despite being declared illegal by the Ministry of Transport in November 2014 due to issues related to vehicle licensing, driver registration, and allegations of credit card transaction discrimination. Despite this, UBER continued to operate without adhering to registration fees for cars and drivers, as well as the standard fares established by the Department of Land Transport. The UBER application facilitates ride reservations, route selection, and payment transactions through mobile devices, while security concerns led to fines for UBER services caught by Thai police. However, UBER gained popularity among young professionals due to its reliability, convenience, and passenger courtesy. The situation highlights the differentiation in service offerings between regulated taxis and UBER, raising questions about the necessity of regulatory alignment. A triangular relationship among customers, service providers, and regulators is depicted in Figure 1, illustrating the absence of compliance where UBER services remain unregulated. Consequently, UBER directly communicates with customers regarding service expectations, and since UBER operates outside legal regulations, regulators are unable to ensure customer welfare. The primary objective of this study is to empirically analyze the phenomenon of diminishing customer-perceived quality due to the lack of regulatory measures to uphold quality levels in regulated taxis. The findings are expected to provide insights to regulators, suggesting that their role extends beyond registration fees, road usage, and pricing regulations to encompass defining quality levels that meet customer welfare. The secondary goal aims to elucidate how regulators can gain insights into customer preferences and desired quality standards to bridge the identified gap.

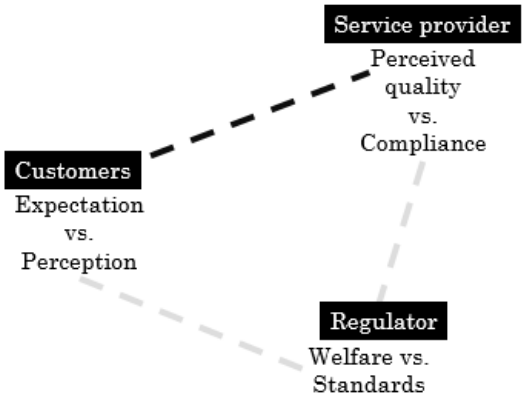

Figure 1 UBER services operating independently of regulatory compliance

To comprehend contemporary transportation services, previous research has emphasized the investigation of trust as a fundamental framework for establishing connections between service providers and customers. Trust is gauged through secure and autonomous transactional information (Hamill & Gambetta, 2006). and serves as a tool to instill confidence in the service's reliability (Gill et al., 2006; Lau et al., 2021). Trust is a prevalent factor in both traditional and modern business settings, where service providers can ensure trust by upholding a robust level of security, thereby differentiating themselves from competitors (Lu et al., 2018; Pavlou, 2001). Trust in electronic business often revolves around transactional and personal information security. Studies investigating the impact of trust on service quality (Kundu & Datta, 2015; Singh & Sirdeshmukh, 2000). have suggested that trust can be a precursor to pre- and post-trust interactions that influence service quality and satisfaction. Numerous scholarly works have underscored trust as a determinant in enhancing customer-provider relationships, with trust being frequently employed as a determinant for mobile application adoption and usage (Einav et al., 2014; Gera et al., 2020; Mahliza, 2020; Yoon, 2002). Trust has been found to directly correlate with the inclination to purchase online services and positively influence the utilization of products (Chen & Barnes, 2007). In this study, it is postulated that the benefits of mobile application usage will heighten overall satisfaction in the context of mobile application services (UBER). It is further hypothesized that service quality will positively impact trust, and mobile application benefits will enhance the overall satisfaction of taxi services.

