Sustainable transportation: the perspective of women community (a literature review)

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Abstract. The vast and increasingly complex urban growth can change the characteristics of travel behavior in women. Women have very different and complex travel patterns than men. They have various destinations and modes of travel based on social, cultural, economic, and demographic characteristics. The result is a significant women-based community. This paper includes a literature review from various sources on a systemically pattern-oriented research, integrating the results of many studies for over the past 15 years, explaining that the travel behavior in women is seen in many variables (distance, time, travel mode, reasons for travel and travel patterns) which support sustainable transportation. However, a better transportation infrastructure design is needed in the form of transit or public transport that is more representative to support the travel of women in the framework of sustainable transportation. This study also gives evaluation towards the research which includes the issues of data accuracy, reliability and quality, application of research methods, and interpretation of data. These evaluations focus in detail on the interaction of socioeconomic factors that influence the travel patterns.

1. Introduction

The concept of sustainability is “the idea of meeting the needs of life today without sacrificing the women of future generations to meet their own needs” including transportation [1]. The three sustainability dimensions, namely environment (maintaining resources and ecosystems), economy (taking into account the environmental impact of economic policies), and social (meeting the needs of human life fairly), are the main objectives in applying the concept of sustainable transportation [1].

The concept of sustainable transportation then becomes a trending issue everywhere in the world today [2] hence a significant relationship between research, policy proposals, and its implementation on the field is needed. The transportation problems faced by developing society are different; in fact, the transportation will worsen with the increasing economic development [3]. A city becomes more civilized not when the city has wide and long highways, but when a child with his bicycle can move easily and safely, and when women can carry out their daily activities without worry [3].
Mobility in women will not only empower women themselves, but also their families. Women’s mobility allows women and family members (children) to reach their destination (workplace, school, shop/mall, hospital, tourist site, etc.), and to increase productivity [1]. The biggest change to the process of empowering women occurs when women are allowed to move outside the home to public spaces for positive activities which in turn will increase the productivity of human resources.

The problem of transportation mobility is also the case in the big cities in the world, where transportation problems that occur are so complex and difficult to solve [4]. Economic awakening and lifestyle changes, such as dependence on private vehicles, cannot be ignored. Throughout population growth, the increase of motorized vehicle ownership has led to an explosion in travel demand [5]. The significant increase in the use of private vehicles, both two-wheeled and four-wheeled, will spur urban development to the periphery on a large scale which results in an inevitable increase in travel length. From the supply side, there are often delays along with the increase in transportation demand including externalities, such as congestion, accidents, pollution, and inequality [5]. This applies to men and women who have regular daily activities. This process occurs by itself without regarding to the availability of adequate infrastructure and mass public transportation [3].

The attraction of the city center as the central business district, favorite schools, office centers, and recreation centers makes the travel pattern almost all aimed at the center for both men and women [4]. In this case, women are most often disadvantaged by inadequate conditions of the infrastructure and transportation facilities, especially in developing countries, such as in Mexico [6]. The travel pattern of women is short and relies on non-motorized or mass public transportation modes [3]. In turn, these adverse transportation conditions change women’s travel patterns and the modes they use. Women in the big cities, following the trends, are shifting their orientation to private two-wheeled and four-wheeled vehicles to meet their travel needs [7]. The changing role of women as busy, very professional, and workaholic workers in the last few decades explains the high growth of travel hours [8]. The increase in the supply of women and an increase in women’s community awareness of equality in employment and income refer to one of the objectives of the Millennium Development Goals [9].

Women have different travel patterns from men based on their instincts and sense of responsibility towards themselves and their family. Women have more limited access than men [1][10][11]. Women’s travel is more related to reproduction and nurturing matters so that women’s travel patterns are carried out for various reasons and goals, namely: working, shopping, picking up children, recreation or just enjoying their me-time [3]. In the Metropolis Network Conference, Peters [12] states that women have inequality in access to transportation and decision making related to transportation. A simple example of male dominance in transportation can be seen from men’s participation in both employment and education. However, women still need to travel. This increases women’s travel time consumption. Therefore, women in the big cities with high levels of mobility prefer using private motorized vehicles to public transportation to meet their daily activities needs [8].

