

FACTORS AFFECTING PRIVATE VEHICLE USERS DECISION INTENTION TO SWITCH USING KERETA REL LISTRIK (KRL)

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Abstract: In urban mobility, public transportation especially Kereta Rel Listrik (KRL) is the key to sustainable transportation for daily travel. On the other hand, higher population growth can cause travel volume to increase, especially since there is still little interest in using public transportation, causing traffic jams in the city center. This research analyzes the convenience, flexible service, and commute impedance on private vehicle users' intentions to use KRL, using quantitative descriptive methods with a population of private vehicle users from August to October. Data collection through distributing questionnaires via Google Forms. Data analysis used SEM PLS 3. 100 respondents were selected. The sampling technique used was purposive. Research shows that the three conveniences, flexible services, and travel impedance have a positive effect on turnover intention. This means that convenience, flexible service and commute impedance can increase the number of KRL passengers.

Keywords: *convenience, flexible services, commute impedance, KRL, private vehicle users*

INTRODUCTION

Encouraging public transportation, KRL is important in determining urban mobility because it offers several benefits. For example, it encouraged the use of KRL rather than private motorized vehicles. On the one hand, this reduces air pollution, noise, travel time and traffic congestion. On the other hand, encouraging physical activity or improving the urban environment positively impacts motorists' health.

Congestion is a reflection of problems that must be followed up in big cities, such as DKI Jakarta. Congestion will cause several effects that will have an impact on the environment, especially in terms of exhaust emissions (Iqbal Firdaus et al., 2023). Human needs and lifestyles that continue to develop will increase demand in transportation (Alfazri et al., 2020). Urban traffic congestion is also a problem in developing countries due to the uncontrolled and rapid increase in private vehicles. As a result, the consumption of material fuel, emissions, costs of travel, and productivity increase (Nguyen-Phuoc et al., 2021). Many communities are making significant efforts to encourage modal shifts to public transportation due to the increasing importance of congestion-related issues (Nguyen-Phuoc et al., 2021). Additionally, public transportation significantly improves social justice by allowing disadvantaged passengers to travel, such as older people, people with disabilities, and those who do not have access to private vehicles. Today, the Commuter Line is becoming a more and more reliable transportation mode for urban people to have secure, comfortable, and free-of-traffic-jam mobility. The mission is to provide Commuter Line service prioritizing safety, service, comfort, punctuality, and environmental insights (Priyanto et al., 2023).

This research focuses on people's intentions to use public transportation, in this case, KRL. Convenience, flexible service and travel barriers can play a role in contributing further to public transport use, reducing private vehicle use and encouraging a shift to public transport using sustainable methods and intermodality.

LITERATURE REVIEW

Convenience

The convenience of public transport implies two aspects of demands: perceived physical and cognitive (Gardner & Abraham, 2007). For example, physical demands mean traveling with adequate personal space, such as the availability of seats, while cognitive demands mean having control over one's movements. Need (Chi et al., n.d.) comfort drivers want comfort that can meet their social needs to ensure comfort using public transportation, such as the availability of seats, which is recognized as a desire for convenience (Kang et al., 2020). So, society wants to ensure the same comfort when using private vehicles.

Flexible Services

Quality service flexibility is considered necessary for competitiveness (Baker, 2013). Service quality is an assessment of how good a delivered service conforms to the customer expectations (Muda Kusuma et al., 2022). Quality services are also defined as the impression of a general customer on related assessments of the organization and services (Bitner, 1994). Appropriateness of service transportation shows that flexible service transportation is one more solution to problem transportation in areas of congested residents (Velaga et al., n.d.). This variable is considered vital because it will assess the quality of the services provided by KRL in traveling both in the carriage and on the station platform.

