ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/25dec778

Trip Generation Model of Permanent Residents (Case Study of Duyu Permanent Residence)

Abdullah Yasir Prasetyo[1*]; Arief Setiawan[2]; Syamsul Arifin[3]; Taslim Bahar[4]; Novita Pradani[5]

[1]Master of Civil Engineering Study Program, Tadulako University, Palu, Indonesia, 94112
[2]Lecturers of Civil Engineering Department, Faculty of Engineering, Tadulako University, Palu, Indonesia, 94112

Corresponding Author: Abdullah Yasir Prasetyo[1*]

Publication Date: 2026/01/09

Abstract: Duyu permanent housing is located in Tatanga sub-district, South Palu district, Palu city. The housing will have a traffic impact on the road network. This study aims to model the movement generation and analyze the factors that influence the movement generation in Duyu permanent housing (Huntap). Data collection through filling out questionnaires distributed and given to housing residents using random sampling techniques (Stratified random sampling). Based on the results of the analysis of household characteristics of residents in Duyu permanent housing (Huntap) 57.4% amounted to 3 to 4 people per household, the education of the head of the household 36.7% bachelor's degree and 34.1% high school graduates with the type of work 31% private employees and 22% self-employed where the average income per month 72% Rp. 3,000,000.00 - Rp. 6,000,000.00 with the number of ownership of 1 unit of 2-wheeled vehicles of 47.4%, ownership of 4-wheeled vehicles of 35.2%. The best model for the generation of movement in Duyu permanent housing is Y = - 0.592 + 0.093 X3, the number of cars X4, the number of motorbikes X5. Based on the model, the total trip generation is 7428 trips/day and the average trip generation is 8 trips/day, from the results of Traffic Count it is known that the peak hour of outgoing vehicles occurs at 06.30 – 07.30 with a traffic volume of 594.2 pcu/hour. The peak hour for incoming vehicles occurs at 16.45 – 17.45 with a traffic volume of 715.1 pcu/hour.

Keywords: *Household Characteristics, Generation Travel, Housing, Multiple Linear Regression Multiple.*

How to Cite: Abdullah Yasir Prasetyo; Arief Setiawan; Syamsul Arifin; Taslim Bahar; Novita Pradani (2025) Trip Generation Model of Permanent Residents (Case Study of Duyu Permanent Residence). *International Journal of Innovative Science and Research Technology*,10(12), 2763-2772. https://doi.org/10.38124/ijisrt/25dec778

I. INTRODUCTION

Development in Palu City after disaster earthquake Earthquake and liquefaction that occurred on September 28, 2018 in some field , one of the his field is field infrastructure. Infrastructure development For residence still in progress ongoing is commitment government For give House to affected communities the current disaster This his house is in the red zone as determined by the National Agency for Disease Control National Disaster as area forbidden For establish building.

One of type designed house government to the affected communities disaster is residence still intended for For affected residents disaster that will happen relocated to the residence that will be built . Head of the Implementation Center Provision Housing (BP2P) Sulawesi II Directorate General Housing area explain , the total amount the housing that was built is 5,732 units carried out in three district / city namely Palu City, Sigi Regency and Sigi Regency Donggala . By him it is in Palu City, the government do development residence stay in the area, Huntap Duyu who has inhabited by around 850 residents affected disaster Already seen activities public as usual residence that is activity activities daily like go to place work , go to the market, go to school , to campus and activities community other .

Research location in huntap Duyu Because Huntap Duyu assessed more Good compared to with temporary housing others in Palu City because strategic location , better accessibility easy , availability infrastructure base such as clean water and more electricity stable , and more spatial planning organized and friendly environment ; however , the existence of temporary housing this also provides impact to network the surrounding roads , such as increased traffic volume cross , needs repair and widening road , and potential traffic jams at certain times consequence increase activity resident Study This aim For know characteristics House stairs

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/25dec778

, characteristics journey public housing area and modeling awakening movement as well as analyze .

II. RESEARCH METHODS

➢ *Research Location*

Study This located in the residential area Still Duyu Jl. Vtungguni Tatanga District . Residential Still This get up For inhabitant affected disaster by the Hall Executor Provision Housing (BP2P) Sulawesi II Directorate General Housing area.