A lot of daily activities cause the intensity of the trip will also increase. Then, it will have an impact on traffic delays, trip reliability, trip duration, and high congestion rates (BTRE, 2007) in Cavagnoli, et al [8] Women who intensify their trips by increasing the number of stops on each trip, including to avoid traffic, thus the travel time and socioeconomic costs of travel will increase [8, 13, 14].

2. Methodology of Approach and Journal Review

This paper focuses on finding the issues on sustainability that can influence women’s travel patterns in the context of perspective in the women’s community, such as the following:

- Economy
- Society
- Environment
This paper will explore the evidence of research results from various countries in the world over the past 15 years (1999-2014), regarding the socioeconomic and cultural influences related to the sustainable transportation issues on travel patterns seen in the perspective of women’s community. This study is to see the difference in travel patterns between men and women that occurred in major cities in the world. Different travel patterns related to the women’s community are as follows:

- Length of Travel
- Frequency of Travel
- Mode of transportation used
- Time of Travel
- Cost of Travel

The complete journal reference can be seen in the following table:

| Women’s Travel Pattern | Sustainable Transportation Issues |
|------------------------|----------------------------------|
|                        | Sustainable Economy | Sustainable Society | Sustainable Environment | Sustainable Policy | Households |
| Length of Travel       | Cavagnoli & Norman (2008) | Yagi (2006) | Malayath, et al. (2013) | Malayath, et al. (2013) | Malayath, et al. (2013) |
|                        | Yagi (2006) | Deakin (2002) | Delaughey (2012) | Yagi (2006) |
|                        | Pénalosa (2005) | Choiejit (2002) | Perschon (2001) | Yagi (2006) |
|                        | Hyodo (2005) | Perschon (2001) | Carlsson (1999) | Malayath, et al. (2013) |
| Without Vehicle        | Malayath (2013) | Choi (2014) | Malayath (2013) | Malayath (2013) |
|                        | Albert (2011) | Kalter (2009) | Malayath (2013) | Yagi (2006) |
|                        | Cavagnoli & Norman (2008) | Jabareen (2006) | Hanso (2010) | Malayath (2013) |
|                        | Yagi (2006) | Yagi (2006) | Jabareen (2006) | Yagi (2006) |
|                        | Hyodo (2005) | Choiejit (2002) | Garling (2002) | Malayath (2013) |
| Frequency of Travel    | Lon (2013) | Lam (2013) | Bamber (2011) | Malayath (2013) |
|                        | Kalter (2009) | Lam (2013) | Yagi (2006) | Malayath (2013) |
|                        | Yagi (2006) | Lam (2013) | Perschon (2001) | Malayath (2013) |
| Time of Travel         | Min Yang (2013) | Thynell (2009), GTZ | Bamber (2011) | Malayath (2013) |
|                        | Lon (2013) | Kalter (2009) | Thynell (2019), GTZ | Malayath (2013) |
|                        | Queiros (2012) | Choiejit (2002) | Yagi (2006) | Malayath (2013) |
|                        | Kalter (2009) | Perschon (2001) | Buluing (2004) | Malayath (2013) |
|                        | Cavagnoli & Norman (2008) | Min Yang (2013) | Thynell (2008), GTZ | Malayath (2013) |
|                        | Yagi (2006) | Malayath (2013) | Malayath (2013) | Malayath (2013) |
|                        | Mohkhtarian (2003) | Malayath (2013) | Malayath (2013) | Malayath (2013) | Malayath (2013) |

Table 1. The Study of Relationship Classification between Sustainable Transportation Issues and Women’s Travel Pattern in Urban Areas
There is a strong tendency for women to use public transportation as a means to work in a metropolitan city, which changes the characteristics of women's travel. In the last few decades, many increases in travel hours have contributed significantly to an increase in travel hours, the use of public transport and goods, and the length of travel by vehicle. An accurate assessment of the travel time for busy women in Australia is needed to optimize investment decisions regarding transportation infrastructure. In recent decades, women have contributed significantly to an increase in travel hours, the use of public transport and goods, and the length of travel by vehicle.