Hypotheses

Conflicts between service providers and regulators are commonplace. According to Lewis and Sappington (1992), in a monopoly scenario where a single provider controls a commodity, the provider often aims to establish a high price to maximize profits, yet the regulator determines the price. The regulator's objective is to set the lowest price that maximizes customer welfare. Consequently, customers' marginal evaluation of quality tends to decrease over time. This situation frequently leads service providers to opt for subpar quality. Given that all taxis in Thailand adhere to a uniform set of regulations set by the Department of Land Transportation, encompassing registration fees and fare charges, the regulated taxi operations can be understood within the framework of a single regulator model. The initial phase of this study aims to empirically detect a decline in customers' marginal evaluation of quality due to the absence of regulations that ensure maintained quality levels. The primary aim of this phase is to recommend to regulators that their role extends beyond price and safety regulations, encompassing the determination of quality levels that cater to customer welfare. In Hypothesis 1, tangibles, while a relatively modest dimension of a service, are integral as customers can pre-evaluate service quality. For instance, service providers can exhibit attentiveness to detail through the state of the physical environment, such as cleanliness or tidiness. In high-contact service industries, factors like personnel appearance or the behavior of other customers can significantly impact the overall ambiance. Tangible aspects, including vehicle appearance, should be visually appealing, with both exterior and interior facilities maintained in a clean and comfortable condition for passengers. Taxi drivers' appearance, such as uniforms, should be neat, and the issuance of receipts at the end of trips is crucial. Thus, mobile application-based taxis, particularly UBER, are likely to yield higher customer satisfaction results, as they offer a range of well-maintained car options, while issues related to

the subpar condition of regular taxis, visibility of driver ID, and absence of receipts or change are recurrently reported.

The initial hypothesis posits that mobile application-based taxis offer superior tangible attributes compared to regular taxis. Concerning reliability, drivers are expected to provide accurate services during the first attempt and ensure timely passenger arrivals at their destinations. However, numerous passengers in Bangkok have raised grievances about drivers refusing to pick them up and instead opting to overcharge foreign tourists. Instances of drivers taking longer routes to inflate taxi fares without informing passengers have also been reported. Consequently, the second hypothesis suggests that mobile application-based taxis exhibit higher reliability than regular taxis. The concept of empathy encompasses the endeavor to understand customer needs or concerns and maintain a customer-centric attitude, prioritizing customer requirements and desires. Exemplary service providers often recognize regular customers by name, provide complimentary items, or offer special promotions for occasions like birthdays. The assurance component encompasses factors such as competence in service delivery, respectful and courteous behavior towards customers, and the demonstration of credibility and security. Effective communication skills are frequently associated with service providers exhibiting a high level of assurance (Tadesse et al., 2014). Additionally, offering operating hours that align with consumers' convenience plays a crucial role in achieving elevated customer satisfaction. Responsiveness denotes the willingness and enthusiasm of service providers to assist consumers and offer prompt services. Customers generally expect service providers to address their needs and promptly resolve issues with impeccable outcomes. While passengers have the option to provide feedback to the Department of Land Transport, it is less likely for them to directly communicate safety concerns to the driver. In contrast, UBER passengers are more inclined to instantly and directly share feedback about the driver's behavior and performance with the company through the UBER application on their smartphones, which offers a safer and more efficient avenue. The third, fourth, and fifth hypotheses align with the notion that mobile application-based taxis exhibit greater empathy, assurance, and responsiveness compared to regular taxis.

The Thai government monitors and oversees the operation of taxis in order to ensure their safety and dependability. The standards, laws, and practices that taxi operators and drivers must adhere to are developed and upheld by the Department of Land Transport. The government also sets guidelines for tariff structures to prevent overcharging and to provide justice for travelers. Taxi meters need to be calibrated and maintained in order to determine rates based on distance and time properly. Fares are frequently standardized. This guards against price gouging and guarantees accuracy in ticket pricing. The government also enforces rules pertaining to taxi safety. Taxi cars must adhere to stringent safety regulations and pass routine inspections to guarantee they are in excellent condition. To safeguard both drivers and passengers, this includes inspecting the mechanical components, brakes, lighting, and other safety features. To oversee and implement these regulations, government employees often check and inspect the taxis on the road. Infractions of the law may result in penalties, fines, and potentially the suspension of licenses. The recent rise of ride-hailing services like UBER and Grab has created new challenges for the conventional taxi industry and generated discussions about revising regulations to accommodate for these services while ensuring a

level playing field for all service providers. In order to guarantee that the public obtains trustworthy, transparent, and safe transportation services as well as to encourage fair competition among taxi businesses and sustain industry standards, Thailand's government has therefore regulated taxis.

