

Effect of Push-Pull Factors on Change in Behavior of Students' Shuttle by Using Motorcycle Case Study: Gianyar - Bali

I Made Rai Ridartha¹, Putu Alit Suthanaya², Dewa Made Priyantha Wedagama²,
Ngakan Ketut Acwin Dwijendra^{2,*}

¹Engineering Study Program, Udayana University, Denpasar, 80361, Bali, Indonesia

²Department of Doctoral Program, Faculty of Engineering, Udayana University, Denpasar, 80361, Bali, Indonesia

Received December 18, 2021; Revised January 28, 2022; Accepted March 7, 2022

Cite This Paper in the following Citation Styles

(a): [1] I Made Rai Ridartha, Putu Alit Suthanaya, Dewa Made Priyantha Wedagama, Ngakan Ketut Acwin Dwijendra, "Effect of Push-Pull Factors on Change in Behavior of Students' Shuttle by Using Motorcycle Case Study: Gianyar - Bali," *Civil Engineering and Architecture*, Vol. 10, No. 3, pp. 858-873, 2022. DOI: 10.13189/cea.2022.100309.

(b): I Made Rai Ridartha, Putu Alit Suthanaya, Dewa Made Priyantha Wedagama, Ngakan Ketut Acwin Dwijendra (2022). *Effect of Push-Pull Factors on Change in Behavior of Students' Shuttle by Using Motorcycle Case Study: Gianyar - Bali*. *Civil Engineering and Architecture*, 10(3), 858-873. DOI: 10.13189/cea.2022.100309.

Copyright©2022 by authors, all rights reserved. Authors agree that this article remains permanently open access under the terms of the Creative Commons Attribution License 4.0 International License

Abstract Transportation problems are caused by many factors. In addition to factors directly related to the transportation itself, such as traffic density, the availability of adequate public transportation, it is also influenced by other factors outside of transportation. The phenomenon of student shuttle activities using motorbikes is one of the causes of transportation problems. This phenomenon appears in almost all of Indonesia, including in Gianyar Regency. The frequency of these activities is influenced, among others, by the time schedule for teaching and learning at school (half day school) and the behavior and habits of the community in traffic. The habit of picking up students by motorcycle is getting stronger along with the low quality of public transportation services. Data collected from 14 junior high schools in Gianyar district showed that almost 48% of students were picked up by their parents using motorbikes. Meanwhile, 17.80% of students ride their own motorbikes for school activities. The consequences of these problems include congestion and the possibility of experiencing traffic accidents, inefficient use of time and costs and air pollution. On the other hand, the Gianyar Regency government has operated free student transportation #AMAN to serve students in 43 junior high schools, although its operations have not covered the entire region. The purpose of this study was to find how do push and pull strategies affect student's shuttle

activities using motorbikes? The study was conducted in 14 junior high schools with 400 respondents from parents of students. The analytical method used is SEM-AMOS. The result of this study is that there is a fairly strong influence of the pull strategy on the willingness to move using student transportation. Meanwhile, the pull strategy has a less strong influence on behavioral changes in the use of motorcycle for student's shuttle activities.

Keywords Student's Shuttle, Push and Pull Strategy, Free Student Transportation #AMAN, SEM-AMOS

1. Introduction

Traffic problems that often occur in many urban areas include the emergence of negative impacts not only on the urban environment but also on socio-economic conditions [33]. Examples of losses that can be witnessed are traffic jams and accidents, lost time due to the inefficient use of travel, air pollution and the low quality of public transportation services. Losses from the non-material side can come from the impact of traffic accidents and air pollution. The impact of traffic accidents will disrupt the survival of both victims and their families. Accident

victims, either as the backbone of the family or part of the next generation, are a burden to be borne by the victims and their families. If the victim is the backbone of the family, it will indirectly disrupt the continuity of family life. If the victim is a child as the next generation, it will lose potential assets in the future. Meanwhile, the impact of air pollution is a disturbance to health. Pollution, among others, can have an impact on breathing [2]. Pollution is not only detrimental to human health that will also cause disruption to the environment. The combustion of this fuel is the main sources of pollutants released into the air, such as CO_x, NO_x, SO_x, SPM (suspended particulate matter), O_x, and various heavy metals. Globally, the transportation sector as the backbone of human activities has a significant contribution to air pollution, 44 percent TSP (total suspended particulate), 89 percent hydrocarbons, 100 percent PB and 73 percent Nox [8, 49].

Meanwhile, material losses will occur in the economic field. Inefficient use of fuel due to congestion and inefficient travel due to increased travel time becomes a cost and time loss if all these costs are generalized (generalized cost). Many travelers ultimately choose a travel pattern and make that choice on the basis of consideration of travel costs. As an example, the decision to use toll roads instead of ordinary roads is one that is based on considerations of cost and travel time.

In order to maintain the continuity of good traffic management, it is necessary to carry out several initiatives, both those based on the transportation system and those that are not entirely a pure transportation system. Policies should be taken and developed immediately so that they can be used as breakthroughs in order to overcome the negative impacts of existing transportation problem [20].

The concept for the continuity of the movement is expected to encourage high-level service innovation, give priority to public transportation and initiate urban forms that are within walking distance and friendly to non-motorized vehicles [5]. In general, it is known that transport demand management (TDM) can be defined as an effort or an approach to reduce the number of vehicle trips with objects to use more efficient and adequate transportation facilities [17]. The TDM method designed is a pull and push strategy. The concept of pull and push strategy is to form a measure of transportation strategy where push strategy is an effort to reduce vehicle use, meanwhile pull strategy is to make public transportation more attractive [36].

One of the variables that affect the frequency of accidents is the average daily traffic volume embodied in vehicles/day [9]. On the other hand [26] demonstrated that the average daily traffic is a very important variable of various road characteristics related to their effect on traffic accidents. Meanwhile [10] said that traffic is one of the main causes of traffic accidents. Indonesia as a developing country has the same characteristics as other developing countries in the world, namely the high volume of motorcycles operating on the road. Thus, the probability of

a motorcycle having an accident is very large. Motorcycle accidents are the leading cause of death in adolescent children [34, 43, 47]. The consequences of traffic accidents are also very worrying. Some of the bad consequences caused after the occurrence of traffic accidents. Acute illness, emotional and stress are common diseases that arise due to traffic accidents [30]. Another impact that also arises is the occurrence of air pollution as a result of the high volume of traffic. One of the studies conducted in GTHA (Greater Toronto and Hamilton Area), Canada resulted that traffic congestion has a substantial impact on human health and the economy [39]. In addition, road transportation through vehicle emissions significantly contributes to air quality problems [23, 41, 48].

However, it is recognized that overcoming transportation problems in developing countries in Asia is a very big challenge. People in developing Asian countries are very fond of using private vehicles/motorcycles rather than using other means of transportation [35]. Mixed traffic dominated by motorcycles is very common in most Asian countries such as Taiwan, Thailand, Vietnam, Indonesia, and Malaysia. For example, the proportion of motorcycles in Hanoi and Ho Chi Minh City in Vietnam is around 90% [14, 40]. What is more concerning is that accidents involving students are still quite high. The incidence of accidents in motor vehicles has increased sharply, especially among students [22, 46].

Gianyar Regency, as one of the regencies in Bali Province has the same difficulties and problems in overcoming traffic problems. The high level of vehicle ownership with a fairly large percentage of motorcycles (87%) is a condition faced in solving transportation problems properly [50, 51].

The phenomenon that is still very large in traffic activities and occurs in almost all places is the student shuttle activity using motorbikes, including in the city of Gianyar. This phenomenon raises several problems, especially those related to the possibility of accidents and travel efficiency which will affect traffic safety and comfort. This activity occurred in addition to the classic reasons, namely the lack of quality public transportation services, also because, among other things, the implementation of the education system in the teaching and learning process on a regular basis, namely half day school. This system also contributes to the increase in the number of trips. Parents must make at least two deliveries and two pick-ups in regular and extracurricular learning. To overcome these problems, generally good public transportation services are developed. One of the advantages of using public transportation is that it can basically mitigate traffic accidents [28].