➢ *Data Types and Sources*

Primary data was obtained by conducting a direct field survey (Home Interview Survey) randomly among several families, with a number appropriate to the data requirements. The questionnaire was developed based on the variables to be used in the analysis.

Secondary data for this study was obtained from the village office, including data on the number of permanent housing units (Huntap) already built and those yet to be built, as well as data on the number of households. Literature related to this study can be obtained from reference books, journals, theses. In addition to *home interview surveys, traffic counts* done For search for current volume data Then cross.

➢ *Population, Sample and Technique Taking Sample*

The number of samples is determined based on the population size, meaning that the larger the sample size or the closer it is to the population, the smaller the chance of generalization error, and vice versa, the smaller the sample size or the further away it is from the population, the greater the generalization error. To determine the minimum sample size, the Slovin formula can be used, and as a comparison, the Krejcie table is used. Mathematically, the sample size from the population according to the Slovin formula can be formulated as follows:

$$n = \frac{N}{Nd^2 + 1}$$

As for stages study shown in the following figure:

Where :

n = Sample size

N = size population

d = error taking the sample that tolerated (%)

$$n = \frac{850}{(850\ x\ 0.05^2) + 1} = 272\ Sampel$$

From the results of calculations using the Slovin formula, the number of samples taken from Duyu permanent housing (Huntap) was 272 samples.

➢ *Operationalization Variables*

The dependent variable is a variable that is influenced or affected by the presence of the independent variable. In this study, the dependent variable is the number of trips generated by permanent housing (Huntap) in Duyu.

The independent variable is a variable that influences the dependent variable, either positively or negatively. There are eleven independent variables in this study: number of family members (X1), number of employed family members (X2), number of schooled family members (X3), number of car owners (X4), number of motorcycle owners (X5), travel distance (X6), type of employment (X7), family income (X8), and education of the head of household (X9).

➢ *Data Collection Techniques*

Data collection techniques are a crucial step in research. The collected data will be used as material for analysis and testing of the formulated hypotheses.In this study, the researcher used primary data collection techniques by administering questionnaires containing a series of questions to homeowners, which were distributed to be completed and returned.When planning and designing the questionnaire, several factors must be considered, including:

- *The format and content of the form must be easy for respondents to understand.*
- *The form must accurately represent/describe the conditions of the population or sample at the study location.*
- *The questionnaire must align with the study objectives.*