Table 1 Linkage between cited regulations announced in Land Transport Act to SERVQUAL dimension

Regulations cited in Land Transport Act	Linkage to SERVQUAL dimension(s)
Section 24. An applicant for a license to operate fixed route transport, non-fixed route transport, and transport by a small vehicle must be a Thai national. In the case where the applicant for a license is a partnership, limited company, public limited company, such partnership, limited company, public limited company must be registered under Thai law and have its head office in the Kingdom of Thailand and: (1) in case of a registered ordinary partnership, all the partners must be of Thai nationality; (2) in case of a limited partnership, all the unlimited partners must be of Thai nationality, and not less than fifty-one percent of the capital of such limited partnership must be held by the partners who are natural persons of Thai nationality; (3) 5 in case of a limited company, not less than one-half of the total number of directors of the company must be of Thai nationality, and not less than fifty-one percent of the capital of such limited company must be held by the shareholders who are natural persons of Thai nationality, or by a registered ordinary partnership, a limited partnership, a limited company, a Ministry, a Sub-Ministry, a Department, local government, a State enterprise under the law on budgetary procedure, or a State organization under the law on establishment of a Government organization or on such other law respectively, and there is no regulation allowing such limited company to issue shares in a certificate to bearer. (4) in case of a public limited company, not less than one-half of the total number of directors of such public limited company must be of Thai nationality, and not less than fifty percent of the number of shares already sold of such limited company must be held by the shareholders who are natural persons of Thai nationality. In the case where the shares of the limited company or public limited company are held by a registered ordinary partnership, limited partnership, limited company or	Tangible-Physical facilities, equipment, and communication materials are assessed based on their visual characteristics.

Regulations cited in Land Transport Act	Linkage to SERVQUAL dimension(s)
public limited company, such shareholder must bear the nature under (1), (2), (3) or (4) as the case may be. The Central Land Transport Control Board shall have power to exempt the requirement as necessary or grant a special treatment for a specific case.	
Section 26. No person shall use a vehicle registered in a foreign country for transport operation except in the international transport and having been permitted by the Central Registrar. The vehicle personnel under section 92 working in the vehicle under paragraph one shall comply with all the provisions of this Act, and/or the existing agreement between the Thai Government and the Government of such country.	Reliability-Ability to perform the promised service dependably and accurately
Section 31. In issuing a license to operate fixed route transport the Registrar, with the approval of the Board, shall impose the conditions in the license concerning: (1) the number of vehicles to be used in the transport operation on the routes of transport; (2) the right to the vehicles used for transportation by the transport operation licensee; (3) the nature, type, size, and colors of the vehicles, and the sign of the transport operator to be made appear on every vehicle; (4) the number of seats, load weight limit, and loading method; (5) the number of vehicle personnel; (6) the routes of transport; (7) the rates of transport charges and other service charges in the transport; (8) the places for stopping or parking in order to load and unload passengers, animals or goods; (9) the places to stop on the way; (10) the standard of transport operation services; (11) timetable and number of trip a day in transport service.	Tangible-Physical facilities, equipment, and communication materials are assessed based on their visual characteristics**.**
Section 33. In issuing a license to operate transport by a small vehicle the Registrar, with the approval of the Board, shall impose the conditions in the license concerning: (1) the number of vehicles to be used in the transport operation on the routes of transport; (2) the nature, type, size, and colors of the vehicles, and the sign of the transport operator to be made appear on every vehicle; (3) the number of seats, load weight limit, and loading method; (4) timetable and number of trip a day in transport service; (5) the routes of transport; (6) the rates	Tangible-Physical facilities, equipment, and communication materials are assessed based on their visual characteristics. Reliability-Ability to perform the promised service dependably and accurately

Regulations cited in Land Transport Act	Linkage to SERVQUAL dimension(s)
of transport charges and other service charges in the transport; (7) other conditions prescribed in the Ministerial Regulation. The holder of the license to operate transport by a small vehicle shall provide a notice showing the conditions under (5) and (6) to be affixed at the place determined by the Director-General	

