

## UNDERSTANDING FACTORS OF USING PUBLIC TRANSPORTATION AMONG WOMEN IN KUALA LUMPUR

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**Abstrak.** Dalam beberapa dekade terakhir, peningkatan persentase wanita yang bekerja di luar rumah di banyak negara berkembang menggambarkan perlunya pemahaman tentang bagaimana wanita bepergian setiap hari. Banyak yang mengklaim, sarana dan prasarana angkutan umum yang terkait dengannya tidak memperhitungkan kebutuhan pemudik perempuan tetapi disesuaikan dengan standar laki-laki. Akibatnya, banyak yang mengalami kesulitan, menjadi ketergantungan pada laki-laki dalam perjalanan atau menghadapi masalah terkait keselamatan yang membuat mereka tidak dapat menggunakan angkutan umum secara mandiri. Oleh karena itu, penelitian ini bertujuan untuk mengetahui faktor-faktor penggunaan angkutan umum di kalangan pengguna wanita di Kuala Lumpur. Studi ini mengidentifikasi tiga atribut utama dalam penggunaan angkutan umum yang mempengaruhi pengguna wanita. Dengan menggunakan Structural Equation Modeling (SEM), peneliti menemukan bahwa atribut situasional mempunyai pengaruh yang lebih besar terhadap frekuensi angkutan umum atau terhadap penggunaan angkutan umum dan membuktikan bahwa pengguna wanita lebih peka terhadap kondisi sekitar angkutan, pengambilan keputusan tentang angkutan umum dan pilihan moda untuk preferensi perjalanan mereka.

**Kata Kunci:** Mobilitas Wanita; Kendaraan umum; Perencanaan Transportasi; Perencanaan Kota

**[Title: Understanding Factors of Using Public Transportation Among Women in Kuala Lumpur].** In recent decades, the percentage of women working outside their homes has ascended in many developing countries depicts the needs on the understanding of how women travel daily. Many claims, public transportation facilities, and infrastructure related to it do not consider the needs of women travelers but fit men's standards. As a result, many face difficulties became dependent on men for traveling or facing safety-related issues that deter them to use public transportation independently. Thus, this study is to identify factors of public transportation usage among women users in Kuala Lumpur. The study has able to identify three main attributes in public transportation usage factors that influence women users. Using the Structural Equation Modelling (SEM) researchers have found that situational attributes have a larger influence on public transportation frequency, in the use of public transportation and surrounding condition of the public transportation in the mode choice decisions of their travel preferences.

**Keyword:** Women Mobility; Public Transportation; Transportation Planning; Urban Planning

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### 1. INTRODUCTION

Ironically, it is said that women travel differently than men (Crane, 2007). While women share

almost equal responsibilities in the workplace, there are more responsibilities in the home (Turner & Niemeier, 1997). This has prompted many researchers to find strong explanations for

understanding the variations in transport priorities, particularly where multiple tasks and different expectations have to be answered. The many roles upon women has raised a complexity in the understanding how women travel daily. Gardner (1990) explains safety is the major reason for affecting women's choices, and it is not really clear how this can apply to the actual reasons why women use public transport. In the most recent research by Choi and Lee (2020) found that safety is one of the main component that influence a development in gender segregation of areas and activities reflecting on many women only areas in Korea. While, Mim and Chowdhury (2017) stated that in Bangladesh streets and space are not considering women needs affecting women decision to be in public spaces. In Malaysia, Kaffashi et al. (2016), indicated that the government action by introducing creative transport policies such as charging and delivering more effective public transport might result in a modal change of 70% from existing users of the car to public transport. With that in mind, public transportation needs to be ready and be able to accommodate more needs of their users' regardless gender.

## 2. METHOD

Structural Equation Modeling (SEM) is a type of statistical analyses that seeks to explain multi-variable relationships (Bag, 2015). SEM are used in a broad spectrum of exploratory researches. 13 variables are used to defined frequency of using public transportation. Variables are defined through past researchers and also secondary data researches on factors influencing use of public transportation. Despite there is a lot of studies on safety perceptions and frequency of public transport usage by using SEM, there are still lack of topic focus on women public transportation users as the main attention by using this method. The survey was conducted in 2019, a poll of 463 respondents was performed using Stratified Random Samples that stratified public transportation users. To categorize the characteristics of public transport usage, factor analysis was conducted Factor analysis results are summarized in Table 1, and only variables with

factor loading greater or equal to 0.65 are listed. Several factors were derived from the factor analysis and labeled representing the nature of associated observed variables, i.e., service attributes of public transport (PT); physical attributes and situational attributes. The observed variables with higher factor loading have more significance in explaining the influence of corresponding extracted factors on overall frequency of public transport usage.

