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The role of health, safety and environmental perceptions on forming bus passengers' loyalty – A case study of Vietnam

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ABSTRACT

Introduction: Responsible businesses actively engage in climate action, health, and safety initiatives as part of their corporate strategy. The outcomes of such initiatives could play an essential role in forming customers' loyalty. However, very few studies have aimed at understanding the relationship among such factors in the public transport (PT) context. As such, this investigation explores the direct impact of perception of health benefits, environmental benefits and safety on passengers' loyalty intentions towards a PT service. The mediating roles of image and perceived value on these links are also considered.
Methods: Partial Least Square - Structural Equation Modeling (PLS-SEM) was utilised to assess the measurement and develop structural models. A multi-group analysis (MGA) was also deployed to test the significant group differences. For this investigation, a sample of 866 individuals was collected from two cities in Vietnam.
Results: The results indicate that there were significant relationships between these constructs and the loyalty intention of passengers. The perception of health benefits and image were the main factors affecting passengers' loyalty in both cities. In contrast, the perception of environmental benefits had the weakest effect on the loyalty intention towards bus services.
Conclusions: The results from this study could support the development of interventions to increase PT ridership in low-income countries. Promotional efforts to boost PT ridership should focus on highlighting the health benefits of using PT for passengers and the community. PT operators were also recommended to convey societal and environmental contributions through logos, graphic design, mission statements, slogans, and media relations to improve the image of the bus services.

1. Introduction

In low-income countries, the growth of road vehicles increases fossil fuel consumption and environmental pollution, ultimately

contributing to climate risk. Public transport (PT) is recognised to be an effective solution to cope with this trend in the Global South (Nguyen-Phuoc et al., 2020c). PT can accommodate many people simultaneously, so making PT more appealing in urban areas, especially those with high population density and high levels of motorisation, is extremely important (Nguyen et al., 2021; Nguyen-Phuoc et al., 2017). Buses are one of the safest and most sustainable modes of transport among all PT modes (Miti et al., 2023; Loukaitou-Sideris, 1999). For transport operators, buses have certain advantages compared to other PT modes, especially in terms of capital investment and network coverage. Bus services are recognised to be cost-effective, and reliable for the users, which encourages the mode shift from private cars to PT (Waterson et al., 2003). Bus services also enhance people's accessibility to other forms of sustainable transport (e.g., rail) as well as education, health services, or employment (Public Transport Victoria, 2016).

Vietnam is a low-income country in Southeast Asia that has rapidly developed over the past years (Frijns et al., 2000). Due to the increasing number of vehicles, particularly in big and crowded cities (e.g., Hochiminh and Hanoi city), the government has increased investment in PT infrastructure over the last decade. Although metro systems have been under construction for several years, the bus is still a main PT mode in urban areas in Vietnam. There have been other forms of paid transport in Vietnam (e.g., app-based motorcycle taxi, conventional taxi and app-based taxi); however, these options are not operated by the government (Nguyen-Phuoc et al., 2020a, 2022). Currently, the expansion of the bus network and the improvement of bus service quality have been carried out to encourage the mode shift from private vehicles to PT. However, the ridership has not been as high as expected since bus share was less than 10% in Hochiminh city and under 1% in Danang city (Van et al., 2009). This study focuses on Hochiminh City (HCMC), the largest city in Vietnam with approximately 9 million inhabitants, where bus ridership has declined. Additionally, Danang City (DNC), with a population of around 1.2 million, was selected due to its commitment to increasing investment in bus transport and promoting a green and sustainable urban environment. The aim of this study is to gain a deeper understanding of passengers' loyalty towards buses, which had a close connection to the increase in the bus ridership (Vicente et al., 2020; Lai and Chen, 2011), as well as their determinants. Due to the differences in population, demographic characteristics and bus systems between the two cities, this study also aims to assess whether the relationships between determinants and loyalty are invariant across two cities. The investigation can help PT operators develop measures to increase ridership.

Previous scholars often investigated how individuals' attitudes and perceptions of sustainability influence their choices of transportation modes, particularly in the context of PT usage (Corpuz, 2007; Prillwitz and Barr, 2011; Beirao and Cabral, 2007). Given PT users' loyalty intention has been investigated in many previous studies, limited studies have examined the link between the loyalty and sustainability. For instant, the role of factors relating to environmental perception (i.e., perception of environmental benefits (PEB)) on PT passengers' loyalty has not received much attention from scholars (van Lierop et al., 2018). Indeed, PEB currently attracts growing concern from societies due to climate change (Cho et al., 2014). A study conducted in Lisbon (Portugal) indicated that commitment to environmental sustainability by PT providers had a positive influence on passenger loyalty since commitment to environmental sustainability improved the image of a service provider and as a result, contributed to increasing rider loyalty (Vicente et al., 2020). However, the environmental construct mentioned in the study was just considered from PT providers' environmental perception instead of the one from PT users.

The customers' perception of health benefits (PHB) towards a product/service has also been explored in a number of studies, particularly in food service fields (George et al., 2008). However, there has been limited research examining the perception of health benefits towards PT and how this factor affect the loyalty intention of this transport mode. In the context of transport, this construct has been mentioned in some studies relating to active travel, such as walking and cycling (Rissel et al., 2012). In fact, individuals who use PT are likely to engage in higher daily physical activity levels compared to those who do not, as they involve walking to stops and final destinations. Informal interactions with familiar strangers, such as exchanging greetings with your driver or fellow passengers, also contribute to enhancing emotional well-being and resilience. As such, exploring PHB of PT and its role in loyalty intention is needed. Various previous studies have indicated that concerns about personal safety on PT serve as a constraint on ridership and diminish the overall travel experience for passengers (Nguyen-Phuoc et al., 2021). For instance, in a study on transport disadvantage in Western Sydney, refugee youth reported feeling victimized and fearful of transit officers on PT. Young girls voice concerns about personal safety while travelling, and this fear could impact their decision to use PT. Clearly, perception of safety (PSA) towards PT is an important factor affecting passengers' travel; however, it is unclear how PSA influences the loyalty intention of PT users.

From the customer's viewpoint, perceived value (PVA) was considered the customers' overall assessment of the utility of a service based on the disparity of what they received and what they were given from that service while image (IMA) is recognised as the overall impression made on customers' minds about a service. According to Fredericks and Salter (1995), IMA was confirmed to be one in four determinants of PVA. These two latent factors have also been confirmed to have significant effects on customer loyalty in prior studies (Fu et al., 2018; Lai and Chen, 2011). In the context of PT services, PEB, PHB and PSA can be seen as major antecedents of PVA as well as IMA; however, there is a lack of research investigating the mediating relationship between PEB, PHB, PSA and the PT passengers' loyalty intention via perceived value (PVA) and image (IMA), particularly in developing countries. In response to the above research gaps, the main objective of this study is to develop and empirically validate a comprehensive model which can explore the direct impact of three constructs (i.e., PEB, PHB, PSA) on passengers' loyalty in the context of bus services in Vietnam. The proposed model also examines the mediating effects of PVA and IMA on these relationships. Additionally, multi-group analysis (MGA) was used to test the statistically significant differences between the proposed models for the groups of bus passengers in two different cities.