Drawing from existing literature, trust is defined as the customer's confidence in the reliability and ethical conduct of a service provider, coupled with the anticipation that the service will be delivered as promised and characterize trust as the belief that a party can be confidently relied upon to fulfill its fiduciary responsibilities. Various studies have suggested distinct constituents of trust, including attributes such as credibility, honesty, reliability, responsibility, and positive intentions. Trust holds significance across diverse markets, especially within the service industry where customers are confronted with a multitude of provider choices. Consequently, the predicament of adverse selection emerges, wherein consumers may struggle to discern the nuances in service quality offered by each provider. This information asymmetry prompts customers to expend time and effort in seeking additional information through sources like friends or advertisements, comparing competing assertions to circumvent the potential pitfalls of adverse selection. Providers who consistently deliver as agreed upon are likely to be perceived as trustworthy entities by consumers. In this context, the final hypothesis posits that Trust exerts a positive influence on overall satisfaction for both conventional taxis and mobile application-based taxis.

Table 2 Summary of hypotheses

	Hypothesis
H1	Due to regulations, mobile application-based taxis exhibit superior tangible attributes in comparison to regular taxis, impacting passenger satisfaction
H2	Due to regulations, mobile application-based taxis demonstrate greater reliability relative to regular taxis, influencing overall customer contentment.
H3	Without regulations, mobile application-based taxis offer a higher level of empathy in their service provision compared to regular taxis, contributing to passenger satisfaction
H4	Without regulations, mobile application-based taxis deliver service with enhanced assurance when contrasted with regular taxis, affecting passenger contentment
H5	Without regulations, mobile application-based taxis display heightened responsiveness compared to regular taxis, influencing overall customer satisfaction
H6	Due to regulations, trust exerts a positive influence on overall satisfaction in both conventional taxis and mobile application-based taxis, contributing to passenger contentment

Methodology

A series of survey questions was formulated to validate the hypotheses put forth in this study. The survey was intended to engage both UBER and conventional taxi users within the Bangkok metropolitan area during September 2016-November of 2017. The questionnaire was structured into three sections. The initial section encompassed queries concerning demographic information such as gender, age, educational background, and occupation. The second segment comprised 20 SERVQUAL items, utilizing a 5-point Likert scale to evaluate service quality and overall satisfaction. These SERVQUAL dimensions were adapted from Parasuraman et al. (2002). The last section examined passengers' levels of trust and perceptions of the benefit of mobile applications. Each participant had previously taken a standard cab as well as a UBER ride, and they were asked to fill out a survey contrasting the two services. Table 2 contains information that describes the responders. This section provides a summary of the service elements compared to standard taxi services. Realistic elements, responsiveness, assurance, and trust are a few of these traits. Based on data acquired from a survey of regular taxi users in the greater Bangkok area, the study was conducted. Each service dimension was assessed using a 5-point Likert scale. The results in Table 3 offers insights into the levels of perceived service quality across these dimensions, shedding light on the strengths and areas for improvement within the realm of traditional taxi services.

This study gathers data from participants by using an online self-administered questionnaire, with a specific emphasis on the data collecting approach during the commencement of application service in Thailand. The questionnaire consists of closed-ended questions and Likert scale ratings. The Likert scale rating approach involves presenting respondents with a series of attitude variables. For each item, respondents are asked to indicate their level of agreement or disagreement, using a five-point scale to express the strength of their agreement or disagreement. Furthermore, this approach is regarded as being easily implementable in self-completion surveys, whether in paper or electronic format. To facilitate efficient expression of respondents' sentiments, the researchers opted to use five-point Likert scales for the collection of opinion data. Moreover, prior research has shown that the combination of a five-point scale with bipolar scales, such as those measuring levels of agreement or disagreement, yields the most reliable results. The questionnaire serves as a research tool in this study. Questions 1-4 pertain to demographic factors and their potential effect on the likelihood of satisfaction with normal taxis vs mobile application-based taxis. These factors include respondents' gender, age, education level, and employment. The SERVQUAL Model, established by Parasuraman et al. (2002), consists of a set of questions that assess five characteristics of service quality. The study will examine five key dimensions, namely tangibles, responsiveness, assurance, empathy, and dependability. In order to ascertain the potential impact of a high level of trust on passengers' happiness, it is necessary to explore and evaluate many aspects pertaining to trust. This entails formulating relevant questions that may aid in comprehending and quantifying the relationship between trust and satisfaction levels among passengers. Question number 27 pertains to the assessment of general satisfaction with conventional taxi services. The next section is focusing on quantifying the degree of passengers' contentment with mobile application-based taxi services. The questionnaire will consist of the SERVQUAL Model, which is based on five aspects of service quality, trust, and overall