The purpose of this study is to examine whether the push strategy policy through the implementation of full day school accompanied by travel blending and the pull strategy policy through the operation of free student transportation #AMAN has an effect on willingness to shift

to student transportation and at the same time can change the behavior of using motorcycle to pick up students. The full day school policy is an option in its implementation even though there are some controversies. On the other hand, travel blending has basically been applied by parents by combining work trips and taking their children to school. Meanwhile, the Gianyar Regency Government through the Gianyar Regency Transportation Office has provided services for free student transportation. Free student transportation program by operating School Buses in 7 districts which has been carried out since 2016. Each sub-district is operated by one bus with a capacity of 30 seats to serve 9 schools of junior high school students on the main track. Furthermore, in 2018 its services were added with a service purchase program (buy the service). In addition to supporting student transportation services, this program is also aimed at empowering existing public transportation which at that time had begun to languish. This program began with 75 vehicles at the beginning of the 2019/2020 fiscal year and was expanded in 2019 to 204 vehicles by serving around 2,500 students. The entire program of this service is packaged under the name of free student transportation #AMAN for Our Children.

2. Theoretical Framework and Hypothesis Development

2.1. Push-Pull Framework

The Push-Pull framework was developed to find the relationship between related variables. On the basis of the preparation of these variables and indicators, the relationship between latent variables is designed according to SEM-AMOS as shown in Figure 1 below.

The research was conducted on the effect of the push and pull strategy on efforts to reduce the number of motorbikes used to pick up students by parents through changes in their behavior. The push and pull strategy factor is fundamental in understanding travel behavior and explaining why people travel [24, 45]. Although motivation from push and pull strategies can be accepted as a very useful framework for explaining motivation for travel and destinations [8], there is no widely accepted theory or conceptual framework for understanding travel motivation [21, 44]. There are several classifications and models for presenting different motifs. Each theory of travel motivation has strengths and weaknesses and requires operational and empirical support [12].

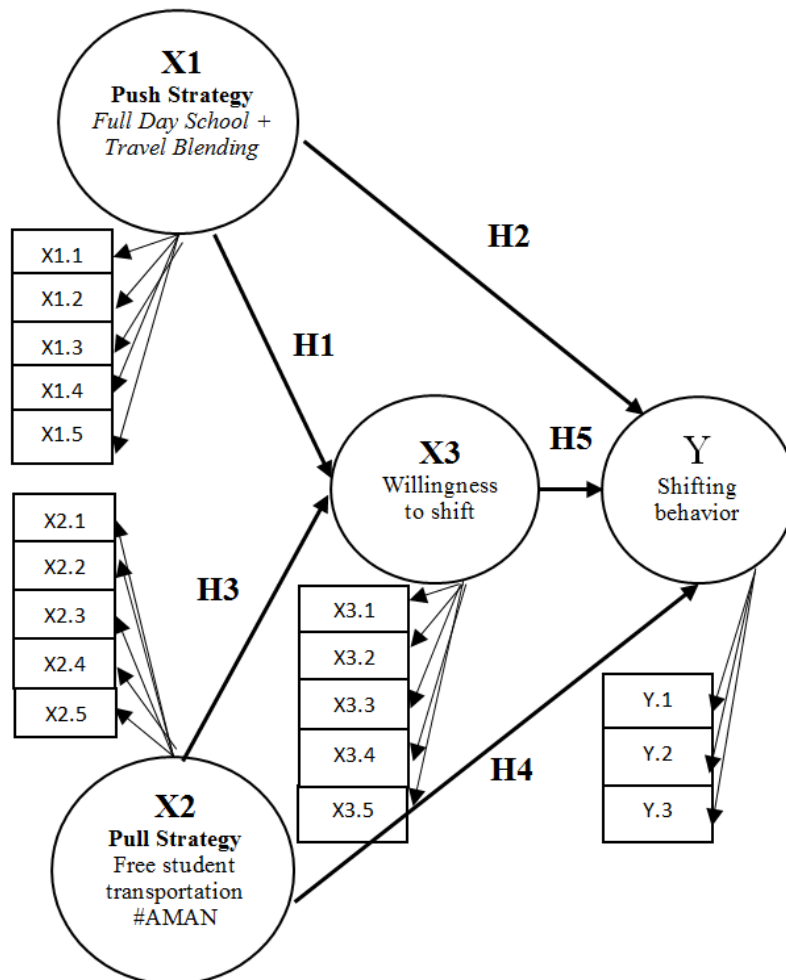


Figure 1. Relationship between variables

2.2. Push Factor and Shifting Willingness

The push factor is defined as something that is negative for private vehicle travelers and this attribute may lead individuals away from traveling by private vehicles. The negative attributes of commuting with private vehicles can be classified as situational and psychological [15]. The push factor of this study is the perception of environmental threats and the perception of discomfort to describe the negative characteristics of commuting with private vehicles from psychological and situational aspects. The push factor in this study is a change in the learning system from half day school to full day school which is accompanied by the application of travel blending. One of the policies that have been promoted to be implemented is by improving the education system. The education system established is to implement a full day school policy. Minister of Education and Culture Muhadjir Effendy has stipulated Ministerial Regulation Number 23 of 2017 concerning school days which regulates schooling 8 hours a day for 5 days aka full day school on June 12, 2017. Full Day School (FDS) policy is the opposite of half day school (HDS). FDS is an all-day school or teaching and learning process which is carried out starting at 06.45 – 15.00 with a break every two hours [6]. Furthermore, Baharuddin [6] stated that the priority in full day school is the arrangement of subject schedules and experiences. This is also stated in Ministerial Regulation Number 23 of 2017 concerning School Days in Article 2 paragraph (1) that school days are carried out 8 (eight) hours in 1 (one) day or 40 (forty) hours for 5 (five) days in 1 (one) week. Meanwhile, according to [16] what is meant by full day school is full day school, on the other hand [38]. So the definition of full day school is a school that is held almost a full day, namely from 8.00 am to 15.00 pm [31] where most of the learning time is in an informal and fun atmosphere. Regardless of the various different names they have in common in the fact that they are designed to offer a safe, secure place that students and youth can go after the school session is over.

Further explained by Baharuddin [6], several reasons for the choice of full day school are: 1) the increasing number of working parents; 2) Socio-cultural changes that occur in society; 3) Socio-cultural changes that affect the mindset; 4) the rapid progress of technology and science. Apart from these reasons, full day school also aims to improve intellectual, emotional, physical and social development. This is because there is more time to educate and not only learn about theory, but practical learning gets a larger portion [37].

Several studies related to full day school studies in conceptual implementation and outputs have been carried out [11]. The results of this study indicate that the full day school policy has a positive impact on students, because it can result in an increase in the quality and achievement of students in accordance with their fields [31]. Meanwhile [4] found that full day school can prevent students from deviant behavior because they are more in school. Here is

an astounding share of traffic accidents that cause death to children when they travel as passengers [29].

Travel blending – is an individual action approach to reduce car use [3]. This is at the heart of the residential area approach where anyone who lives, works, studies and plays in one area is offered the opportunity to mix travel. Travel Blending is a strategy/strategy innovation that is carried out individually and voluntarily by travelers. The point is that the traveler combines/mixes his personal trip with other trips so as to minimize the number of repeated trips which will ultimately result in travel efficiency. The general conclusion is that the essence of travel blending is to change the behavior (behavior) of current habits to the habit of blending travel (blend of travel) to gain efficiency. The change is not based on coercion, but is based on the individual's willingness to make changes without any influence from any party. Voluntary habit change is defined as the change that occurs when individuals make choices for personal rewards in the absence of top-down mechanisms, regulations or feelings from external conditions [1]. In various countries, evaluations have been carried out to reduce vehicle use and plan individual trips and increase the use of public transport [19]. The next hypothesis is:

H1 Perception of push strategy (full day school + travel blending) affects willingness to switch from using motorcycles to public transportation

H2 Perception of push strategy (full day school + travel blending) affects behavior change in student shuttle activities by motorbike.