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/25dec778

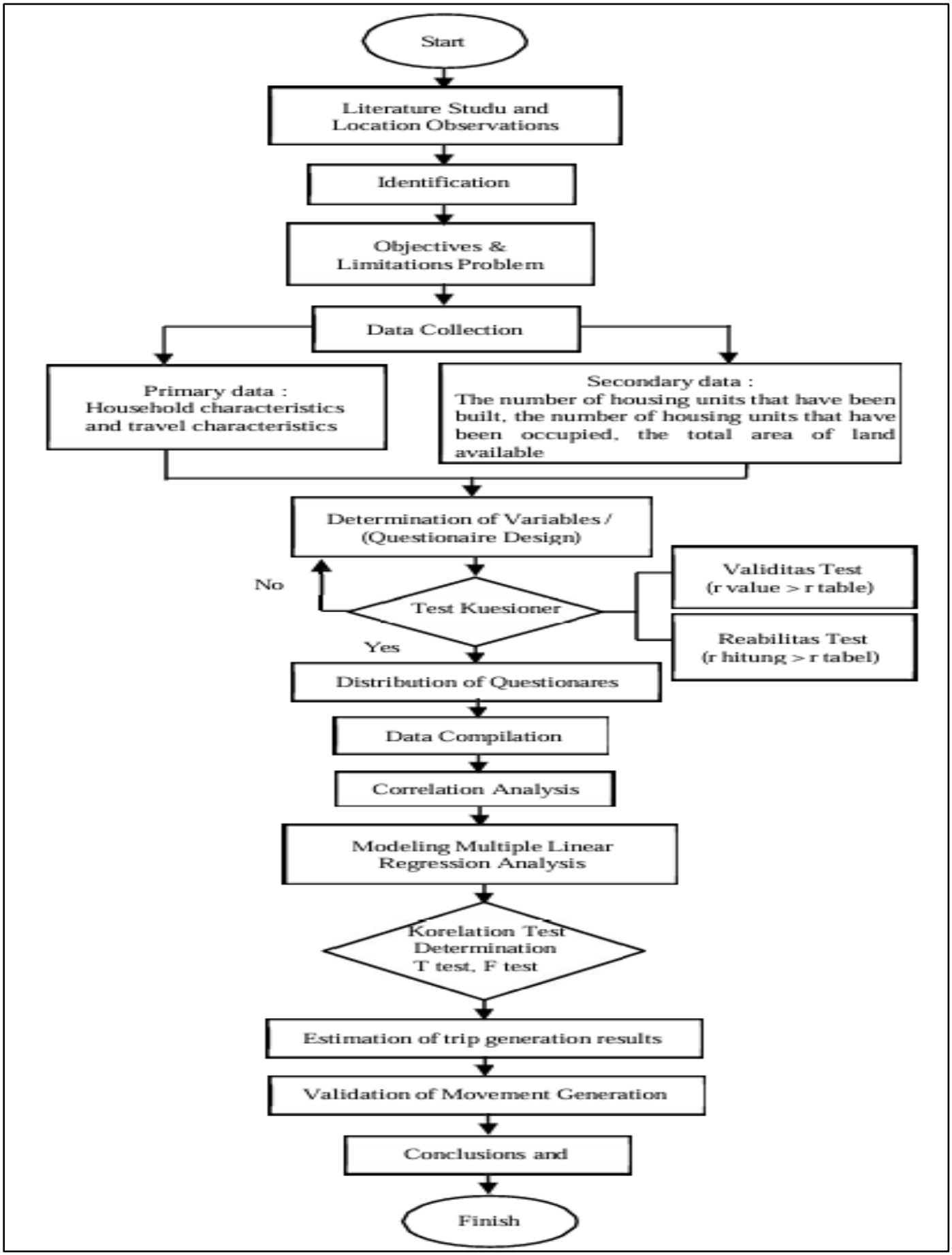

Fig 1 Stages Study

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/25dec778

III. RESULTS AND DISCUSSION

➢ *Analysis Household Characteristics and Characteristics*

From the results distribution questionnaire / questionnaire with a number of questions asked to residents Residence Still Duyu obtained socio-economic data obtained House ladder.

Table 1 Frequency Amount Residents House

Category	Frequency	Percent
1 to 2 people	60	22.1
3 to 4 people	156	57.4
5 to 6 people	52	19.1
7 to 8 people	4	1.5
Total	272	100.0

Residents House is families who have child who is school and some residents House is Students studying in Palu City.

Table 2 Frequency Amount Member Working Families

Category	Frequency	Percent
Not yet working	23	8.46
1 person	107	39.34
2 persons	129	47.43
3 people	13	4.78
4 people	0	0.0
Total	272	100.0

From the survey results obtained that 86.7% of the population has 1 to 2 occupants House from member working families.

Table 3 Frequency Amount Member Families Who Go to School

Category	Frequency	Percent
Nobody goes to school	112	41.18
1 person	90	33.09
2 persons	64	23.53
3 people	5	1.84
4 people	1	0.37
Total	272	100.0

From the table on can seen that 33.09% of residents housing area have 1 child who is currently schools and 23.53% of residents housing area have 2 children who are school.

Table 4 Frequency Type Work

Category	Frequency	Percent
Not yet Work	30	11.03
self-employed	61	22.43
Honorary	31	11.40
Employee Private	85	31.25
TNI / POLRI	21	7.72
Government employees	44	16.18
Total	272	100.0

Table 5 Frequency Amount Income

Category	Frequency	Percent
1 million to 3 million	58	21.32
3 million to 6 million	177	65.07
6 million to 9 million	36	13.24
9 million to 12 million	1	0.37
Total	272	100

Type of work residents housing and amount different incomes Because from results interview known that percentage work public the biggest is as employee private 31.25 % of those working in offices private, company private, home sick, bank and central employees shopping.

