Discrete-Choice Modeling Of Non-Working Women’s Trip-Chaining Activity Based

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Abstract. Start The urban developments of technology and economics are now changing the lifestyles of the urban societies. It is also changing their travel demand to meet their movement needs. Nowadays, urban women, especially in Bandung, West Java, have a high demand for their daily travel and tend to increase. They have the ease of accessibility to personal modes of transportation and freedom to go anywhere to meet their personal and family needs. This also happens to non-working women or as housewives in the city of Bandung. More than 50% of women’s mobility is outside the home, in the term of trip-chaining, from leaving to returning home in one day. It is based on their complex activities in order to meet the needs of family and home care. While less than 60% of male’s mobility is outdoors, it is a simple trip-chaining or only has a single trip. The trip-chaining has significant differences between non-working women and working men. This illustrates the pattern of Mom and Dad’s mobility in a family with an activity-based approach for the same purpose, i.e. family welfare. This study explains how complex the trip-chaining of non-working urban women and as housewives, with an activity-based approach done outdoors in a week. Socio-economic and household demographic variables serve as the basis for measuring the independent variables affecting family welfare, as well as the variables of type, time and duration of activities performed by unemployed housewives. This study aims to examine the interrelationships between activity variables, especially the time of activity and travel, and socio-economic of household variables that can generate the complexity of women's daily travel. Discrete Choice Modeling developed by Ben-Akiva, Chandra Bhat, etc., is used in this study to illustrate the relationship between activity and socio-economic demographic variables based on primary survey data in Bandung, West Java for 466 unemployed housewives. The results of the regression, by Seemingly Unrelated Regression approach methods, showed the interrelationship between all variables, including the complexity of trip chaining of housewives based on their daily activities. The type of mandatory and discretionary activities, and the duration of activities performed during the dismissal in the series of trip chains conducted are intended for the fulfillment of the welfare of all family members.

1. Introduction
Historically, travel is a derived demand from the need for consumption and usually uses the main transport. Along with the changing pattern of consumption to be complex life needs, the changes in travel patterns are increasingly complex as well. Based on physical activity in meeting needs and consumption, activity-based models and the study of trip-chain patterns become one of the focuses on transportation models development.
To achieve a policy statement that is in the process of friendly citizens, the authors believe it is important to understand the travel behavior activity-based of two groups of women from Bandung City. Although there are many studies on non-worker travel behavior, but have not received deep attention, especially women as housewives. Group of non-working women is an important part of Bandung’s population. In comparison, [1] focused on the behavior of individual travel-activities of the Jakarta Metropolitan Region in Indonesia. Create a lower dependency on personalized mode, reduce slightly more travel, and allocate less time to travel. Then [2] in his analysis of long-term activities of the Osaka Metropolitan area of Japan, found non-workers and their activities. The selection found differences in daily patterns of non-workers between the Indonesian city and the U.S. [3].

The paper examines a typology of trip chains based on the spatial-temporal structure of trips and activity type at the destination and contains as follows. First, some introduction notions regarding the study of travel behaviors and trip chaining are provided. Then, the methodology is defined. An entire section is devoted to the presentation of a trip chain typology along with a summary analysis of the occurrence of these various types of chains for the population under study. The relations between activity-based and socio-demographic variables are then examined. A conclusion follows [4].

2. Background Theory

2.1 Activity models

Typical transportation models rely on the notion of single trips. The widely used four-step model predicts the number of trips that will occur in a study area and relies on this simple concept through the four steps in order to estimate the level of usage of various transportation infrastructures. Faced with these limitations, the increasing complexity of travel behaviors and the increasing capacities of technology, new modeling approaches are being developed to enhance the relevance of models and outputted results. Activity-based models are one of the directions taken by the research community in order to enhance modeling capacities. These models rely on the notion that trips are a derived demand for the necessity, or desire, of individuals to perform out-of-home activities in various locations. One of the strong points of this model is its disaggregate nature since it performs the analysis at the individual level (set of trips made by an individual).