2. Theoretical background

2.1. Loyalty intention

Many definitions of loyalty intention are available in the literature. In the marketing area, loyalty was defined as "a deeply held commitment to re-buy or re-patronise a preferred product/service consistently in the future, thereby causing repetitive same-branch or same branch set purchasing, despite situational influences and marketing efforts having the potential to cause switching behaviour" (Oliver, 1999). In contrast, another study accepted the definition of loyalty intention as a behavioural construct demonstrated through customers' intention to continue business relations or to spread positive word-of-mouth (Wang et al., 2017). Recently, loyalty intention has also received a great deal of attention from researchers in the transport context (Vicente et al., 2020; Nguyen-Phuoc et al., 2020b). Most of these studies have accepted the definition of loyalty intention, which is composed of two main parts: (1) a planned behaviour to use a service in the future and (2) a willingness to recommend a service to other people (Fu et al., 2018; Sumaedi et al., 2012). Although research on loyalty intention was found to be popular in the literature, careful examination of passenger loyalty intention still needs to be conducted within a particular context in order to find proper solutions to increase loyalty intention (Chua et al., 2017). This research focuses on the traveler loyalty intention towards bus systems in Vietnam, which is reflected by reuse and recommendation intention. It is an essential determinant for the long-term solutions aiming to keep the current PT passengers and attract the new ones.

2.2. Determinants of passengers' loyalty intention

Previous research has shown that the most common determinants of customer loyalty intention are satisfaction and perceived service quality and image (van Lierop et al., 2018). In the transport context, particularly in PT, loyalty intention could be affected by other variables related to customers' safety and security (PSA) or perceived value (PVA) (Chowdhury and Van Wee, 2020; Sumaedi et al., 2012). The relationships between these constructs and loyalty were identified in existing studies (Nguyen-Phuoc et al., 2021; Su et al., 2019). Meanwhile, perception of environmental benefits (PEB) and perception of health benefits (PHB) towards PT have received less attention from researchers. A study conducted by Vicente et al. (2020) indicated that the environmental commitment of a PT provider significantly affected PT users' loyalty and therefore is an important factor associated with PT usage. However, the environmental factor mentioned in this study was PT providers' commitment to environmental sustainability instead of PT users' perception of green value towards PT systems. Similarly, in another research on the public bike system in Taipei, the critical role of PEB in the human living environment and its positive impact on public bike usage were also confirmed. Besides, perception of health benefits (PHB) was mentioned as well (Chen, 2016). No research has investigated the impacts of these two constructs (PEB and PHB) on passengers' loyalty intention in the context of PT system services. This study adds the two constructs (PEB and PHB) and examines their impacts on passenger loyalty intention to understand better the complexity of factors affecting transit loyalty.

Moreover, the value-attitude-behaviour theory (VAB), a cognitive hierarchy representing the relationship between values, attitudes and behaviours, proposed that "the influence should theoretically flow from abstract values to mid-range attitudes to specific behaviour" (Homer and Kahle, 1988). This means that values help to shape and form attitudes, with attitudes in turn influencing behaviour. This theory has been tested in many fields in existing studies, especially in the field of green food marketing (Sneed, 2014). The present study proposes to use a value-attitude-behaviour model, in which image is considered to be a mediator formed from values (PHB, PEB, PSA and PVA), that in turn influence passengers' loyalty intention. In doing so, the paper helps close a gap in VAB theory application to public transportation. As a result, a conceptual model is proposed to examine the direct and indirect relationships between the five constructs (including perception of health benefits (PHB), perception of environmental benefits (PEB), perception of safety (PSA), perceived value (PVA) and image (IMA)) and the passengers' loyalty intention (LIN) towards PT services in two cities of Vietnam.

3. Research hypotheses

3.1. Perception of environmental benefits (PEB)

Environmental problems, such as noise pollution or air pollution, have seriously affected humans' quality of life for many years. Previous studies indicated that people were more likely to choose an environmentally friendly product or service even though they may pay more money (Eurobarometer, 2008; Vicente et al., 2020). This could allow transit agencies to encourage the use of PT with a commitment to the environmental sustainability of PT. Thus, perception of environmental benefits (PEB) of PT use, which was defined as a set of attributes demonstrating the commitment to environmental sustainability from the use of PT as well as the conscious contribution of users to environmental protection (Chen, 2016), will be considered in this study.

A previous study of business organisations showed that perception of environmental benefits (PEB) or perceived environmental value had an impact on the environmental image. Accordingly, customers who had a stronger perception of environmental benefits also evaluated their providers' environmental image more favourably (Hänninen and Karjaluoto, 2017). They also confirmed a significant relationship between perception of environmental benefits (PEB) and perceived value (PVA). Additionally, PEB was found to have a positive influence on green loyalty (Chen, 2013). In the transportation context, a study conducted in the Metropolitan Area of Lisbon, Portugal indicated that providers' commitment to environmental sustainability (CES) had a positive impact on the image of transit agencies and, thus increased customer loyalty towards PT (Vicente et al., 2020). There has been a lack of studies examining direct relationships between users' perception of environmental benefits (PEB), perceived value (PVA) and passengers' loyalty in the

context of PT. Based on the above discussion, the hypothesises of the relationships between the perception of environmental benefits and image, perceived value and loyalty intention towards bus services are suggested as follows:

H1. Perception of environmental benefits has a direct positive effect on the image of bus services

H2. Perception of environmental benefits has a direct positive effect on perceived value towards bus services

H3. Perception of environmental benefits has a direct positive effect on bus passengers' loyalty intention for the services

3.2. Perception of health benefits (PHB)

Perception of health benefits (PHB) was partly found in several studies in the food or medicine fields (Darian and Tucci, 2011; Penedo and Dahn, 2005). In the context of transport, perception of health benefits was mentioned in studies on green travel modes (e. g., walking or cycling) (Webb, 2010; Chen, 2016) and mostly regarding physical activities (Mueller et al., 2015). The use of PT generally involves walking to bus or train stations, a kind of physical activity; therefore, PT usage could positively influence both the physical and mental health of users (Saxena et al., 2005). However, these studies investigated the perception of health benefits associated with physical activity. In our study, PHB from the use of PT is defined as a set of characteristics related to general health benefits (including physical and mental health) that people could experience when using PT services.