satisfaction with mobile application-based taxi services. The respondents who had experience in both regular taxi and UBER will be included into the dataset.

Table 3 Summary of Dependent and Independent Variables

	Independent Variable	Dependent Variable
1	Tangibles	
2	Responsiveness	
3	Assurance	Overall Customer Satisfaction
4	Empathy	
5	Reliability	
6	Trust	

Table 4 Descriptive Summary for service dimensions in regular taxis

Regular Taxi					
Variable	**Obs**	**Mean**	**Standard Deviation**	**Min**	**Max**
Tangibles	500	3.1465	0.605513	1.75	5
Responsiveness	500	3.0095	0.6207297	1	5
Assurance	500	2.796667	0.6734706	1	5
Empathy	500	3.0745	0.5713823	1	5
Reliability	500	2.8976	0.6189349	1	5
Trust	500	3.006	0.7106152	1	5
Overall Satisfaction	500	4.1765	0.578699	1.75	5

Table 5 Descriptive Summary for service dimensions UBER

Mobile Application Based Taxi (UBER)					
Variable	**Obs**	**Mean**	**Standard Deviation**	**Min**	**Max**
Tangibles	500	4.0015	0.6704639	1.25	5
Responsiveness	500	4.088	0.7551725	1	5
Assurance	500	3.593	0.5499599	2	5
Empathy	500	3.9936	0.7193567	1.4	5
Reliability	500	4.083	0.6462944	2	5
Trust	500	3.593	0.5499599	2	5
Overall Satisfaction	500	4.296	0.83052	1	5

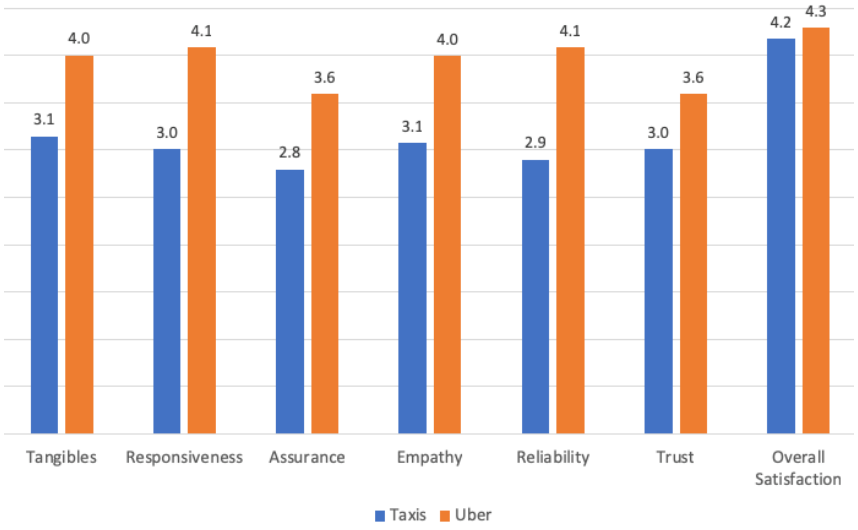

Figure 2 Average scores of SERVQUAL Dimension between Regular Taxis and Mobile application-based taxis (UBER)

Table 6 Regression Results of the Impact of Service Dimensions on Overall Satisfaction between Regular Taxis and UBER