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/25dec778

Table 6 Frequency Education Head House Ladder

Category	Frequency	Percent
SMP	16	5.88
SMA	93	34.19
SMK	30	11.03
D3	32	11.76
S1	100	36.76
S2	1	0.37
Total	272	100

Table 7 Frequency Motorcycle Ownership

Category	Frequency	Percent
No there is a motorbike	9	3.31
1 unit motorbike	129	47.43
2 motorbikes	94	34.56
3 motorbikes	36	13.24
4 motorbikes	4	1.47
Total	272	100

Table 8 Frequency Ownership Car

Category	Frequency	Percent
n't any car	167	61.40
1 unit car	96	35.29
2 units car	9	3.31
Total	272	100

Table 9 Mileage Journey to Place Work

Category	Frequency	Percent
not enough from 5 km	73	26.84
5 to with 10 km	127	46.69
10 to with 15 km	45	16.54
more from 15 km	27	9.93
Total	272	100

Ownership vehicle motorized 2 (two) wheels on each House ladder naturally own influence and provide convenience access somebody For do movement , there are 9 houses or 3.3% of respondents who did not own vehicle motorized 2 (two) wheels and 167 respondents or 26.84% no own vehicle 4 (four) wheels.

➢ *Instrument Trial*

- *Validity Test*

Validity test use correlation *Person Product Moment* with criteria validity r count more big from r table on degrees significant 5% and level df (*degree of freedom*) n- 2 is 270, obtained r table 10 value 0.1190.

Table 10 Validity Test Results

Variables	r count	r table	Note:
X1	0.545	0.1190	Valid
X2	0.411	0.1190	Valid
X3	0.460	0.1190	Valid
X4	0.406	0.1190	Valid
X5	0.403	0.1190	Valid
X6	0.145	0.1190	Valid
X7	0.536	0.1190	Valid
X8	0.593	0.1190	Valid
X9	0.573	0.1190	Valid

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/25dec778

- *Reliability Test*

Reliability test done after validity testing on variables declared valid, a questionnaire it is said reliable or reliable If answer somebody to statement is consistent or stable from time to time . If alpha > 0.90 then reliability perfect . If alpha is between 0.70 – 0.90 then reliability . If alpha is 0.50 – 0.70 then Enough reliable . If alpha < 0.50 then reliability low [6] If alpha is low , it means the item is not reliable . Based on Table 11, the value *Cronbach Alpha* shows mark above 0.50 so that variables independent in study This reliable .

Table 11 Reliability Test Results

Cronbach Alpha	Condition	Note:
0.6	0.5 – 0.7	Enough Reliable

From the SPSS calculation results, the Cronbach's Alpha value is 0.6 . from 0.6 then results calculation the stated reliable and worthy.

- *Normality Test*

Normality test done For know is the research data normally distributed or not known that residual value of variables free and variable bound own sig value 0.108 >0.05. Based on criteria the can concluded that all variables normally distributed.

➢ *Modeling Resurrection Movement*

From the results distribution questionnaire with a number of representative questions variables free awakening journey , which will used is the one who has correlation highest , has mark significance to resurrection and fellow variables free No may each other correlated [11]. For see existence connection bivariate between variables independent (X) with awakening movement (Y) is done analysis correlation *Pearson.* Correlation test results can seen in table 12 as following:

Table 12 Correlation Test Results Between Variables

Variables	R	Sig.	Conclusion
X1	0.506	0.000	Significant (correlation strong)
X2	0.383	0.000	Significant (correlation moderate)
X3	0.641	0.000	Significant (correlation strong)
X4	0.137	0.024	Significant (correlation weak)
X5	0.548	0.000	Significant (correlation strong)
X6	-0.004	0.948	n't any connection
X7	-0.002	0.975	n't any connection
X8	0.387	0.000	Significant (correlation moderate)
X9	0.065	0.283	Significant (correlation weak)

Based on results table 12 is known that No all variables independent (X) has relationship (correlation) with variable (Y). variable independent who has correlation with variable (Y) namely Amount member family X1, Total member family work X2, amount member family school X3, number X4 Car ownership , number X5 Motorcycle ownership , number income X8 family , Head of Education House X9 stairs . Next the results of the data obtained processed use *multiple linear regression analysis* with using SPSS software version 25 then obtained model form.