In a study on organic products from 1,052 New Zealand consumers, Aitken et al. (2020) supposed PHB as a main contributor to actionable labelling, which was considered as a product's image and affected the consumer intention to purchase organic food products. In the literature of transport, no research has investigated the connection between PHB and the image of service as well as the relationship between PHB and perceived value (PVA). However, PHB could be considered as a utility of physical health from the customers' PT usage due to involving some walking to/from PT stations (Rissel et al., 2012), which belonged to the definition of perceived value (Fu et al., 2018). Therefore, in this study, the impacts of PHB on these two constructs, image (IMA) and PVA, will be tested. The association between PHB and passengers' loyalty intention has not been confirmed directly in previous studies in the transport context. Yet, in other fields, previous studies stated that PHB directly affected behavioural intention (Samoggia and Riedel, 2019; Moon et al., 2005). Accordingly, consumers who positively perceived a product's health benefits were more likely to continue to purchase such a product, which increased customer loyalty towards the product. Based on the review of the literature, the following hypotheses are proposed:

H4. Perception of health benefits has a direct positive effect on the image of bus services

H5. Perception of health benefits has a direct positive effect on perceived value towards bus services

H6. Perception of health benefits has a direct positive effect on bus passengers' loyalty intention for the services

3.3. Perception of safety (PSA)

In the context of PT, perception of safety (PSA) was recognised to be a key variable contributing to the perception of service quality (Van Lierop and El-Geneidy, 2016; Lai and Chen, 2011). PSA towards a PT system was defined as a complex feeling of PT users composed of feeling safe from crime and safe from accidents during their PT trips, on-board the vehicles and at PT stations (Van Lierop and El-Geneidy, 2016; Nguyen-Phuoc et al., 2021). The link between PSA and IMA has not been confirmed in this area. But, in the field of tourism, IMA was affected by PSA, which was composed of the construct of perceived risk (Lepp et al., 2011). Accordingly, users who had a negative perceived risk would perceive the image of the destination positively. Furthermore, PSA is also associated with passenger loyalty intention, which was mentioned in many previous studies on transport (Su et al., 2019; van Lierop et al., 2018). Considering the relationship with perceived value (PVA), the literature review showed that there was a lack of research investigating the impact of PSA on the users' perception of value. Clearly, the positive perception of passengers towards a PT service affects their perceived value of the PT as an advantage or benefit of the PT compared with other travel modes. As such, the hypotheses regarding the perception of safety of bus services are proposed:

H7. Perception of safety has a direct positive effect on the image of bus services

H8. Perception of safety has a direct positive effect on perceived value towards bus services

H9. Perception of safety has a direct positive effect on bus passengers' loyalty intention for the services

3.4. Image (IMA)

Image was a critical concept that has been widely investigated in the literature, particularly in the marketing context (e.g., corporate, product, and brand) and tourism (e.g., destination). According to Worcester (1997), image was defined as "the net result of interaction of all experiences, impressions, beliefs, feelings and knowledge people have about a company" (p. 147). Ledden et al. (2007) described image as the overall impression made on customers' minds about a service provider. As such, the image of a service can affect how customers perceive the performance of that service (Minser and Webb, 2010). The positive effect relationship between image and perceived value has been confirmed in various settings such as restaurants (Ryu et al., 2008), hotels (Lien et al., 2015) or tourist destinations (Cheng and Lu, 2013; Chen and Tsai, 2007). In the public transport context, this relationship has rarely been

examined. In contrast, the role of image on customer loyalty has been confirmed in many previous studies on public transport. For instance, Fu et al. (2018) revealed that image significantly affected loyalty towards bus services in China. A similar finding was found in another study investigating the users of bus and train systems in Chicago (Minser and Webb, 2010). In this study, the role of image on passengers' loyalty is tested in the bus service context in a low-income country. Therefore, the following hypotheses are proposed as follows:

H10. The image of bus services has a direct positive effect on perceived value

H11. The image of bus services has a direct positive effect on bus passengers' loyalty intention for the services

3.5. Perceived value (PVA)

Perceived value (PVA) was defined as a trade-off between benefits one receives from a product/service and costs he had to pay for that product/service (Lee and Cunningham, 2001). The perceived value of a service was likely to be high once the perceived benefits received from the service were higher than the costs paid (Wen et al., 2005). From the customer's viewpoint, PVA was considered the customers' overall assessment of the utility of a product or a service based on the disparity of what they received and what they were given from that product or service (Zeithaml, 1988). The assessment of perceived value can be approached through either a self-reported, unidimensional measure or a multidimensional scale. According to Sheth et al. (1991), a multidimensional scale can address the validity concern by defining PVA across various dimensions, such as social, emotional, functional, epistemic, and conditional responses. Another illustrative example is the PVA scale introduced by Petrick and Backman (2002) which incorporates five dimensions: quality, monetary price, non-monetary price, reputation, and emotional response. In the PT context, PVA has received much attention from scholars and practitioners. For instant, Jen and Hu (2003) developed and validated the perceived value model, employing it to pinpoint factors influencing passengers' intentions to repurchase public transit services. They showed that perceived value was determined by two perspectives: perceived benefits and perceived costs which were a combination of perceived monetary (e. g., fare cost) and non-monetary prices (e.g., time cost). In this study, perceived value was defined following Jen and Hu (2003).

Fu et al. (2018) revealed that perceived value positively impacted the image of the PT service in Suzhou. In some other studies, the role of PVA on passengers' loyalty was also confirmed. For instance, a study conducted in Taiwan (Lai and Chen, 2011) stated that PVA directly impacted behavioural intention towards the Kaohsiung Mass Rapid Transit (KMRT). In another study of passenger loyalty towards the intercity bus service in the west corridor of Taiwan, customer loyalty was affected by PVA (Wen et al., 2005). Based on the review of the literature, the following hypotheses are suggested:

H12. Perceived value has a direct positive effect on bus passengers' loyalty intention for the services.

This research developed a conceptual model to examine the relationships among six constructs: PEB, PHB, PSA, PVA, IMA and LIN as well as to explore the role of PVE and PHB in the association with LIN as shown in Fig. 1.

4. Research context

This section provides a short description of the location and characteristics of study areas, Hochiminh and Danang city, the two large distinct cities of Vietnam. These cities are the typical example of megacities in developing countries struggling with transport-related challenges (e.g., traffic congestion and pollution).

Hochiminh (HCM, formally known as Saigon), the largest city of Vietnam, is the business and financial hub of this country. It is located in the southeastern part with an area of 2,095 km square and a population of 9.23 million. Similar to many other cities of
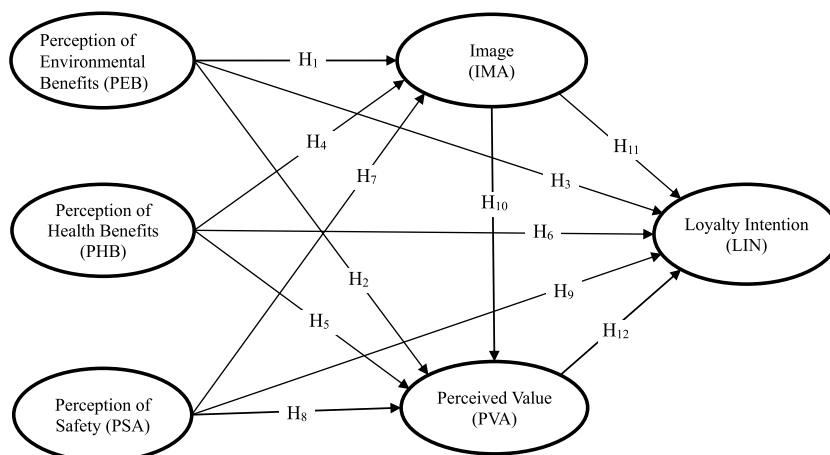

Fig. 1. Conceptual framework of the study.

Vietnam, HCM city is considered as one of the largest motorcycle-dependent cities in Southeast Asia (Le and Trinh, 2016). Currently, bus is the only PT mode with 137 bus routes, including price-subsidised bus routes (109) and normal bus routes (28), covering all parts of the city; however, the bus modal share is limited (under 10%). Private vehicles, including cars and motorcycles, are used by the majority of citizens, which results in heavy traffic congestion in many parts of the city. To deal with the serious problem, the authority has planned to invest in other types of PT, such as bus rapid transit (BRT) and mass rapid transit (MRS) (e.g., metro systems). The first metro line started construction in 2012 and is expected to operate in early 2022.