2.3. Pull Factor and Shifting Willingness

The pull strategy is in the form of operating free student transportation as an effort to attract the public (parents) and students to use it and switch from using private vehicles, especially motorbikes. The pull factor is defined as something positive that is attractive to commuters with friendly modes of transportation, where this effort may be able to attract individuals to move using friendly transportation. The government can make efforts to overcome obstacles to developing friendly transportation and motivate individuals to move using friendly transportation [7]. The transport fraternity often takes for granted that people do not include the operating costs of a vehicle when they make a cost-based decision to drive a car [1]. Thus, the hypothesis is:

H3 Perception of pull strategy (Free Student Transport #AMAN) affects willingness to switch from using motorbikes to public transportation

H4 The perception of the pull strategy (Free Student Transport #AMAN) affects changes in the behavior of student shuttle activities on motorbikes

2.4. Willingness to Shift and Changing Behavior

The desire to switch to using transportation from motorbikes to public transportation (free student

transportation) will affect changes in the behavior of parents who previously used motorbikes to carry out shuttle activities. People will make change to travel behavior if they receive a final incentive [1]. Based on this, the hypothesis is:

H5 Perception of willingness to switch to public transportation affects behavior change in student shuttle activities by motorbike

3. Research Methods

3.1. Measures

To collect data from the four latent variables, a questionnaire survey method was used. Five-point Likerts scale, namely for variables X1 and X2 (1 "Strongly Disagree" to 5 "Strongly Agree"). For variable X3 (1 "Not at All" to 5 "Very Willing"). For variable Y (1 "Never" to 5 "Always"). Five indicators of X-1 push strategy (full day school + travel blending) were developed independently. The four indicators of X2 - pull strategy (free student transport #AMAN) are taken from the green transport system approach that is referenced from [25] and [27]. Indicators of X3 – Willingness to move and Y-Displacement of behavior referenced from [13]. The expected result of this research is how much impact the implementation of the push and pull strategy policy has on reducing the use of motorbikes for student shuttle activities. The analytical method used is structural equation modelling (SEM)-AMOS. Stages in conducting the analysis are to determine the variables and indicators that will be used in the analysis. There are 4 variables used in the analysis, namely:

3.1.1. Variable X1 – Implementation of Full Day School (FDS) + Travel Blending (TB).

Variable X1 is a push factor variable in the form of full day school policy implementation coupled with a travel blending strategy. The implementation of teaching and learning activities which was originally a half day school system was changed by implementing a full day school policy, where parents combine their personal trips (to the office or other workplace) and their children's trips (to school or other learning locations) in each daily activity. The indicators of this variable are:

- 1) X11 Congestion reduction
- 2) X12 Air pollution reduction
- 3) X13 Reduced number of trips
- 4) X14 Travel Cost Reduction
- 5) X15 Increase efficiency

3.1.2. Variable X2 – Free Student Transportation #AMAN

Variable X2 is the pull factor variable by operating free student transportation #AMAN to provide transportation services to junior high school students in the Gianyar district. The free student transportation services provided

are in the form of school buses and passenger transportation which are operated with a service purchase system (buy the service). The indicators of this variable are:

- 1) X21 Travel time
- 2) X22 Waiting room facilities
- 3) X23 Convenience
- 4) X24 Fleet availability
- 5) X25 Area coverage

3.1.3. Variable X3 – Willingness to Shift

Variable X3 is the desire to shift, that is, with the implementation of push and pull factors, it is hoped that there will be a change in the desire to make the move from using private transportation to shuttle students (especially motorbikes) to using public transportation which is provided free of charge. The indicators of this variable are:

- 1) X31 Learning system changes
- 2) X32 Switch to student transport
- 3) X33 The waiting time for student transportation is short
- 4) X34 Free transport fare
- 5) X35 Travel time is on time

3.1.4. Variable Y – Behavior Change

Variable Y is a change in behavior from parents who previously used motorbikes to shuttle students to use free student transportation so that the number of student shuttle trips using motorbikes was reduced. The indicators of this variable are:

- 1) Y11 Traffic condition is good
- 2) Y12 The quality of student transportation is good
- 3) Y13 Changes in the full day school education system

3.2. Respondents and sampling design

Gianyar Regency has 43 junior high schools spreading over 7 sub-districts with 23,311 students. Of the total number, research was conducted on 16 junior high schools with a total of 11,911 students. Data collection was carried out in two stages, namely the first stage of data collection was collecting data on the modes of transportation used by students to go to school. From the first stage of data collection, 5,241 students (44%) went to school and their parents picked them up by motorbike. From this amount, the second stage of data collection was carried out, namely by taking a sample of 600 parents of students.

Furthermore, the second stage of data collection was carried out by distributing questionnaires to the parents of students who were selected as samples. The questionnaire submitted contains 7 types of questions (Q1 – Q7), where each group of questions can be explained as follows:

- a) Q1 is a questionnaire to determine the identity of the respondent which includes age, occupation, education, income, distance from home and school/workplace, reasons for using/not using a motorbike, number of daily trips, length of time for carrying out activities,

costs incurred, vehicle ownership, opinions about student transportation services, reasons for carrying out shuttle activities by motorbike.

- b) Q2 is a question related to respondents' perceptions of the push strategy (full day school + travel blending), opinions about the implementation of full day school.
- c) Q3 is a question related to respondents' perceptions of the pull strategy (free #AMAN student transportation), related to services including traffic conditions, waiting room facilities, transportation costs, fleet availability, punctuality.
- d) Q4 is a question related to the respondent's knowledge of the unique problems of motorcyclists. How much knowledge of respondents about things that must be known and understood when riding a motorcycle.
- e) Q5 is a question related to accident risk, which includes an understanding of accident risk, type of accident experienced, severity, perception of the likelihood of an accident occurring.
- f) Q6 is a question related to the respondent's willingness/desire to change the means of transportation, from using a motorbike to free student transportation. This question includes what things can encourage respondents to make changes or have the will to change. These include changes in the education system, availability of student transportation, waiting times for public transportation, transportation fares, travel time on time,
- g) Q7 is a question related to behavior change, namely a reduction in the use of motorbikes for student shuttle activities. This is related to changes in traffic conditions, the quality of student transportation and changes in the education system

4. Results and Discussion

4.1. Result

4.1.1. Schools' Profile

Gianyar Regency has 43 junior high schools with a total of 23,311 students spreading over 7 sub-districts covered 70 villages. The most schools are in Gianyar sub-district as many as 9 junior high schools (20.93%). Payangan sub-district, one of the areas located in the northern region of Gianyar district, has the least number of junior high schools, namely 3 junior high schools (6.97%) as well as several other sub-districts in the region. More detail is presented in Table 1 below.

Table 1. Junior High School in Gianyar Regency

No	Location/District	No of school	%	No. of student	%
1	Gianyar	9	20,93	4502	19,31
2	Sukawati	8	18,60	5046	21,65
3	Ubud	8	18,60	3513	15,07
4	Blahbatuh	6	13,95	3185	13,66
5	Tampaksiring	5	11,62	2711	11,63
6	Tegallalang	4	9,30	2693	11,55
7	Payangan	3	6,97	1661	7,13
Total		43	1100,00	23311	100,00

Source: Dinas Pendidikan Kabupaten Gianyar

On the basis of Table 1 above, an analysis was carried out on 14 junior high schools in Gianyar Regency representing all existing sub-districts with student data as presented in Table 2.

