Innovating Urban Tourism in the Asia-Pacific: Evaluating Tourist-Centric Enhancements to Ebeca Services in Malaysia

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ABSTRACT

In Malaysia, tourism is adapting by introducing sustainable transportation such as electric trishaws (eBECA). It examines the effects of factors such as convenience, accessibility, safety and digital integration on what attracts tourists to eBECA services. The purpose is to judge the outcomes of these improvements for the adoption of eBECA within urban transportation. The data for this study were collected from responses to a carefully structured questionnaire comprising 54 questions administered to 212 individual tourists. All data were examined by using SPSS version 26. The study provided evidence that the questionnaire has strong reliability (Cronbach's Alpha = 0.975). A strong link was found between tourism, transportation, accommodation, as well as tourist preferences. Around 53.7% of the changes in tourist preference were found to be related to convenience, accessibility, safety, and the digital aspect of the service, indicating that the predicted numbers were accurate.

Keywords: Tourism, Sustainable transportation, Electric trishaws (eBECA), Urban transportation, Tourist preferences

INTRODUCTION

Electric vehicles (EVs) are helping to improve urban mobility sustainably by reducing greenhouse gas emissions and air pollution in cities [36]. Studies like those by [1] have estimated that electric vehicles (EVs) powered by clean grids produce fewer greenhouse gases than regular fuel vehicles do during their life cycle. Electric vehicles generate less pollution than other types of vehicles in many urban tourism scenarios, making them a more environmentally friendly choice for urban tourism [25]. Malaysia, with the support of its National Automotive Policy (NAP 2020) and the Twelfth Malaysia Plan, has promoted the use of electric vehicles in its transition to the Fourth Industrial Revolution [10]. New battery technologies and upgraded decentralised charging systems, are well-suited for tropical climates, are crucial for developing Malaysia's electric vehicle (EV) ecosystem [6].

The Asia-Pacific region has experienced rapid growth in urban tourism, which contributed to a US$3 trillion GDP boost last year [32]. More people are travelling to Asia because the middle class is earning more, air tickets are affordable, and cities in countries such as Malaysia, Thailand, and Vietnam are being upgraded. The number of people visiting Kuala Lumpur, Penang, and Melaka for culture and travel has increased, which means city transport needs to be smart and eco-friendly [41]. An example of this is the electric trishaw (eBECA) program, which provides tourists with a new and convenient way to travel in urban areas [49]. [30] emphasise that maintaining a commitment to innovation, government support, and regular collaboration is crucial for ensuring that electric vehicles (EVs) enhance urban tourism.

The eBECA was developed from traditional becas, which are a main feature of heritage cities like Melaka and Terengganu, so that the travel service can meet today's environmental and accessibility requirements with electric propulsion [2]. The Ministry of Science, Technology, and Innovation (MOSTI) introduced the eBECA program to revive the trishaw industry, making it easier by providing them with LED displays, audio systems, and solar batteries rather than relying on human pedal power [38]. Malaysia's tourism plan reflects the country's commitment to the Sustainable Development Goals (SDGs), particularly Goal 11, which aims for cities that are inclusive, safe, resilient, and sustainable [27]. [40] pointed out that accessible transportation helps people with disabilities (PWDs) become more independent and enjoy a better quality of life.

Electric trishaws (eBECA) could improve tourism in Malaysia, but several obstacles are hindering their widespread adoption. A lack of charging stations and battery swap centers can slow down operations, particularly in popular tourist destinations [39]. However, the concern is that there are still gaps in regulation and policy, as Malaysia lacks a legal system specifically designed to control and oversee electric trishaws in cities [17]. Many tourists involved in the tourism industry remain hesitant to adopt electric solutions due to concerns about their reliability and cost [19]. Additionally, a lack of readiness for technology is a problem, as evidenced by the limited lifespan of batteries in warmer climates and the scarcity of useful apps for tourists [43].

The study focuses on electric trishaws, particularly on how the eBECA service operates in Malaysia. The evaluations involve reviewing factors that influence tourists to ride electric trishaws, updating technology for easier reservations, and promoting cooperation between tourism administrators and electric trishaw companies. It is also important to study the novelty of the eBECA ride experience and how satisfied and willing travellers are to use the service again. The purpose of this study is to assess eBECA (electric trishaws) use in Malaysia and suggest ways to make it more beneficial for urban tourism. The objective is to assess how eBECA helps make urban tourism in Malaysia better, highlight main improvements in tourism services such as making them more accessible, more digital and better for the environment and identify the factors that influence how widely electric trishaws are adopted and used in urban tourism.

