# Factors affecting commuters' intentions in using park and ride (P&R) facilities based on theory of planned behavior

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**Abstract**. Park and Ride (P&R) is a form of transportation demand management closely related to commuting activities. Several developed countries, such as the UK, Canada, China, and Hong Kong, have already implemented P&R with a high level of effectiveness and success in overcoming the congestion problems in the city center, low use of public transportation, and air pollution. However, in developing countries, the various positive impacts of P&R still have not been able to encourage commuters' intentions to use these facilities. As a result, the level of P&R use at Sidoarjo Station is still relatively low (44.3%). Behavioral is one of several keys to the success of P&R that depends on intention and ability. The intention is the result of knowledge, social, and infrastructure that can support the use of public transport and P&R. This study aims to identify factors that can influence commuters' intentions to use P&R at Sidoarjo Station based on the theory of planned behavior using SEM analysis. The results showed that P&R and public transportation conditions as perceived behavioral control were the most influential factors on commuter intentions. Therefore, the conditions of public transportation (including availability and location) and the quality of P&R facilities are essential considerations for commuters using P&R.

## 1. Introduction

Transportation is one of the keys to the development of a region [1]. Along with the increasing population and the level of the community's economy, the number of private vehicle users from year to year continues to increase. The comparison between the number of transportation needs inversely proportional to the availability of proper and adequate transportation facilities causes various transportation problems, such as traffic congestion and air pollution [2]. Besides limited infrastructure, transportation problems are also caused by the lack of sustainable transportation innovation, especially in developing countries [3]. Based on Fajar & Djunaedi [4], big cities in Indonesia still use the old or conventional transportation planning paradigm, namely widening roads without being accompanied by sustainable transportation innovations, especially to meet the needs of people's movements. There are several problems with urban transportation, including a limited public transportation network and lousy quality of public transportation services, so the use of private vehicles is the only access for people in sub-urban areas to go to the city center [5]. This condition causes a low use of public transportation for commuters in Indonesia. 78% of urban people prefer private vehicles to public transportation [6].

Surabaya is the capital and economic center in East Java Province, one of the destinations for workers outside the Surabaya City area. Based on BPS, the number of commuters in Surabaya in 2018 reached 169,560 people. The area of origin that contributes the most significant percentage of commuters is the Sidoarjo Regency, with 40% or as many as 109,351 people of the total commuters in Surabaya. Along with the increasing number of commuters, Surabaya has several alternative modes of transportation to move commuters from Sidoarjo to Surabaya, one of which is a commuter train with a large carrying capacity and short travel time [7]. However, based on the 2019 KAI Passenger Data, the level of use of commuter trains in Sidoarjo Regency is still relatively low, which is only 3,176 people using commuter trains out of 109,351 inhabitants of the total number of Sidoarjo people who are active in Surabaya. Therefore, it impacts the congestion level on the Sidoarjo - Surabaya connecting road, which ranges from 0.90 to 1.58 [8].

The government has made various efforts to increase the use of public transportation for commuters. There is a plan based on RPJMD Surabaya 2021 – 2026 to strengthen connectivity and accessibility to support the development of the Gerbangkertasusila Metropolitan Area. One of the plans is in the form of public transportation development for the Gerbangkertasusila Metropolitan Area, which consists of the Surabaya Regional Railway Line and the Surabaya LRT. The construction of the Surabaya Regional Railway Line will connect Surabaya to Sidoarjo and become an alternative mode of transportation that can accommodate the needs of commuters. Departing from this issue, the East Java Provincial Government began to develop a plan to provide supporting facilities for public transportation, such as Park and Ride.

Park and Ride (P&R) is a form of TDM in the improved transport option category in the form of parking facilities integrated with the public transportation network [9]. P&R facilities can reduce traffic congestion, increase the use of public transportation, and reduce parking areas in the city center [9]–[11]. P&R is synonymous with commuter activities because these facilities can be a liaison between the sub-urban area and the city center and function as a transfer node that can distribute travel demand [4]. P&R has many positive impacts on facilitating the demand for public transport and helping to reduce the number of trips within an area [12].

Sidoarjo Station has the potential for developing P&R facilities because Sidoarjo Station is the largest origin station in the Sidoarjo Regency, with an average number of 1,200 passengers per day [7]. The various positive impacts of P&R still have not been able to encourage commuters to switch to using public transportation and use these facilities. Based on the findings of research conducted by Irawati [13], in existing conditions, the probability of commuters from Sidoarjo - Surabaya who wants to move using commuter trains through the use of P&R is relatively low, at 44.3%. The low probability is caused by several factors, including the low quality and quantity of public transportation, the high cost, and the absence of a supportive transportation policy. On the other hand, the low use of P&R can also be influenced by people's behavior which is shaped by intention and ability. This condition is related to public acceptability, one of the important aspects of the success of sustainable transportation planning [3]

Behavioral is one of several keys to the success of P&R that depends on intention and ability. The intention is the result of knowledge, social, and infrastructure that can support the use of public transport and P&R. The commuter must have a positive attitude towards P&R and support by public transport conditions, parking facilities, and transportation policies to encourage the intention of commuters to use P&R [14]. This condition is expected to increase the probability of commuters using public transportation via P&R to 82.91% [13].