[5] identify three important and positive features of this new generation of models:

- tour-based travel where the tour is the basic unit for modeling travel instead of the single trip,
- rely on an activity-based platform implying that travel is derived demand within a general framework of the daily activities undertaken by households’ member, especially housewife,
- micro-simulation techniques are applied at the disaggregate level of a person based on household’s needs.

Behaviors of individuals of households are examined simultaneously to account for combined trips and the negotiation between individuals to gain access to mobility tools. With this underlying framework, it is easier to address more complex behaviors. It is also easier to make comparisons between each of households and not just between sectors. Figure 1 presents the typical structure of an activity-based framework.

Almost all travel demand analysis is rooted in applied and suspended econometric techniques on a discrete choice model. It has had an understanding of the process. Econometrics, more than microeconomic theory, is inspired by the study of the actual situation in which data are available and which are of policy interest.

Even so, this paper micro-economically discusses the development of travel demand activity-based, most of which are travel for shopping, recreation, socializing, eating out and other activities. Current transport analysis has experienced problems with travel patterns and complex activity scheduling from conceptual and empirical perspectives. This has spawned a variety of applied studies on travel patterns that bring their cues directly with econometric
techniques [6].

![Figure 1](image1.png)

**Figure 1.** Input, model components, output and application of activity based approaches [4]

2.2 *Tour or trip chain*

In [4], activity-based models support analysis at the tour or trip chain level. Several authors have conducted studies on daily behaviors for typical days and propose various definitions of a trip chain. For instance, [7] suggested that a trip chain is a series of trips between two anchor points, home and work. Others suggested that a trip chain includes all trips between leaving home and returning to it. It is the case for [8]. [9] is mostly in agreement with this previous definition but adding that a trip chain is not necessarily only “home – activity – home”, but can also be “home - activity 1 - activity 2 - activity N – home”.

In addition, several authors have examined statistical relations between trip chains and variables such as gender, age, present of children in the household, mode of travel, residence location and others. First, gender greatly influences trip chains. According to [10], women have a higher likelihood of performing multiple activities during their trip chains than men. In addition, women do more trip chains per day than men. [8] focus their analysis on the trip purposes of men and women. The results show that women perform a greater number of simple trip chains for shopping, drop-off and pick-up than men. Household composition also greatly influences trip chains [4].

![Figure 2](image2.png)

**Figure 2.** Women’s trip chaining activity-based approaches (a) Natural approach (b) Space-Time approach [11-12]
3. Methodology

3.1. Concepts
First, trip chains are based on anchor points. These anchor points are important and fixed spatial locations. For the purpose of this study, three locations can be set as anchor points: home location, workplace and school. The home location is set as the anchor point at the beginning and end of every trip chain. Work and school activities are often considered as mandatory. Many people in the examined population segments will, during a typical weekday, travel for at least one of these purposes if not for both.

Workplace and school are therefore important locations in the daily travel behaviors of individuals; thus, the proposed typology will need to take these anchor points into consideration. Moreover, intermediate trips will often be linked to mandatory trips leading to these anchor points. This leads to the definition of other important concepts: mandatory and discretion activities. The mandatory activity of a trip chain is the one with the longest duration. However, if work or study is in the trip chain, it becomes the mandatory activity even if it is not the longest activity. Typically, mandatory activities are located at anchor points. However, other trip purposes may result in mandatory activities, especially when there are no work or study trips in the chain. In these cases, the activity with the longest duration will be set as the mandatory activity. The discretion activities are all the other activities conducted between home location and the mandatory activity of a trip chain. Thus, the trip chain will include a single mandatory activity, and one or many discretion activities [4].

Second, the method used in this paper is to examine the travel patterns and their complexities travel spatially with the Space-Time Prism Method to illustrate the trip-chaining model in question. To explain the variables affecting women's activity by household background and the complexity of travel patterns, a regression approach with Seemingly Unrelated Regression is used.