Danang (DN), the third largest City in Vietnam, is located on the Eastern Sea coast, midway between Hanoi and Hochiminh City. This city is also the largest urban center in the central region of Vietnam with an area of 1,285 km square and a population of 1.13 million. Similar to HCM city, two-wheel vehicles (e.g., motorcycles and bicycles) are considered to be a major mode of transport in Danang with a rate of 90% (Kutani et al., 2015). Bus is also the unique formal PT of the city with a modal share of 1.2%. There are a total of 12 price-subsidised bus routes covering all districts of the city.

5. Methods

5.1. Survey design

The questionnaire is composed of three major sections:

(1) *Section 1:* This section provided research participants with general information about the study as well as the survey (e.g., survey's aim, objectives) and their involvement to accommodate their understanding to seek their participation consent.

Table 1
Measurement scales.

Constructs	Items	Mean		Std. Deviation	
		HCM	DN	HCM	DN
Perception of Environmental Benefits (PEB) Adapt from (Uherek et al., 2010; Sellittoa et al., 2013)	PEB1. Travelling by PT will contribute to reducing pollution	5.658	5.931	1.453	0.921
	PEB2. Travelling by PT has more environmental benefits than other forms of transport	5.481	5.751	1.497	1.055
	PEB3. Travelling by PT is environmentally friendly	5.449	5.677	1.495	1.122
	PEB4. Travelling by PT will contribute to reducing greenhouse gas emissions and CO_2	5.380	5.667	1.468	1.080
Perception of Health Benefits (PHB) Adapt from Brown (2005) and Gamble et al. (2015), Lai and Chen (2011)	PHB1. I believe that travelling by buses improves my mental health	5.261	5.375	1.447	1.123
	PHB2. Travelling by buses is less stressful rather than riding/driving in traffic	5.443	5.800	1.404	1.021
	PHB3. Travelling by buses prevents you from the harmful impacts of adverse weather conditions	5.748	6.048	1.238	0.868
	PHB4. Travelling by buses prevents you from the impact of air pollution	5.683	5.995	1.324	0.917
Perception of Safety (PSA) Adapt from Weng et al. (2017), Su et al. (2019)	PSA1. I fell safe from crime on buses	3.840	5.537	1.877	1.279
	PSA2. I feel safe from traffic accidents when travelling on buses	4.631	5.572	1.735	1.245
	PSA3. I feel safe while using bus services daytime	5.308	5.713	1.306	1.077
	PSA4. I feel safe while using bus services at nighttime	4.310	5.356	1.681	1.264
Perceived Value (PVA) Adapt from Jen and Hu (2003)	PVA1. Compared to the money I spend, going by buses is worthwhile	5.774	5.936	1.163	0.937
	PVA2. Compared to the time I spend, going by buses is worthwhile	5.336	5.501	1.298	1.223
	PVA3. Going by buses is worthwhile	5.541	5.879	1.236	0.856
Image (IMA) Adapt from and Sumaedi et al. (2016)	IMA1. In my opinion, this bus system has a good image in the minds of passengers	5.090	5.340	1.238	0.992
	IMA2. Compared to other bus systems, this bus system has a better image	4.966	5.489	1.318	0.911
	IMA3. The reputation of this bus system is good	5.128	5.591	1.261	0.880
	IMA4. The impression of this bus system is good	5.099	5.653	1.307	0.914
	IMA5. The overall image of this bus system is good	5.148	5.698	1.238	0.856
Loyalty Intention (LIN) Adapt from Yuksel et al. (2010), Su et al. (2019)	LIN1. I would tell other people positive things about this transport service	5.270	5.694	1.250	0.979
	LIN2. I would recommend other people to travel by this transport service	5.285	5.753	1.321	0.923
	LIN3. I would provide my friends, family and neighbors with positive things about this transport service when they choose a transport mode to travel	5.402	5.786	1.206	0.938
	LIN4. I intend to travel by this transportation service more often in the future	5.157	5.492	1.362	1.113
	LIN5. I feel better when travelling by this transport service	5.189	5.582	1.341	1.110
	LIN6. I intend to keep travelling by this transport service in the future	5.387	5.855	1.365	1.004

Note: HCM: Hochiminh city, DN: Danang city.

(2) *Section 2*: The first part included a set of questions that were designed to collect information about participants' bus trips, such as frequency, trip purpose or travel time. The second part consisted of 7 point-Likert scale questions adapted from prior research to measure bus passengers' perception and behaviour towards the bus services. The scales used to measure the constructs in the proposed model were adapted from established and validated measurement scales in prior research since this can enhance the reliability and validity of the measures in the current study as well as increase comparability between studies (Kimberlin and Winterstein, 2008). Additionally, adapting measurement scales could save time and resources compared to developing entirely new scales. Adapting measurement scales from a prior study entails adjusting the existing scales to align with the distinct context, demographic, or research goals of the current study. In particular, as presented in Table 1, four measurement items of perception of environmental benefits (PEB) were mostly adapted from the study of Duan and Sheng (2018), while perception of health benefits (PHB) was measured by four items adapted from Brown (2005) and Gamble et al. (2015). For measuring perception of safety (PSA), four items were adapted from the research of Weng et al. (2017) and Su et al. (2019), whereas the scale to measure perceived value (PVA) was adapted from Chen and Chen (2010). Also, the measurement scale of image (IMA) includes five items derived from Jani and Han (2014) and Sumaedi et al. (2016). Lastly, loyalty intention (LIN) was measured by a scale of six items taken from the studies of Yuksel et al. (2010) and Su et al. (2019).

(3) *Section 3*: In the last section, participants were asked to provide their demographic information, including gender, age, married status, level of education, occupation and income.

The questionnaire was first sent to five transport experts to get their feedback. A pilot survey was then conducted with 50 undergraduate students in order to identify the potential weaknesses, ambiguities, or missing questions in the designed questionnaire. After revising and finalising, the final questionnaire was delivered on a large scale to research participants in two cities in Vietnam, including Hochiminh city and Danang city. The main aim of the survey is to investigate the perception of bus users regarding various concepts related to bus travelling activities such as PEB, PHB, PSA, IMA, PVA and LIN by using the adapted measurement scales.

5.2. Data collection

The questionnaire was conducted in Danang and Hochiminh city from September 2019 to November 2019. Six undergraduate students from Hochiminh University of Transport delivered the questionnaires in paper forms to potential respondents at bus stops and on buses. Before that, they were well-trained by research team members to sufficiently handle the survey method and understand the research's purposes. Simple random sampling technique was used to collect data from bus passengers at ramdomly chosen bus stops, on-board buses, different time points, on both weekdays and weekends to reduce potential bias. Bus users in the main districts of the two cities were randomly approached and offline questionnaires were given to them to fill. To reduce potential bias in time-selection, different time points were chosen to conduct the survey, such as daytime, nighttime, weekdays or weekends. In order to increase the response rate, 20.000 VND mobile recharge cards (approximately US$1) were given to participants who completed the survey as an acknowledgment of their involvement in the project. In addition, research team members encouraged bus passengers to participate in the survey by carefully explaining the importance of the study in the first part of the questionnaire as well as changing the questions' format. The response rates are shown in Table 2.