LITERATURE REVIEW

Urban Tourism in the Asia-Pacific

Innovation is now a significant factor in tourism, as people seek engaging and immersive experiences during their trips. The choices of travellers have changed significantly over the years due to technological progress, shifting societal values, and increased environmental concerns [52]. In the Asia-Pacific region, urban tourism is expanding rapidly, and Malaysia plays a crucial role in shaping its development. [51] emphasised that the tourism industry in Malaysia contributed MYR 157 billion to the nation's GDP, accounting for 8.6% of the country's GDP. In addition, [16] discussed that urban tourism is very popular in cities like Kuala Lumpur, George Town, and Melaka, which also have many attractions that showcase their cultural backgrounds mixed with modern development. [53] note that tourists can now receive instant updates, manage their bookings, and receive customised advice through mobile apps, social media, and AI platforms.

Additionally, an increasing number of tourists are becoming more concerned about protecting the environment. [47] illustrated that eco-innovations, such as the eco-friendliness of green hotels, are reasons that are a key factor in tourists' satisfaction. However, [31] pointed out that Malaysia has responded by introducing new electric vehicles, such as the eBECA, which is an electric version of the traditional trishaw. A study by [28] discussed that walkable paths, implementing bike-sharing programs, and promoting low-emission public transportation are helping Malaysian cities become more like smart cities worldwide. [7] highlighted that Malaysia's urban tourism vision, supported by innovation, sustainability, and culture, aligns with Asia-Pacific trends.

Authenticity

In the Asia-Pacific region, many people now prefer to explore and engage with local cultures, which is most noticeable in Malaysia. The use of electric trishaws, or eBECA, has increased since they are both environmentally friendly and allow visitors to experience the area's local heritage [29]. Such vehicles not only address sustainability issues; they are also a way to celebrate local stories and art, providing people with unique experiences. [51] discussed that today's tourist’s care more about experiences that embody local traditions, which is why trishaws with hand-painted batik designs, wood carvings, and local textiles are a popular request. [9] state

that introducing traditional art enhances tourists' perceptions of their visits and makes the place more authentic [9]. [48] analysed that riding a trishaw can include storytelling or live music from local artists, creating an all-around exciting experience.

[39] note that participating in cooking or watching demonstrations is especially important for satisfying tourists as it adds a unique experience to their trip. The presence of local communities is crucial for genuine travel experiences. In addition, [3] dicussed that several eBECA programs collaborate with local communities to train guides who promote cultural understanding and appreciation [3]. Programs designed to improve language skills have helped guides communicate with people from many different countries. Although, [37]) note that eBECA models structured as social enterprises utilise some of their earnings to support local growth, thereby making them sustainable. [5] highlighted that adding mobile apps and augmented reality enhances the tour by providing information on the past, stories, and visual superimpositions to both guide and engage tourists.

Safety

The tourism industry always puts safety first because travelers prefer having safe and trustworthy travel options in new places. [29] study discussed people are recognising electric trishaws, also known as eBECA, for their eco-friendliness and for providing a safe, easy, and enjoyable way to travel in cities. According to [4] study, travellers feel secure, they value their tourism experience more and are more likely to utilise certain types of transportation services. However, [17] discussed that electric trishaws are now made safer and sturdier by adding thick steel frames and strong materials, which help protect passengers from minor injuries in the event of a collision. [22] study elaborated that new safety features on electric trishaws, such as anti-lock braking systems (ABS) and regenerative braking, enable gentler deceleration, improved control.

Modern technology such as advanced driver assistance systems (ADAS), is now familiar in e-trishaw designs. [24] pointed out that systems reduce the risk of accidents when backing up or driving in narrow streets, often found often found in cities. GPS systems make it possible for tour bus companies to track vehicles instantly which helps them handle emergencies or breakdowns without delay. Travellers are reassured by the fact that their journeys are monitored from a control room. Additionally, [48] discussed that technology-supported systems track drivers using facial recognition, fatigue detection, and behavioural analytics, ensuring operators drive safety guidelines during the trip. Experienced trainers are organising training and certification programs to facilitate the proper development of e-trishaw drivers.

