

# International Journal of Innovative Research in Science, Engineering and Technology

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## Study of Commuter Travel Characteristics of Makassar Suburban

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**ABSTRACT** : This study aims to analyze Makassar suburban employee travel behaviour. The approach of this study is activity approach, which is the research that develops a study of a phenomenon This population activity approach can be viewed from its dissemination, interaction, and description with other symptoms related to activities in the course of work. Variables used in this study are work, private car ownership, private motorcycle ownership, mode, commuter travel chains, travel time, departure time, and arrival time.

The result shows that private commuter ownership domiciled in suburban area of Makassar is dominated by 1 piece ownership of 56.42% and ownership of motor cycle domination with 1 piece ownership that is 55,72% from population, commute mode of transportation tend to use private vehicle compared with public transportation. Results The chain of commuting trips is dominated by commuters traveling from home directly to work as much as 62.18% of the total population. Travel distance commuting trip from residence to workplace is dominated by the distance of 14.5 to 19.00 kilometers with a percentage of 34.09%. Travel time commuters who travel to work in dominance with travel time 31 minutes to 40 minutes with a percentage of 30.35%. Departure time of Government Civil Servants is dominated between 06.21-06.40, Teachers and Army / Police is dominated by departure time at 06.01 - 06.20. While Entrepreneur and Private Employees are dominated between 06.41 - 07.00.

Arrival time at the workplace of Government Civil Servants is dominated between 06.46-07.00, Teachers and Army/Police is dominated between 06.46-07.00, while Entrepreneur and Private Employees are dominated between 07.31 - 08.00.

**KEY WORDS** : Characteristics, travel, commuter, suburban

### I. INTRODUCTION

Work trips are the main commute routine commuters daily. This trip will result in a very high accessibility, especially when leaving for work or in the afternoon after returning from work.

Workers domiciled in the suburbs of Makassar, South Sulawesi Province, Indonesia have varied jobs such as Government Civil Servants, Teachers, Army / Police, Entrepreneurs, Private employees. This variation of work leads to the departure time and arriving time at the workplace as well. Teachers and Army / Police leave early because time starts work at 07.00 while Government Civil Servants start work at 07.30 and Entrepreneur, Private employees work at 08.00. Since the time began to work in each agency binds, the workers begin the journey by thinking of the modes used, the travel chain, the distance traveled, the travel time, departure time and arrival time. The characteristics of travel need to be known for an urban transport planning.

Various studies conducted to examine the journeys of suburban residents include; Empirical models are developed for the departure time choices for home-based commuting trips in the Greater Toronto and Hamilton Area (GTHA)[1], Study on choice model of departure time based on disutility of going to city center activity by taking the suburb of Tokyo [2], Examine the matter of departure of workers from the suburbs [3], analyse mode choice behaviour for suburban trips in the Grand Canary island using mixed revealed preference (RP)/stated preference (SP) information [4]. Considering latent attitudes in mode choice: The case of Switzerland [5]. Gender-Based Analysis of Work Trip Mode Choice of Commuters in Suburban Montreal, Canada [6]. Market research evaluation of actions to reduce suburban traffic congestion: Commuter travel behavior and response to demand reduction actions [7]. Transport

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mobility associated with selection of residence in suburb area Semarang, Indonesia [8], Discrete Choice Modeling of Combined Mode and Departure Time [9]. What affects commute mode choice: neighborhood physical structure or preferences toward neighborhoods [10], Suburban commuter's choice behavior of travel mode: a case study in Nanjing [11]. Mode choice models reveal that office workers are most likely to rail-commute if frequent feeder bus services are available, their employers help cover the cost of taking transit, and parking is in short supply [12]. This study focus on characteristics of Makassar suburban employee travel behavior.