As observed in Tables 2 and in total, 910 paper-based questionnaires were delivered in the two cities (481 for HCM and 429 for DN). The scanning and screening process were also conducted to eliminate invalid returned questionnaires, such as ones with missing data in some important variables, having the same values in most of the variables or having outlier values. As a result, the valid response rates for the two cities are considerably high with 92.5% for HCM and 98.1% for DN, which are considered sufficient for performing data analysis at the next step.

5.3. Data analysis

Data collected from the survey conducted in HCM and DN cities were analysed, including descriptive analysis and inferential analysis. Firstly, descriptive analysis was employed in this study to analyse the demographic information of research respondents. Secondly, inferential analysis was performed under structural equation modeling (SEM) analysis. In this study, the conceptual framework was proposed as shown in Fig. 1, including the relationships among constructs, which were described in the proposed hypotheses. SEM was found to be suitable for testing the proposed hypothesis in this study because it was suggested to be used for "tests hypothesised patterns of directional and non-directional relationships among a set of observed (measured) and unobserved (latent)

Table 2
Number of respondents.

	Hochiminh	Danang	Total
Distributed	481	429	910
Missing values for critical variables	21	2	23
Same values for most variables	6	2	8
Outlier values	9	4	13
Valid responses	445	421	866
Rate of valid response (%)	92.5	98.1	95.2

variables" (MacCallum et al., 2000). According to Byrne (2010), SEM allowed researchers to test all dependence relationships among latent variables at the same time, which fits the purpose of this research. While there have been two main forms of SEM, namely covariance-based SEM (CB-SEM) and least squares-based SEM (PLS-SEM), this study adopted the PLS-SEM since this method was initially used for developing theories in an exploratory study by explaining the variance among the dependent variables (Hair et al., 2017). The process of SEM analysis included two main steps such the evaluation of the measurement model and the evaluation of structural model which were performed under the Smart-PLS 3.0 software package (Ringle et al., 2015). In this study, mediating effect (i.e., indirect effect or mediation), which involves a third variable playing an intermediate role in the relationships between independent and dependent variables, was also examined. According to Carrión et al. (2017), testing mediating effects in PLS-SEM includes the assessment of the significance of indirect effects and their magnitude by bootstrapping the sample of the indirect effects. This procedure can be carried out with the help of Smart-PLS 3.0 software. Moreover, the partial least squares multi-group analysis (MGA-PLS) was employed to compare the differences in the proposed model between bus passengers in HCM and DN city.

6. Results

6.1. Sample profile

Table 3 presents the demographics of survey respondents in two cities in Vietnam, namely Hochiminh (HCM) and Danang (DN). Within the two cities, more than half of the respondents are females with a percentage of 60.4% in HCM and 55.6% in DN. Passengers who are aged from 18 to 25 account for the largest proportion of respondents, with 45.6% for HCM and 53.7% for DN. The survey result shows that single respondents are predominant in the two cities with around 59.3% for HCM and 64.1% for DN. Regarding the education level, most bus users hold a high school degree (33.3% for HCM and 31.6% for DN) or a university degree (43.4% for HCM and 41.3% for DN). In terms of occupation, 48.9% of respondents in DN are students (the highest proportion), while this number is around 36.6% for HCM. In contrast, passengers who are full-time employees in HCM city stand for the highest percentage of survey respondents with 41.6% and this figure for DN city is lower with 27.8%. Since bus services offer a lower cost than other services, the majority of respondents are low-income people. Accordingly, in HCM city, 42.2% of respondents have a monthly income of less than 5 million VND, while this figure for the group income of 5–10 million VND is around 36.0%. Similarly, in DN city, the percentage of respondents having income lower than 5 million VND is predominant at 65.3% and this number for the 5–10 million VND income group is around 20.4%. The survey also reveals that most of the survey respondents using bus services are mainly for going to work (41.3% for HCM and 27.8% for DN) or going to school (30.3% for HCM and 39.4% for DN). The profile of respondents indicates that different types of survey participants regarding gender, age, married status, level of education, occupation, income, and purposes of using bus services were recruited, indicating the diversity of research participants.

While there has been a lack of adequate data to evaluate the sample's representativeness, it is important to highlight that a significant proportion of survey participants appeared to be female, students and in the young adult group (aged 18 to 25). Notably, a previous survey conducted in 2017 among 400 bus users in Hochiminh City, Vietnam, revealed that around 60% were female, approximately 36.25% were students and 39% were aged from 18 to 22 (Pham et al., 2021). These statistics align reasonably well with the demographics of the current study's sample, offering a degree of confidence in its representativeness.

Table 3
Respondent demographics.

	Hochiminh		Danang			Hochiminh		Danang	
	n	%	n	%		n	%	n	%
Gender					Occupation				
Male	176	39.6	187	44.4	Student	163	36.6	206	48.9
Female	269	60.4	234	55.6	Full-time employee	185	41.6	117	27.8
Age					Part-time employee	41	9.2	28	6.7
18–25	203	45.6	226	53.7	Retired	11	2.5	33	7.8
26–35	91	20.4	76	18.1	Unemployed	1	0.2	3	0.7
36–45	66	14.8	36	8.6	Work at home	24	5.4	27	6.4
46–55	42	9.4	36	8.6	Other	20	4.5	7	1.7
v > 55	43	9.7	47	11.2	***Monthly income (VND)***				
Married status					<5 million	188	42.2	275	65.3
Single	264	59.3	270	64.1	5 - <10 million	160	36.0	86	20.4
Married	181	40.7	151	35.9	10 - <15 million	70	15.7	51	12.1
Level of education					≥ 15 million	27	6.1	9	2.1
Secondary school	26	5.8	30	7.1	***Purpose of most bus trips***				
High school	148	33.3	133	31.6	Going to work	184	41.3	117	27.8
University	193	43.4	174	41.3	Going to school	135	30.3	166	39.4
Above university	41	9.2	64	15.2	Going shopping	14	3.1	46	10.9
Other	37	8.3	20	4.8	Going to catch up with friends	48	10.8	53	12.6
					Others	64	14.4	39	9.3

6.2. The measurement model evaluation

Before evaluating the structural model as proposed in the conceptual framework of the study, it is necessary to evaluate the measurement model. As most of the measurement items were adopted from previous similar research, confirmatory factor analysis (CFA) was performed to confirm the reliability and the validity of the six constructs, including the perception of environmental benefits (PEB), perception of health benefit (PHB), perception of safety (PSA), image (IMA), perceived value (PVA) and loyalty intention (LIN). The evaluation process includes checking the internal consistency among measurement scales, the convergent validity and the discrimination validity of the model. Table 4 illustrates the results of the measurement model evaluation.

Internal consistency among items in each construct was examined through the composite reliability (CR). As can be seen, all of the CR values of the six latent variables are higher than the recommended benchmark of 0.7 (Fornell and Larcker, 1981). Herein, the ranges of CR values for data collected in HCM city and DN city are as follows: 0.844–0.971 and 0.832–0.921. This suggested a high level of internal consistency among the measurement items.