3. Complete Review
In this section, a detailed review of the journals will be explained where sustainable transportation is the main issue in this paper. Therefore, the division of sub-studies related to the issue of sustainable transportation consists of economy, society, environment, culture, and households. The role of women is eagerly discussed in the reviews of these journals, because women are always seen to be negatively affected by these issues, while the regulation in the household is mostly left to women.

3.1. The Context of Sustainable Transportation – Economy
Cavagnoli & Norman [8] explained that the changing role of women in the last few decades explains many increases in travel hours. An accurate assessment of the travel time for busy women in Australia is needed to optimize investment decisions regarding transportation infrastructure. In recent decades, women have contributed significantly to an increase in travel hours, the use of public transport and goods, and the length of travel by vehicle.

Morris, et al. (1996) stated that the growing complexity of travel patterns in the Melbourne metropolitan city is illustrated most explicitly which changes the characteristics of women’s travel. There is a strong tendency for women to use public transportation as a means to work however, outside

| Women’s Travel Pattern | Sustainable Transportation Issues |
|------------------------|----------------------------------|
|                       | Sustainable Economy | Sustainable Society | Sustainable Environment | Sustainable Policy | Households |
| Cost of Travel         | Malayath (2013)       | Malayath, et al. (2013) | Lon (2013)            | Lon (2013)       | Malayath, et al. (2013) |
|                       | Lon (2013)            | Curtis (2006)          | Curtis (2006)         | Malayath (2013)  | Archer (2012)          |
|                       | Cavagnoli & Norman (2008) | Bonnel (2002) | Lon (2013)            | Malayath (2013)  | Archer (2012)          |
|                       | Cromwick (2005)       | Perschon (2001)        | Curtis (2006)         | Cavagnoli & Norman (2008) | Perschon (2001) |
| Proportion of Travel   | Min Yang (2013)       | Kamargianni (2012)     | Nolan (2010)          | Peters (2013)    | Malayath (2013)        |
| Private Vehicle        | Queiros (2012)        | Nolan (2010)           | Curtis (2006)         | Malayath (2013)  | Archer (2012)          |
| (Two-Wheeled nor Four-Wheeled) | Albert (2011)  | Rudinger (2006)        | Curtis (2006)         | Morris (2010)    | Nolan (2010)           |
|                       | Nolan (2010)          |                       | Garling (2002)        | Garling (2002)   | Hyodo (2005)           |
|                       | Morris (2010)         |                       |                      |                  | Morris (2010)          |
|                       | Cervero (2002)        |                       |                      |                  | Yagi (2006)            |
|                       | Carlsson (1999)       |                       |                      |                  | Hyodo (2005)           |
| Public Transportation  | Min Yang (2013)       | Kamargianni (2012)     | Lon (2013)            | Odufuwa (2013)   | Malayath (2013)        |
|                       | Dunckle (2013)        | Tynell (2009)          | Bamberg (2011)        | Peters (2013)    | Archer (2012)          |
|                       | Lon (2013)            | Curtis (2006)          | Cervero (2010)        | Malayath (2013)  | Yagi (2006)            |
|                       | Albert (2011)         | Bonnel (2002)          | 4. Curtis (2006)      | Lon (2013)       | Hyodo (2005)           |
|                       | Ibrahim (2011)        |                       |                      |                  |                      |
|                       | Morris (2010)         |                       |                      |                  |                      |
|                       | Norhazlin (2008)      |                       |                      |                  |                      |
| Non-Vehicle           | Min Yang (2013)       | Kamargianni (2012)     | Delaughery (2012)     | Peters (2013)    | Malayath (2013)        |
|                       | Bamberg (2011)        | Tynell (2009)          | Zegras (2011)         | Delaughery (2012) | Archer (2012)          |
|                       | Wright (2005)         | Curtis (2006)          | Cervero (2010)        | Wright (2005)    | Yagi (2006)            |
|                       | Nasser (2004)         | Nasser (2004)          | 4. Curtis (2006)      |                  | Hyodo (2005)           |
|                       | Cervero (2002)        |                       |                      |                  |                       |
of work, the pressure of household needs and other activities requires a more flexible mode of transportation. This pressure is related to the strong contribution that women are continuously responsible for household needs and unpaid, which increase significantly depending on the number of children (Morris et al., 1996). Small shifts to more sustainable modes of transportation by groups of workers are beginning to emerge, but private cars are still the dominant mode of travel for most Australians of working age. This is true especially for women who work part-time, and for men/women involved in technical, commercial, and social-community work and personal services.