	(1) Overall Satisfaction Regular Taxi	(2) Overall Satisfaction UBER
Tangibles	**0.305*****	**0.490*****
	(0.0592)	(0.074)
Empathy	0.122	0.123
	(0.074)	(0.076)
Reliability	**0.382*****	**0.348*****
	(0.081)	(0.056)
Responsive	-0.080	**0.144***
	(0.066)	(0.059)
Assurance	**0.155***	0.057
	(0.072)	(0.060)
Trust	**0.298*****	-0.009
	(0.058)	(0.059)
_cons	-0.728***	-0.428*
	(0.132)	(0.193)
N	500	500
R^2	0.602	0.693
adj. R^2	0.597	0.689
F	135.9	181.3

Standard errors in parentheses

* p < 0.05, ** p < 0.01, *** p < 0.001

Results

The table presents the results of a multiple regression analysis conducted to examine the relationship between various service quality dimensions and customer satisfaction for both regular taxis and UBER services. The coefficients shown under "Regular Taxi" and "UBER" columns represent the estimated impact of each service quality dimension on customer satisfaction for the respective modes of transportation. In figure 2, average score of service dimensions from Table 4 and 5 are portrayed in a bar chart to compare service outcome for dimensions of Tangibles, Responsiveness, Assurance, Empathy, Reliability, Trust and Overall Satisfaction. UBER received higher scores of all dimensions which reflects the service design and execution from perspective of passengers who had experiences on both services. In model (1) related to regular taxis, the coefficient for "Tangibles" is 0.305***, which indicates a statistically significant positive effect. This suggests that enhancing the physical attributes and appearance of regular taxis contributes to an increase in customer satisfaction. However, "Empathy" has a coefficient of 0.122, which is not statistically significant, implying that personalized attention and understanding customer needs may not be strongly influencing overall satisfaction for regular taxis. Similarly, "Reliability" in regular taxis has a coefficient of 0.382***, indicating a significant positive impact. This highlights the importance of consistent and dependable service in shaping customer satisfaction. However, "Responsive" has a negative coefficient of -0.0798, which is not statistically significant, suggesting that responsiveness may not be a significant factor affecting satisfaction for regular taxis. "Assurance" with a coefficient of 0.155* suggests that building trust and confidence in service delivery positively influences satisfaction. The coefficient for "Trust" is 0.298***, indicating a significant positive relationship, implying that trust in the regular taxi service contributes positively to customer satisfaction. The constant term (_cons) coefficient of -0.728*** reflects the baseline level of customer dissatisfaction for regular taxis.

In model (2) for UBER services, the coefficients for "Tangibles," "Reliability," and "Responsive" are 0.490***, 0.348***, and 0.144*, respectively, all of which are statistically significant. These coefficients suggest that enhancing physical attributes, ensuring consistent service quality, and being responsive to customer needs are key drivers of customer satisfaction for UBER services. Interestingly, "Empathy," "Assurance," and "Trust" dimensions show relatively lower coefficients for UBER compared to regular taxis, and the coefficient for "Trust" in UBER is -0.00891, which is statistically significant with a negative sign. This implies that while trust is important, its impact on UBER customer satisfaction is not as significant as in regular taxis. The constant term coefficient for UBER is -0.428*, indicating the baseline level of customer dissatisfaction. Overall, the results exhibit the coefficients and significance levels for the various service quality dimensions in two models: one for regular taxis and the other for UBER services. In model (1) concerning regular taxis, it is evident that tangibles, reliability, and assurance significantly contribute to overall customer satisfaction, while trust also demonstrates a positive correlation. Model (2) focusing on UBER services reveals that tangibles, reliability, and responsiveness have notable positive effects on customer satisfaction, whereas trust does not significantly influence satisfaction. The coefficients for the constant terms are also significant, suggesting baseline levels of dissatisfaction for both types of services. Additionally, the fit of the models is

indicated by R-squared and adjusted R-squared values, and the F-tests signify the overall significance of the models. The results are based on a sample of 500 respondents for each model