![Figure 3. Various steps involved in the enumeration and classification of individual trip chains](image-url)
3.2. Space-Time Prism Method to capture Trip Chaining Model

(a) Trip chaining map (a) Space-Time Path with Map approach (b) Space-Time without Map approach [13-14]
Space-time prism method is to describe the pattern of trip chaining performed by women as housewives with a spatial approach based on distance and time. This method can explain the complexity of daily trips by looking at the number of stop for activity-based discharges.

### 3.3. Seemingly Unrelated Regression Model to capture Trip Chaining Figure
Random Utility Maximum Model is a kind of Economic model to capture the women travel behavior in mathematical and statistical approaches. Random utility maximum by time and task optimization can describe a hectic mobility of urban women to meet their needs in term of making household members’ satisfaction.

Random Utility Maximum Model can be explained by econometric technically as Seemingly Unrelated Regression (SURE). SURE model is very useful for this case because it is considered capable of accommodating ordinal and nominal variables according to data taken in the questionnaire adopted, such as VISTA (Victoria Integrated Survey of Travel Activity) and simplified. SURE is used because it is considered to be the most accommodating research needs for multi data both input (Independent Variable), as well as output (Dependent Variable). This Quantitative Data Processing uses E-VIEWS software.

Regression Model:

\[ Y = \alpha_0 + \beta_i X_i + \varepsilon \]
(1)

Estimation Model

\[ \hat{Y} = \alpha_0 + \beta_i X_i \]
(2)

Regression Model by Seemingly Unrelated Regression Approach :

\[ TMA_{Act} = \alpha_0 + \beta_1 Age + \beta_2 Educ + \beta_3 Child + \beta_4 Fam + \beta_5 House + \beta_6 Eltc + \beta_7 Motor + \beta_8 Bns + \beta_{10} TDA_{Act} + \beta_{11} ToJ + \beta_{12} TOD + \beta_{13} Inc \]
(3)

\[ TDA_{Act} = \alpha_0 + \beta_1 Age + \beta_2 Educ + \beta_3 Child + \beta_4 Fam + \beta_5 House + \beta_6 Eltc + \beta_7 Motor + \beta_8 Bns + \beta_9 TMA_{Act} + \beta_{11} ToJ + \beta_{12} TOD + \beta_{13} Inc \]
(4)

\[ ToJ = \alpha_0 + \beta_1 Age + \beta_2 Educ + \beta_3 Child + \beta_4 Fam + \beta_5 House + \beta_6 Eltc + \beta_7 Motor + \beta_8 Bns + \beta_9 TMA_{Act} + \beta_{10} TDA_{Act} + \beta_{12} TOD + \beta_{13} Inc \]
(5)

### 4. Area of study
The study area, Bandung city, is the capital city of West Java Province in Indonesia. The population of Bandung City is nearly 2.5 million. As the same time, information from the Bandung Central Bureau of Statistics. Bandung City covers an area of approximately 167.67 km² with density is about 14.768/km². This city is the biggest metropolitan area in West Java Province. The largest ethnic is Sundanese for more than 60% of population with most religion is Islam (88.72%), Protestant (7.32%) and Catholic (3.01%).
4.1. The Data
This primary data were surveyed by the authors and survey team in 2 clusters of Bandung City with 'Face-to-Face' interview method for 89% response rate. Interviews were conducted with random respondents from 30 sub-districts that include socio-demographic trends in 2017 WJPMMDM region of 466 women as housewives from 466 households. The applied random sampling method was used to collect demographic data and household data.

4.2. Characteristics of the sample
Out of 500 households, the selected number of 466 households was valid, 466 non-working women for household purposes were available for analysis. Summary of household features is presented in Table 1. Most households have at least one child. An important part of monthly household income data ranges from 1,000,000 to over 10,000,000 rupiahs. Most non-workers live with husbands and families.