Hyodo, et al. [4] explained that transportation demand is influenced by many factors, such as transportation facilities, the level of motorized vehicles, city structure, economic growth, local culture, etc. It is important to analyze the relationship between these factors to see current conditions and future possibilities. One fairly good method is an international comparison using actual economic conditions and travel demand data, including Tripoli, Phnom Penh, Damascus, Manila, Cheng Du, Managua, Belem, Bucharest, Cairo, Jabodetabek, Kuala Lumpur, Tokyo and Hiroshima. There are very significant differences between men’s and women’s travel patterns. Women are more complex and more spread out, as well as longer periods. That is because the responsibilities of work/household activities are on women.

Choi, et al. [16] examined travel patterns by surveying household data in Korea involving individuals in the household, both men and women, from 2002 to 2010, to see the frequency, length, and time of trips. The results of the data analysis showed that there is a statistically significant causal relationship between travel behavior and the impact of the required variables. Besides, a new study is needed to investigate the combined effects of household travel patterns in 3 cities, namely: Seoul, Gyeonggi, and Incheon. Geographical spatial analysis is also required by GIS simulation, and activity-based impact analysis is also needed on new policies implemented.

Albert, et al. [15] conducted a study within the scope of the laboratory to explore the impact of various personality factors in terms of the driver’s geographical ability on the choice of the route offered by providing travel time information before traveling, for both male and female participants. The info of travel time turns out to have a significant impact on travel behavior in determining the choices to be taken so that it is more efficient, namely the choice of routes, modes of transportation, and estimated time on the trip. Drivers with low geographical ability, tend to choose the main route and rarely switch routes compared to high-ability drivers. While racers tend to change routes for faster travel time. In turn, the efficiency of transportation with info on travel time before the trip will lead to sustainable transportation for both men and women.

3.2. The Context of Sustainable Transportation – Society

Cavagnoli & Norman [8] also explained that most of these findings reflect social changes that underlie lifestyles and the nature of work, changes in social expectations and customs, and structural changes in the economy and character of urban housing that affect the individual woman-based community. The findings have implications for understanding travel patterns, forecasting travel requests, and developing transportation policies that facilitate participation in economic and civil opportunities by groups (in this case referring to different groups of men and women) in cities.