In line with this, Parkhurst [15], in his findings, explains that implementing sustainable transportation strategies must be accompanied by changes in people's mindsets and habits, especially in developing countries. Therefore, it is essential to discuss a person's motivation and behavior related to using P&R. However, the current state of the COVID-19 pandemic impacts public transportation. Javid et al. [16] and Zhang et al. [17] explained that there was an increase in passenger anxiety because they considered public transportation to have a high risk of being exposed to the COVID-19 virus. Therefore, apart from implementing the social restriction policy, there was a 43% decrease in the number of public

transportation users in East Java. This condition is one of the transportation challenges that need to be faced by urban areas, especially areas with a high level of mobility because these conditions will also affect the use of public transportation and P&R facilities in the future.

Many developed countries already used P&R, such as the UK, Canada, China, and Hong kong. The existence of these facilities is considered successful in reducing congestion in the city center and increasing the use of public transportation. In addition, the implementation of P&R also has a good level of public acceptability as an early stage in efforts to increase the use of public transportation in line with the plan to develop an integrated public transportation network [2], [18], [19]. Many studies have discussed P&R planning in developed countries, but research on P&R planning in developing countries is still limited. Most research also only focuses on parking characteristics and public transportation conditions separately. However, only a few studies were found discussing the relationship between these two aspects and people's behavior towards the intention to use P&R facilities [9], especially during the COVID-19 pandemic.

In his previous research, Ibrahim [9] tried to examine people's intentions using P&R based on the theory of planned behavior using several variables, including attitudes, subjective norms, perceived behavioral control, and beliefs. However, this research has not accommodated the condition of public transportation as a research variable. The condition of public transportation is the main consideration of the community in carrying out travel activities and determining the mode of transportation. Guarantees regarding the availability of public transportation and good service quality are factors that encourage people to use public transportation and P&R [1], [10]. In addition, the quality of the P&R facilities offered is also an important consideration. The availability of public transportation and P&R conditions can be a perceived behavioral control because these facilities' existence can affect a person's attitude and behavior [20]. Perceived behavioral control is an individual's beliefs about factors that can facilitate or hinder behavioral performance [21]. Several studies that have been conducted have only been able to determine the effect of all dependent variables on commuter intentions, so they cannot examine the possible interactions between dependent variables that can affect people's intentions to use P&R [3], [4], [22].

Therefore, this research is essential to find out and examine more deeply the community's behavior towards the use of P&R facilities in commuters based on the Theory Of Planned Behavior (TPB) using SEM analysis. The respondent's determination is that commuters have a high level of mobility between regions and are the main targets of P&R planning. The Theory of Planned Behavior (TPB) is one of the most widely used models to study the choice of travel modes [20]. The three main factors in the TPB, namely attitude, subjective norm, and perceived behavioral control, produce an intention to behave, take action, or anything that can guide a person's behavior. In this context, to arouse the motivation or intention of commuters to use P&R, the commuter must have a positive attitude towards public transportation and P&R, supported by the surrounding environment, and can use P&R (supported by public transport conditions, parking facilities, and transportation policies). SEM analysis is expected to overcome the shortcomings of previous research to determine the dependent variable that can affect the commuter's intention to use P&R and determine the relationship between the dependent variables. This research is important to be carried out as study material for P&R planning, which is one form of sustainable transportation to overcome the problem of the low use of public transportation and traffic congestion at regional borders due to commuter activities in the future.

## 2. Material and Methods

### 2.1. Data collection

The location of this research is in Sidoarjo Regency, especially in the Sidoarjo Station area. Data collection in this study was obtained from online distributing questionnaires to commuters in Sidoarjo - Surabaya as the population in the study. The data were collected over two weeks in March 2022 and received responses from 150 commuters. The sample size of commuters from Sidoarjo – Surabaya was appropriate or more than the minimum sample size recommendation based on Hair et al. [23], which

uses the maximum number of arrows in one construct as a reference in determining the minimum sample requirement. The maximum number of arrows in one construct is the highest number of indicators in one variable. In this study, the highest number of indicators was eight, namely the perceived behavioral control variable. This study uses a significant level of 5% with a minimum $R^2$ of 0.1, so the minimum sample size required is 144 samples.

### 2.2. Research instruments and measurements

The research method used is quantitative research. There are five research variables obtained through the study of literature. The five variables consist of several indicators and are measured using a Likert scale, ranging from 1 = "strongly disagree" to 5 = "strongly agree." In addition, questions related to the characteristic of commuters (gender, age, education, and occupation) and those related to the use of the mode of transportation were also included. The PLS-SEM model in this study consists of five constructs of variables and twenty-two items or indicators that identify the factors that influence commuters' intention to use P&R based on the theory of planned behavior. Variables and indicators were obtained from literature studies and modified according to the research objectives to identify factors influencing commuters' intentions to use P&R during the covid-19 pandemic. Intention to use P&R influenced by attitude consist of three items [6], [9], [24], [25], subjective norm consist of three items [6], [24], [26], perceived behavioral control, including P&R and public transportation conditions that consist of eight items [1], [5], [17], [27]–[30], policy, including vehicle use restrictions, parking restrictions in city center, and the use of public transportation during the covid-19 pandemic that consist of six items [15], [21], [31], [32], and intention to use P&R [6], [9], [24].