The share of motorcycles has a very high household in the cities of Indonesia, including Bandung, as seen from the table. However, more than 80% of households have one two-wheeled motorcycle available for use.

5. Analysis

5.1. Analysis of activity–travel behavior
A preliminary investigation into travel behavior activity based on non-working women as housewives in a week (Monday, Thursday, and Sunday) of the survey is the focus of this section. The travel behavior activity-based indicators are considered in the analysis by different activities (travel behavior purposes), time allocation for various activities, mode choice, daily patterns, and time options for travel or trip departure.

A summary can see significant differences between clusters of household and private socio-demographic factors in the context of downtown and suburbs. Such factors among many others that influence them are the determinants of individual activity-based travel behavior.

5.1.1. Data of Socio-economic. The most age characteristic of travellers is lower than 40 years, a very productive age. For educational level, it is a bit difference between the first cluster and second as
shown in the table. It means the first cluster are more educated persons. Educational characteristic is followed by income in which the first cluster has higher income. There is 4.17% of women in the first cluster who are not married, but none in the second cluster. The family planning program in Bandung seems successful in reducing the bigger population of Bandung’s household.

| Household Characteristics | Cluster 1 (Radius 0 – 10 Km) | Cluster 2 (Radius 10 – 20 Km) in the area of Bandung City |
|---------------------------|-------------------------------|----------------------------------------------------------|
| Age of women              |                               |                                                          |
| < 30                      | 18.52                         | 32.40                                                    |
| 31 – 40                   | 47.69                         | 37.20                                                    |
| 41 – 50                   | 26.39                         | 23.20                                                    |
| 51 – 60                   | 6.94                          | 6.00                                                     |
| > 60                      | 0.46                          | 1.20                                                     |
| Education                 |                               |                                                          |
| Elementary School         | 6.48                          | 18.00                                                    |
| Junior High School        | 12.04                         | 40.00                                                    |
| Senior High School        | 62.50                         | 27.60                                                    |
| University                | 18.98                         | 14.40                                                    |
| Household Income (Millions Rupiahs/MR) |                |                                                          |
| < 2.5                     | 21.76                         | 38.40                                                    |
| 2.5 – 5                   | 62.96                         | 43.60                                                    |
| 5 – 10                    | 14.35                         | 12.80                                                    |
| >10                       | 0.93                          | 5.20                                                     |
| Marriage Status           |                               |                                                          |
| Unmarried                 | 4.17                          | 0.00                                                     |
| Married                   | 95.83                         | 100                                                      |
| No Child                  | 4.63                          | 2.80                                                     |
| Number of Children        |                               |                                                          |
| 1 Child                   | 29.63                         | 28.40                                                    |
| 2 Children                | 38.43                         | 38.00                                                    |
| >2 Children               | 27.31                         | 30.80                                                    |
| Number of Family Member   |                               |                                                          |
| 2 – 4 persons             | 68.98                         | 74.40                                                    |
| >4 persons                | 31.62                         | 25.60                                                    |
| Vehicle Ownership         |                               |                                                          |
| No Vehicle                | 7.32                          | 14.40                                                    |
| 2 Wheels Vehicle          | 47.73                         | 67.60                                                    |
| 4 Wheels Vehicle          | 25.44                         | 1.60                                                     |
| Mixed Vehicles            | 19.51                         | 16.40                                                    |

*) Result Processing

5.1.2. Characterizing on different types of activities. From the data in table 2, every woman spends more time to do her activities for the whole day as it is shown by time duration for more than 2 hours. Both of those clusters, more than 45% of the individuals participate in discretionary activities in Bandung City; whereas 61.30% of the individuals participate in a discretionary activity in the first cluster. All of
the women population in Bandung do their travel on weekday to cover their daily needs of transportation with two-wheels motorized vehicle.