Best model selection done For choose a model that can used for the generation model that has coefficient determinant (R2) which is close to 1, the SEE value and the constant show small value and the model has variables more diverse freedom describe condition Actually.

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/25dec778

Table 13 Analysis of Generation Model

Model	Var.	Regression Coefficient	R Square	Str. Error of the Estimate
1	(Constant)	-0.490	0.715	0.365
	X1	0.100		
	X2	0.407		
	X3	0.415		
	X5	0.195		
2	(Constant)	-0.592	0.720	0.363
	X1	0.093		
	X2	0.388		
	X3	0.405		
	X4	0.088		
	X5	0.218		

Based on Table 13 above is the generation model selected trip is model 2. because own large R *square* value compared to with model 1 and has 5 variables that can be entered in model analysis .

➢ *Assumption Test Classic*

Assumption test classic own function For know what is the regression model truly show significant and representative relationships or No , as for testing assumptions classic done before testing Multiple Linear Regression , with using multicollinearity test and heteroscedasticity test.

- *Multicollinearity Test*

Regression model it is said free from multicollinearity if own VIF value is higher small of 10 and have number tolerant more big from 0.10. [6] Variance value inflation obtained as results SPSS calculations can seen table following :

Table 14 Multicollinearity Test Results

Variables	Statistical collinearity	
(Constant)	Tolerance	VIF
X1	0.729	1,372
X2	0.772	1,295
X3	0.665	1,504
X4	0.824	1,214
X5	0.690	1,450

Based on Table 14 VIF Values. More small than 10 and more *tolerance* tall from 0.10 to all variables free . With thus the regression model No happen multicollinearity.

- *Heteroscedasticity Test*

If *variance* from residual one observation to other observations remain , then called homoscedasticity and if different called heteroscedasticity . White Test, Testing to symptom heteroscedasticity can with method regressing the squared residuals with variables free [6]. This test was carried out with compare $\chi 2$ and $\chi 2$ table count , if $\chi 2$ count > $\chi 2$ table so happen heteroscedasticity and vice versa if $\chi 2$ count < $\chi 2$ table so No happen heteroscedasticity .

Table 15 Results of Heteroscedasticity Test

Model	R	R Square	Standard Error of the Estimate
1	0.097	0.009	0.009

From the table 15 on can seen that The R Square value is 0.009. With this data counted using $\chi 2$ (n x R) where n : 272 and R square : 0.009. Obtained $\chi 2$ calculation results is (272 x 0.009 = 2.574). And the $\chi 2$ table counted use (df = k – 1) where k : amount variables dependent . Obtained $\chi 2$ table results is (df = 6 - 1) 11.0707. From the data above known that calculated $\chi 2$ value more small than the value of $\chi 2$ table that can be concluded that No happen symptom heteroscedasticity.

➢ *Hypothesis Testing*

Hypothesis testing done before taking decisions based on from data analysis . A results Can it is said significant in a way statistics If incident the almost No Possible caused by factors coincidentally , appropriately with the probability limits that have been determined determined , testing hypothesis influence variables free to variables still is as following :

- *Partial Test (t-Test)*

Partial test (t test) is used For know the influence of each variable independent to variables dependent [6] t value which is obtained as results SPSS calculations can seen table following :

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/25dec778

Table 16 Results of the Significance of the Regression Model in a Way Partial (T-Test)

Varn	Coef Regress	Std Error	Standardized Beta	t	Sig
(Constant	-0.592	0.120		-4,938	0.000
X1	0.093	0.038	0.094	2,470	0.014
X2	0.388	0.035	0.411	11,110	0.000
X3	0.405	0.029	0.565	14,189	0.000
X4	0.088	0.044	0.072	2,014	0.045
X5	0.218	0.033	0.260	6,650	0.000

Table 16 shows the results of the t-test , namely the influence test or significance of regression parameters in a way partial .