**Table 1.** Research Variables

| Variable | Indicator | Parameter | Source |
|---|---|---|---|
| Attitude | **A1**. Using P&R is a good idea | 1= Very disagree<br>2= Disagree<br>3= Neutral<br>4= Agree<br>5= Strongly agree | [6], [9], [24], [25] |
| | **A2**. Using P&R provides many advantages | | |
| | **A3**. Using P&R support public transportation use behavior | | |
| Subjective Norm | **SN1**. People closest to me use P&R | 1= Do not know<br>2= No<br>3= Yes | [6], [24], [26] |
| | **SN2**. People who are my role models use P&R | | |
| | **SN3**. People important to me recommend using P&R | | |
| Perceived Behavioral Control | **PBC1.** P&R's location is strategic and easy to access | 1= Very disagree<br>2= Disagree<br>3= Neutral<br>4= Agree<br>5= Strongly agree | [1], [5], [17], [27]–[30] |
| | **PBC2.** Plenty of available parking capacity | | |
| | **PBC3.** P&R has good service quality | | |
| | **PBC4.** The security and safety in P&R | | |
| | **PBC5.** The availability of parking spaces information | | |
| | **PBC6.** Availability of public transportation | | |
| | **PBC7.** Cleanliness of public transportation during the covid-19 pandemic | | |
| | **PBC8.** The public transportation conditions around P&R during the covid-19 pandemic made it easier for me to use P&R | | |

| | | | |
|---|---|---|---|
| Policy | **P1**. The implementation of the vehicle use restriction policy hindered my trip | 1= Very disagree<br>2= Disagree<br>3= Neutral<br>4= Agree<br>5= Strongly agree | [15], [21], [31]–[33] |
| | **P2**. The implementation of the vehicle use restriction policy encourages me to use P&R | | |
| | **P3**. The implementation of a parking restriction policy in the city center makes it difficult for me | | |
| | **P4**. The implementation of a parking restriction policy in the city center encourages me to use P&R | | |
| | **P5**. The policy of public transportation during the covid-19 pandemic has been implemented properly | | |
| | **P6**. The implementation of public transportation policy during the covid-19 pandemic encourages me to use P&R | | |
| Intention To Use P&R | **I1**. I want to use P&R | 1= Do not know<br>2= No<br>3= Yes | [6], [24], [26] |
| | **I2**. I will use P&R | | |

## 2.3. Analysis

The data obtained from data collection will be analyzed using Structural Equation Model (SEM). A structural Equation Model (SEM) is a combination of multivariate statistical techniques (factor analysis and regression) which aims to examine the relationship between variables in a model, both between indicators and constructs or relationships between constructs [6]. Based on Hair et al. [23], there are two types of structural equation modeling, namely covariance-based (CB-SEM) and variance-based (PLS-SEM). This study uses PLS-SEM to identify the factors influencing the commuter's intention to use P&R and the interrelationships between the variables. The PLS-SEM model is the result of a combination between theory and logical reasoning. There are two-step approaches in PLS-SEM, namely the measurement and structural models. First, the evaluation of the measurement model using a reflective approach is carried out by evaluating the value of outer loading, construct reliability and validity (CR and AVE), and discriminant validity.

Meanwhile, the measurement model using a formative approach is carried out by evaluating the collinearity level of the VIF value and measuring the significance level of the outer weight and outer loading values. Structural model evaluation is generally more accessible, as seen from the t-statistical value and p-value, which show the significance level between one latent variable and other variables. The measurement and structural models were evaluated according to Hair et al. [34].

## 3. Result and Discussion

### 3.1. Characteristics of Sidoarjo - Surabaya commuters

Sidoarjo Regency is one of the cities in the Gerbangkertasusila Metropolitan Area, with the City of Surabaya as the center of its activities. One of the impacts of this condition is the high number of commuters in the Sidoarjo Regency, along with the increasing number of jobs available in Surabaya. A commuter has a pattern of moving from one point to another without having the intention of settling down. The move is often motivated by education and work. In this study, the commuters are workers who live in Sidoarjo and work in Surabaya using private vehicles (cars and motorcycles). Data collection

regarding the characteristics of commuters in Sidoarjo – Surabaya was conducted through questionnaires distributed online to 150 commuters in Sidoarjo - Surabaya.