Conclusions and Recommendations

This study investigates the dimensions of service quality that impact customer satisfaction in both traditional taxis and app-based ride-hailing services or UBER in the context of Thailand during 2016-2017. The research validates certain service quality dimensions of UBER that surpass those of conventional taxis, shedding light on their effects. In today's competitive service industry, achieving a high level of perceived service quality from customers has become increasingly intricate for service providers. The study's findings pertaining to regular taxis underscore the significance of Tangibles, Assurance, Reliability, and Trust in shaping overall customer satisfaction. Consequently, service providers should allocate more attention to these elements. In terms of Tangibles, conventional taxi services should ensure both external and internal cleanliness and comfort, such as maintaining clean seats and unobstructed windows. Furthermore, the drivers' appearance should convey professionalism, and clear visibility of the driver's ID and license plate within the vehicle is imperative.

Guidelines, set forth by The Land Traffic Act sections 93-102, dictate certain aspects of service quality that regulated taxi drivers must adhere to. These aspects correlate with Tangibles (e.g., meter visibility), Reliability (e.g., driving behavior and punctuality), and Assurance (e.g., politeness, communication skills, and route knowledge) as outlined in the SERVQUAL framework. Aligning with the Assurance facet, it is crucial for conventional taxi companies to emphasize passenger safety by consistently enhancing drivers' skills and assessing their conduct to ensure secure rides. Additionally, keeping drivers well-informed about routes and traffic conditions is essential for them to offer passengers optimal routes with a positive demeanor. Regarding Reliability, ensuring convenient accessibility and encouraging taxi drivers to accept passenger requests unconditionally is pivotal. Furthermore, drivers should ensure passengers' timely and accurate arrival at their destination, without unnecessary detours. In terms of Trust, companies should enact policies safeguarding transaction security, such as measures to ensure drivers provide accurate change, avoiding situations where drivers solicit extra payment without passengers' consent. A uniform fee structure for regular taxis should be applied, ensuring equitable charges for both local residents and foreign visitors, solely based on meter readings and not bundled packages.

Moreover, this study proposes recommendations for conventional taxi companies to emphasize Assurance and Trust in order to distinguish their service from UBER, as these two dimensions have a more pronounced impact on the overall customer satisfaction of regular taxis compared to UBER. For UBER, Tangibles, Responsiveness, and Reliability emerge as key components influencing overall customer satisfaction. The strategies related to Tangibles and Reliability can be similarly applied to both regular taxis and UBER, entailing improvements in the exterior and interior appearance of vehicles and ensuring timely pickups without rejecting requests. However, UBER should particularly emphasize responsiveness to set their service apart from regular taxis. Within this aspect, UBER needs to ensure that their drivers demonstrate a willingness to provide responsive communication, such as confirming locations and times with passengers, promptly offering solutions, and maintaining a positive demeanor. Furthermore, elevated overall customer

satisfaction in UBER's service can be achieved through drivers' attentiveness to passenger feedback and their ability to accommodate requests, such as adjustments to booking times and locations.

Considering The Land Traffic Act section 93-102, which mandates that regulated taxi drivers adhere to specific aspects of service quality including tangibles (meter visibility), reliability (driving behavior, punctuality), and assurance (politeness, communication skills, route, and traffic knowledge), the research outcomes confirm that regular taxis indeed uphold high levels in these three dimensions. Notably, Tangibles, Reliability, and Assurance play a role in engendering trust in regular taxi services, an aspect seemingly lacking in UBER's service. Additionally, the analysis of the impact of service quality and trust on satisfaction suggests that tangibles, empathy, and reliability are pivotal determinants of satisfaction for both regular taxis and UBER. This underscores the importance of factors such as the cleanliness of physical attributes, the ability to perform services competently and courteously, and the punctuality of service. UBER's service excels in responsiveness, signifying the willingness and promptness of service providers to cater to consumers' needs, thereby directly influencing satisfaction. However, Assurance and Trust do not exhibit significance within this model. This outcome potentially explains why regular taxis remain favorable despite UBER's higher scores in various service dimensions.