The convergent validity and discriminant validity of the six constructs were examined to check whether the measurement model appropriately reflects the proposed construct. Table 4 shows that most of the factor loadings of measurement items of each construct for data collected in HCM and DN city are greater than the reference value of 0.7 (Hulland, 1999). In addition, the average variance extracted (AVE) values of all constructs range from 0.576 to 0.894 for HCM and from 0.624 to 0.744 for DN, which is above the cut-off value of 0.5 (Fornell and Larcker, 1981). These above evaluations validate the convergent validity of the constructs.

The discriminant validity among factors was evaluated using the Fornell-Larker criterion, as shown in Table 5. Within this method, the square root of AVE value of one construct was calculated and compared with other values showing the cross-correlations between this construct and others. Table 5 shows that for the two cities, all of the bold diagonal values showing the results of the square root of AVE are the highest values in comparison to other non-diagonal values showing the cross-correlation with other constructs. This result confirms the validity of the discriminant among the constructs.

In summary, all the above-evaluations indicate that the proposed measurement model is reliable and valid which is considered sufficient for conducting the next step of evaluating the structural model.

Table 4
The assessment of measurement model.

Path	Outer Loading		Composite Reliability		Average Variance Extracted	
	HCM	DN	HCM	DN	HCM	DN
Perception of Environmental Benefits (PEB)			0.971	0.891	0.894	0.675
PEB1	0.925	0.659				
PEB2	0.965	0.868				
PEB3	0.954	0.892				
PEB4	0.937	0.846				
Perception of Health Benefits (PHB)			0.922	0.873	0.748	0.633
PHB1	0.876	0.776				
PHB2	0.843	0.748				
PHB3	0.858	0.835				
PHB4	0.882	0.820				
Perception of Safety (PSA)			0.844	0.921	0.576	0.744
PSA1	0.686	0.852				
PSA2	0.820	0.913				
PSA3	0.759	0.865				
PSA4	0.764	0.817				
Perceived Value (PVA)			0.888	0.832	0.726	0.624
PVA1	0.800	0.738				
PVA2	0.862	0.788				
PVA3	0.891	0.841				
Image (IMA)			0.953	0.914	0.804	0.681
IMA1	0.860	0.756				
IMA2	0.887	0.841				
IMA3	0.911	0.857				
IMA4	0.916	0.829				
IMA5	0.908	0.841				
Loyalty Intention (LIN)			0.935	0.915	0.707	0.643
LIN1	0.840	0.818				
LIN2	0.849	0.817				
LIN3	0.781	0.811				
LIN4	0.863	0.811				
LIN5	0.872	0.794				
LIN6	0.837	0.760				

Table 5
Fornell-Larker criterion results.

Constructs		Hochiminh city							Danang city					
	AVE	PEB	PHB	PSA	PVA	IMA	LIN	AVE	PEB	PHB	PSA	PVA	IMA	LIN
PEB	**0.894**	**0.945**						**0.675**	**0.821**					
PHB	**0.748**	0.676	**0.865**					**0.633**	0.398	**0.795**				
PSA	**0.576**	0.374	0.476	**0.759**				**0.744**	0.193	0.411	**0.863**			
PVA	**0.726**	0.325	0.506	0.362	**0.852**			**0.624**	0.327	0.494	0.312	**0.790**		
IMA	**0.804**	0.379	0.522	0.451	0.585	**0.896**		**0.681**	0.388	0.570	0.400	0.438	**0.826**	
LIN	**0.707**	0.468	0.596	0.431	0.643	0.656	**0.841**	**0.643**	0.412	0.598	0.467	0.546	0.637	**0.802**

Note: AVE = Average Variance Extracted.

6.3. The structural model evaluation

6.3.1. Model fit

To assess the fitness of the model, a number of goodness-of-fit indices, including the standardised root mean square residual (SRMR), the geodesic distance (d-G), the squared Euclidean distance (d-ULS) and the Normed Fit Index (NFI), were evaluated. For data collected from HCM city, the results show that the fitting indices are all acceptable with SRMR = 0.060, d-G = 0.706, d-ULS = 1.244 and NFI = 0.817. As similarly, data collected from DN city, the analysis resulted in that all the fitness indices satisfied the requirements with SRMR = 0.064, d-G = 0.508, d-ULS = 1.445 and NFI = 0.798. A goodness-of-fit indices suggested by Hu and Bentler (1999) (SRMR < 0.08) indicates that the proposed structural model reasonably fits the data collected from the two cities. However, unlike Covariance based Structural Equation Modeling (CB-SEM), Partial Least Squares based Structural Equation Modeling (PLS-SEM) is focused on estimating causal–predictive relationships, the model fit assessment is still not clear and is under exploration (Hair et al., 2017).

6.3.2. Path relationships

The relationships among the constructs as proposed in the conceptual framework were tested through path coefficients (β). The evaluation was based on the criteria suggested by Hair et al. (2017) that a path relationship is considered significant if the t-value is more than 1.65, 1.96 and 2.57 at 10%, 5% and 1% significant level, respectively. When more than one correlation among factors has the same coefficient value, the t-value and the significant level were then evaluated to determine which correlation is more important than others. Accordingly, a correlation with a higher t-value and a higher level of significance is more important.

As observed from Table 6, in HCM city, 8 out of 12 proposed hypotheses are supported while four of them are rejected (H1, H2, H8 and H9). This indicates that within specific conditions of HCM city, there are no relationships between PEB and other two factors, including IMA (H1) and PVA (H2). In addition, the connection between PSA and PVA (H8) as well as PSA and LIN (H9) is not empirically validated. Among the factors having positive effects on loyalty intention of bus users, perceived value (PVA) has the greatest influence on loyalty intention (LIN) as proposed in H12 ($\beta_{PVA \to LIN} = 0.318$), following by image (IMA) ($\beta_{IMA \to LIN} = 0.314$) as proposed in H11. It is also noticed that the factors such as PHB and PSA as proposed in H4 and H7, are the determinants of IMA and the effect of PHB is found to be higher ($\beta_{PVA \to IMA} = 0.382$).

In terms of DN city, the result shows that all of the path coefficients of 12 proposed hypotheses are positive and significant. There are five determinants of LIN of bus passengers, namely PEB, PHB, PSA, PVA and IMA and the determinant that has the most significant effects on LIN is IMA ($\beta_{IMA \to LIN} = 0.321$). It also can be seen from Table 6 that these factors including PVG, PHB, PSA and PVA are all good predictors of IMA while factors having the most significant influence on IMA is PHB ($\beta_{PHB \to IMA} = 0.417$). Also, the factors, namely PEB, PHB, PSA and IMA have positively effects on PVA and the best predictor of PVA is PHB ($\beta_{PHB \to PVA} = 0.306$).

As the loyalty intention (LIN) plays an important role in increasing the ridership of bus passengers in the future, it is necessary to determine critical factors affecting the loyalty intention. Table 7 presents the total effects of various factors namely perception of environmental benefits (PEB), perception of health benefits (PHB), perception of safety (PSA), perceived value (PVA) and image (IMA) on the loyalty intention of bus users. The total effects on LIN can be calculated by summarising the coefficient values reflecting the direct effect and indirect effect of one factor to LIN.