**Table 2.** Characteristic Of Respondents

| Variable | Characteristic |
|---|---|
| Gender | 73% Male; 27% Female |
| Age | 4% Less than 20 years old; 37% 20 – 30 years old; 31% 30 – 40 years old; 20% 40 – 50 years old; and 8% More than 50 years old |
| Education | 7% Junior High School; 31% Senior High School; 19% Diploma I/II/III; 34% Undergraduate; 9% Graduate, and 2% Postgraduate |
| Occupation | 7% Students; 15% Government Employees; 34% Private Sector Employees; 12% Teachers or Lecturers; 10% Trader, 14% Entrepreneur; and 5% Others |
| Use of Transportation Modes | 72% Motorcycle Users; 28% Car Users |

The questionnaire results show that commuters from Sidoarjo – Surabaya are dominated by motorcycle users by 72% and males by 73%. The average Sidoarjo – Surabaya commuter is 20 to 30 years old. This condition shows that most of the commuters from Sidoarjo – Surabaya are of working productive age. Meanwhile, from the type of work and education level, most of the commuters from Sidoarjo – Surabaya have the latest undergraduate education level and work as private employees. In addition, in the characteristics of transportation modes, identification of the number of vehicle ownership for Sidoarjo – Surabaya commuters is also carried out, both two-wheeled vehicles (motorcycles) and four-wheeled vehicles (cars).

**Table 3.** Number of Vehicle Ownership in Sidoarjo - Surabaya Commuters

| Types of Transportation Modes | Number of Vehicles (Unit) | | | | Total |
|---|---|---|---|---|---|
| | 0 | 1 – 2 | 3 – 4 | More Than 4 Units | |
| Car | 48 | 93 | 9 | 0 | 150 |
| Motorcycle | 20 | 100 | 28 | 2 | 150 |

The average Sidoarjo – Surabaya commuter has two types of vehicles, namely cars and motorcycles, with a total of 1 – 2 vehicle ownership units per vehicle type. As many as 67% of the commuters from Sidoarjo – Surabaya have 1-2 units of motorbikes, and 62% have 1-2 units of cars. This condition shows that the average vehicle ownership of commuters in Sidoarjo – Surabaya is still relatively high compared to commuters in several other developed countries, such as Singapore, Japan, and Germany.

*3.2. Measurement Model*

The measurement model is a model that contains the relationship between the latent variable and its indicators. There are two ways to measure a latent variable: reflective and formative [23]. The first stage in evaluating the measurement model using a reflective approach is the value of the outer loading on each indicator. Based on Hair et al. (2019), the outer loading on each indicator must at least have a value above 0.708. The results showed that of the 14 existing indicators, 13 indicators were following the PLS-SEM standard because they had an outer loading above 0.708 (Table 2). Therefore, it shows that these indicators can explain the latent variable by more than 50%, which can be said to be reliable. In addition, from the measurement results, there is one indicator with an outer loading value below

0.708, namely the SN3 indicator (0.592). Therefore, it is necessary to eliminate the SN3 indicator to obtain a better model.

The results of the research findings explain that the subjective norm variable shows that of the three indicators, the SN3 indicator does not affect the commuter's intention to use P&R. Meanwhile, SN1 and SN2 influence commuters to use P&R at Sidoarjo Station. This condition is in line with Brohi et al. [24], which state that the role of someone considered necessary, close, or professional influences a person's intention to take specific actions. In this study, the intentions of the Sidoarjo - Surabaya commuters cannot be formed simply through one-way direction but need to be accompanied by evidence through actions taken by people in the surrounding environment, which indirectly creates a "pressure" that can lead to an urge to take action. Based to Ingvardson & Nielsen [37], the behavior of people in the surrounding environment can form a social norm that can indirectly encourage the formation of certain attitudes or actions. In this context, the use of P&R. The results give an alternative solution to increase the use of P&R among commuters, namely through socialization and promotion, as well as activities that can shape people's behavior, such as the pro-public transportation movement and the environment-friendly movement.

Furthermore, the second stage in evaluating the measurement model is to test the reliability and validity of the model through the value of consistency reliability (CR) and AVE. Based on Hair et al. [34], the standard CR value is more than 0.7, and the AVE value is above 0.5. Table 2 shows that the four latent variables have CR values above 0.7 and AVE above 0.5, namely attitude (CR: 0.844; AVE: 0.664), subjective norm (CR: 0.775; AVE: 0.540), policy (CR :0.929; AVE:0.688), and intention (CR:0.947; AVE:0.899), so it can be said that the model is reliable and valid. The last stage is the measurement of discriminant validity through the HTMT value. In this study, when referring to the PLS-SEM standard based on Hair et al. [34], the value of HTMT in a PLS-SEM model is less than 0.90 because the theory about P&R is still quite limited. The result shows that four latent variables have met the standard HTMT value of less than 0.90. It explains that all latent variables in the PLS-SEM model of this study are valid.