Table 2. School name, location and number of students At 14 junior high schools in Gianyar. Regency

No	School	Location/District	No. of student
1	SMPN 1 Gianyar	Gianyar	1,223
2	SMPN 2 Gianyar	Gianyar	1,232
3	SMPN Hindu Sukawati	Sukawati	1,051
4	SMPN 4 Sukawati	Sukawati	363
5	SMPN 1 Ubud	Ubud	1,112
6	SMP PGRI 3 Ubud	Ubud	59
7	SMPN 1 Blahbatuh	Blahbatuh	962
8	SMPN Hindu 3 Blahbatuh	Blahbatuh	478
9	SMPN 3 Tampaksiring	Tampaksiring	1,314
10	SMPN 1 Tampaksiring	Tampaksiring	1,033
11	SMPN 2 Tegallalang	Tegallalang	598
12	SMPN 3 Tegallalang	Tegallalang	440
13	SMPN 1 Payangan	Payangan	835
14	SMPN 2 Payangan	Payangan	250
Total			10,950

Source: Dinas Pendidikan Kabupaten Gianyar

Table 3. Selection of Transportation Mode to School at 14 Junior High School – Gianyar Regency

No	Means of transport	No. of student	%
1	Free school transportation	2,328	2,26
2	Other public transportation	19	0.17
3	Walking	641	5.85
4	Bicycle	173	1.58
5	Drive own motorcycle	1,950	17.80
6	Join friend	491	4.49
7	Shuttle service	97	0.89
8	Shuttle using motorcycle	5,037	46.00
9	Shuttle using car	214	1.96
Total		10,950	100.00

Source: Data analysis

Transportation Mode of 14 Junior High School Gianyar Regency

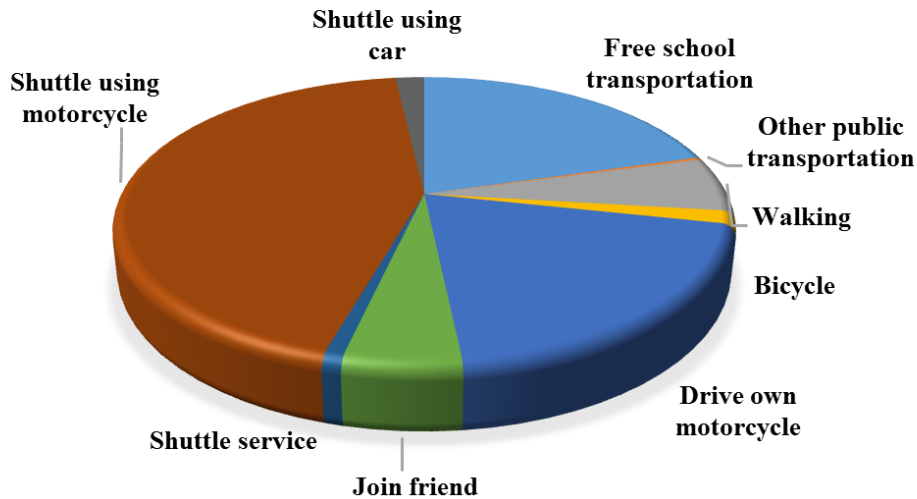


Figure 2. Mode of transportation to Junior High School

Based on the data above, data collection was carried out to find out how students came to school presented in Table 3 and Figure 2.

Meanwhile, the data on students who were picked up by their parents using motorbikes at 14 junior high schools in Gianyar Regency are as described in Table 4.

From the data above, it can be seen that there are 7 schools where the percentage of student pick-up is below the average percentage of all schools.

This is because some students at the school 1) use free student transportation (4 schools in Payangan and Tegallalang sub-districts) and 2) ride their own motorbikes (3 schools in Gianyar, Blahbatuh and Tampaksiring sub-districts).

Based on the data in Table 4 and Table 5, respondents were selected to be the object of research to be distributed questionnaires.

Table 4. Students who are picked up and picked up by motorbikes

No	School	No. of student	Shuttle using motorcycle	%
1	SMPN 1 Gianyar	1,223	1,005	82.17
2	SMPN 2 Gianyar	1,232	251	20.37
3	SMPN Hindu Sukawati	1,051	771	73.36
4	SMPN 4 Sukawati	363	286	78.79
5	SMPN 1 Ubud	1,112	1,022	91.91
6	SMP PGRI 3 Ubud	59	43	72.88
7	SMPN 1 Blahbatuh	962	555	57.69
8	SMPN Hindu 3 Blahbatuh	478	272	56.90
9	SMPN 3 Tampaksiring	1,314	370	28.16
10	SMPN 1 Tampaksiring	1,033	367	35.53
11	SMPN 2 Tegallalang	598	9	1.51
12	SMPN 3 Tegallalang	440	21	4.77
13	SMPN 1 Payangan	835	52	6.23
14	SMPN 2 Payangan	250	13	5.20
Total		10,950	5,037	43.70

Source: Data analysis

4.1.2. Performance of Student Free Transportation

The performance of the free student transportation service is that this student transportation service uses passenger cars from the revitalization of existing public transportation activities. Existing public transportation that has begun to languish is re-empowered for student transportation operations after going through the administrative and technical selection stages of vehicle feasibility. The operational implementation was handed over to PT DAMRI Denpasar Branch with the tagline #AMAN for Our Children. The number of services is 204 units divided into 60 routes in 6 sub-districts (except Sukawati) divided into 21 routes in Gianyar, Blahbatuh and Tampaksiring sub-districts; 14 routes in the district of Tegallalang; 14 routes in the sub-district of Ubud; and 11 routes in Payangan sub-district. The average route length is 14.66 km with the longest route being 26.10 km and the shortest being 9.00 km. The potential demand for the 60 routes is 2,602 students (the largest number is 119 people and the smallest is 2 people). The number of junior high schools currently being served is 21 junior high schools (48.83%) consisting of transportation services for 16 junior high school students and school bus services for 5 junior high schools as well as student transportation and school buses for 4 junior high schools. The student transportation service is not only served by purchasing services, but also additional services using one school bus in each sub-district except for Gianyar sub-district. Especially for

the Sukawati sub-district, it is not served by student transportation services through the service purchase program but is only served by using School Buses as many as 5 units serving 3 junior high schools. The average length of route is 13.90 km or it can be reached within 30 minutes operation. In detail, the number and length of routes for each sub-district can be seen in Table 5 below.

Table 5. Number of routes and length of free student transport routes

District	No. of route	No of school coverage	Average length of route (km)
Gianyar, Blahbatuh, Tampaksiring	21	7	18,41
Tegallalang	14	4	15,10
Ubud	14	2	12,07
Payangan	11	3	10,21
Sukawati	0	0	0
Total route	60	16	13,90

Source: Dinas Perhubungan Kabupaten Gianyar

4.1.3. Respondents' Profile (Q1)

1) Age, occupation, education, income, home-school distance, number of trips, school-to-work distance, pick-up time, transport costs per month, vehicle ownership are described in Table 6.

Table 6. Respondents' profile

Criteria	n	%
Age		
30-34	9	2.25
35-39	69	17.25

Table 6. Continued

40-44	167	41.75
45-49	88	22.00
50-54	48	12.00
>55	19	4.75
Education level		
Elementary school	31	7.75
Junior high school	27	6.75
Senior high school	216	34.00
University	126	31.50
Employee		
Yes	352	88
No	48	12
Income		
< IDR 2,000,000	207	51.75
IDR 2,000,000 – IDR 3,000,000	27	6.75
IDR 3,000,000 – IDR 4,000,000	98	24.50
IDR 4,000,000 – IDR 5,000,000	22	5.50
IDR 5,000,000 – IDR 6,000,000	36	9.00
> IDR 6,000,000	10	2.50
Distance from home to work place		
1 – 3 km	174	43.50
3 – 5 km	70	17.50
5 – 7 km	42	10.50
7 – 9 km	31	7.75
> 9 km	83	20.75
Distance from home to school		
< 500 m	39	12.25
500 m – 1 km	114	28.50
1 km – 3 km	134	33.50
3 km – 6 km	76	19.00
6 km – 9 km	29	7.25
> 9 km	8	2.00
Distance from school to work place		
< 500 m	3	0.75
500 m – 1 km	77	19.25
1 km – 3 km	108	27.00
3 km – 6 km	56	9.00
6 km – 9 km	62	15.50
> 9 km	58	14.50
Pick-up time		
< 10 minutes	155	38.75
10 – 20 minutes	194	48.50
20 – 30 minutes	36	9.00
30 – 40 minutes	14	3.50
40 – 50 minutes	1	0.25
> 60 minutes	0	0.00
Transport expenses per moth		
< IDR 200,000	228	57.00
IDR 200,000 – IDR 400,000	25	6.25
IDR 400,000 – IDR 600,000	121	30.25
IDR 600,000 – IDR 800,000	6	1.50
IDR 800,000 – IDR 1,000,000	14	3.50
> IDR 1,000,000	8	2.00
Vehicle ownership		
Car/motorcycle/bicycle		
0 unit	11/2/11	
1 unit	99/105/66	
2 unit	18/187/37	
3 unit	5/74/10	
> 3unit	1/25/3	
Number of trips in a day (including shuttle)		
1 – 2 trips	148	37.00
3 – 4 trips	151	37.75
5 – 6 trips	73	18.25
7 – 8 trips	15	3.75
9 – 10 trips	11	2.75
> 10 trips	2	0.50