H0 = None variables significant independence influential to variables dependent

H1 = Variable significant independence influential to variables dependent

Table 16 shows t - value from Amount member family (X1), Number member family work (X2), amount member family school (X3), number Car ownership (X4), number Motorbike ownership (X5) more big from t table in degrees significant 5% and level df (*degree of freedom*) n- 1 is 271, obtained t table value 1.650 < t count and sig. value < level error (α) is 0.05, so H0 is rejected , which means all over variables the significant influence variables dependent in a way partial.

- *Simultaneous Test (F Test)*

The purpose of the F test For know influence variables independent together (simultaneously) against variables dependent [6] The results of the F test can seen in table 17 as following :

Table 17 Significance Results of Regression in a Way Simultaneously (F Test)

Model	Sum of Square	df	Mean Square	F	P-value (Sig.)
Regression	89,809	5	17,962	136,467	.000
Residual	35,011	266	0.132		
Total	124,820	271			

➢ *Amount Resurrection*

From the results multiple linear regression obtained generation model equation journey resident Residence Still Duyu. The size mark variables in the model are based on with total value of each variables and average values for each obtained variables from survey results from a total of 272 samples . Calculation of the total and average of each variable X is given as following :

Table 18 Total Value of Each Variable Independent

Variables	Total Value	Expansion Factor (Amount Population / number sample)
(X1)	544	2838/272 = 10.43
(X2)	676	
(X3)	519	
(X4)	386	
(X5)	713	

Based on the generation model that has been done total trip obtained resident Kelapa Gading Kalukubula housing complex , then total trip generation resident Residence Stay Duyu:

Y = -0.592+ 0.093 X1+ 0.388 X2 + 0.405

Y = -0.592 + (0.093 x 544 x 10.43) + (0.388 x 676 x 10.43)

+ (0.405 x 519 x 10.43) + (0.088 x 386 x 10.43) +

(0.218 x 713 x 10.43)

Y = 3482 trips resident Residence Still Duyu per day

➢ *Past Survey Cross Daily / Traffic Counting of the Resulting Surges*

In the validity test amount awakening from the generation model movement in housing still Duyu done recording Then cross *(traffic counting)* on day Tuesday at 1 (one) point survey . Calculation done in the past outgoing and incoming traffic incoming traffic Kelapa Gading Table 18 shows the results of the F test , namely the influence test or significance of regression parameters in a way simultaneously . Retrieval decision seen based on mark *p-value* or sig value . on SPSS 25 output . If sig. value < level

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/25dec778

error (α) is 0.05 then H0 is rejected and vice versa if sig. value > level error (α) is 0.05 , so H0 is accepted . The table above show sig. value of the result of the F test is 0.00 which is more small from 0.05, which means that based on the test simultaneously there is influence to variables independent. fluctuations vehicle in and out Kelapa Gading Housing Complex Kalukubula :