**Table 4.** Measurement Model Evaluation with Reflective Approach

| Variable and Indicator | Outer Loading | CR | AVE |
|---|---|---|---|
| *Attitude* | | 0,844 | 0,664 |
| **A1**. Using P&R is a good idea | 0,854 | | |
| **A2**. Using P&R provides many advantages | 0,803 | | |
| **A3**. Using P&R support public transportation use behavior | 0,747 | | |
| *Subjective Norm* | | 0,775 | 0,540 |
| **SN1**. People closest to me use P&R | 0,840 | | |
| **SN2**. People who are my role models use P&R | 0,751 | | |
| **SN3**. People important to me recommend using P&R | 0,592 | | |
| *Policy* | | 0,929 | 0,688 |
| **P1**. The implementation of the vehicle use restriction policy hindered my trip | 0,874 | | |
| **P2**. The implementation of the vehicle use restriction policy encourages me to use P&R | 0,890 | | |
| **P3**. The implementation of a parking restriction policy in the city center makes it difficult for me | 0,833 | | |

| Variable and Indicator | Outer Loading | CR | AVE |
|---|---|---|---|
| **P4**. The implementation of a parking restriction policy in the city center encourages me to use P&R | 0,795 | | |
| **P5**. The policy of public transportation during the covid-19 pandemic has been implemented properly | 0,830 | | |
| **P6**. The implementation of public transportation policy during the covid-19 pandemic encourages me to use P&R | 0,745 | | |
| ***Intention*** | | **0,947** | **0,899** |
| **I1**. I want to use P&R | 0,953 | | |
| **I2**. I will use P&R | 0,944 | | |

The first step in evaluating the measurement model using a formative approach is to see the level of collinearity of the model's VIF value. Based on Hair et al. [34], the standard VIF value is below 3. Therefore, indicators with a VIF value of more than three must be reduced or eliminated to obtain better model accuracy. For example, table 3 shows that 7 of the eight indicators have a VIF value of less than 3, while the other 1 has a VIF value above 3, namely PBC1 (VIF: 4,939), which indicates multicollinearity. Therefore, based on the collinearity level test, it is necessary to eliminate the PBC1 indicator.

Next, in the second stage, measuring the level of significance seen through the p-value on the outer weight. Measurements in the second stage are carried out after the bootstrapping process. A p-value of less than 0.05 indicates that the indicator significantly influences the latent variable. Indicators with a p-value of more than 0.05 will be eliminated [23]. However, this indicator can still be maintained if it has an outer loading value of more than 0.50. Based on this explanation, out of the eight indicators, 6 of them are significant, while the other two indicators, namely PBC1 and PBC7, have values above 0.05. When referring to the PLS-SEM standard based on Hair et al. [23], the PBC1 indicator needs to be eliminated because it is insignificant and has an outer loading value of less than 0.50.

**Table 5.** Measurement Model Evaluation with Formative Approach

| Variable and Indicator | Outer Loading | Outer Weight | VIF | P-Value |
|---|---|---|---|---|
| ***Perceived Behavioral Control*** | | | | |
| **PBC1.** P&R's location is strategic and easy to access | 0,012 | 0,236 | 4,939 | 0,446 |
| **PBC2.** Plenty of available parking capacity | 0,850 | 0,569 | 1,746 | 0,010 |
| **PBC3.** P&R has good service quality | 0,872 | 0,463 | 2,762 | 0,033 |
| **PBC4.** The security and safety in P&R | 0,743 | 0,161 | 2,788 | 0,044 |
| **PBC5.** The availability of parking spaces information | 0,530 | 0,173 | 2,369 | 0,037 |
| **PBC6.** Availability of public transportation | 0,470 | 0,140 | 2,939 | 0,035 |
| **PBC7.** Cleanliness of public transportation during the covid-19 pandemic | 0,598 | 0,320 | 1,720 | 0,104 |
| **PBC8.** The public transportation conditions around P&R during the covid-19 pandemic made it easier for me to use P&R | 0,416 | 0,162 | 2,616 | 0,047 |

The literature studies explain that the location of P&R is one of the factors that can affect the level of use of P&R. But, in some cases, especially for commuters, the availability of public transportation and adequate parking capacity has a more significant influence than the location in influencing commuters' intentions to use P&R. [27], [31], [38]. Therefore, the PBC1 indicator (strategic and easily accessible P&R location) can be eliminated by evaluating the measurement model and the literature study. Meanwhile, from the results of the measurement model evaluation, the PBC7 indicator is still maintained because even though it is not significant, the indicator has an outer loading value of more than 0.50, which is 0.598. This condition is also reinforced by the Covid-19 pandemic, which causes changes in people's behavior in mode selection activities, where cleanliness is one of the essential aspects that people consider when using public transportation during the pandemic [16], [17], [39].

In the initial PLS-SEM model, there are five variables and 22 indicators. Based on the measurement model results, using both reflective and formative approaches, several indicators need to be eliminated because they are not following PLS-SEM standards. The indicators that need to be reduced are SN3, PBC7, and PB8. So out of 22 indicators, only 19 will be used in the final model. Furthermore, measurement model evaluations were carried out in the final model to determine the suitability of the PLS-SEM model.