For data collected from HCM city, the research findings show that the four path correlations showing the relationships between LIN and the factors, namely PHB, PSA, PVA and IMA, are significant at $p < 0.001$ which means that they are good predictors of LIN. On the other hand, the correlation between PEB and LIN is non-significant. Among the identified determinants of LIN, the total effect of IMA on LIN is the highest ($\beta_{IMA \to LIN} = 0.452$), following by PHB ($\beta_{PHB \to LIN} = 0.440$) and PVA ($\beta_{PVA \to LIN} = 0.318$). Factor having the lowest effect on LIN is PSA ($\beta_{PSA \to LIN} = 0.184$).

In terms of DN city, it is shown from Table 7 that five determinants of LIN, namely PEB, PHB, PSA, PVA and IMA are identified in that all five path correlations showing the total effects of these factors on LIN are all significant at $p < 0.001$. The highest total effect on

Table 6
Direct effects.

Path relation (Hypothesis)	Hochiminh City				Danang City			
	Coefficient	SD	t-value	Result	Coefficient	SD	t-value	Result
H_1: PEB $\to$ IMA	0.024^{ns}	0.065	0.369	*Rejected*	0.185^{***}	0.047	3.929	Supported
H_2: PEB $\to$ PVA	-0.057^{ns}	0.066	0.858	*Rejected*	0.119^{***}	0.046	2.612	Supported
H_3: PEB $\to$ LIN	0.110^{**}	0.050	2.181	Supported	0.104^{***}	0.037	2.775	Supported
H_4: PHB $\to$ IMA	0.382^{***}	0.072	5.335	Supported	0.417^{***}	0.051	8.245	Supported
H_5: PHB $\to$ PVA	0.294^{***}	0.074	3.951	Supported	0.306^{***}	0.054	5.620	Supported
H_6: PHB $\to$ LIN	0.174^{***}	0.055	3.148	Supported	0.194^{***}	0.051	3.808	Supported
H_7: PSA $\to$ IMA	0.261^{***}	0.058	4.470	Supported	0.193^{***}	0.042	4.543	Supported
H_8: PSA $\to$ PVA	0.049^{ns}	0.058	0.842	*Rejected*	0.091^{**}	0.045	2.005	Supported
H_9: PSA $\to$ LIN	0.050^{ns}	0.046	1.096	*Rejected*	0.170^{***}	0.046	3.661	Supported
H_{10}: IMA $\to$ PVA	0.432^{***}	0.056	7.736	Supported	0.180^{***}	0.059	3.052	Supported
H_{11}: IMA $\to$ LIN	0.314^{***}	0.057	5.559	Supported	0.321^{***}	0.041	7.863	Supported
H_{12}: PVA $\to$ LIN	0.318^{***}	0.049	6.479	Supported	0.223^{***}	0.044	5.025	Supported

Notes: ^{ns} non-significant, $^{***}p < 0.01$ or $t < 2.57$, $^{**}p < 0.05$ or $t < 1.96$, $^{*}p < 0.1$ or $t < 1.65$.

Table 7
Direct, indirect and total effects on loyalty intentions.

Path relation	Effect	Model 1: Hochiminh City				Model 2: Danang City			
		β	SD	t-value	Sig.	β	SD	t-value	Sig.
PEB → LIN	Direct effect	0.110	0.050	2.181	**	0.104	0.037	2.775	***
	Indirect effect	−0.007	0.037	0.196	ns	0.093	0.023	3.977	***
	Total effect	0.103	0.063	1.638	ns	0.197	0.046	4.314	***
PHB → LIN	Direct effect	0.174	0.055	3.148	***	0.194	0.051	3.808	***
	Indirect effect	0.266	0.044	6.094	***	0.219	0.029	7.540	***
	Total effect	0.440	0.067	6.597	***	0.413	0.051	8.080	***
PSA → LIN	Direct effect	0.050	0.046	1.096	ns	0.170	0.046	3.661	***
	Indirect effect	0.133	0.036	3.709	***	0.090	0.021	4.295	***
	Total effect	0.184	0.053	3.481	***	0.260	0.049	5.269	***
IMA → LIN	Direct effect	0.314	0.057	5.559	***	0.321	0.041	7.863	***
	Indirect effect	0.137	0.030	4.546	***	0.040	0.015	2.607	***
	Total effect	0.452	0.050	9.034	***	0.361	0.044	8.148	***
PVA → LIN	Direct effect	0.318	0.049	6.479	***	0.223	0.044	5.025	***
	Indirect effect	–	–	–	–	–	–	–	–
	Total effect	0.318	0.049	6.479	***	0.223	0.044	5.025	***

Note: ***p < 0.01, **p < 0.05, *p < 0.1, ns not significant, Sig. = Significant, SD = Standard Deviance.

LIN is from PHB ($\beta_{PHB \to LIN} = 0.413$), following by IMA ($\beta_{IMA \to LIN} = 0.361$), PSA ($\beta_{PSA \to LIN} = 0.226$), PVA ($\beta_{PSA \to LIN} = 0.223$) and PEB ($\beta_{PEB \to LIN} = 0.197$).

6.3.3. Predictive capability

In this research, the predictive capability of the proposed model was evaluated to test the accuracy and predictive relevance using the data collected from both cities. Accordingly, the coefficient of determination (R^2 value) and the predictive relevance (Q^2 value) were calculated using Smart PLS 3.0. While R^2 takes the value from 0 to 1 with the higher value of R^2 corresponds to the higher level of accuracy in prediction, the value of $Q^2 > 0$ indicates the predictive relevance of endogenous variables in the model (Hair et al., 2019).

The analysis results (Table 8) show that all of the R^2 values of the three constructs including IMG, PVA and LIN in the proposed model are higher than 0.2 which is the minimum requirement for study involving with explaining the loyalty of customers (Hair et al., 2017). The evaluation implies the satisfactory in the predictive accuracy of the model for both HCM and DN city. In addition, the blindfolding procedure resulted in that predictive relevance among the endogenous constructs in the model is also confirmed because all the Q^2 values of the five main constructs are positive.

6.4. Multi-group analysis (MGA)

In this study, MGA was utilised to examine the significant difference between two groups (Hochiminh and Danang passengers) towards PT loyalty intentions. Both methods, including Henseler's MGA (the non-parametric method) and Permutation test, was ultilised. Table 9 presented the results of MGA in which a significant difference in the direct effects between PSA and LIN was confirmed by both methods. The effect of PSA on LIN among passengers in Hochiminh is smaller than that among passengers in Danang.

7. Discussion

The present investigation has made several significant contributions to the transport literature, particularly in public transport (PT) area. While service quality and passenger satisfaction have been widely discussed in the PT literature, few studies have emphasised the importance of perception of health benefits (PHB), perception of environmental benefits (PEB), perception of safety (PSA) as key strategic constructs in forming the passengers' behavioural intention. PHB is found to have the most substantial impact on behavioural intention of three exogenous variables. PT provides many benefits to the community, such as reducing traffic congestion (Nguyen-Phuoc et al., 2017), traffic crashes (Kenworthy et al., 1999) and air pollution (Bel and Holst, 2018). However, the health impacts of PT

Table 8
Accuracy (R^2) and predictive relevance (Q^2) of developed models.