## II. LITERATURE REVIEW

### Suburban

Suburban is an area where adjacent to other areas, be it the downtown area and the sub-city center. Urban development activities can not be separated from the overall development activities within the framework of space and time, because of the demands of the needs that always arise in the form of city development associated with the development of the population and activities or activities undertaken as well as its relationship with other regional developments. Having a residence in the city center today is very difficult especially because the price factor is relatively expensive. So for the middle class population down the solution is to find a place to live in the suburbs with far from the consequences of work or place of education. Residents in the suburbs mostly work in urban centers and this zone is solely used for shelter. Nevertheless, the outskirts of the country will grow and attract other functions as well, such as shopping malls, offices, etc. and the process will be similar to the existing city.

### Trip Characteristic

Indonesian Dictionary of Publications published by the Library of the Year 1996, defines characteristic is something that has a special character according to certain character. Travel is the movement of a person or a vehicle in an area with one or several modes, and with origin and a destination. On travelling, we pay attention to trajectories, conveyances (vehicles), speed, and everything that happens or we see along the path. Meanwhile, the trip is done with the purpose of enjoying the journey itself or because there is a purpose, besides of course there are elements traveling in it.

### Operational Definition

Commuter is a person who travels every day, depart from the residence in the morning and back in the afternoon. In this study, commuters domiciled in the suburbs of Makassar who travel on the job. Ownership of private commuter vehicles domiciled in the suburbs of Makassar, consisting of private car (PC), motor cycle (MC). In this study, the private car ownership consists of do not have a car, have 1 car, have 2 cars, and have 3 cars. In the commuting trip, it uses a private car (PC) mode, motor cycle (MC), public transport (PT), motorcycle used as public transport (Ojek), three-wheeled motorcycle as public transport (Bentor). The chain of commuter journeys from the house to the workplace is not only straight to the workplace (H-O) but also commuting that departs from home to drive the family either school or elsewhere first then to the workplace (H-D-O). In addition there are also workers who take care of office affairs first then to work (H-T-O).

Commuting trips from home to workplace have varying distances ranging from a distance of 5 to 30 kilometers. In this study the distance traveled in 5 - 9 kilometers, 9.1 - 14 km, 14.1 - 19 kilometers, 19.1 - 24 kilometers and 24.1 - 30 kilometers. Travel time commuting is the time spent traveling from a residence in the suburbs of Makassar to the workplace. The commuting time varies from 10 minutes to 70 minutes. In this study the travel time is divided between 10 - 20 minutes, 21 - 30 minutes, 31 - 40, 41 - 50 minutes, 51 - 60 minutes and 61 - 70 minutes.

Departure time from residence to workplace of the commuter varies this depending on the time to start working in their respective places. Started time at work, Teachers and Army / Police at the same time at 07.00. Government Civil Servants start work at work at 07.30 while Entrepreneur and Private employees is at 08.00. In this study departure time is divided between the hours of <06.00, 06.01-06.20; 06.21-06.40; 06.41-07.00; 07.01-07.20. The time comes when commuters will arrive at their workplace. Coming time commuters at commuters work from 06.30 to 08.00. In this

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study the time arrived at work divided between 06.30-06.45; 06.46-07.00; 07.01-07.15; 07.16-07.30; 07.31-07.45 and 07.46-08.00.

### III. RESEARCH METHODOLOGY

The approach used is the activity approach, ie research that develops a study of a phenomenon. This population activity approach can be viewed from its distribution, its interaction, and its description with other symptoms related to the activity in doing the work trip. The use of quantitative data is more widely used in this research, so the method of analysis used in this research is quantitative and quantitative descriptive method. Technique of collecting data which done consist of primary and secondary data collection. Primary data collection is through observation or observation directly at the location of research and secondary data collection conducted such as collection of information and data both literature and agencies associated with this research. This study conducted at four suburban areas in Makassar with number of population as seen on table 1.

The variables surveyed were occupation, private car ownership, ownership of motorcycles, modes used, commuter travel chains, travel distance, travel time, departure time and arrival time.