UBER faced challenges and ultimately failed to establish a strong presence in Thailand due to several factors. These included legal and regulatory issues, such as the Ministry of Transport deeming UBER's services illegal due to unlicensed processes for cars and drivers, as well as concerns about discrimination against those without access to credit cards. The company's persistent operation despite non-compliance with registration fees and standard fares set by the Department of Land Transport led to clashes with authorities. Additionally, safety concerns, including fines for UBER drivers and their popularity among tourists, contributed to a strained relationship with local taxi operators. The absence of full regulatory alignment, combined with these various challenges, hindered UBER's success in the Thai market. The study's findings suggest that technology, exemplified by mobile service apps and payment systems, plays a crucial role in shaping the quality of interaction between customers and service providers. While customers seek service quality across multiple dimensions, this study proposes that the impact of different quality aspects on overall service performance varies. These implications could guide service providers to concentrate on improving the physical attributes of regular taxis (Tangibles), enhancing drivers' familiarity with alternate routes (Assurance), and ensuring punctuality (Reliability).

The primary factors behind UBER's withdrawal strategy from Thailand in 2018 were a confluence of legal challenges and fierce competition in the local ride-hailing sector. Due to issues from Thai authorities about licensing and regulatory compliance, UBER ran into legal battles that caused operational interruptions. UBER was subject to limitations and penalties from the Thai government, which claimed that the firm's operations were against the law. UBER undoubtedly had to reevaluate its position in the market because of these legal disputes and doubts over the future regulatory environment. In addition to these legislative difficulties, UBER must contend with severe rivalry from regional ride-hailing providers such as Grab. The favorable market conditions allowed Grab to expand its presence and form partnerships with traditional taxi firms. After years of battling regulations and rivalry, UBER eventually made the strategic decision to get

out of the Thai market. UBER was able to end its direct involvement in Thailand's ride-hailing sector by selling its Southeast Asia company to Grab in late 2018, allowing Grab to establish greater regional dominance. The results of this study suggest that Thailand's regulatory framework stresses physical elements and secure systems as part of safety standards, while placing less focus on other crucial traits such as empathy. An observation from this study reveals that Thailand's regulatory focus is primarily on tangible elements and secure systems as part of safety standards, with limited attention to other crucial service attributes. In Thailand, offline taxis tend to offer lower quality. The study advocates Thai regulators to formulate regulations that align with customer expectations, acknowledge customer preferences, and incorporate desired quality attributes to satisfy both customers and enhance service satisfaction. The research has shown empirical evidence from the industry urging the authorities to create policies that take into account to improve the future of service industry in Thailand.

After years of operations since this study was completed, the rise of app-based taxi services has provided significant benefits to the transportation industry in Thailand. Modern ride hailing applications have shown the advantages of a convenient and efficient mode of transportation. Trust has a crucial role in shaping the behavior of passengers in the transportation sector in Thailand and Southeast Asia. (Hongladarom, 2020; Wiengdee & Nimanussaornkul, 2019). Therefore, this study has identified a critical juncture in which consumers' perspectives shifted from one of skepticism to one of confidence in the applications. Moreover, the degree of convenience provided is especially beneficial in Thai urban areas, where dealing with traffic congestion may pose a substantial obstacle. App-based ride-hailing services provide a dependable option for travelers, facilitating the efficiency of transportation and diminishing the unpredictability linked to conventional taxi hailing. Surviving companies such as GRAB have shown its capacity to address trust concerns among passengers, and as a result of the disruptive impact of COVID-19, the demand for app-based taxi services has increased (Chalermpong et al., 2023; Guo, 2023). Furthermore, these platforms actively contribute to improved safety and security measures for both passengers and drivers. App-based services use their digital infrastructure to enable meticulous monitoring of every travel, resulting in a clear and comprehensive log of the voyage. Passengers have the option to disclose their ride information to friends or family members to enhance safety, while drivers may be held responsible via the electronic record generated by the application. The results of this study should shed light into implementations in the use of app-based taxi services and government initiatives to improve transportation effectiveness in order to improve urban growth, mobility, safety, and security.

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