Table 2. Bandung Urban Non-working Women of Trip-Chaining Activity-Based Percentage (%) of Non-Working Urban Women Trip Chaining Activity-Based*)

| Characteristic of Variables | Cluster 1 (Radius 0 – 10 Km) | Cluster 2 (Radius 10 – 20 Km) |
|-----------------------------|-------------------------------|-------------------------------|
| Type of Trip Chain          |                               |                               |
| Simple                      | 12.50                         | 60.40                         |
| Complex                     | 86.57                         | 39.20                         |
| Open                        | 0.93                          | 0.40                          |
| Time Duration of Activity   |                               |                               |
| < 1 hour                    | 2.78                          | 4.68                          |
| 1 – 2 hours                 | 11.57                         | 40.24                         |
| > 2 hours                   | 85.65                         | 55.08                         |
| Type of Activity            |                               |                               |
| Mandatory                   | 38.70                         | 53.75                         |
| Discretion                  | 61.30                         | 46.25                         |
| Type of Day Trip            |                               |                               |
| Weekday                     | 72.63                         | 78.24                         |
| Weekend                     | 24.37                         | 21.76                         |
| Mode Choice                 |                               |                               |
| Non-Motorize                | 1.85                          | 5.62                          |
| Public Transport            | 10.56                         | 11.80                         |
| 2 Wheels                    | 57.34                         | 65.32                         |
| 4 Wheels                    | 30.25                         | 17.26                         |

*) Result Processing

5.1.3. Trip Chaining for Daily Pattern

The analysis is also presented at the daily pattern level. Consistent with observations in samples, three typologies of trip-chaining are used for analysis. They are Simple Single Chains where individual one-stop visits for today, Simple Multiple Chains/Complex where individual visits for more than one stop per tour, and an open travel chain that cannot be monitored within the study area. All tours come from home. The samples were sampled under each of the categories in Table 2. More than 86% of women did Trip chains in the first group but only 39.20% in the second group.

As summary, exploratory analysis generates behavior that does not work in the activity behavior of each cluster in the city of Bandung. In cluster 1, the weekday travel chain is longer than with a relatively large number of stops. On the weekend, it is also not too much different even though there is a longer tendency. While in cluster 2, the daily business day-trip chain is shorter with fewer stops, but over the weekend.
Figure 6. Samples of Individual Trip chaining map  
(a) Diagram of the respondent no.240 in Cluster 1  
(b) Diagram of the respondent no.028 in Cluster 2
The objective of this section is to analyze the influence of household, individual, and land use on the travel behavior activity based on non-working women as housewives. Child dropping, shopping, and personal activities are the focus of this section. The regression approach with the Seemingly Unrelated

Figure 7. Samples of Aggregate Trip chaining map (a) Diagram of 250 UWTC on Monday in Cluster 1 (b) Diagram of 250 UWTC on Monday in Cluster 2

5.2. Analysis of activity participation behavior
The objective of this section is to analyze the influence of household, individual, and land use on the travel behavior activity based on non-working women as housewives. Child dropping, shopping, and personal activities are the focus of this section. The regression approach with the Seemingly Unrelated
Regression model is used to find out the relationship between the variable attributes of the daily travel behavior activity based on household utility. It can generate 3 regression models that can accommodate the interrelations between these variables.

5.3. A simultaneous model of activity–travel behavior
It can be seen from Table 3, for cluster 1 models of SURe, that the Model 1 is the best model of all that belongs to “Time of M(Mandatory) Act” as the dependent variable. In that model, many variables are significant, these are Mode-choice(motor), business (buss), Time of D Act, and Time of journey, with having t-significantly by 1% (**), 5% (**), and 10% (*).