Lon, et al. [16] discussed the importance of understanding user attitudes relating to factors or criteria that explain the preferences of the Phnom Penh community regarding private and public transportation modes. The findings show that there is no way to change people’s preferences regarding the use of private vehicles, especially cars. Except for the Worker case, all permutations from the survey carried out indicate Travel Car as the preferred mode of personal transportation and Light Rail Transit as the preferred mode of public transportation. Motorbikes and buses are the most preferred mode, even among motorbike owners. Note that even with this preference, motorbikes are the main means of transportation in Phnom Penh because of their affordability, both for men and women.
Curtis, et al. (2006) added in his study that socio-demographic conditions can change travel patterns between men and women with different orientations, such as the destination of travel, number of trips, distance of travel, and mode of transportation used. Best and Lanzrdorf (2005) explained that the majority of women do not use private vehicles to meet the daily needs of their daily activities, such as travel to work. But in the fulfillment of other activities related to household affairs such as shopping, children’s shuttle to and from school, business, recreation, and other non-routine activities, women prefer using private vehicles as a mode of transportation because it is considered more efficient and flexible.

The results of Curtis, et al. (2006) research are enforced by Morris, et al. (1996) indicating that rapid and increasingly complex city growth can change the characteristics of travel behavior in women. Women prefer public transportation to work or to fulfill routine activities, while to meet the transportation needs of families, they prefer private vehicles. Private vehicles are still the preferred mode of transportation for working-age women who also take care of family travel needs such as accompanying children and doing non-routine work, with professions of working part-time, business, insurance sales, technicians, and personal service providers.

A study on transportation problems related to the women community conducted by Popoola, et al. (2006) showed that social status and density of the neighborhoods affect all of the travel destinations of the community, on both men and women. Other variables, such as age, education, occupation, household composition, affected travel patterns including number of travels, distance of travel, cost of travel, and time of travel.

3.3. The Context of Sustainable Transportation – Environment

Deakin [17] revealed in his study that the issue of sustainable transportation is as an effort to pay attention to environmental quality, social equality, and economic vitality, as well as safeguarding against climate change. Attention in the context of improvement for sustainable transportation is related to the system of activities and land use that cannot be separated. Therefore, a strategy for sustainable transportation looks at operations management, pricing policies, improved vehicle technology, environmentally friendly fuels, and integration between land use and transportation planning.

Congestion is a major problem in urban transportation around the world [18] and harms the economy, environment, and quality of life. Other consequences of congestion are time increase on journey, environmental pollution, travel costs, changes in land use, and increasing level of user stress. The new urban model that refers to Transit-Oriented Development (TOD), the concept of One-stop shopping/activities, public transport innovation/Bus Rapid Transit (BRT)/Light Rapid Transit (LRT) that is convenient, safe, cheap and fast, relocating work hours activities and schools is strive as a strategy for solving various transportation problems.

3.4. The Context of Sustainable Transportation – Policy

Malayath, et al. [5] explained in their paper that sustainable development is considered to be a solution to meet the current population travel requirements. Many researchers have discussed various policies to achieve sustainable conditions in the transportation sector (for example: Pucher, Korattyswaroopam, Mittal & Italy, 2005). The Indian government launched the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) in 2005 and allocated significant resources for comprehensive changes in the urban sector (including urban transportation). This initiative was guided and encouraged by the launch of the National Urban Transport Policy (NUTP) around the same time. The objectives in this policy are to manage demand in such a way that the mobility needs of present and future generations can be met sustainably while reducing the associated external transportation. The basic principle of this policy is to change how people travel (on both men and women), and then fulfill sustainability goals.
The result of the study from Choi, et al. [16] mentioned that one of the important goals of travel behavior analysis is to understand the relationship between social change and the resulting changes in travel behavior. The success of every policy input in the transportation sector is to assess individual responses to policy measures before and/or after policy implementation. Individual travel behavior is assumed to be influenced by various variables that are considered as the main policy. BRT and a clear reduction in transport transfer costs are intended to facilitate the use of public modes and reduce car use.

The Doctoral Program research conducted by Yagi [19] at MIT explained that travel requests are based on individual activities in the city of Jakarta, Indonesia, which come from separate households based on the women community. This travel request can be simulated by modeling, including daily activities undertaken by household respondents, undertaken daily travel patterns, duration of the travel taken, and the choice of transportation mode. The results of the analysis with the Microsimulation Model can see a variety of both negative and positive impacts of individual travel patterns taken on that day. The results of the analysis are also able to provide alternatives to the policies taken by the local government in regulating community travel patterns.