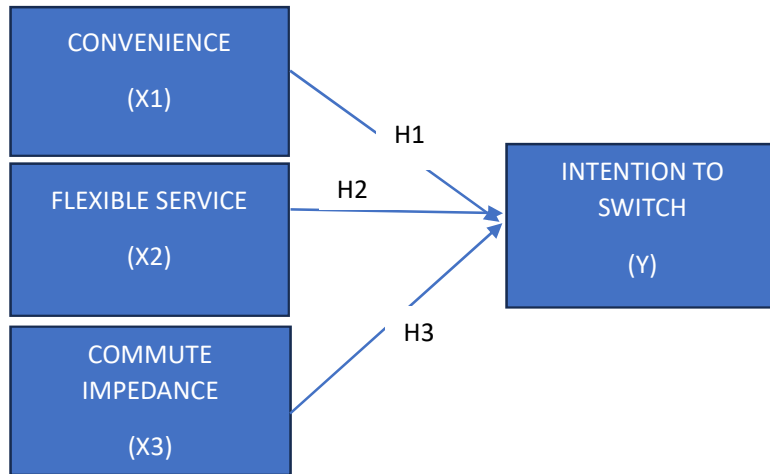
Commute Impedance

Affective or emotional responses are strong emotions certain circumstances trigger (Russell, 1987). Previous research concluded that a lack of positive energy hinders the development of self-determination motivation, which is important for taking action (De Groot & Steg, 2010). The adverse emotional disposition of traffic jams makes drivers frustrated and motivated to lower their stress levels (Schneider, 2013). In research conducted by (Kang et al., 2019a), drivers, when traveling in busy traffic lanes, may face emotionally charged scenarios known as an emotional disposition to the situation; this is caused by traffic jams, which can cause irritation and bad driving attitudes. (Kang et al., 2019b). (Kang et al., 2019a) do another study on drivers who reported that driving can cause them more stress than public transportation. Travel impedance on traffic lanes shows high congestion during travel, and traffic jams can hamper mobility.

Intention to Switch

This research focuses on a person's intention to switch to using KRL, one of the public transportation, instead of a private vehicle. This indicates that travel time problems when using private vehicles have caused people to switch to public transportation (Currie, 2008). The desired service design may vary depending on the driver's travel destination, but it can help significantly improve public transport use (Taylor et al., 2009). Streamline arrival and departure times of KRL up to fifty percent can increase the number of

passengers by up to fifteen percent, but the time factor is also influenced by the frequency of KRL arriving at the station (Borhan et al., 2019). So KRL must ensure the departure schedule is on time so private vehicle users can switch to public transportation.



- H1: Convenience has a significant effect on intention to switch.
- H2: Flexible service has a significant effect on intention to switch.
- H3: Commute impedance has a significant effect on intention to switch.

RESEARCH METHOD

Data Collection

This research uses a quantitative approach, and population data cannot be obtained with certainty because the existing data is the total number of KRL passengers for all routes. The sampling method used is probability sampling, with the technique taking purposive sampling, a survey technique that ensures an equal opportunity for each member of the population to be considered in the research sample (Sugiyono., 2017). So, the research sample of 100 KRL users was taken with unique criteria. Based on (Joseph F. Hair Jr., William C. Black Barry J. Babin Rolph E., 2014), a good sample size is around 100 - 300 respondents. Data collection techniques are carried out by distributing questionnaires and using tools analysis of SEM PLS version 3.0.

Information demographics were obtained by spreading the questionnaire to 100 respondents KRL users, and the results were as follows: As much as 56 percent manifold sex men and 44 percent manifold sex female, respondents dominated the range ages 18 to 30 years by 88 percent, respondents own jobs dominated by students at 66 percent and employees at 30 percent. It can be concluded that respondents use KRL as a means of transportation for daily mobility. This is confirmed by the specific criteria proposed to respondents as to why they use KRL, whether because the route is suitable for everyday mobility, time efficiency or cost efficiency.

Research Instruments

On research These indicators used For measure variable adapted from : (Kang et al., 2019b), (Kang et al., 2020), (Nguyen-Phuoc et al., 2021), (Tuan et al., 2022), (de Oña et al., 2021), (Mugion et al., 2018), (He et al., 2023) (Wang et al., 2021), the aim is to gain information about their travel preferences as well as suggestions for improvements. The

results of this questionnaire will provide valuable insight into efforts to improve KRL transportation services. Likert scale points are used as answer choices for respondents for 20 question items questionnaire and assuming equal distance between response objects, with Rating 1 = strongly agree, 4 = agree, 3 = neutral, 2 = no agree, and 5 = strongly disagree agree (Russell, I., & Snodgrass, 1987).

Data Analysis

The SmartPLS program was used to analyze data using the Structural Equation Modeling Partial Least Square (SEM-PLS) methodology. This method is used to establish the existence of a cause and effect relationship, determine a measurement model to validate and measure hypotheses, analyze the relationship between variables, and explain the dependent variable, which is assessed by (Luki Chrisnawan, 2019).R2