For model 2 in table 3 where Time of Journey is the predictor variable, this proves that many independents variable such as education, business, time of mandatory activity, and time of discretion activity can significantly affect the time of journey. It means several socio-economic of households are significantly relevant to the time of journey to meet their activities in Bandung City, even on weekday and weekend.

| Model 1 | Model 2 | Model 3 |
|---------|---------|---------|
| R²      | 0.314   | 0.229   | 0.203   |
| Fstat   | 8,868***| 5,754***| 4,930***|
| (Constant) | 601,441*** | 479,259** | 14,642 |
| Age (Yr) | -1,812 | -0,227  | 0,274   |
| Education (Yr) | 7,730 | -10,597* | 9,063* |
| No. of Children (Pr) | -9,272 | 18,103   | 5,093   |
| No. of Family (Pr) | 0,341  | 6,723    | -8,407  |
| Housing (Y/N) | 57,946 | -57,826* | 38,767 |
| Electricity (Watt) | -0,054 | -0,008  | -0,022  |
| Motorcycle (Y/N) | -158,292** | 19,005  | 1,698   |
| Business (Y/N) | 232,096*** | -0,963  | -49,930** |
| Time of M Act (Mnt) | DV | -0,246*** | 0,177*** |
| Time of D Act (Mnt) | -0,473*** | DV   | 0,247*** |
| Time of Journey (Mnt) | -0,584*** | 0,424*** | DV |
| Time of Outdoor (mnt) | --- | ---     | ---     |
| Income (M Rp) | -4,005 | -3,905  | 7,192   |

Compared with the SURe Model of Cluster 1, we found different model of Cluster 2 in table 4 describing outside area around the Cluster 1. For model 1 where “Time of M(Mandatory) Activities” as the dependent variable, we found that “motorcycle”, “business”, “Time of D (Discretion) Activities” and “Time of Journey” variables significantly affect to “Time of M (Mandatory)
Activities”. It means that mode-choice, added activities to business, discretion activities and time of journey for daily travel significantly affect Time spent on Mandatory activities. Those variables support Mandatory activities i.e. Child dropping and or primary shopping.

However, the resulting model in Cluster 2 (see table 4) is significantly different. The best model is Model 3 where the “Time of Journey” is the dependent variable. Variable “Business” and “Time of D(Discretion) Activities become the significant variables to support the dependent variable. It means discretion activities and business support the dependent variable for the non-working women in Cluster 2. When we see the distance to the downtown in radius, it can be logically to do.

**Table 4. Result of SURe Approach for Non-working Urban Women Daily Activities in Cluster 2**

|                      | Model 1 | Model 2 | Model 3 |
|----------------------|---------|---------|---------|
| $R^2$                | 0.045   | 0.162   | 0.139   |
| $F_{stat}$           | 0.892   | 3.660***| 3.071***|
| (Constant)           | 609,071*| 313,875**| -34,279 |
| Age (Yr)             | 6,982   | -1,949  | 1,430   |
| Educ (Yr)            | 26,029  | 5,262   | 4,542   |
| No. of Children (Pr) | 49,117  | -18,776 | -1,340  |
| No. of Family (Pr)   | -47,041 | 4,641   | 5,627   |
| Housing (Y/N)        | -11,432 | 36,479  | 31,714  |
| Electricity (Watt)   | -201    | -0,012  | -0,017  |
| Motorcycle (Y/N)     | 21,658  | 67,626  | 34,185  |
| Business (Y/N)       | 111,265 | -105,425**| 52,205**|
| Time of M Act (Mnt)  | DV      | 0,007   | -0,004  |
| Time of D Act (Mnt)  | 0,051   | DV      | 0,157***|
| Time of Journey (Mnt)| -0,80   | 0,393***| DV      |
| Time of Outdoor (mnt)| ---     | ---     | ---     |
| Income (M Rp)        | 4,096   | 2,660   | 6,019*  |

5.4 *Planning and policy implications*

The model of trip chaining of non-working urban women can be predicted by socioeconomic data and regression model with the SURe approach. The analysis of the findings has important implications for transportation planning and policy for Bandung city. Table 1 and 2 report the aggregate effects of various exogenous variables. The findings are timely relevant as Bandung City has been experiencing rapid socio-demographic transition.