Tourist-Centric Innovation in Urban Transport

Innovation in public transport for foreign tourists is profoundly changing the way places like Malaysia serve their visitors. [42] discussed that local drivers now use eBECAs, which combine elements of tradition, sustainability, and technology. They are not only set up to be environmentally friendly but also to introduce tourists in Antonia to the culture of cities with heritage, such as Melaka and George Town [13]. The main innovation is transforming a traditional trishaw into a modern and digital one, thereby improving its usefulness and enhancing its appeal to travellers. [29]) discussed that EbeCA services focus on what tourists’ care about the most, making them different from before: being genuine, secure and easy to use, which are trendy qualities today. Improving eBECA services has become largely about enhancing user experience and service design. However, [21] illustrated that highly designed features, such as user-friendly apps for booking, real-time tracking, and easy online payments, significantly enhance customer satisfaction. User-centred design helps these platforms make the process from pre-booking to post-tour feedback smoother. In addition, [50]) emphasised that innovations offer interesting features such as audio guides in multiple languages, route recommendations, and displays that showcase traveler’s local history and culture.

Accessibility, Safety, and Digital Integration

Reliable eBECA services depend on having easy access, good safety measures and digital integration. Ramps and easier chairs help disabled people with disabilities and older people enjoy the guided tours. [14] discussed that GPS tracking, reinforcements for the chassis and anti-lock brakes are just a few of the safety additions in today's vehicles. Collision detection sensors and rear-view cameras are useful extras for keeping cabs safe in crowded cities. [18] highlighted that utilising digital technologies enables transportation companies to monitor vehicles remotely and adjust routes promptly in response to events, benefiting both the business and its visitors.

Tourists' readiness to try new technologies has a significant impact on the transportation they prefer. People would prefer unique and flexible journeys rather than the same experiences sold to all customers, so eBECA gives travellers the travellers the freedom to visit street food joints, heritage museums, and artisan markets along the route. Additionally, [5] emphasised that using augmented reality guides enables tourists to record and share their journey in real time through social networks. All of these improvements have made eBECA services a key element in Malaysia's strategy for urban tourism, aligning with global trends that emphasise smart, inclusive, and tourist-focused travel.

METHODOLOGY

The study employs a quantitative research approach to examine ways to enhance eBECA (electric trishaw) services for tourists in Malaysia, with a focus on the factors that influence tourists' preferences for these services. Quantitative research is well-suited for this study because it enables the analysis of the relationships between different variables [11]. The approach was chosen because the study aims to analyze what tourists consider most important in hotels, especially related to convenience, accessibility, safety and digital services. Under these circumstances, convenience, ease of finding information, cost, and policies among the important independent variables. Data were collected by distributing a planned survey to individuals with backgrounds using eBECA services. Surveys are justified because they make it possible to collect data from many people in the same manner which can be compared and makes the results more reliable [30]. The survey consisted of 54 items, each designed to elicit views related to the four independent variables.

Around 10 experienced trishaw tourists helped out with the first phase, advising us on which parts of the survey questionnaire needed improvement. The collected feedback on the questionnaire helped improve its use with a wider group. Reviewing enables an understanding of the views of both local people and tourists, which is essential for serving a diverse range of tourists. Respondents for the study were selected with the goal of including individuals who had sufficient interaction with the service being evaluated. The data analysis was conducted using the Statistical Package for the Social Sciences (SPSS), version 26. Data were summarised using statistical methods, including frequencies and percentages, and the internal consistency of the items was tested with reliability measures [15]. This high Cronbach's Alpha value (0.975) confirms the solid reliability of the questionnaire which means it often measures what it was created to measure.