Table 1. Questionnaire indicators

Variables	Indicator	Source
Convenience (X1)	X1.1 Using a multi trip card/money card Electronics are a requirement for boarding the KRL.	(Currie and Walis, 2008)
	X1.2 There is a voice notification to provide information regarding KRL (arrival, departure schedule and transit platform.)	(Currie and Walis, 2008)
	X1.3 The KRL stops (transit) according to the information provided.	(Currie and Walis, 2008)
	X1.4 KRL provides respective information stop (transit).	(Currie and Walis, 2008)
	X1.5 KRL provides a voice message if this delays happens in departure or obstacles in the middle of the journey.	(Wen et al., 2005)
	X1.6 Security officers inside the station respond quickly to passenger complaints KRL.	(Chou et al., 2014)
Flexible Services (X2)	X2.1 This station is relatively close to residential areas.	(Eboli & Mazulla, 2011)
	X2.2 Using KRL can reduce the possibility of accidents.	(Eboli & Mazulla, 2011)
	X2.3 Using KRL can shorten travel time.	(Eboli & Mazulla, 2011)
	X2.4 Using KRL can save fuel compared to driving a private vehicle.	(Eboli & Mazulla, 2011)
	X2.5 The travel time using KRL is correct with the schedule listed.	(Beirao and Sarsfield Cabral, 2007)
	X2.6 The number of KRL trips during working hours is every 5 to 10 minutes.	(Van Lierop et al, 2018)
	X2.7 Ease of switching modes of transportation after using KRL.	(Redman et al., 2013)

Commute Impedance (X3)	X3.1	I use KRL to avoid traffic jams.	(Novaco et al., 1991)
		X3.2 I use KRL because it has a more efficient travel time.	(Novaco et al., 1991)
		X3.3 I didn't experience any traffic jams using KRL.	(Novaco et al., 1991)
Intention Switch (Y)	to Y.1	I changed to using other transportation after I finished using the KRL.	(Hsu, 2014)
	Y.2	I decided to use KRL for daily mobility.	(Hsu, 2014)
	Y.3	Most likely, I will use the KRL for mobility on weekends.	(Hsu, 2014)
	Y.4	I feel there are time and cost efficiencies in using KRL.	(Hsu, 2014)

DISCUSSION AND RESULTS

The findings from this paper show that convenience, flexible service and commute impedance are predictors of people's intention to switch to using KRL. The three predictors, namely convenience, flexible services, and commute impedance, are positively related to intention to switch. The convenient KRL service offering meets the demands of those accustomed to the comfort of private vehicles. Flexible service design provides convenience and offers services that can overcome problems arising from people's low interest in using KRL. The travel obstacles experienced by people in using private vehicles for daily mobility are also the reason they switch to using KRL.

Data from the result analysis use the SEM-PLS method, which tested 20 questionnaire indicators from Convenience, Flexible Service, Commute impedance, and Intention to Switch. The results obtained as follows:

Outer loading test

Table 2. outer loading

Indicator	Convenience	Flexible service	Commute impedance	Intention to switch
CON1	0,888			
CON2	0,875			
CON3	0,888			
CON4	0,849			
CON5	0,722			
CON6	0,819			
FS1		0,691		
FS2		0,775		
FS3		0,782		
FS4		0,767		
FS5		0,768		
FS6		0,742		
FS7		0,841		

CI1	0,890	
CI2	0,775	
CI3	0,887	
IS1		0,852
IS2		0,896
IS3		0,644
IS4		0,897

From the results above, it can be seen that of the 20 indicators there are 18 indicators whose value is above 0.70, which means that the indicator is valid for measuring the variables convenience, flexible service, commute impedance, and intention to switch.

Convergent validity test

In the initial stage, convergent validity testing was carried out in the measurement model, which was assessed by evaluating the loading indicators of the indicators – values in each configuration variation.