Bamberg, et al. [20] revealed that the ‘soft transportation’ measurement policy for reducing the use of private vehicles uses 2 different behavioral theories; first, the theory of reduction of private vehicles from the supply side, while the second is the theory of the demand side, in which the community voluntarily change from private vehicles to public vehicles. Both theories can be done by setting up a policy for using private vehicles, initiation from individuals or groups and even institutions, and evaluating the results.

3.5. The Context of Sustainable Transportation – Households

Choi, et al. [16] found that large household data is needed to determine individual travel characteristics (for men and women). Dieleman, et al. (2002) used the Netherlands National Travel Survey (OVG) to study the relationship between travel behavior and urban forms at the micro-level and found that travel distance and modes are interrelated, and individual characteristics have a strong impact on the travel behavior they do. The research by Choi, et al. [16] was conducted in 3 cities in Korea; Seoul, Gyeonggi, and Incheon, involving surveys of household travel based on activities, including pollination, socio-economic, geographical area, travel destination, and travel modes.

Kalter [21] stated that household conditions (social status, feminism issues, work needs, increasing family incomes, and household composition) influence women’s behavior towards their travel patterns. This results in an increase in mobility among women for longer periods and longer total distance so that it substantially increases general mobility. Crane [22] explained that the behavior of female commuters in their travel pattern is more convergent than men. Women’s travel times turned out to be more divergent, as women made more stops to meet their household needs.

4. Evaluation & Suggestion

The evaluation in this literature review consists of 3 parts. First is the accuracy of research data, the reliability and quality of research; the second is about the various research methods developed; and the third is the interpretation of the data and the result of analysis.

4.1. The Accuracy, Reliability and Quality of Research Data

The question of whether the data is accurate and reliable is the basis of all research. This paper does not attempt to examine the accuracy and reliability of all studies in which the results have been summarized above. Instead, a more general number of issues regarding data accuracy, reliability, and quality have been directed to this type of empirical study. The evaluation of the three studies by Choi, et al. [16], Albert, et al. [15] and Hyodo, et al. [4] raise several issues that also apply to many other studies concerning sustainable transportation and perspective of the women community.
The first problem concerns the accuracy of the data. Several studies have examined the effect of socioeconomic characteristics and travel patterns in a sustainable transportation framework, involving the calculation of travel distances and travel times from travel zone data. Choi, et al. [16] explained the accuracy of travel distance calculation from travel zone data, where the length of travel was calculated from the average distance between centroids zones using GIS, and Choi used the causality statistical method. A study conducted by Albert, et al. [15] also relied on travel zone data to calculate travel distances. The distance of each trip was calculated according to the distance between the origin and centroids zone destination. However, the simulation was done within the scope of the laboratory. The advantage is that Albert’s study accommodated the psychological factors of participants in the selection of routes based on the travel time information obtained before traveling. Therefore, both studies which used microdata cannot be said to have a significant level of data accuracy; however, both had their respective advantages of using additional data collection methods with GIS [16] and using qualitative data on participant/respondent psychological factors [15].  

The second problem is the reliability of research data. Lon, et al. [16] inquiring the preferences of the Phnom Penh community regarding private and public transportation modes with a focus on work objectives, without considering other more complex destinations. Lon did not calculate the average energy consumption of a vehicle that was affected by the number of vehicles, travel and passenger characteristics, vehicle year, fuel type, engine size, engine temperature, vehicle speed and passenger load (or occupancy), when people’s choice mostly fell on private vehicles. The strength of Lon’s study in Phnom Penh is that it involved all modes available used by the whole community. So, the modal choice preference factor became complete.  