Source: Data analysis

Based on Table 6 was found that 34% of respondent's education level is senior high school almost the same with university education level 31.50%. This data indicate that respondents have an enough education level to overcome some problems. Most of parents (88%) are working and 51.70% have income level < IDR 2,000,000. On the other hand 57% of them only spend their income of < IDR 200,000 on transportation. In other word only 10% of income was used for transportation cost. The data obtained also shows that the distance from home to school and from home to work place is beyond 500m-3 km (62.00% and 43.50%. Meanwhile, the percentage of distance between home and workplace beyond 500m-3 km is 47%. It is explained whether their trips are in the same direction or with different travel routes. From the side of the number of trips it is found that the number of trips including shuttle trips is 1-4 trips, which is 74.75%

2) The reasons for choosing to use a motorbike for shuttle are described in Table 7. In this result 29.75% respondent use a close distance from home to school as a reason. Meanwhile, 27% the reason is because of motorcycle quicker in time of consuming. In contrary, fewer respondents use half day school system and quality of public transport services as a reason (1.25%). There is a fairly small percentage (9%) choosing the reason that motorcycles is more efficient.

Table 7. The reason of using motorcycle

Reason	n	Reason	n
School location	12	Motorcycle ownership	14
Distance of school (far)	42	Time available	20
Distance of school (close)	119	Same time as work time	16
Efficient (cost)	36	More comfort	26
Quick (time consuming)	108	Half day school system	1
Secure and comfort	10	Extra curricular	7
Convenient	15	Quality of public transport	4

Source: Data analysis

Table 8. The reason of not using motorcycle

Reason	n	Reason	n	Reason	n
Slow	54	Not secure	15	Hard to reach	7
Wasteful	5	Not practical	5	Long distance	13
Not comfort	3	Expensive	4	Short distance	18
Public transport available	8	Different with working time	154	Does not have enough time	41
No have motorcycle	16	Physical condition is not possible	30	Others	38

Source: Data analysis

3) The reasons for not using a motorcycle for shuttle are described in Table 8. In this study, in addition to the

respondents being asked about the reasons why they use motorcycle, they were also asked the reasons why they do not use motorbikes? This is quite important to know to see what the biggest motivation for not using a motorcycle is. From the data collected, the most common reason for parents not to use motorcycle in their activities is 38.50% because parent's working time is different with school's time and 10.25% because of parents do not have enough time.

4.1.3. Respondents' O-D Matrix

In this section, it is also necessary to know the origin of the students. It is important to know the scope of the area affected by the school where they attend school. This is necessary to find out and estimate whether the school area coverage will affect the student's choice of transportation mode to go to school. Or it can be a recommendation for parents to choose the appropriate mode of transportation. The origin of the student from 400 respondents is determined based on the village area (village) where the student's home is located as an origin and school location as a destination. In Gianyar Regency, there are 70 villages spreading over 7 sub-districts. The following Table 9 is the result of the recapitulation of the O-D Matrix from students.

Table 9. School area coverage

School Name	School location as destination	No. of village as origin	Average distance (km)	
			By survey	By Google
SMPN 1 Gianyar	Gianyar	15	5.74	4.23
SMPN 2 Gianyar	Bitera	9	5.12	5.08
SMPN Hindu Sukawati	Singapadu	5	10.5	4.20
SMPN 4 Sukawati	Ketewel	3	6.54	2.93
SMPN 1 Ubud	Ubud	9	4.6	3.49
SMP PGRI 3 Ubud	Ubud	5	6.1	4.90
SMPN 1 Blahbatuh	Blahbatuh	10	4.25	4.52
SMPN Hindu 3 Blahbatuh	Bona	10	6.7	4.77
SMPN 3 Tampaksiring	Pejeng	6	3.06	3.73
SMPN 1 Tampaksiring	Manukaya	7	7.27	5.19
SMPN 2 Tegallalang	Sebatu	2	3.25	3.25
SMPN 3 Tegallalang	Kedisan	4	4.45	4.45
SMPN 1 Payangan	Melinggih	3	3.7	3.60
SMPN 3 Payangan	Buahan Kaja	2	4.40	4.40

Source: Data analysis

Average distance by survey is coming from the result of questionnaire: "travel distance between home and school". Meanwhile, distance by Google is calculated by using

direct distance line between central point at origin and destination. The result of this table calculation will be used to indicate the distance covered by each school. The average distance between home and school from the data collected is 5.36 km through the survey and 4.05 when measured using Google.

4.1.4. Respondents' Perceive

1) Perceived of Q2

Perceived of respondent about full day school and travel blending are able to reduce several thing. There were 66.25% respondent agree to apply full day school (FDS) and 71.75% agree to apply travel blending to reduce congestion.. In general, most of respondents agreed that full day school and travel blending will have a good impact on reducing congestion, air pollution, accidents and the number of trips. Likewise, the policy will have an impact on the implementation of extra school and can result in better time efficiency. In terms of reducing the number of trips, 36.50% of respondents believe that 60 to >80% full day school and travel blending will reduce the number of trips. The detail of those findings is as shown on Table 10 below.

Table 10. Perceived of respondent on full day school and travel blending

Indicators	Strongly disagree	Disagree	Average	Agree	Strongly agree
Congestion	10	36	90	234	30
Air pollution	6	34	68	252	40
No, of trips	5	36	44	278	37
Travel cost	6	50	42	260	42
Time efficiency	8	34	79	249	30
Extra school	3	37	41	299	20
Reduce accident	3	35	83	236	43
FDS reduce no. of trips					
<30%	30-40%	40-60%	60-80%	>80%	
71	74	109	117	29	

Source: Data Analysis

Table 11. Perceived of respondent on pull strategy

Indicators	Strongly disagree	Disagree	Average	Agree	Strongly agree
Travel time	5	20	228	112	35
Waiting room facilities	2	28	118	225	27
Convenience	3	35	95	237	30
Fleet availability	3	14	69	272	42
Area coverage	7	36	107	228	22

Source: Data Analysis

Table 12. Perceived of respondent's knowledge of motorcycle

Indicators	Not know at all	Not know	Average	Know	Known very well
Visual recognition	3	60	54	246	28
Road hazard	5	28	29	283	55
Speed accident	8	101	74	196	21
Riding skills and familiarity	2	38	59	267	34

Source: Data Analysis

2) Perceived of Q3

Perceived of respondent about pull strategy is able to shifting people to use free student transport as Table 11 below. Most of respondents (61.50%) agree and strongly agree to the whole indicators should be in a good quality in order to attract people to use free student transportation. They believe that if all these indicators can be met properly, there will be a shift in the use of transportation from motorbikes to student transportation. The largest percentage of their perception of the requirements for implementing a full strategy is fleet availability (78.5%).

3) Perceived of Q4

Perceived of respondent about their knowledge of the unique of motorcycle is shown in Table 12 below. This perceived is useful to indicate the respondent's knowledge in order to anticipate the possibilities of traffic accident cause by motorcycle. Fortunately, 78.87% respondents knew and knew very well about the unique of riding motorcycle. This will be very helpful in efforts to reduce the possibility of accidents due to ignorance about motorcycle driving.