**Table 6.** Final Measurement Model Evaluation with Reflective Approach

| Variable and Indicator | Outer Loading | CR | AVE |
|---|---|---|---|
| *Attitude* | | 0,844 | 0,664 |
| **A1**. Using P&R is a good idea | 0,855 | | |
| **A2**. Using P&R provides many advantages | 0,808 | | |
| **A3**. Using P&R support public transportation use behavior | 0,741 | | |
| *Subjective Norm* | | 0,824 | 0,701 |
| **SN1**. People closest to me use P&R | 0,850 | | |
| **SN2**. People who are my role models use P&R | 0,825 | | |
| *Policy* | | 0,929 | 0,688 |
| **P1**. The implementation of the vehicle use restriction policy hindered my trip | 0,872 | | |
| **P2**. The implementation of the vehicle use restriction policy encourages me to use P&R | 0,889 | | |
| **P3**. The implementation of a parking restriction policy in the city center makes it difficult for me | 0,826 | | |
| **P4**. The implementation of a parking restriction policy in the city center encourages me to use P&R | 0,796 | | |
| **P5**. The policy of public transportation during the covid-19 pandemic has been implemented properly | 0,835 | | |
| **P6**. The implementation of public transportation policy during the covid-19 pandemic encourages me to use P&R | 0,749 | | |
| *Intention* | | 0,947 | 0,899 |
| **I1**. I want to use P&R | 0,952 | | |
| **I2**. I will use P&R | 0,944 | | |

**Table 7.** Final Measurement Model Evaluation with Formative Approach

| Variable and Indicator | Outer Loading | Outer Weight | VIF | P-Value |
|---|---|---|---|---|
| *Perceived Behavioral Control* | | | | |
| **PBC2.** Plenty of available parking capacity | 0,858 | 0,575 | 1,744 | 0,858 |
| **PBC3.** P&R has good service quality | 0,881 | 0,461 | 2,693 | 0,881 |
| **PBC4.** The security and safety in P&R | 0,745 | 0,189 | 2,748 | 0,745 |
| **PBC5.** The availability of parking spaces information | 0,527 | 0,189 | 2,778 | 0,527 |
| **PBC6.** Availability of public transportation | 0,481 | 0,154 | 2,830 | 0,481 |
| **PBC7.** Cleanliness of public transportation during the covid-19 pandemic | 0,596 | 0,329 | 1,715 | 0,596 |
| **PBC8.** The public transportation conditions around P&R during the covid-19 pandemic made it easier for me to use P&R | 0,412 | 0,168 | 2,615 | 0,412 |

### 3.3. Structural Model

The structural model is a model that contains latent variables to show the relationship between one variable and other latent variables. Determining the order or path relationship between latent variables is based on the literature study results. Structural model evaluation is generally more accessible, seen from the t-statistical value and p-value, which show the significance level between one latent variable and other variables. Based on Hair et al. [34], the first stage in evaluating the structural model is looking at the t-statistical value. The PLS-SEM model can be accepted if the t-statistic value is greater than the t-table value. The number of variables in this study was 5, so if using a significance value of 0.05, the t-table was 2.01505. Table 4 shows that all variables have a t-statistic value greater than the t-table, except for the relationship between the policy variable and attitude, which has a t-statistic value of 1.509 (smaller than the t-table).

Next, the evaluation looks at the p-value. The relationship between one variable and another can be significant if it has a p-value less than 0.05. The results of the structural model measurement show that six of the seven hypotheses are accepted and are significant because they have a p-value of less than 0.05. Meanwhile, the hypothesis that the policy variable affects attitude has a p-value of more than 0.05, which means it is not significant, so the research hypothesis is rejected.

**Table 8.** Structural Model Evaluation

| Variable | B | T-Value | P-Value | Description |
|---|---|---|---|---|
| *Attitude → Intention* | 0,303 | 3,193 | 0,001 | Significant |
| *Subjective Norm → Intention* | 0,489 | 5,725 | 0,000 | Significant |
| *Perceived Behavioral Control → Intention* | 0,498 | 5,327 | 0,020 | Significant |
| *Policy → Intention* | 0,266 | 2,508 | 0,012 | Significant |
| *Policy → Attitude* | 0,205 | 1,509 | 0,131 | Not Significant |
| *Policy → Subjective Norm* | 0,292 | 2,493 | 0,013 | Significant |
| *Subjective Norm → Attitude* | 0,722 | 13,025 | 0,000 | Significant |

A person's attitudes and behavior are also related to the policies that apply in an area, both written and unwritten (norms) [21]. The existence of a policy will suppress and limit a person's actions so that it can affect his attitudes and behavior. However, this is not in line with this study's findings, which

show that the policy does not affect a person's attitude and behavior. This condition can occur due to the low level of public trust in the government and the effectiveness and efficiency of the policies drawn up.