Construct	Hochiminh				Danang			
	R^2	SSO	SSE	$Q^2 = 1-SSE/SSO$	R^2	SSO	SSE	$Q^2 = 1-SSE/SSO$
IMG	0.326	2225	1683	0.243	0.368	2105	1595	0.242
PVA	0.400	1335	0,974	0.270	0.297	1263	1050	0.168
LIN	0.588	2670	1642	0.385	0.564	2526	1678	0.336

Table 9
Multigroup analysis results: Hochiminh (HCM) vs Danang (DN).

Relationship	Effect	Path Coefficient Difference (HCM-DN)	p-value difference (One-Tailed)		Supported
			Henseler's MGA	Permutation Test	
PEB → LIN	Direct	0.005	0.530	0.465	No/No
PHB → LIN	Direct	−0.021	0.389	0.396	No/No
PSA → LIN	Direct	−0.119	0.034**	0.037**	*Yes/Yes*
IMA → LIN	Direct	−0.004	0.476	0.472	No/No
PVA → LIN	Direct	0.094	0.920	0.089	No/No

Note: **$p < 0.05$.

seem to be overlooked and undervalued (Litman, 2015). PT users often walk from their houses to the nearby PT stations and back, which increases physical activity (Bassett et al., 2008; Evans and Wener, 2007). PT can also reduce personal exposure to harmful air, water and noise pollution, mitigate emotional stresses, and improve access to economic, social and recreational opportunities (King et al., 2021; Litman, 2015). Currently, little research has explored the link between PHB and the loyalty intention (LIN) of PT users. This is one of the first studies examining and confirming the impact of PHB on the behavioural intention of PT users.

The results suggest that developing positive indicators of customer behavioural intentions relies not only on the ability of PT operators to enhance passengers' perception of environmental, health and safety benefits but also to establish the favourable image (IMA) and perceived value (PVA) of a PT service. IMA and PVA were the second and third strongest constructs affecting the loyalty intentions of bus users in both cities. This finding was in line with Fu et al. (2018) and Minser and Webb (2010), who found that PVA and IMA towards PT services significantly affect passenger loyalty. In this study, IMA and PVA were taken as mediators of the relationships between PEB, PHB, PSA and loyalty intention. While PVA and IMA were found to partially mediate the links of PEB and LIN in the context of Danang city, the direct effects of PEB on PVA and IMA were not confirmed for Hochiminh city. The result of multi-group analysis (MGA) also indicated a significant difference in the direct impact of PSA on passengers' loyalty intention between Hochiminh city and Danang city. The effect of PSA on LIN among passengers in Hochiminh is significantly smaller than that among passengers in Danang. This can be explained by the fact that Danang city, with its low population density, has sought low emissions as part of its urban model and is considered the most livable city in Vietnam. As such, people from this city were more concerned about the environmental and safety outcomes than those from other cities in Vietnam. PT users with a high level of PEB and PAS were likely to have a high level of PVA and IMA towards PT services, positively affecting their loyalty intention.

PEB was the weakest indicator affecting the loyalty intention of PT passengers in the two cities. It means that people do not care much about the impact of using PT on the environment. This finding was consistent with those of studies conducted in low- and middle-income countries where people was not concerned about the environment (Borhan et al., 2014). Several scholars have argued that people in high-income countries were more concerned about environmental quality and were more willing to pay for environmental improvements than people with low incomes (Sulemana et al., 2016).

8. Conclusion

Research on PT passengers' loyalty has recently received much attention from scholars. While most previous studies focused on understanding the role of service quality and satisfaction on loyalty to PT services (van Lierop et al., 2018), this study investigated the associations among perceived health benefits, environmental benefits and safety and bus passengers' loyalty in Hochiminh (HCM) vs Danang (DN). The mediating effects of image and perceived value on these relationships are also explored in this study. The findings show that all the five constructs (i.e., PEB, PHB, PSA, PVA and IMA) are significant predictors of passengers' behavioural intentions in Danang city. In contrast, the link between perception of safety and bus passengers' loyalty is not confirmed in the context of Hochiminh city. The findings are helpful for transport agencies and policymakers in proposing effective and sustainable strategies to increase bus ridership.

PT operators should recognise the critical role of PHB on the passengers' loyalty toward bus systems in urban areas of Vietnam. The findings reveal that to increase passengers' loyalty intentions, it is necessary to focus on enhancing passengers' perception of the health benefits of bus systems. Advertising and education programs aiming to increase PT ridership should concentrate on the health benefits that PT could bring passengers and the community. Furthermore, passengers' loyalty towards bus systems would also be enhanced if PT operators designed strategies to increase the image of PT service systems. For example, for motivating users to develop a positive image towards a PT system, PT operators were suggested to use an appropriate image through logos and graphic design, mission statements, slogans or media relations to highlight the societal contributions as well as environmental ones of PT (Nguyen-Phuoc et al., 2021). Finally, to encourage a positive perception of the value of a PT service, PT authorities should focus not only on the cost paid for the service but also on time spent using the service. These recommendations could increase passengers' perceived value of a PT service, especially important in Hochiminh city, where this variable had the third important role derived from its total effect on loyalty intentions.

Differing from Hochiminh city, the impact of PSA and PEB on loyalty intention was only confirmed in Danang city. As such, increasing the perception of safety and environmental benefits towards the bus system in this city is also needed. Particularly, the perception of safety can be enhanced by targeted efforts such as carrying out special police patrols, installing a camera to monitor transit vehicles and waiting areas, and other strategies for crime prevention through environmental design (Zelinka and Brennan,

2001; Orozco-Fontalvo et al., 2019; King et al., 2021). On the other hand, public education campaigns that highlight the environmental benefits of using PT (e.g., using PT can reduce greenhouse gas emissions and air pollution that is not just good for the environment but also improves air quality and human health) can be implemented to attract new users.

There are several limitations. Firstly, the study was conducted in two cities in Vietnam where bus services were the unique official PT mode, so the findings might not be appropriate for all cases. In addition, participants' behaviour reflects the infrastructural and traffic conditions of Vietnam. Further studies should be conducted in other high-income nations to generalise the results. Secondly, this study focused on bus users; hence, the study should be carried out with passengers from different PT modes such as trains or trams to confirm the findings. Thirdly, a deliberate choice was made to focus on a limited number of constructs in this study, aiming to maintain simplicity and provide a practical framework suitable for use by PT managers. Future research can address this limitation by adding some other constructs such as satisfaction, perceived service quality or involvement. Finally, the sample may not accurately represent the entire population of bus users owing to a dearth of data on bus ridership in Vietnam. In an effort to enhance the sample's representativeness, we employed a diverse set of data collection strategies to mitigate selection bias.

CRediT authorship contribution statement

Anh Phuong Tran-Thi: Writing – original draft, Data curation, Conceptualization. **Duy Quy Nguyen-Phuoc:** Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Methodology, Data curation, Conceptualization. **Tho Cao Phan:** Writing – original draft, Methodology. **Oscar Oviedo-Trespalacios:** Writing – review & editing, Writing – original draft, Conceptualization.

Declaration of competing interest

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