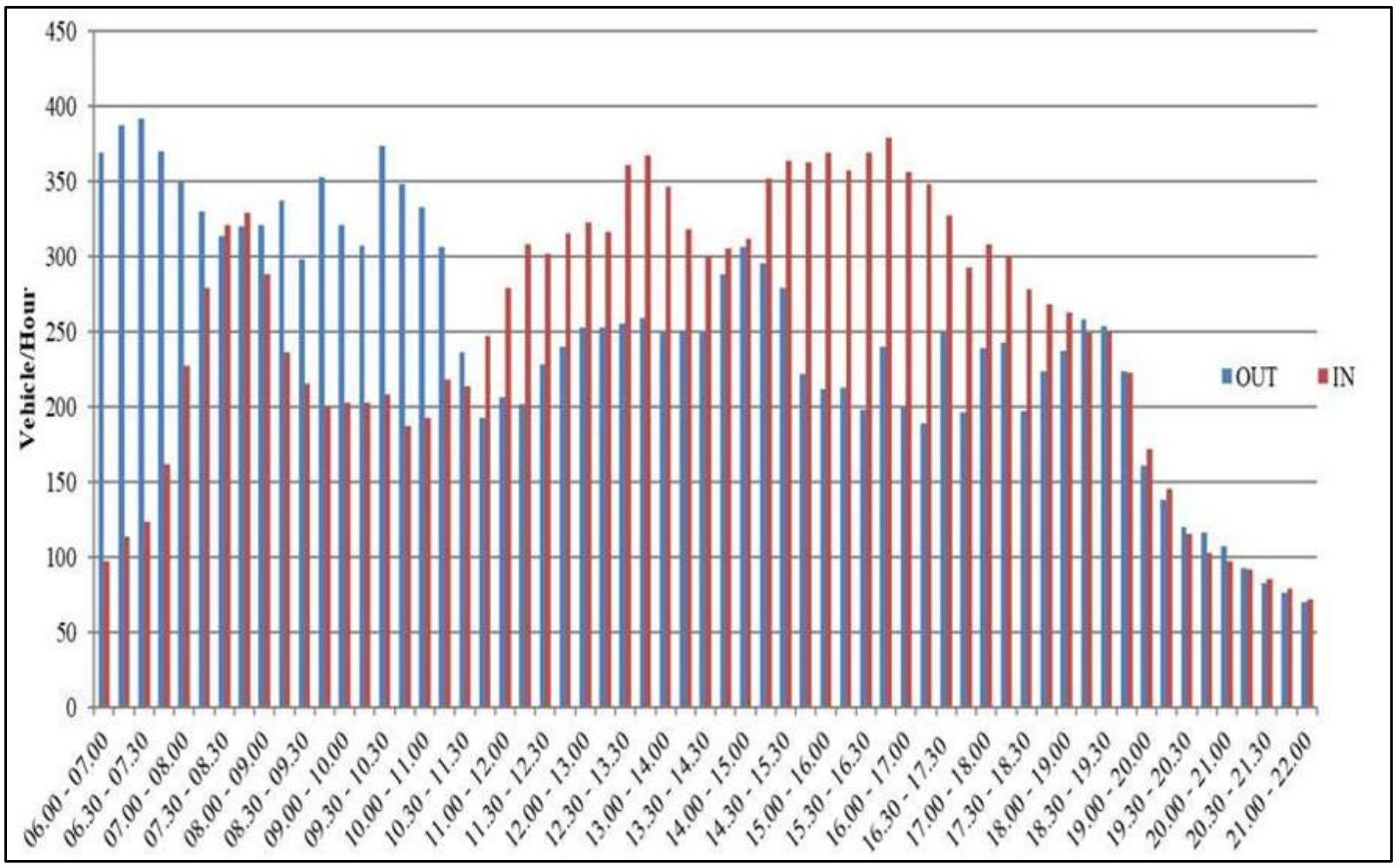

Fig 2 Chart Fluctuation Vehicle Entering and Exiting the Residence Still Duyu

From the results of *the traffic count* survey during the 16 hour survey and the total number of vehicles obtained go out amounting to 3934 trips / day , for the busiest hours or peak hours awakening journey occurred at 06.30 – 07.30 where at that time the is time For child school leave school time shopping need daily and go Work with amount MC motorbikes amounted to 363 vehicles , the number LV (*Light Vehicle)* or vehicle light as many as 24 vehicles , for HV *(Heavy Vehicle)* or vehicle heavy as large as 6 vehicles Total vehicles enter of 3905 trips and peak hours vehicle enter to in housing area occurred at 15.45 – 16.45 where time the is home time Work residents Residence still Duyu with amount MC motorbikes amounted to 342 vehicles , the number LV (*Light Vehicle)* or vehicle light as many as 32 vehicles , for HV *(Heavy Vehicle)* or vehicle heavy as large as 5 vehicles .