4) Perceived of Q5

Perceived of respondent about their knowledge of the unique of motorcycle is shown in Table 13 below. The information in this perceived is useful to refer how the risk of using a motorcycle. The parents believe that using motorcycle for shuttle is risky for their kids (89.75%). Meanwhile, 49.75% of parents answer using a motorcycle for shuttle their children have a high risk of accident possibilities. In other hand, 66.76% respondents answer that 30-40% the possibilities of accident occur when using motorcycle. The data shows that basically parents are aware that using motorbikes for student pick-up activities is very risky for children’s safety and is at risk for accidents.

Table 13. Perceived of respondent on accident risk of motorcycle

Indicators	Strongly disagree	Disagree	Average	Agree	Strongly agree
Child safety	3	17	18	274	86
Accident risk	7	92	102	176	23
Possibilities of accident					
<30%	30-40%	40-65%	65-80%	>80%	
149	118	78	37	18	

Source: Data Analysis

5) Perceived of Q6

Table 14. Perceived of respondent on willingness to shift

Indicators	Strongly disagree	Disagree	Average	Agree	Strongly agree
Learning system change	9	43	130	196	22
Shift to student transport	3	28	73	251	45
Waiting time short	3	28	82	249	38
Free fare	1	22	55	344	78
Travel time on time	1	13	63	254	69

Source: Data Analysis

Perceived of respondent about their willingness to shift from using motorcycle for shuttle to free student transport is shown in Table 14. Basically, most respondents (74%) answer that they are willing to shift from using motorcycle for shuttle to free student transport if the quality of services

(waiting time (71.75%) and travel time (80.75%)) are good. It is interesting that more than a half of respondents (54.50%) answer they will shift to free student transport when learning system change (from HDS to FDS). No further investigation was conducted on why half of the respondents chose the answer that changing the learning system from half day school to full day school would cause them to use student transportation.

7) Perceived of Q7

Perceived of respondent about whether their behavior will change when several policies were applied as shown as Table 15 below. Most of respondents answer that they will change their behavior from using motorcycle for shuttle to use free student transport if the condition of traffic is good (47.50%), quality of free student transport good (62.75%) and learning system change (59%).

Table 15. Perceived of respondent on change behavior

Indicators	Never	Ever	Sometimes	Often	Always
Good traffic condition	53	78	79	110	80
Quality of student transport good	39	58	52	130	121
Learning system change	41	66	57	124	112

Source: Data Analysis

4.1.5. Model validation

Validation was carried out on the relationship model designed to prove the position of the dependent and independent variables. In this process, it is checked whether the independent variables (X1 and X2) are truly independent or whether there is a relationship between these variables. If the reciprocal relationship between the two variables < 0.40, then the two variables are independent.

Furthermore, the selection of indicators for each independent and dependent variable is carried out to select indicators that are in accordance with the relevant variables

4.1.6. Relationship between variables

From the relationship obtained in the SEM-AMOS analysis, it is found that some results are as shown in Figure 3 and Table 16 below.

Effect of Push-Pull Factors on Change in Behavior of Students' Shuttle
by Using Motorcycle Case Study: Gianyar - Bali

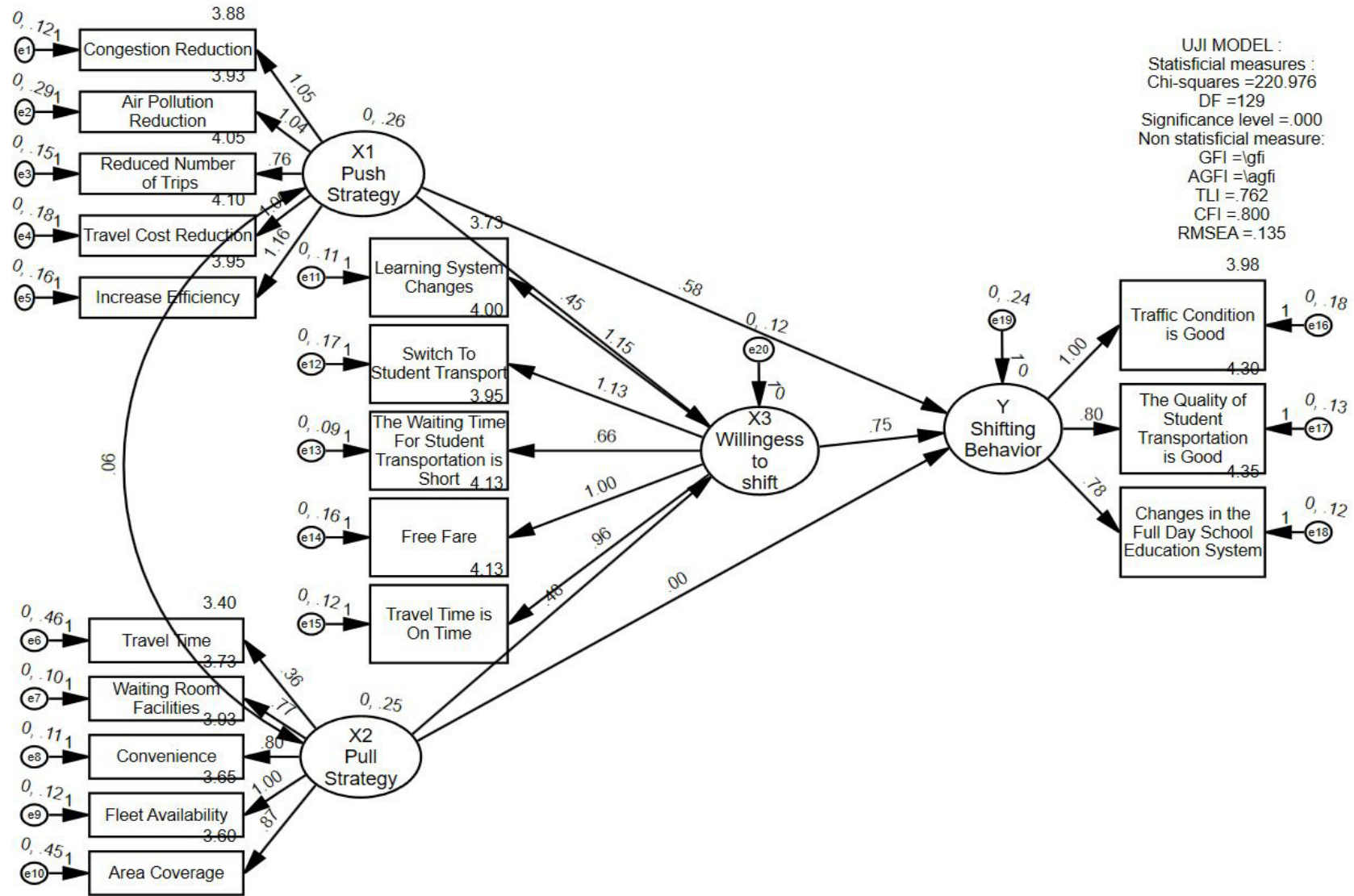


Figure 3. SEM-AMOS Analysis Results

Table 16. Relationship between Variable (*Regression Weights*)

Relationship between variables	Estimate	S.E.	C.R.
X1 – X3 (H1)	,190	,088	2.163
X2 – X3 (H2)	,789	,138	5.715
X1 – Y (H3)	,071	,097	,729
X2 – Y (H4)	,299	,183	1.638
X3 – Y (H5)	,651	,091	7.125

Source: Analysis

From the explanation in Table 16 above, a series of relationships between variables are obtained as follows:

- 1) **H1** is the relationship between push strategy and willingness to shift which results in 0.190
- 2) **H2** is the relationship between pull strategy and willingness to shift which results in the number 0.789
- 3) **H3** is the relationship between push strategy and shifting behavior which results in the number 0.071
- 4) **H4** is the relationship between the pull strategy and shifting behavior which results in the number 0.299
- 5) **H5** is the relationship between willingness to shift and shifting behavior which results in the number 0.651

4.2. Discussion

Based on some of the perceptions given by the respondents, some things can be discussed as follows:

- 1) Several previous studies stated that the change in the education system to full day school had a positive impact on students' knowledge. However, in this study most of the respondents responded that changing the learning system from half day school to full day school would provide benefits to traffic conditions and safety. Although it is not explained with certainty what is the reason for this perception. What is very encouraging is that parents believe that changing the learning system to full day school and implementing travel blending will have an impact on reducing the number of trips between 60 and 80%.
- 2) In general, the reason parents use motorcycle for student's shuttle activities is that motorbikes are faster in terms of time and also because of the short distance between home and school.
- 3) Another fact also shows that parents of students know well and are very aware that the use of motorcycle is very risky to safety (89.75%) and 66.76% believe that using motorbikes has the possibility of having an accident up to 30-40%.