For research quality issues, most of the literature studies cover articles from international journals such as Elsevier, European Transport, EJTIR (European Journal of Transport and Infrastructure Research). Although some are still in the form of working papers, the contents of research are very relevant to the purpose of this literature review. Thus, the quality of research presented in this journal article is considered sufficient to be a source of literature review in the subsequent studies.  

Some of the articles focus more on examining women’s travel pattern [1][7][8][10][11][21][22][23]. Although those literature studies are more on the perspective of women community, in which to see how the travel patterns of men and women are balanced, the perspective of society today, even in the world, about women community is more identical to female; thus, the focuses of research (research objects, data accuracy, etc.) are directly on the female.

4.2. Methods of Analysis

There are limitations to all the analytical methods and limitations of the empirical study of sustainable transportation and women-based community travel pattern outlined above. There are two issues relating to the limitations of the empirical studies discussed in this section. The first problem concerns the difficulty in establishing causality relationships. The second problem is the case photography in a study of socioeconomic factors that influences the travel patterns of men and women.

Cross-sectional analysis (Table 2) of sustainable transportation and travel patterns, as written in the study classification above, is not easy in establishing causal relationships. Several studies show a strong correlation between various characteristics measures of sustainable transportation and women-based community travel patterns. Such analysis, however, cannot prove a causal relationship, even where high correlations are shown. Correlation can identify relationships between variables, but this relationship can indicate a causal relationship directly or indirectly. Therefore, a strong correlation between travel frequency and sustainable environmental variables, for example, does not mean a direct relationship between the two variables, such as car ownership or income. Likewise, the results of the regression analysis can identify statistical dependencies between variables, but do not identify the physical
relationship between variables. Like correlation analysis, regression analysis can identify relationships between variables but may not be directly connected.

When identifying the relationship between the characteristics of sustainable transportation and women’s community-based travel patterns, it is necessary to accommodate all other constant variables. This is not easy in empirical research, because different characteristics of sustainable transportation are often associated with different socioeconomic factors, which also have effects on women-based community travel patterns. Variations in socioeconomic factors increase the difficulty in establishing the influence of land use characteristics on travel patterns and add complications to compare travel patterns in different regions. Many socioeconomic factors can influence women-based community travel patterns. This study does not present a comprehensive condition of the impact of all socioeconomic factors on women-based community travel patterns. Instead, this study only identifies the main types of socioeconomic factors and illustrates how each of these factors can influence women-based community travel patterns. There are eleven types of socioeconomic factors identified in this study, seen from the literature review on women-based community travel patterns and socioeconomic factors. The eleven types of variables consist of income, car or motorbike ownership, SIM (driving license) ownership, employment status, type of work, women’s community age, household size and composition, level of education, attitude, and personality type.

5. Conclusion
It has been proven that there is a relationship between the characteristics of socioeconomic factors and sustainable transportation, as well as between the characteristics of socioeconomic factors and women-based community travel patterns, so that in the end, it can combine the relationship between sustainable transportation and women-based community travel patterns (in the context of women’s community perspectives). The effects of sustainable transportation and socioeconomic characteristics must be distinguished in the interpretation of the results. Malayath, et.al, [5] concluded that the behavior of transportation users, both men and women, with those influenced by socioeconomic factors there is a significant relationship with travel patterns in daily activities.

There are significantly different travel patterns between men and women that are influenced by patriarchal culture and models. Women have complex activities to meet household and family needs, especially for shopping and children’s shuttle. Compared with men, women’s travel patterns are more converging in distance but more divergent in activity [25]. Women need more time with more diffuse travel patterns [4][16]. Women prefer public transportation modes for work purposes but prefer private vehicle modes for travel to meet household and family needs [7][10]. Women prefer non-motorized modes if they are not pressed [6].

All these explanations show that women’s travel patterns are more supportive of the concept of sustainable transportation in terms of economics, society, environment, policy, and households. [1][5][7][12][22]

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