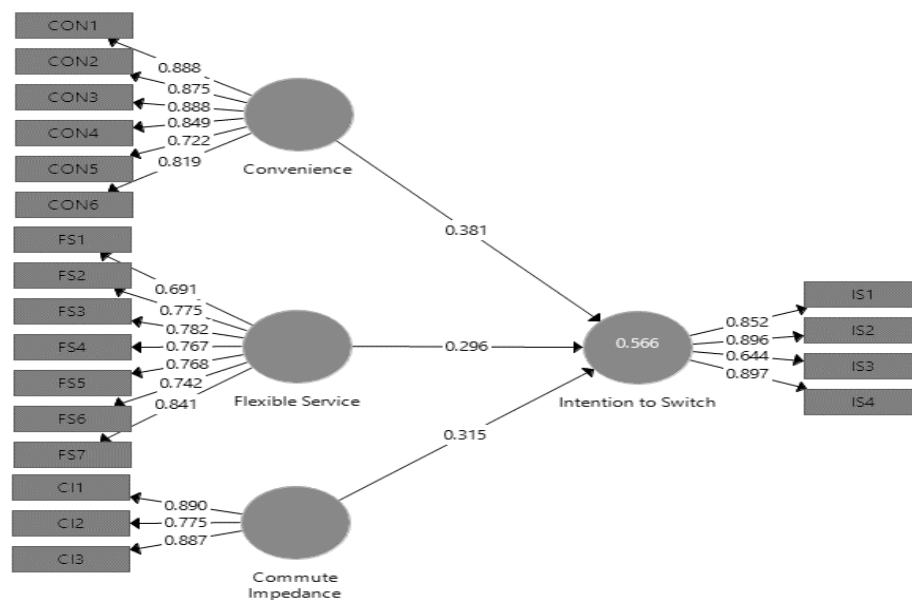


Fig. 1. Outer Model Test

Factor loadings reflect the extent of the relationship between the indicator and its construct. If the indicator loading value is low, it indicates that the indicator's contribution to measuring the construct in question is less significant. Generally, we expect this loading value to exceed 0.7 (Ghozali, 2016). Based on results from Convergent validity testing in (Fig. 1) above, 18 indicators were declared valid because their outer loading values exceeded 0.70.

Table 3. Square Root of AVE and Correlation Between 4 Variables

Variables	AVE	Root of Ave
Convenience (X1)	0.709	0.842
Flexible Services (X2)	0.590	0.768
Commute Impedance (X3)	0.727	0.852
Intention to Switch (Y)	0.687	0.829

The AVE root of each variable is more significant than its value, as shown in the table above. The results will be acceptable if there are good determinants for each variable. If the AVE value is more significant than 0.5, all variables are considered valid based on the validity test results. (Joseph F. Hair Jr. William C. Black Barry J. Babin Rolph E., 2014).

Based on the validity test results, all variables are considered valid because the AVE value has exceeded 0.5.

Reliability test

Table 4. Reliability Indikator

Variables	Composite Reliability	Cronbach's Alpha
Convenience	0.936	0.917
Flexible Services	0.909	0.884
Commute Impedance	0.888	0.810
Intention to Switch	0.896	0.844

The concept is considered reliable if the composite reliability rating exceeds 0.70 (Ghozali, 2016). This value reflects internal consistency, which means the composite reliability value shows that the indicators used to measure the construct are consistent. Reliability testing in PLS uses two methods, namely Composite Reliability and Cronbach's Alpha. As a rule of thumb, the alpha or composite reliability value must be greater than 0.7, although 0.6 is still acceptable (Joseph F. Hair Jr. William C. Black Barry J. Babin Rolph E., 2014).

It can be concluded that this concept has good reliability because the value is higher than 0.70.

R2 Test Results

The coefficient of determination, also known as R square (R²), is the square of the correlation coefficient (Joseph F. Hair Jr. William C. Black Barry J. Babin Rolph E., 2014). To see the extent of the influence of the independent variable on the dependent variable, refer to the model summary table below. The R-Square value is classified as strong if it exceeds 0.67, as moderate if it is more than 0.33 but less than 0.67, and as weak if it exceeds 0.19 but less than 0.33

Table 5. R Square

Variables	R square	R square adjusted	Results
Intention to Switch	0.566	0.553	Moderate

Table 5 shows that variable Y has an adjusted R² value of 0.553, indicating the influence of the Convenience, Flexible Service, and Commute Impedance variables on Intention to Switch is 55%.

Q-squared shows the suitability of the structural model as follows:

$$Q^2 = 1 - (1 - 0.553) = 0.553$$

The Q-squared obtained is 0.553. Because it is higher than 0, the model is proven to have predictive relevance with a strong value.

Hypothesis Test

The final step is to evaluate the regression coefficients of all mutually influential relationships between variables. Hypothesis testing is carried out by determining the significance level, namely 5% and a hypothesis is considered valid if the calculated T exceeds 1.980 and the p-value is less than 0.05. then the regression coefficient is considered significant and shows a relationship between one variable and another (Joseph F. Hair Jr. William C. Black Barry J. Babin Rolph E., 2014).

The following is the regression coefficient value of each independent variable on the tested variable listed in the table below.

Table 6. Path Coefficients

Path		Original sample	T statistic	P value	Results
Convenience	->	0.381	4,061	0,000	Acceptable
Intention to Switch (H1)					
Flexible service	->	0.296	3,346	0.001	Acceptable
Intention to Switch (H2)					
Commute Impedance	->	0.315	3,304	0.001	Acceptable
Intention to Switch (H3)					

The data in the table above shows that the variables Convenience, Flexible Service, and Commute Impedance significantly influence Intention to Switch. The T-calculated value of all variables exceeds the value of 1.980, which shows that each variable strongly affects the Intention to Switch. The P Values show less than 0.05, which means that the three hypotheses in this research are valid and significant.