IV. CONCLUSION

➢ *Characteristics Socio- Economics in Housing Still Duyu (Huntap):*

- From the results distribution questionnaire and interview survey known that 57.4% of residents temporary housing consisting of 3 to 4 people
- Amount member families who attend school at each families in temporary housing numbering 1 to 2 people with percentage 56.6 %.
- Head education House 36.76 % of undergraduate students and 34.19% of graduates school medium on with type 31.25% of employees work private and 22.43% self-employed Where average income per Month 72% Rp. 3,000,000.00 – Rp. 6,000,000.00
- Ownership vehicle 2 -wheeled vehicle (motorcycle) 1 unit by 47.43% and ownership vehicle wheel 4 by 35.29%.

➢ *Characteristics Movement Resident Huntap :*

- From the analysis awakening results modeling obtained total generation value Residence Still (Huntap) amounting to 7428 trips / day .
- From the results *Traffic counting* is carried out total number of vehicles obtained go out amounting to 3934 trips / day and incoming vehicles amounting to 3905 trips / day .
- Degrees saturation (DS) with mark For existence awakening movement of 0.15 and for without existence awakening movement 0.11 where still enter LOS Category A.
- Birthday average trips per housing unit or per head family is 7428 / 850 = 8 trips / day .
- Peak hour vehicle go out occurred at 06.30 – 07.30 with

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/25dec778

traffic volume cross of 122 smp /hour Where time the is time child leave school , time shopping need daily and time For go work and peak hours vehicle enter occurred at 16.45 – 17.45 with traffic volume cross as much as 124 smp / hour Where time the is time to go home .

- *Based on results testing hypothesis that coefficient determination or R^2 obtained from analysis regression is is 0.720 then can explained that variable Y , namely amount awakening journey can be explained by the model by 72% then can regression model formed as following :*

$$Y = -0.592 + 0.093 X1 + 0.388 X2 + 0.405$$

Resurrection journey residents in huntap influenced by the variable X1 the amount member family , X2 number member working families , X3 number member families who attend school , X5 number motorcycle ownership . Based on table 4.23 testing hypothesis influence of X1 Amount member family , X2 Total member family work , X3 amount member family school , X4 number X5 Car ownership total Motorbike ownership.

REFERENCES

[1]. Akhmad Abdi Damhudi, et al 2015 " *Analysis influence awakening journey resident to performance road main area Wira Praja Muara Teweh housing complex* " Lambung University Mangkurat , Banjarbaru , South Kalimantan.

[2]. Central Statistics Agency Sigi Regency , 2021 " Sigi *Regency in Figures 2021* " Publisher BPS Central Sulawesi.

[3]. Black, JA 1981 " *Urban Transport Planning: Theory and Practice* " Cromm Helm, London.

[4]. Department Work General , 1997 " *Indonesian Road Capacity Manual* " Directorate General of Highways.

[5]. FD Hobbs, 1995 " *Traffic Planning and Engineering* " Gaja Mada Press University, Yogyakarta .

[6]. Ghozali , 2017 " *Application Analysis Multivariate With SPSS 23 Program* " Diponegoro University Publisher .

[7]. G. Oltean, et al 2019, " *Towards Real Time Vehicle Counting using YOLO-Tiny and Fast Motion Estimation* " SIITME 2019 - 2019 IEEE 25th Int. Symp.

[8]. Morlok, Edward K. , 1991 " *Introduction to Engineering and Planning Transportation* " Erlangga " , Jakarta

[9]. Nugroho Dwi Puspito 2016 " *Awakening Model Movement in the area housing area Bengkuring Samarinda* " University of August 17, 1945, Samarinda.

[10]. Nuryadi , et al 2017 " *Basics of Statistics Research* " Publisher My Book Media, Yogyakarta.

[11]. Ofyar Z. Tamin, 1997 " *Planning & Modeling Transportation* " Institute Bandung Technology , Bandung.

[12]. Sarwono Jonathan 2013 " Smart *Book IBM SPSS Statistics 19* " PT. Elex Media, Jakarta.

[13]. Sugiyono , 2016 " *Research Methods Quantitative , Qualitative and R&D* " Publisher PT Alfabet Bandung.

[14]. Warpani , S. 1985 " *Traffic Engineering* " Publisher Bharatara Karya Aksara Jakarta.