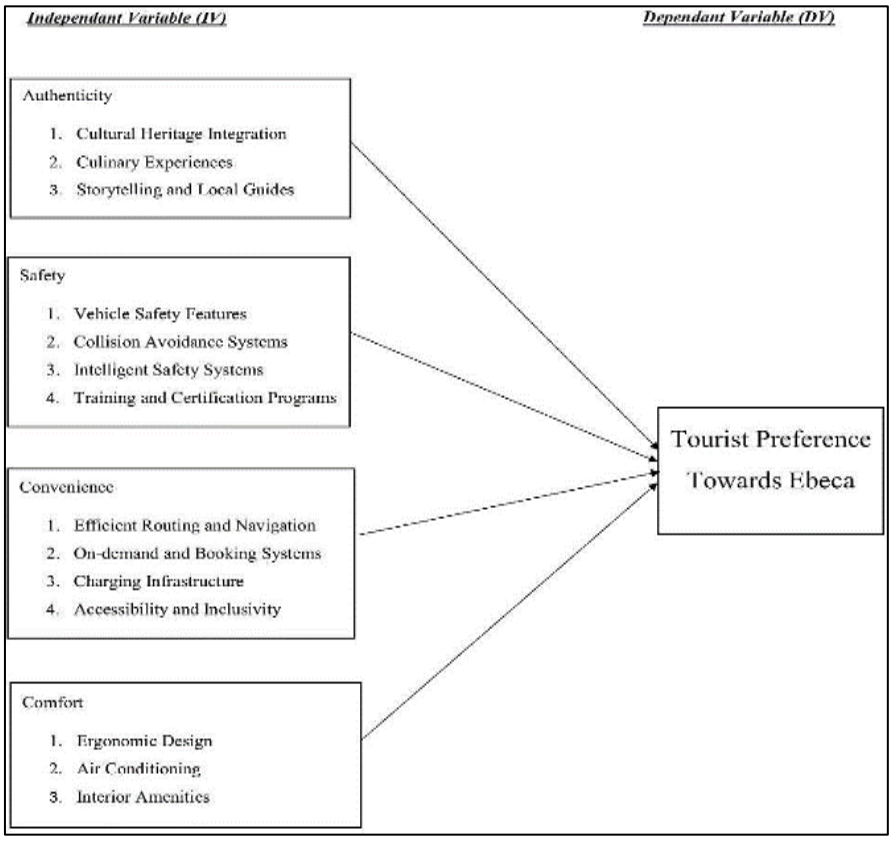

Fig 1. Theoretical Model in this study

RESULTS

B. Pilot Test

The results indicate that the questionnaire is highly reliable, as evidenced by its Cronbach's Alpha value of 0.975. The high Cronbach's alpha value which is much more than 0.7, indicates that the survey used for data collection is highly reliable. The Cronbach's Alpha from the standardised items showed a value of 0.975, indicating that the participants' answers were reliable. Responses from 10 participants indicated that the questionnaire accurately measured their experiences and was easy to understand, which supported their inclusion in future data collection (Table 1).

Table I Profile of Respondents

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Respondents
0.975	0.975	10

C. Demographic Analysis

The results demonstrate that most respondents (57%) were female, while male participants accounted for only 43%. There are more women than men in this data, which may slightly impact the analysis of preferred activities or desired services. It is crucial to understand this demographic split because it helps us assess how gender influences responses, including those related to electric trishaw (eBECA) services in Malaysia (Figure 2).

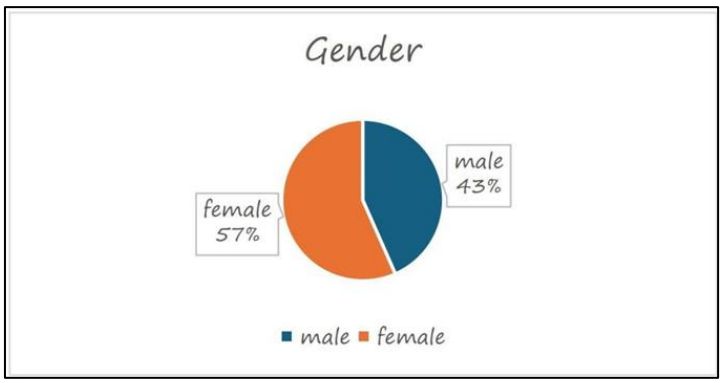

Fig 2. Demographic Analysis of Gender

The findings indicate that 126 people aged 18–25 are included in the sample, comprising the majority of the group. The next largest group is comprised of 26–33 year-olds, with 34 responses. Compared to these, the age ranges below 18, between 34 and 41, between 42 and 49 and 50 and over have a much smaller number of participants: 19, 12, 7 and 9, respectively. Most respondents in this survey are young, which could shape their ideas related to eBECA improvements in technology, mobility, and digital tourism (Figure 3).