From the SURe approach, we found that several certain variables significantly affect to “Time of Mandatory and Discretion Activities”, these are business, mode-choice, and time of journey. It explains that the raising of socio-economic of household whose non-working urban women will
increase the travel time of journey on weekday or weekend. Motorcycle modes that they have may cause rapid travel behavior with increasing the number of stop place.

The suggested policy is the facility of parking area in the stopping place for women, in the example: around the school area, the mall or mini market area, and the coffee shop, café and recreation area to support the stop area in the journey of non-working women daily trip-chaining. If they have bigger facilities for parking, so they can easily come-in or come out in terms of their stop as the part of their daily trip-chaining. The government has to support this facility to increase of ease women’s mobility, especially non-working women as housewives.

6. Summary and Conclusion

This paper presents exploratory and statistical analyses of the activity–travel behavior of non-working urban women in Bandung City using the primary survey to almost 500 respondents. Only 466 questionnaires are valid by Victorian Integrated Survey for Travel and Activities (VISTA). The exploratory analysis presents a summary of socio-economic and time travel and activities indicator, such as age, education, household income, marriage status, number of children, number of family, and vehicle owner/accessibility, type of trip-chain, time duration of activity, type of activity, type of day-trip, and mode choice.

The study also compares the summary measures with case studies from different areas of Bandung City that is divided into Cluster 1 (less than 10 km radius from Zero point of city center), and Cluster 2 (10 – 20 km radius from Zero point of the City center inside the border of Bandung City area) focusing on the activity–travel behavior of non-working urban women who live within the area of Bandung City.

The analysis shows that, by comparing the case studies from Cluster 1 and Cluster 2 areas, non-working urban women in Bandung city were observed to have 5 activity participation types (in terms of , type of trip-chain, time duration of activity, type of activity, type of day-trip), and a distinct time-of-day preference for departing to activity locations (depend on clustering area). Whereas the summary measures show similarities (by socio-economic and activity-based) and differences (time allocation and mode choice) with the case studies from different clusters.

After the summary of activity–travel attributes, statistical models are developed for analyzing the effects of individual and household socio-demographics, and land use attributes on the activity–travel behavior of non-working urban women. Important findings from the statistical analysis are summarized below:

1. Household socio-demographics and individual’s role place have influences on different activities participation decisions of non-working urban women; whereas individual’s decision and household socio-demographics determine personal/household business activity participation decision, in case in Cluster 2.

2. Individual socio-demographics and Cluster characteristics influence the selection of ‘simple in multiple tours’ daily patterns; on the other hand, household socio-demographics, activity participation characteristics, travel contexts and location of the house in the different cluster influence the selection of ‘complex’ daily pattern.

3. Household income and vehicle ownership govern the selection of private modes for travelling, and apart from the relevant socio-demographics land use attributes appear to influence the decision to go traveling.

Overall, the study contributes to the literature by providing a brief exposition of the activity–travel behavior of non-working urban women in Bandung City, and drawing policy implications of the study in the present urban and transportation systems contexts. Apart from divulging the differences in activity–travel behavior of non-working urban women, the study also sheds light on the influence of in-home activities and the ownership of two-wheels vehicle.

The findings of the two models demonstrate the need for integrating different attributes of activity–travel behavior in a single framework as the observed relationship between many variables (in independent models) can be manifestations of complex relationships through many variables. Further,
if non-workers do not have a specific role in residential self-selection, the analysis shows that land use attributes affect the activity participation behavior of non-workers.

Another extension of this study can be investigating the role of non-working group in residential self-selection, and revisiting the empirical models presented here with its influence. The investigation of neighborhood-level attributes on the activity participation behavior of non-workers is another fruitful area. Furthermore, the impacts of transportation systems on time allocation to in-home and out-home activities with activities defined at disaggregate level should be investigated since the recent studies show that multiple activity categories yield interesting insights into the activity scheduling choices (e.g., [16]).

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