As said by Delbosc and Currie (2011), feeling secure on one's street and putting confidence in the local community had the greatest influence on their implicit residual variables, which in turn had mild effects on public transport health feelings. It was revealed that safety perception on the street is moderately depending to the local community. This result shows that the local community have specific role which contribute to the safety on the street and public transport. In addition, a place condition which includes dirty environment, lighting and people loitering are able to influence an individual perception of a place. A research carried out by Park and Garcia (2020) emphasized on the needs of proper street lighting in giving confidence to street user on safety of a particular area. While, Greene and Ortuzar (2020) reviewed on Park and Garcia (2020) study that the visual control can be refine into type of street and presence of street fence where different people may have different interperations towards safety of a particular street, hence highlighting the importance of these elements in defining safety. It has been shown that individuals who endure physical or emotional assault and bullying decreased their usage of public transit owing to such negative encounters, which indicates that they do not have public life and resources to defend themselves (Deniz, 2016). Many that endured sexual assault thus limited their usage of

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public transport and others transformed their actions into more conscientious (Asian Development Bank, 2015). It should be noted that, following efforts to prevent sexual harassment during public transport, such as women's passenger vehicles, one of the main factors in the health and schedules of public transport is the use of sexual harassment by women.

However, according to The UN Women (2014), the Scoping Study reveals that, despite their repeated reports of sexual violence, women and girls tend to depend heavily on public transport and use the service. This reveals that females in certain country had no other choice in the mode of transport but to use the public transportation even if they are threatening by sexual harassment and not feeling safe. Continued research should therefore be carried out in order to explore approaches and steps to address this issue and to contribute to a better understanding of use in public transport.

### 3. RESULT AND DISCUSSION

The collected data from women users helped to evaluate the safety perceptions and frequency of public transport usage. The analysis consisted of several groups of variables to investigate the factors associated with public transport usage and safety among women users. Structural Equation Modelling (SEM) technique was considered appropriate for application to analyze large number of endogenous, exogenous and unobserved variables (latent variables) that could offer the confirmation of factor analyses, regression path analyses and correlations among all groups of variables at the same time. The data contained multiple information collected by respondents, therefore factor analysis methodology was applied to group the vast number of variables into each variable latent, controlled, and endogenous. Upon grouping all variables by factor analysis, a path analysis approach was introduced to identify the relationships between variables. Only small paths lower than 0.1 would be considered relevant in the model. The function of the model modifier took part in how to select the appropriate paths. Thus,

the SEM would illustrate only the significant paths. Analyzed from data samples, the standardized SEM for the women users population was developed as shown in Figure 1 and Figure 2 (See Appendix for the explanation of variables), respectively.

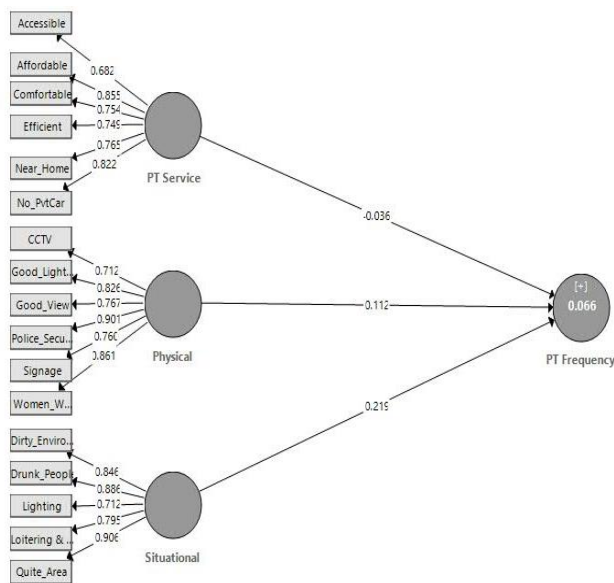
#### Public Transportation Usage Frequency

**Table 1** Factor Loadings for Frequency of Public Transport Usage

Variables	PT Service	Physical	Situational
Accessible	0.682		
Affordable	0.855		
CCTV		0.712	
Comfortable	0.754		
Dirty_Environment			0.846
Drunk_People			0.886
Efficient	0.749		
Frequency_PT_Use			
Good_Lighting		0.826	
Good_View		0.767	
Lighting			0.712
Loitering & Vand			0.795
Near_Home	0.765		
No_Pvt Car	0.822		
Police_Security		0.901	
Quite_Area			0.906
Signage		0.760	
WomenWaiting Area		0.861	