The level of public trust and acceptance is the key to successfully planning government programs. Policies that are applied equitably and fairly, accompanied by the socialization of policies to the public, can accelerate changes in attitudes and behavior. In some conditions, the role of the government as regional leaders as well as important figures who are role models for the community in disseminating policies and contributing to the implementation of policies will encourage people to take specific actions [6], [32]. The study's results indicate that the policy affects the subjective norm and can indirectly affect the attitudes and behavior of commuters. Therefore, one way to increase the use of P&R is to increase trust and public acceptance of the government and its programs. A high level of public trust can affect the condition of the community in an area and accelerate changes in attitudes and behavior. In this context are attitudes and behaviors that can encourage the use of P&R.

### 3.4. Intention commuters to use P&R in Sidoarjo Station

Research findings indicate that the intention of commuters from Sidoarjo – Surabaya to use P&R at Sidoarjo Station is influenced by several factors, including attitude, subjective norm, perceived behavioral control, and policy. If sorted based on the value of the coefficient on each variable, the perceived behavioral control variable related to the P&R condition has the most significant influence on the commuter's intention (0.498). Then continued with the variables were the subjective norm (0.489), attitude (0.303), and policy (0.266). These four variables significantly affect the intention of commuters from Sidoarjo - Surabaya to use P&R. Figure 1 shows the final result of the PLS-SEM analysis. The significance level of the relationship between variables is shown with the symbol (***), which means the hypothesis is accepted and has a p-value less than 0.05 (significant). Meanwhile, the size of their influence can see through the thickness of connecting line between latent variables: the thicker line, the more significant impact or influence.

The commuter's decision to use P&R can be influenced by one's perception of the facility, such as the knowledge and experience commuters possess to form a perception that can influence their actions. In the context of using P&R, Brohi et al. [24] explain that a person's optimistic view of the existence of a facility can encourage someone to use the facility. This statement is in line with the findings of this study which showed that attitude significantly affected commuter intentions. The better a person's view of the benefits and existence of P&R, the greater the commuter's intention to use the facility. Several indicators affect the attitude variable, namely:
1. P&R is a good innovation/idea (0.486; 0.000)
2. P&R provides many advantages (0.382; 0.000)
3. P&R supports the public transport use behavior (0.372; 0.000)

The tendency of a person to perceive P&R as innovation and a good idea in a transportation plan, the better their attitude towards the use of P&R. In addition, in line with the research of Yan [40], commuters will consider the most significant advantages when choosing the mode of transportation to be used. So the more benefits one gets from using P&R, the better one's perception and attitude towards the facility. The higher commuter's awareness of public transportation use behavior encourages the positive commuter's attitude towards P&R. A person's intention to use public transportation and P&R is also influenced by social conditions and the role of the closest people who are considered to have an important position. It tells that when someone is aware, their attitudes and behavior can be imitated by those closest to them [9]. The results showed that the subjective norm variable significantly influenced the commuter's intention to use P&R. Several indicators affect the subjective norm variable, including:
1. The closest people use P&R (0.617; 0.000)
2. People who are role models use P&R (0.576; 0.000)

The more people closest to and are role models use P&R, the better it affects the surrounding environment and encourages commuters' intentions to use P&R. The research findings indicate that the subjective norm variable influences attitude.
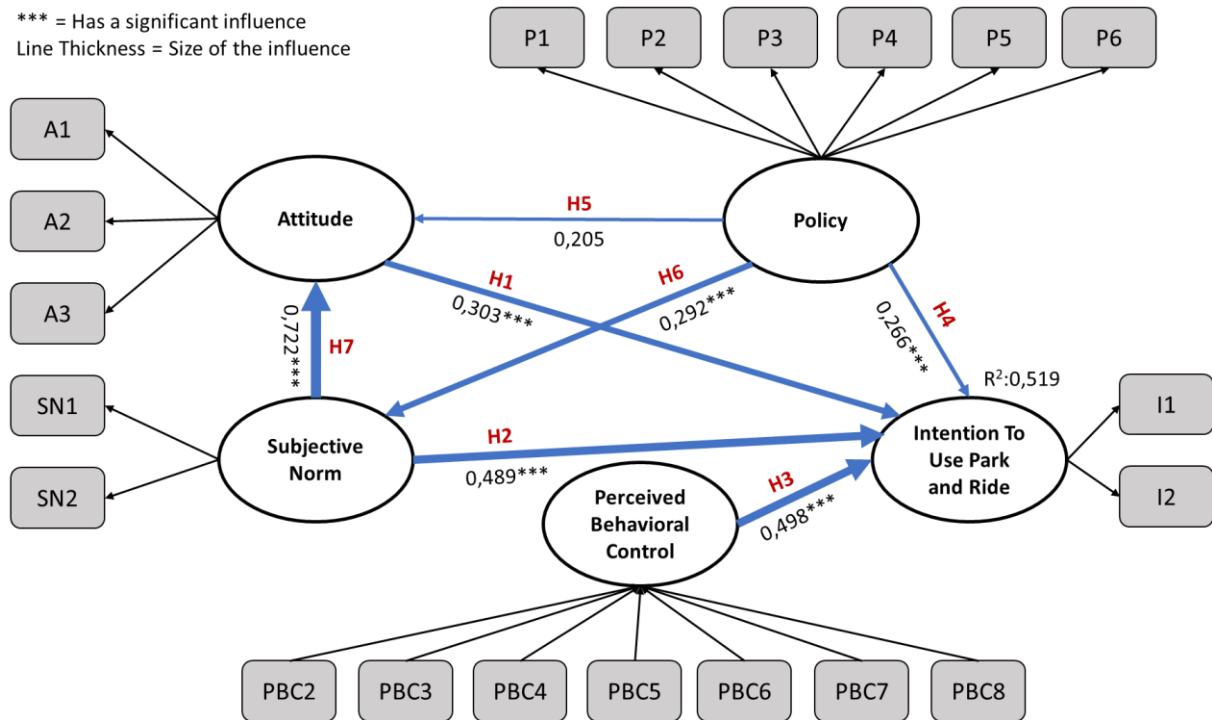
**Figure 1.** Final PLS-SEM Model of The Intention To Use P&R