Table 1. Number of Population

No.	District	Sub-district	Number of workers (people)	Number of sample
1.	Biringkanaya	Sudiang Raya	2.768	339
2.	Manggala	Antang	2.366	331
3.	Tamalate	Barombong	1.460	305
4.	Rappocini	Gunung Sari	1.588	310
	Total		8.182	1.285

### IV. ANALYSIS & DISCUSSION

#### Car Ownership

Figure 1 shows private car ownership percentage for each commuters do not have private car is 7.78% ; have 1 private car 14,47% and have 2 private cars is 1,95% of total commuters who domiciles at Makassar suburban. Private car ownership for teachers who do not have private car is 6,38%, have a private car is 10,35% , and have 2 private cars is 0,93% . 4,67% army/police do not have private car, 5,91% have a private car and 0,47% have 2 private cars. 3,04% enterpreneur do not have private car, 7,32% have a private car and 1,56% have 2 private cars, while 15,88% employees do not have private car, 18,37% have a private car and 0,93% have 2 private cars.

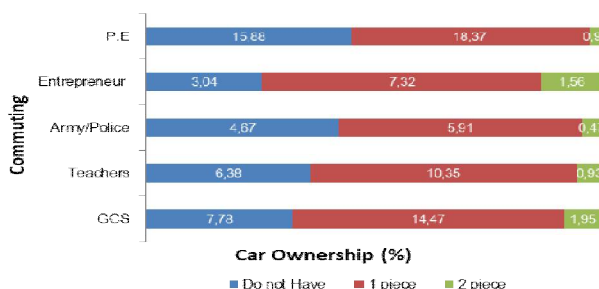


Fig 1. Percentage of Private Car Ownership

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## Motor Cycle

The percentage of commuter motor cycle owners traveling from the suburbs of Makassar as shown in Figure 2 can be known GCS which does not have a motor cycle of 1.48%; which has 1 car 12.14% which has 2 cars 9.34% and which has 3 cars is 1.25%. Teachers who do not have a motor cycle of 0.93%; which has a motorcycle 9.49% which has 2 motorcycles of 5.21% and which has 3 motorcycles is 2.02%. For those working as Army / Police who do not have a motor cycle of 0.31%; which has a motorcycle of 6.69% which has 2 motorcycles 3.66% and which has 3 motorcycles is 0.39%. For those who work as Entrepreneurs who do not have motor cycle as much as 1.63%; which has a motorcycle 5.60% which has 2 motorcycles 4.05% and which has 3 motorcycles is 0.62% while For those who work as employees who do not have motor cycle as much as 2.49%; which has a motorcycle 21.79% which has 2 motorcycles 9.96% and that has 3 motorcycles is 0.93%

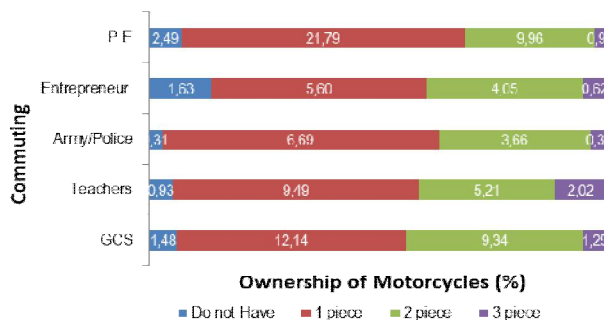


Fig 2. Percentage of Motorcycle Ownership

## Travel Mode

Percentage of the use of transport modes to commuters traveling, as shown in Figure 3, it can be seen that GCS uses a PC of 9.11%, using MC 7.94%, using PT 3.42%, using Ojek 2.33% and using Bent 1.40%. Percentage of use of transportation mode for Teachers 5.60% using PC, 7.32% using MC, 2.33% using PT, 1.79% using Ojek as well as using Bentor is 0.62%. The commuters who work as PC / Army travel using PC as much as 2.10%, using PC 5.91%, using PT 1.17%, using 0.54% Ojek, and those using Bent 1.32%. Entrepreneurs who work as entrepreneurs are 5.84% using PC, 3.36% using MC, 1.40% using PT, 0.70% using Ojek and Bentor is 0.31%. The commuters who work as PEs who travel on PCs are 8.4%, using 11.98% PCs, using PT 5.53%, using Ojek 3.11%, and those using Bentor 6.15%.