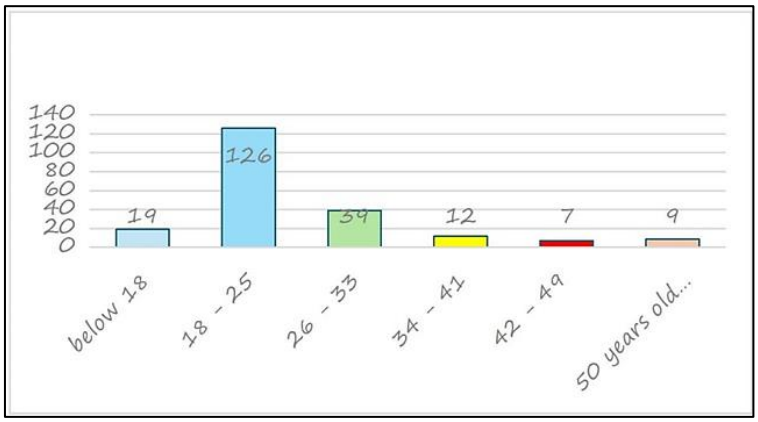

Fig 3. Age distribution of the respondent

The analysis reveals that most participants in this study identify as Malays, comprising 88% of the sample. The results primarily represent Malay participants, which may be due to the population or the method used to select the sample in the area. There are much less of other ethnic groups: Chinese people make up only 3%, Indians even less at 1% and the remaining 8% fall under "Others." Due to the limited number of non-Malay participants, the study's cultural findings may not fully represent the views of ethnically diverse Malaysians, which means that Asian diversity should be taken into account when understanding attitudes toward using Ebeca (Figure 4).

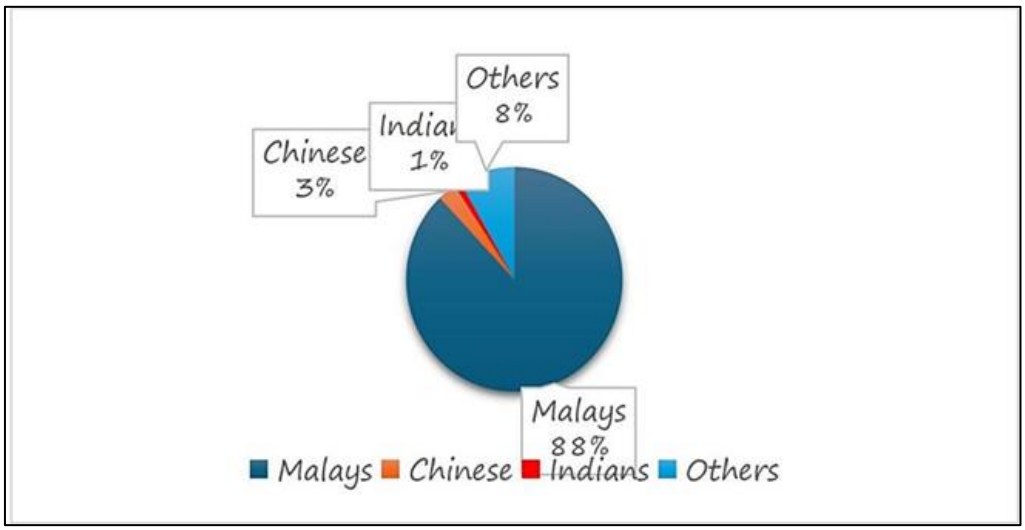

Fig 4. Race Distribution of the Respondents

The study indicates that most participants were employed (80 individuals), comprising the largest percentage of the sample. In addition, students provided 65 responses, suggesting that working professionals and younger, well-educated individuals were strongly represented in this survey. A total of 36 respondents were self-employed, which suggests there were few entrepreneurs or freelancers in the sample. At the same time, 21 replies came from people who are unemployed and 10 from respondents who are retired. It means the sample has diversity in terms of employment. Hence, people such as employees and students are likely to influence insights by using eBECA and utilising digital tourism services in urban areas (Figure 5).