The social conditions of commuters indirectly can influence their perception and encourage commuters to use P&R. On the other side, the commuter's intention to use P&R is influenced by the conditions and facilities that can encourage the formation of an attitude and behavior. In this case, the P&R itself. The perceived behavioral control variable significantly influences the commuter's intention, showing that the better the P&R condition, the greater the commuter's intention to use the facility. Several indicators influence the perceived behavioral control variable, including:

1. Plenty of available parking capacity (0.575; 0.010)
2. P&R has good service quality (0.461; 0.033)
3. Security and safety offered by P&R facilities (0.189; 0.044)
4. Information regarding the availability of parking spaces is clear (0.189; 0.037)
5. Availability of public transportation around P&R (0.154; 0.035)

The research findings explain that the success of P&R implementation is determined by several factors, including the availability of parking spaces and complementary facilities. The better the quality of P&R services, including regarding security, safety, and ease of obtaining information, the greater the public trust and satisfaction with the implementation of P&R. In addition, the availability of public transportation modes also encourages the formation of using P&R. These findings align with the research of Handaeyani & Ariyani [27] and Ibrahim et al. [9]. They say that the availability of public transportation modes is one aspect that affects the level of use of P&R. In the context of commuter travel, the availability of public transportation modes that are easily accessible with a good travel frequency becomes the primary consideration for commuters when using P&R.

Based on several studies on sustainable transportation planning, transportation policy is one aspect that can support the implementation of P&R at Sidoarjo Station. The findings show that the policy variable significantly influences the commuter's intention to use P&R. The higher the strictness of a policy, the higher the intention of commuters. In addition, the policy also influences the subjective norm variable. Applying policies in an area indirectly affects social conditions or the surrounding environment, which can also affect commuters' intentions to use P&R. Several indicators affect policy variables, including:

1.  The implementation of the vehicle use restriction policy hinders commuter travel (0.214; 0.001)
2.  The implementation of the vehicle use restriction policy encourages commuters to use P&R (0.233; 0.001)
3.  The implementation of a parking restriction policy in the city center makes it difficult for commuters (0.207; 0.004)
4.  The implementation of a parking restriction policy in the city center encourages commuters to use P&R (0.165; 0.047)
5.  The policy on the use of public transportation during the covid-19 pandemic has been appropriately implemented (0.213; 0.001)
6.  Implementation of policies on the use of public transportation following health protocols encourages commuters to use P&R (0.167; 0.046)

Furthermore, a person's attitudes and behavior, in general, are also related to the policies that apply in an area. The existence of a policy will suppress and limit a person's actions so that it can affect his attitudes and behavior. In addition, policies that are applied equitably and fairly, accompanied by the socialization of policies to the public, can accelerate changes in attitudes and behavior. If it is related to the covid-19 pandemic that has occurred since the beginning of 2019, it certainly has influenced people's behavior and perception of public transportation. The research findings show that exemplary implementation of policies can increase the public trust and encourage the intention of Sidoarjo - Surabaya commuters to use P&R. Research results also show that public transportation conditions around P&R during the covid-19 pandemic make it easier for commuters to use P&R (0.168; 0.046).

## 4. Conclusions

In achieving the success of P&R planning and other forms of sustainable transportation, infrastructure planning must be accompanied by a change in mindset and behavior, especially in developing countries. Behavioral is one of several keys to the success of P&R that depends on intention and ability. Therefore, this study aims to identify the influence of knowledge, social conditions, parking facilities, public transportation conditions, and policies on commuters' intentions in using P&R. The results indicate that the four variables significantly affect the intention of the commuter. The perceived behavioral control variable obtained the most significant influence value. This result can be interpreted that the conditions of public transportation and the quality of the P&R facilities are among the strongest driving factors for people to use P&R. The more benefits obtained, the greater the commuter's intention to use P&R. On the other hand, this solution also needs to be accompanied by the government's commitment to socializing and publishing, as well as strengthening the implementation of policies to enforce vehicle-free areas in the city center, restrictions on parking in the city center, and implementation of health protocols.

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