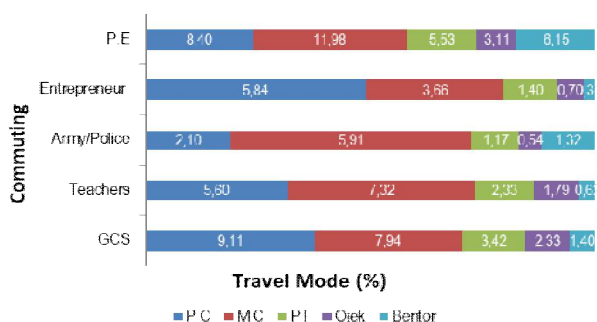


Fig 3. Percentage of Transport Mode

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## Travel Chain

Percentage of number of commuter traveling chains from suburban areas as shown in Figure 4 visually commuting working as Government Civil Servants (GCS) directly to the workplace amounted to 17.90% and GCS which delivered prior to the workplace 3.27% while the take care of the office affairs first before go to the workplace is 3.04%. Teachers who go directly to the workplace amounted to 8.48% and who escorted first before go to the workplace 5.68% while those taking care of office affairs first before go to the workplace is 3.5%. Army / Police who directly to the workplace amounted to 5.68% and who drove first before go to the workplace 3.97% while the office management before go to the workplace is 1.4%. Entrepreneurs who go directly to the workplace amounted to 5.76% and who escorted first before go to the workplace 1.17% while those taking care of office affairs first before the place of work is 4.98%. Private employees who go directly to the workplace amounted to 24.36% and who drove first before go to the workplace 5.37% while those taking care of office affairs first before go to the workplace is 5.45%.

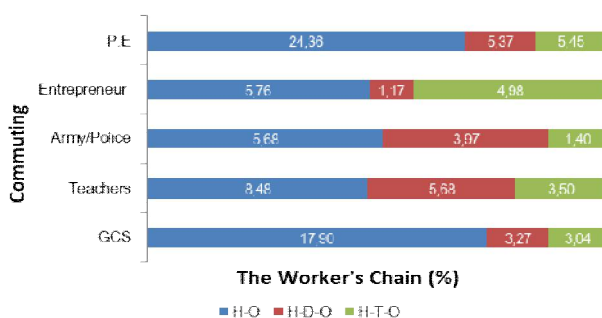


Figure 4. Percentage of Travel Chain

## Distance of Travel

The percentage of distance traveled by commuters domiciled in the suburbs of Makassar as shown in Figure 5 can be seen GCS that traveled 5-9 km as much as 4.98%, which traveled from 9.1 to 14 km 4.59%, which covered a distance of 14 , 1-19 km as much as 8.56%, which covered the distance of 19.1-24 as much as 3.24%, and which covered the distance of 24.1-30 km as much as 2.65%. Teachers who traveled a distance of 5-9 km as much as 2.72%, which traveled a distance of 9.1-14 km 3.19%, which covered a distance of 14.1-19 km as much as 6.85%, which covered a distance of 19.1- 24 as much as 2.72%, and the distance of 24.1-30 km as much as 2.18%. Army / Police who traveled 5-9 km as much as 1.63%, which traveled a distance of 9.1 to 14 km 2.26%, which covered a distance of 14.1-19 km as much as 4.2%, which covered a distance of 19, 1-24 as much as 2.26%, and the distance of 24.1-30 km as much as 0.7%. Entrepreneurs who traveled 5-9 km as much as 1.56%, which traveled a distance of 9.1 to 14 km 2.49%, which covered a distance of 14.1-19 km as much as 2.18%, which covered a distance of 19.1- 24 as much as 4.05%, and which covered a distance of 24.1-30 km as much as 1.63%. Private employees who traveled 5-9 km as much as 1.56%, which traveled a distance of 9.1 to 14 km 2.49%, which covered a distance of 14.1-19 km as much as 2.18%, which covered a distance of 19.1 -24 as much as 4.05%, and which covered a distance of 24.1-30 km as much as 1.63%.