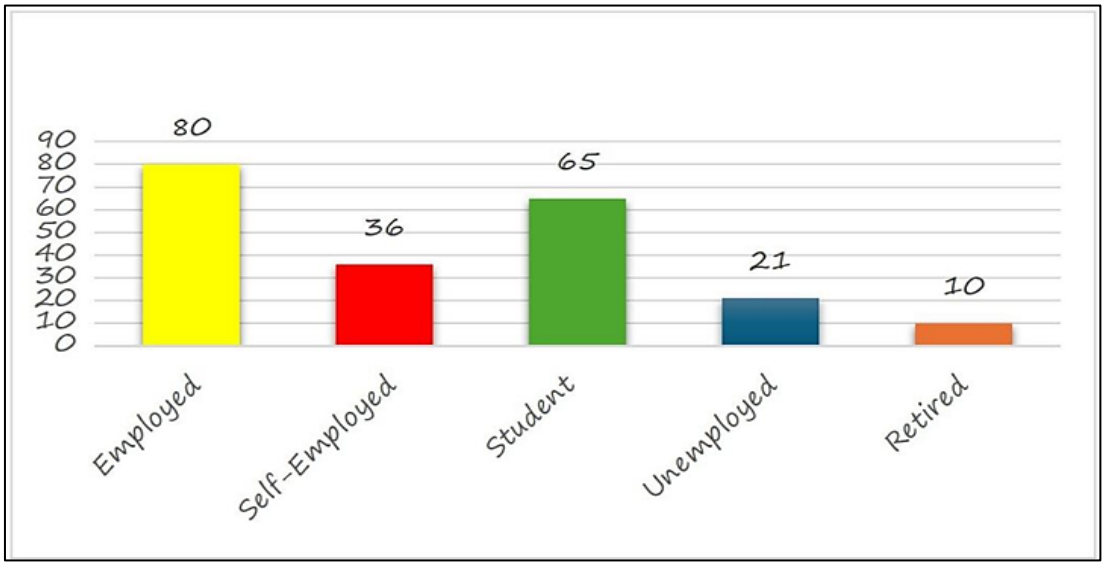

Fig 5. Respondent Employment Status Distribution

The findings show the number of respondents living in each state in Malaysia. This means that Selangor had 50 participants, making it the largest contributor to the sample. In total, 37 people in Pulau Pinang, 25 in Kelantan and 21 in Perak participated in the survey. Malaysian candidates from Kuala Lumpur (14), Johor (19) and Sarawak (8) were among the moderates. There were very few residents in Labuan (2) and Negeri Sembilan (4) who participated, which could be because fewer people live there or there was insufficient awareness about voter

registration. A total of 7 people from Sabah and 13 from Pahang answered the questionnaire. There is more representation from cities and semi-urban areas, which is especially noticeable in high-populated or active regions, such as Selangor and Pulau Pinang (Figure 6).