Referring to the results obtained as shown in Figure 3, the relationship between the variables of push strategy, pull strategy, willingness to shift and shifting behavior are:

- 1) there is a very small/weak effect from the push strategy policy, namely the change in the full day school learning system and the application of travel

blending on willingness to shift the use of motorcycle for student's shuttle activities

- 2) there is a very small/very weak influence directly from the push strategy policy, namely the change in the full day school learning system and the application of travel blending to shifting behavior
- 3) there is a small/weak direct effect of the pull strategy policy, namely the operation of free #AMAN student transportation on shifting behavior
- 4) there is a fairly large/strong influence from the pull strategy policy, namely through the operation of free #AMAN student transportation which serves junior high school students on the shifting behavior of using motorcycle for student's shuttle activities. Likewise, the indicators provide a very strong relationship so that they can provide good service
- 5) there is a fairly large/strong relationship from willingness to shift to shifting behavior in student's shuttle activities using motorcycle.

5. Conclusions

Based on the results of the discussion above, it can be concluded as follows:

- 1) Basically there is no long distance between home and school so that it is possible to operate better school transportation.
- 2) Parents are aware that using motorcycle for student's shuttle activities has a very high risk of having an accident, so this can encourage them to use student transport.
- 3) Even though the implementation of full day school and travel blending has not yet given a strong influence on changes in motorcycle use behavior, it can still be used as an alternative/alternative policy to reduce the number of motorcycle use.
- 4) The implementation of the pull strategy policy, especially the provision of free student transportation #AMAN, has a strong enough influence in switching to use student transportation and at the same time there is a change in student shuttle behavior using motorcycles. Thus, policy makers and decision makers can determine action options to reduce the use of motorcycles for shuttle students by developing free student transportation services more broadly.

Acknowledgments

I am very grateful to Udayana University, Dinas Pendidikan Kabupaten Gianyar, Principals, teachers and parents of student for their support. We are grateful to anonymous reviewers for their valuable comments on the earlier version of this paper.

REFERENCES

- [1] Ampt, E. & Gleave, S. D. Understanding Voluntary Travel Behaviour Change. *Transport Engineering in Australia*, 9, 53-66. 2004.
- [2] Andersen, Z. J., Hvidberg, M., Jensen, S. S., Ketzel, M., Loft, S., Sørensen, M., Tjønneland, A., Overvad, K. & Raaschoot-Nielsen, O. 2011. Chronic Obstructive Pulmonary Disease and Long-Term Exposure to Traffic-Related Air Pollution: A Cohort Study. *American Journal of Respiratory and Critical Care Medicine*, 183, 455-461. 2011.
- [3] Ampt, L. From Travel Blending to Living Neighbourhoods-A Vision for the Future. *Australasian Transport Research Forum (Atrf)*, 23rd, 1999, Perth, Western Australia, Vol. 23, Part 2, 1999.
- [4] Andriansih. Full Day School; Model Alternatif Pembelajaran Karakter Di Sekolah. *Prosiding Seminar Nasional Repositioning Full Day School, Pendidikan Formal, Non Formal Dan Informal*, Malang: Um Press. 2016
- [5] Banister, D. The Sustainable Mobility Paradigm. *Transport Policy*, 15, 73-80. 2008
- [6] Baharuddin, H. Pendidikan Dan Psikologi Perkembangan (Education and Developmental Psychology). *Ar-Ruzz Media*. Jogjakarta. 2010.
- [7] Beltramello, A. Market Development for Green Cars. 2012.
- [8] Budiyo, A. Pencemaran Udara: Dampak Pencemaran Udara Pada Lingkungan (Air Pollution: Impact of Air Pollution on the Environment). *Berita Dirgantara*, 2010.
- [9] Cadar, R. D., Boitor, M. R. & Dumitrescu, M. Effects of Traffic Volumes on Accidents: The Case of Romania's National Roads. *Geogr. Tech*, 12, 20-29. 2017.
- [10] Caliendo, C., Guida, M. & Parisi, A. A Crash-Prediction Model for Multilane Roads. *Accident Analysis & Prevention*, 39, 657-670. 2007.
- [11] Chabibi, M. Politik Pendidikan Tentang Kebijakan Full Day School (Analisis Karakter Kebijakan Publik) - Educational Politics about Full Day School Policy (Character Analysis of Public Policy). *Nidhomul Haq: Jurnal Manajemen Pendidikan Islam*, 3, 98-108. 2018.
- [12] Chiang, C., & Jogaratnam, G. Why Do Women Travel Solo for Purpose of Leisure? *Journal of Vacation Marketing*, 12(1), 56-70. 2006.
- [13] Chowdhury, S. & Ceder, A. A Psychological Investigation on Public-Transport Users' Intention to Use Routes with Transfers. *International Journal of Transportation*, 1, 1-20. 2013.
- [14] Chu Cong Minh, Kazushi Sano, "Analysis of Motorcycles Effects to Saturation Flow Rate at Signalized Intersection in Developing Countries," *Journal of The Eastern Asia Society for Transportation Studies*, Vol. 5, No. 10, Pp. 1211-1222, 2003
- [15] Collins, C. M., Chambers, S.M. Psychological and Situational Influences on Commuter-Transport-Mode Choice. *Environ. Behavior* 37 (5), 640-661. 2005.
- [16] Echols, J. Kamus Inggris-Indonesia= An English-Indonesian Dictionary/Oleh John M. Echols Dan Hassan Shadily. Cornell University Press Pt Gramedia. 1976.
- [17] Dorsey, B. Mass Transit Trends and the Role of Unlimited Access in Transportation Demand Management. *Journal of Transport Geography*, 13, 235-246. 2005.
- [18] Fluker, M. R., & Turner, L. W. Needs, Motivations, and Expectations of a Commercial White Water Rafting Experience. *Journal of Travel Research*, 38(4), 380-389. 2000.
- [19] Friman, M., Larhult, L. & Gärling, T. An Analysis of Soft Transport Policy Measures Implemented in Sweden to Reduce Private Car Use. *Transportation*, 40, 109-129. 2013.
- [20] Gärling, T. & Schuitema, G. Travel Demand Management Targeting Reduced Private Car Use: Effectiveness, Public Acceptability and Political Feasibility. *Journal of Social Issues*, 63, 139-153. 2007.
- [21] Huang, S. Measuring Tourist Motivation: Do Scales Matter? *Tourism: An International Multidisciplinary Journal of Tourism*, 5(1), 153-162. 2010.
- [22] Indawati, R. & Qomaruddin, M. B. The Probability of the Traffic Accidents on Students. *Journal of International Dental and Medical Research*, 11, 348-351. 2018.
- [23] J. Jakubiak-Lasocka. J. Lasocki, R. S., Z. Chlopek. Impact of Traffic-Related Air Pollution on Health. 2014.
- [24] Jang, S., Bai, B., Hu, C., & Wu, C-M. E. Affect, Travel Motivation, and Travel Intention: A Senior Market. *Journal of Hospitality & Tourism Research*, 33(1), 51-73. 2009.
- [25] Jia, H. Green Travel Behavior in Urban China: Influencing Factors and Their Effects. *Sustainable Development*, 26, 350-364. 2018.
- [26] Karlaftis, M. G. & Golias, I. Effects of Road Geometry and Traffic Volumes on Rural Roadway Accident Rates. *Accident Analysis & Prevention*, 34, 357-365. 2002.
- [27] Li, H. R. Study on Green Transportation System of International Metropolises. *Proc. Eng.* 137, 762-771. 2016.
- [28] Lichtman-Sadot, S. Can Public Transportation Reduce Accidents? Evidence from the Introduction of Late-Night Buses in Israeli Cities. *Regional Science and Urban Economics*, 74, 99-117. 2019.
- [29] Maasalo, I., Lehtonen, E. & Summala, H. Drivers with Child Passengers: Distracted But Cautious? *Accident Analysis & Prevention*, 131, 25-32. 2019.
- [30] Mayou, R., Bryant, B. & Duthie, R. Psychiatric Consequences of Road Traffic Accidents. *Bmj*, 307, 647-651. 1993.
- [31] Mon, E. E., Jomnonkwo, S., Khampirat, B., Satiennam, W. & Ratanavaraha, V. Willingness to Pay for Mortality Risk Reduction for Traffic Accidents in Myanmar. *Accident Analysis & Prevention*, 118, 18-28. 2018.
- [32] Niswah, A. Dampak Full Day School Dalam Meningkatkan Prestasi Anak Di Sekolah (Impact of Full Day School in Improving Children's Achievement in School). *Prosiding Seminar Nasional Repositioning Full Day School, Pendidikan Formal, Non Formal Dan Informal*, Malang:

- Um Press, 23-27. 2016.
- [33] Nykvist, B. & Whitmarsh, L. A Multi-Level Analysis of Sustainable Mobility Transitions: Niche Development in The Uk and Sweden. *Technological Forecasting and Social Change*, 75, 1373-1387. 2008.
- [34] Odero, W., Garner, P. & Zwi, A. Road Traffic Injuries in Developing Countries: A Comprehensive Review of Epidemiological Studies. *Tropical Medicine & International Health*, 2, 445-460. 1997.
- [35] Perschon, J. Sustainable Mobility. Policy Paper 36 of the Development and Peace Foundation, 36 Pp. 1-12. 2012.
- [36] Satiennam, T., Jaensirisak, S., Satiennam, W. & Dtdamrong, S. Potential for Modal Shift by Passenger Car and Motorcycle Users towards Bus Rapid Transit (Brt) in an Asian Developing City. *Iatss Research*, 39, 121-129. 2016.
- [37] Seli, M. Metode Pembelajaran Pendidikan Agama Islam Dalam Full Day School Di Sekolah Alam Bilingual Madrasah Tsanawiyah Surya Buana Lowokwaru Malang (Islamic Religious Education Learning Methods in Full Day Schools at Bilingual Natural School Madrasah Tsanawiyah Surya Buana Lowokwaru Malang). Skripsi. Malang. 2009.
- [38] Sulistyarningsih, W. Full Day School Dan Optimalisasi Perkembangan Anak. Yogyakarta: Paradigma Indonesia. 2008.
- [39] Weeberb J. Requia, C. D. H. The Health Impacts of Weekday Traffic: A Health Risk Assessment of Pm2.5 Emissions during Congested Periods. 111, 164-176. 2017.
- [40] Wiryasa, N. M, A, Dwijendra, N.K.A. "Socio-Physical Transformation towards Sustainable Urban Morphology through Land Readjustment in Indonesia," *Civil Engineering and Architecture*, Vol. 9, No. 3, Pp. 874 - 882, 2021. Doi: 10.13189/cea.2021.090329.
- [41] Chen, Tc., Rajiman, R., Elveny, M., Dwijendra, Nka., Et Al. Engineering Of Novel Fe-Based Bulk Metallic Glasses Using a Machine Learning-Based Approach. *Arab J Sci Eng* 46, 12417–12425 (2021). <https://doi.org/10.1007/S13369-021-05966-0>. 2021.
- [42] Dwijendra NKA, Akhmadeev R, Tumanov D, Kosov M, Shoar S, Banaitis A. Modeling Social Impacts of High-Rise Residential Buildings during the Post-Occupancy Phase Using Dematel Method: A Case Study. *Buildings*. 2021; 11(11):504. <https://doi.org/10.3390/Buildings11110504>. 2021.
- [43] Sifatu, W.A, Sjahruddin, Fajriah, H. Y., Dwijendra, N. K. A, Santoso, A. Innovative Work Behaviors in Pharmacies of Indonesia: Role of Employee Voice, Generational Diversity Management and Employee Engagement. *Srp*. 2020; 11(2): 725-734. Doi: 10.31838/Srp.2020.2.105. Retrieved From [Http://Sysrevpharm.Org/?Mno=118846](http://Sysrevpharm.Org/?Mno=118846). 2020.
- [44] Dwijendra, N. K. A., Suyoga, PPG. Analyze of Symbolic Violence Practices in Balinese Vernacular Architecture, Bali Indonesia. *International Journal of Innovation, Creativity and Change*, Vol. 13, Issue 5, 18 June 2020. Retrieved From https://www.ijcc.Net/Images/Vol_13/Iss_5/13543_Dwijendra_2020_E_R.Pdf. 2020.
- [45] Dwijendra, N. K. A., Wiriantari, F., Widiyani, D. M. S, A Yulianasari, A.A.S.R, Wijaatmaja, A. B. M. Transformation of Catuspatha in Bali Indonesia: Alteration Ideas from Empty Space to Aesthetic Element of City. *Rupkatha Journal on Interdisciplinary Studies in Humanities*. Volume 12, Number 6, 2020. Doi: 10.21659/Rupkatha.V12n6.15. 2020.
- [46] Primadewi, S.P.N, Sueca, N.K, Dwijendra, N. K. A, Siwalatri, N.K.A. "Emerging Architect's Design Method in Designing Tourist Accommodation Case Study: Tourist Accommodation in Ubud, Bali," *Civil Engineering and Architecture*, Vol. 9, No. 2, Pp. 271 - 280, 2021. Doi: 10.13189/cea.2021.090201.
- [47] N. P. S. Nurjani, N. K. A. Dwijendra, How Traditional Balinese Houses Can Adjust and Cater for International Tourist in the Cangu Area, Bali Indonesia? In: *International Journal of Psychosocial Rehabilitation*, Vol. 24, No. 03, DOI: 10.37200/IJPR/V24I3/PR201901, Retrieved from <https://www.psychosocial.com/article/PR201901/17512>. 2020.
- [48] M. V. Yogantari, N. K. A. Dwijendra, Visual Exploration Using Acrylic Paint on Used Fashion Items for Sustainable Use. In: *International Journal of Psychosocial Rehabilitation*, Vol. 24, No. 03, DOI: 10.37200/IJPR/V24I3/PR201902, Retrieved from <https://www.psychosocial.com/article/PR201902/17516>. 2020.
- [49] Ida Bagus Gde Wirawibawa , I Dewa Gede Agung Diasana Putra , Ngakan Ketut Acwin Dwijendra , "Memada-mada: The Power Relation and Architectural Creativity of Gianyar Palace," *Civil Engineering and Architecture*, Vol. 9, No. 3, pp. 949 - 957, 2021. DOI: 10.13189/cea.2021.090336.
- [50] I Nyoman Widya Paramadhyaksa, Ngakan Ketut Acwin Dwijendra, "The Complexity of Orientation in Traditional Village Architecture in Bali, Indonesia", *Humanities Diliman, A Philippine Journal of Humanities*, HD Vol. 18 No. 1, January-June 2021.
- [51] I Kadek Pranajaya, Ngakan Ketut Acwin Dwijendra, "The Domination of Cultural and Symbolic Capital in the Preservation of Temple Heritage Architecture through a Restoration Approach in Bali, Indonesia," *Civil Engineering and Architecture*, Vol. 9, No. 6, pp. 1744 – 1753. DOI: 10.13189/cea.2021.090608.