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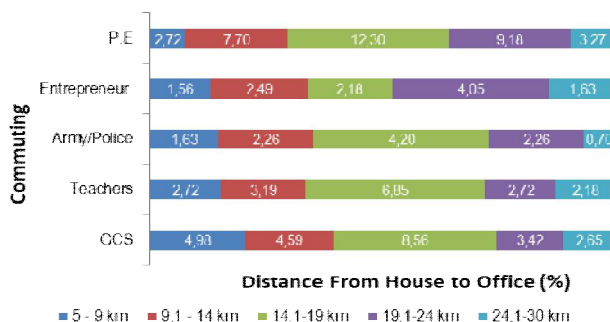


Fig 5. Percentage of Distance

## Traveling time

The percentage of commuter traveling time in traveling for work as shown in Figure 6 described the travel time of GCS between 10 - 20 minutes is 2.41%, travel time 21 - 30 minutes is 4.51%, travel time 31 - 40 minutes is 8.56 %, travel time between 41 - 50 minutes is 3.89%, travel time between 51 - 60 minutes 3.81% and travel time between 61 - 70 minutes is 1.01%. Teachers time between 10 - 20 minutes is 1.79%, travel time 21 - 30 minutes is 3.35%, travel time 31 - 40 minutes is 5.99%, travel time between 41 - 50 minutes is 3.74% , travel time between 51 - 60 minutes 1.71% and travel time between 61 - 70 minutes is 1.09%. Army / Police travel time between 10 - 20 minutes is 0.93%, travel time 21 - 30 minutes is 2.72%, travel time 31 - 40 minutes is 2.41%, travel time between 41 - 50 minutes is 2, 80%, travel time between 51 - 60 minutes 2.02% and travel time between 61 - 70 minutes is 0.16%. Entrepreneur time between 10 - 20 minutes is 0.54%, travel time 21 - 30 minutes is 0.70%, travel time 31 - 40 minutes is 4.12%, travel time between 41 - 50 minutes is 2.41%, travel time between 51 - 60 minutes 2.72% and travel time between 61 - 70 minutes is 1.40%. Private employees time between 10 - 20 minutes is 1.01%, travel time 21 - 30 minutes is 4.28%, travel time 31 - 40 minutes is 9.26%, travel time between 41 - 50 minutes is 14.32%, travel time between 51 - 60 minutes 4.67% and travel time between 61 - 70 minutes is 1.63%.

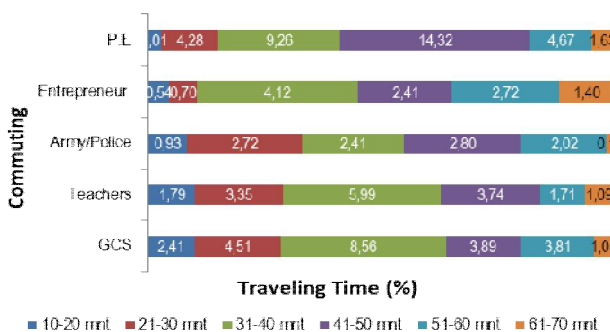


Fig 6. Percentage of Travel Time

## Departure Time

Percentage of departure time from residence to work place as shown in figure 7 can be seen departure time of Government Civil Servants (GCS) <06.00 is 2.1%, from 06.01 to 06.20 time 3.19%, from 06.21 to 06.40 as many as 11,38%, from 06.41 to 07.00 as much as 7.16% and from 07.01 to 07.20 as much as 0.39%. Percentage of Teachers departure time before 06.00 (<06.00) is 5.14%, from 06.01 to 06.20 times 10.19%, from 06.21 to 06.40 as much as 2.33%. The percentage of Army / Police departure time before 06.00 (<06.00) is 3.19%, between 06.01 - 06.20 times



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5.99%, between 06.21 - 06.40 1.87%. Percentage of Entrepreneur departure time between 06.21 - 06.40 is 3.58%, between 06.41 - 07.00 4.98% and between 07.01 - 07.20 is 3.35%. The percentage of Private Employee departure time between 06.01 - 06.20 is 0.08%, between 06.21 - 06.40 7.78%, between 06.41 - 07.00 21.25% and between 07.01 - 07.20 6.07%.