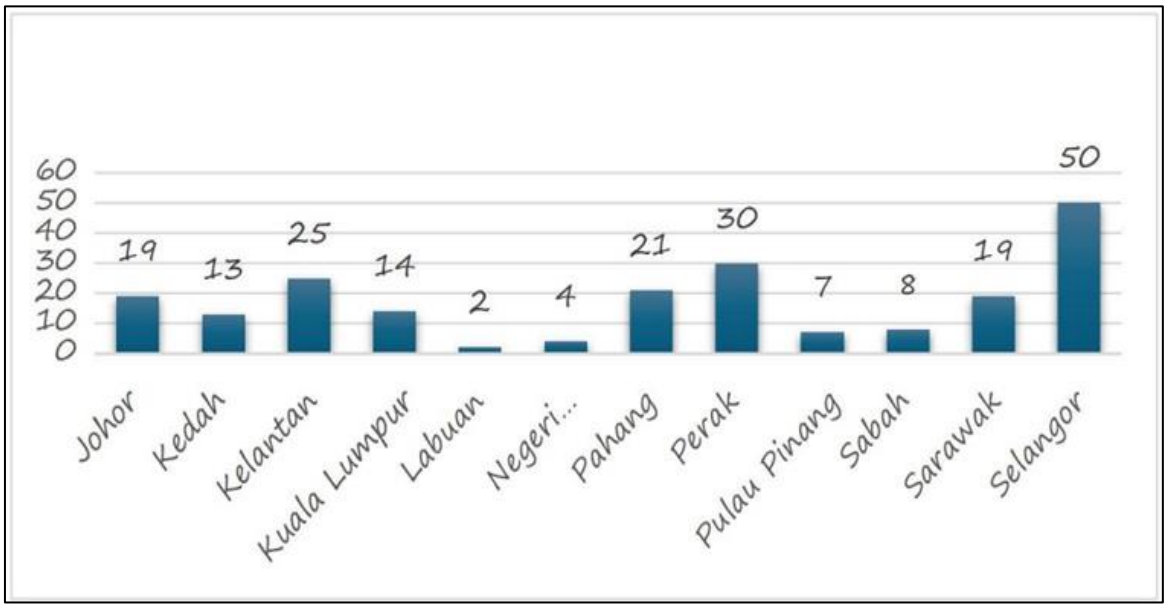

Fig 6. Respondent Employment Status Distribution

D. Correlation Coefficients

The analysis of the Pearson correlation reveals significant and positive relationships between each independent variable (IV1–IV4) and the dependent variable (DV). A strong correlation is found between IV1 (AC1) and IV2 (.896**), IV3 (.920**) and IV4 (.882**), suggesting the reliability of these constructs. IV2 is highly associated with IV3 (.941***) and IV4 (.884***); all these associations are significant at the highest level ($p < 0.01$, two-tailed). Each independent variable is positively correlated with dependent variable, and among them, IV2 is most strongly correlated (r = .711**), followed by IV4 (r = .710**), IV3 (r = .708**), and IV1 (r = .663**). The research indicates that an increase in the values of independent variables leads to an increase in the dependent variable. The findings reveal that none of the relationships were a result of chance, as indicated by the very low significance level (p = .000). All the findings are more reliable due to the consistent sample size of 212 for all relationships, suggesting that meaningful associations between variables can be found (Table 2).

Table II Summary of the Pearson Correlation Coefficients

	AC1		IV2	IV3	IV4	DV
IV1	Pearson Correlation	1	.896**	.920**	.882**	.663**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	212	212	212	212	212
IV2	Pearson Correlation	.896**	1	.941**	.884**	.711**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	212	212	212	212	212
IV3	Pearson Correlation	.920**	.941**	1	.919**	.708**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	212	212	212	212	212
IV4 Pearson		.882**	.884**	.919**	1	.710**
Sig. (2-tailed)		.000	.000	.000		.000
N		212	212	212	212	212
Pearson Correlation		.663**	.711**	.708**	.710**	1
Sig. (2-tailed)		.000	.000	.000	.000	
N		212	212	212	212	212

E. Multiple Linear Regression

The results of the multiple linear regression summary support that the model is strong. R equal to .733 shows that the variables in the sample influence the dependent variable in a positive way. A result of 0.537 for R-squared suggests that 53.7% of the variation in the dependent variable is explained by the combined effects of the four predictors. The adjusted R-squared value of 0.528 indicates that the model remains reliable, even with the inclusion of multiple predictors. The standard error of the estimate is .74134, which is typical of moderate predictive accuracy. Overall, the results indicate that the F-statistic of 60.092 ($p < .001$) supports the statistical significance and predictive ability of the regression model (Figure 7).

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.733[a]	.537	.528	.74134	.537	60.092	4	207	<.001

a. Predictors: (Constant), IV4, AC1, IV2, IV3

b. Dependent Variable: DV

Fig 7. Respondent Employment Status Distribution

DISCUSSION

This discussion examines how the utilisation of eBECA (electric trishaws) enhances urban tourism in Malaysia by exploring the factors that influence people's choices and use of such services. It examines how convenience, safe shopping, easy access, and digital features shape the user experience and looks at the new and cultural value of eBECA. In addition, this study presents various ways to enhance services and promote the wider adoption of tourism technology, as well as to support sustainable and smart mobility in Malaysia. [15] discussed that an overall Cronbach's Alpha of 0.7 indicates excellent consistency within the items, demonstrating that they all measure the same construct. The questionnaire contained questions about convenience, accessibility, safety, and how digital tools are being used. The high alpha value indicates that it consistently records what tourists think. [8] highlights that the use of correct instruments ensures that the data used for statistics is trustworthy and that the results are meaningful for studies in tourism.

In addition, pilot responses confirmed that the questions were clear and easy to answer, indicating that the tool would be suitable for use with a broader population. According to the demographic analysis, a larger number of respondents were female, while a smaller number were male. The difference in gender within the group may have an impact on the results, as gender can influence how individuals experience and perceive tourism. Similarly, [44] identified that women tend to focus on the ease of digital usage, staying secure, and having personalised experiences, which might lead them to judge eBECA differently. Similarly, [23] highlighted that women are more likely to participate in tourism surveys when the topic concerns service quality or digital features. This suggests that, since there were more women, they experienced greater importance of ease in booking, an easy-to-understand design, and perceived safety. A study by [35] pointed out that men's and women's expectations and preferences differ, making input from women crucial for understanding user-centric innovations in transportation. This is consistent with the aims of eBECA services, which aim to provide everyone with safe and inclusive experiences in cities. The combination of these findings supports the research approach and suggests that examining gender in studies on digital and sustainable transport in tourism.