CONCLUSION

Based on the results and data analysis, comfort, service flexibility, and travel impedance significantly influence private vehicle users' intention to switch. This study shows results that are in line with previous research Carried out by Kang et al. (2019), research regarding drivers' psychological and affective aspects is equally important to influence people's intention to switch and their behavioral readiness to adopt public transportation willingly. This means that people's intention to use KRL is significantly influenced by convenience and the variable, flexible services provided by KRL, and barriers to private vehicle travel significantly influence intention to switch. In context, KRL provides convenience and flexible service. By Using a multi trip card/money card Electronics are a requirement for boarding the KRL as the indicator that has the highest value in the

convenience variable, Ease of switching modes of transportation after using KRL as the indicator with the highest value in the flexible service variable, use KRL to avoid traffic jams as the indicator with the highest value on the commute impedance variable, and there are time and cost efficiencies in using KRL as the indicator with the highest value on the intention to switch variable.

IMPLICATIONS

The implications of research regarding convenience, flexible services, and travel barriers on intention to switch have relevant data for society in considering the use of KRL and the development of KRL services. It is hoped that the findings from this research will encourage a shift from private vehicle users to overall KRL users, with the following implications :

1. Convenience in using KRL has significant implications for the travel experience and urban mobility. When KRL provides comfortable and user-friendly facilities, people will tend to switch from private vehicles, which, in the end, can reduce traffic congestion. This means more people can experience the benefits of efficient public transport, with shorter journey times and more affordable costs. In addition, comfort on board KRL can increase productivity because passengers can use travel time to work, read, or relax without worrying about driving or traffic jams. However, if the KRL is uncomfortable, This can reduce people's interest in using public transportation, worsening congestion and environmental problems. Therefore, it is important to prioritize comfort in using KRL by providing good facilities, sufficient space and reliable schedules. Furthermore, convenience in KRL can enhance the quality of life image in large cities with efficient transportation systems. It also impacts the physical and mental well-being of passengers.
2. Private vehicle users have expressed impulsive needs to travel to certain places that trigger spontaneous trips. This phenomenon can be overcome by offering more KRL routes to fulfil people's whimsical travel intentions. The availability of KRL and its daily service routes is the focus here. Government endeavors give new ways for People's impulsive mobility. Generally, flexible services (providing new travel routes) result in more trips. Construction of new stations allows focus on the availability of flexible service, based on the needs of private vehicle users who require it route yet available preference primary private vehicle users towards flexible KRL services including new ways.
3. Travel barriers, especially those related to the use of private vehicles, have various implications that can affect society, the environment and the economy. One of the most striking implications is related to mobility and people's quality of life. Chronic traffic jams can cause increased stress and discomfort for individuals who have to spend long hours commuting. This can also impact productivity when people are late for work or their destination. Limited mobility can also hinder access to health services, education, and economic opportunities. In the long term, these costs can reduce people's purchasing power. In addition, traffic jams can hinder the mobility of goods and services, disrupt supply chains, and increase logistics costs, ultimately reducing business productivity. Therefore, steps need to be taken to improve

transportation efficiency, reduce vehicle emissions, and support sustainable alternatives such as KRL to overcome the implications of travel barriers. Efforts to overcome travel barriers will positively impact people's quality of life, environmental health, and economic stability, creating a more sustainable and competitive society. Furthermore, the intention to switch to KRL has practical implications that can influence transportation policies. If the public exhibits a strong desire to transition to KRL, the government can allocate more budget for the expansion and improvement of the KRL system, including increasing frequency, safety, and comfort. This can also promote investments in a broader KRL infrastructure. Additionally, companies operating KRL may consider promotional and marketing programs to encourage the public to opt for public transportation, such as offering attractive discounts or travel packages to stimulate the growth of KRL usage.

RESEARCH LIMITATIONS

The researcher's experience moment do research, and there are several perceived limitations, so it can be made attention for researchers in the future so that you can increase quality research. There were several limitations of the study, like from facet approach data collection, problems such as respondent bias, difficulties in understanding questions, and different conditions participants the survey did not the same with the moment fill-in question. Furthermore, it is hoped that researchers can add more samples a lot. Knowing the limitations of the research helped the researcher further develop knowledge in field transportation with repair methodology, more accurate analysis and more understanding of factors influencing factors and intention For switch using KRL.

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