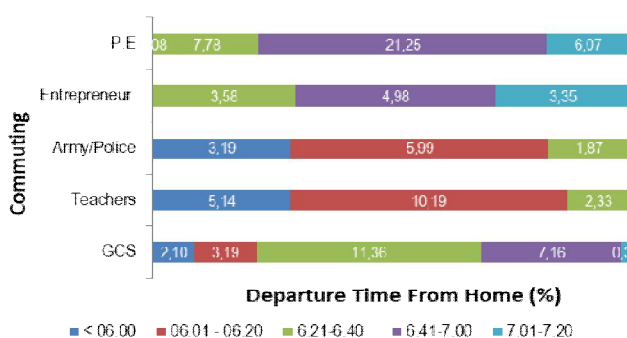


Fig 7. Percentage of Departure Time

## Arrival Time

Percentage of arrival time at work of each commuter as shown in figure 8 can be known by Government Civil Servants (GCS) which arrive between 06.30-06.45 as much as 1.40%, between 06.46-07.00 is 10.66% and 07.01-07.15 is 12.14%. Teachers arrive between 06.30-06.45 as much as 5.37%, and between 06.46- 07.00 is 12.30%. Army / Police arrived between 06.30-06.45 at 3.66%, and between 06.46- 07.00 is 7.39%. Entrepreneurs who arrive between 07.01-07.15 are 0.70%, between 07.16-07.30 is 2.18%, between 07.31-07.45 as 4.36% and between 07.46-08.00 is 4.67%. Private employees (PE) arrive between 06.46-07.00 as 0.23%, arriving between 07.01 and 07.15 is 1.40%, between 07.16-07.30 is 8.33%, from 07.31 to 07.45 as 14.32% and between 07.46-08.00 is 10.89%.

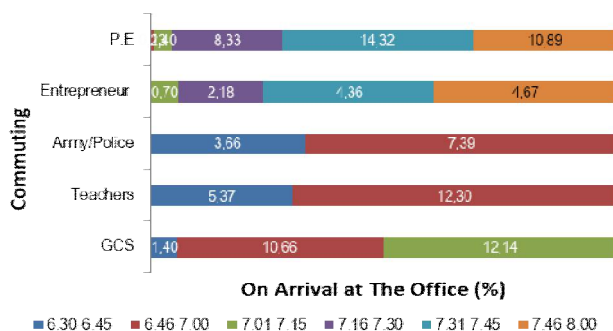


Fig 8. Percentage Time arrives

## V. CONCLUSION

Ownership of private car commuting domiciled in the suburbs of Makassar is dominated by a private car of 56.42% and motor cycle domination ownership with a private car is 55.72% of the population. From analyze it can be concluded that the commute mode of travel tend to use private vehicles (PC & MC) compared with public transportation. The

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commuter travel chain from the suburbs of Makassar is dominated by commuters who depart from home directly to the workplace as much as 62.18% of the population. Travel distance commuting trip from residence to workplace is dominated by the distance of 14.5 to 19.00 kilometers with a percentage of 34.09%. Travel time commuters who travel to work in dominance with travel time 31 minutes to 40 minutes with a percentage of 30.35%. Departure time of Government Civil Servants (GCS) is dominated between 06.21-06.40, Teachers and Army / Police is dominated by departure time at 06.01 - 06.20. While Entrepreneur and Private Employees are dominated from 06.41 to 07.00. Upon arrival the workplace of Government Civil Servants is dominated between 06.46-07.00, Teachers and Army / Police is dominated from 06.46 to 07.00, while Entrepreneur and Private Employees are dominated from 07.31 to 08.00.

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