The results show that the largest group of participants were young, with most being aged 18–25 or 26–33. The trend suggests that young individuals are more likely to utilise digital tourism platforms and may also be more open to new options in urban transportation. Based on [46] findings, younger people tend to use smart devices and applications to guide their travels which supports the idea that convenience, immediate information and digital bookings are important to them. Their familiarity with technology aligns well with the need for tourism services to seamlessly integrate with digital systems. In a similar study, [12] observed that digital-native tourists

want to be involved in their service delivery, easily obtain what they need, and have things work well for them on their mobile devices, which aligns with the eBECA system's main goals.

Most respondents in the survey described themselves as Malay, with few selecting the other stated options, including Chinese, Indian, and others. The imbalance may demonstrate differences in the population itself or response patterns, but it might also mean that the survey answers align with Malay ways of travel. [20] found that people's ethnic background may affect their intentions when travelling, such as what to expect from service, cultural participation and trust in transport providers. Hence, the high number of Malay participants in the study influences the study's findings, especially regarding which cultures people prefer and their experiences with trishaws. Having few other ethnicities represented in the study may mean the findings do not apply well to other cultures, so including more ethnicities in future work is advised.

Most individuals in these findings had jobs or were students, which demonstrates that they are both adept at using technology and familiar with city life. According to [45], individuals with jobs or those studying are more likely to adopt sustainable transportation earlier, as they have access to more information, funds, and opportunities to practice ecological behaviours. [36] study indicates a growing interest in eBECA services, which combine activities related to heritage with environmentally friendly modes of transportation. According to this survey, the current group are best suited to review developments in digital technology for tourism transport because they are most likely to use such advances.

The results showed that most respondents lived in urbanised and semi-urbanised areas, especially in Selangor and Pulau Pinang. Participation from less populated states, such as Labuan and Negeri Sembilan, was also low. The pattern indicates that areas with higher economic development, well-built tourism infrastructure, and improved digital services are leading in the use of Rebeca. Based on [34] urban areas in Malaysia have installed more smart mobility services, as residents here require them more and technological resources are already available. This partly be because residents of urban areas have greater exposure to digital tourism marketing and related infrastructure, as noted by [26] in their observation of the positive impact of city-level innovation systems.

There is a very strong and substantial relationship between all the independent variables convenience, information access, price and transaction ease and the dependent variable, tourist satisfaction or preference. [7] observed that, among all factors, the ease with which users can find information is the most strongly related to their satisfaction. Similar research carried out by [33] found that real-time information and application guidebooks boost the way tourists view the destination. Furthermore, [27] demonstrated that tourists' top priority is to use modes of transportation that ease and enhance their travel experience, which supports findings. Altogether, this demonstrates that eBECA services should be properly designed, available online, affordable and presented to get more acceptance and use from Malaysian tourists in urban areas.

There are some authentic and practical recommendations based on research that enhance the functioning of eBECA services in urban tourism in Malaysia. Using traditional patterns, unique handicrafts, and local fabrics in the construction of electric trishaws can enhance the cultural identity of visitors [50]. Bringing local people on board to guide the groups can enrich the tourist experience by offering stories, history, and interesting facts shared during their excursions. This can be achieved by providing audio guides in multiple languages, utilising AR to offer additional details, and creating mobile application support to assist visitors from overseas. Integrating activities such as food tours, craft workshops, and live performances, organised in collaboration with local businesses and artisans, allows tourists to experience the culture while supporting the local economy [51]. These suggestions support the aims of tourism in saving and creating a more appealing place for city tours.

CONCLUSION

To conclude, by utilising eBECA (electric trishaw) services, Malaysian tourism can be made more sustainable, authentic in its local traditions, fully accessible, and innovative with digital technology. Based on the results, younger tourists living in cities are more likely to use eBECA services because they find it easier to get information, book their trips, save money and feel secure. Many regions across the Asia-Pacific now favour smart and inclusive transportation, which is helping to change the way travellers move around. It has also been

proven that good service design features influence tourists' satisfaction; therefore, utilising advanced online services and highlighting local culture is beneficial for attracting users. This also means that future studies should strive to include greater diversity in ethnic groups and locations, thereby representing Malaysia's broader diversity. With effective policy, cultural efforts and new technology, Malaysia's eBECA services will be able to achieve its goals in urban tourism and sustainable development., and relational science of sustainability and innovation.

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