The extracted factors were used to construct a structural model using Smart PLS3 software. The standardized estimates for all the indicators are positive and significant at 1% significance level. According to the SEM shown in Figure 1, which aimed for effects of degrees of satisfaction with public transit service attributes, physical attributes, and situational attributes (PT Service, physical and situational respectively) on the frequency of public transit usage (PT Frequency). It can be observed that situational attributes have larger effects (0.219) on PT frequency than those of physical and PT service attributes (0.112 and -0.036 respectively). The bootstrapping results for the above SEM model suggests that the physical and situational attributes have significant p-value. However, PT service attributes do not show significant results. It can be implied that lack of satisfaction with both these attributes primarily

discouraged female population to use public transportation.



**Figure 1** Impact of Service, Situational and Physical Attributes on Frequency of Public Transport Usage

Table 2 shows the results of factor analyses, and only variables with factor loads equal or greater than 0.65 are listed. Three parameters have been derived from the factor analysis and assigned their existence, i.e. physical attributes and situational attributes, as related variables.

**Table 2** Statistical Description of Path Models Used in SEM

Hypo	Path	$\beta$	SE	T-Value	P Values
H1	PT Service -> PT Frequency	-0.036	0.057	0.642	0.521
H2	Physical -> PT Frequency	0.112	0.039	2.890*	0.004
H3	Situational -> PT Frequency	0.215	0.035	6.217*	0.000

• Note : \* indicates  $p < 0.05$

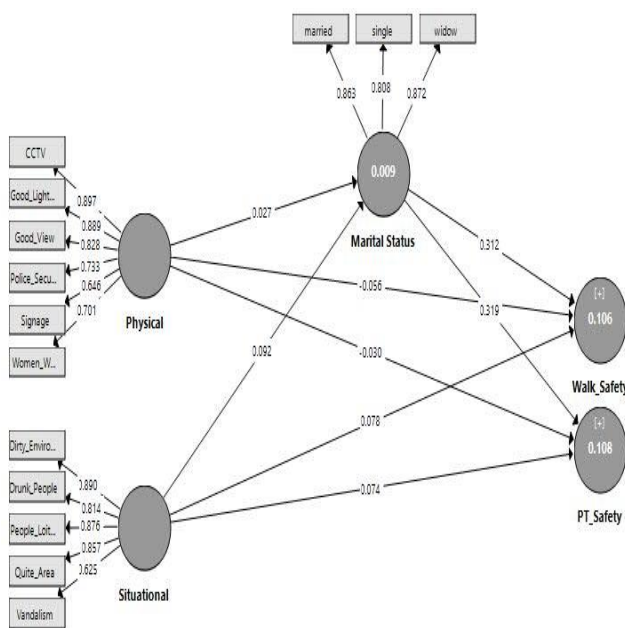
Likewise, factor research was carried out for types of public transport health characteristics. The variables found with higher loading factors are more important to explain the effect of the related extract factors on public transport and safety at walking.

**Table 3** Factor Loadings for Walking and Public Transport Safety

Variables	Marital Status	PT_Safety	Physical	Situational	Safety
CCTV			0.897		
Dirty_Environment				0.89	
Drunk_People				0.814	
Good_Lighting			0.889		
Goodview			0.828		
PT_Safe		1			
People_Loitering				0.876	
Police_Security			0.733		
Quite Area				0.857	
Signage			0.646		
Vandalism				0.625	
Walk Safe					
Women_Waiting				0.701	
Area					
Married	0.863				
Single	0.808				
Widow	0.872				

The factors extracted were used to construct a structural model using the program Smart PLS3. The standardized estimates for all the indicators are positive and significant at 1% significance level. The degrees of satisfaction with the use of ground public transportation were clustered into 2 groups, including degrees of satisfaction with 1) physical attributes (CCTV, Good\_Lighting, Good\_view, Police\_Security, Signage, Women\_Wait) and 2) situational attributes (Dirty\_Environment, Drunk\_People, People\_Loitering, Quite\_Area, Vandalism). For the case of endogenous variables, degree of satisfaction with safety is considered and is divided into two groups including walking and public transport safety (Walk\_Safety, PT\_Safety respectively). However, marital status is considered as the mediated variable. The satisfaction level of public transport travel according to marital status is divided into three categories including : 1) married; 2) single; and 3) widow. Consistent with the SEM shown in Figure 2,

there are direct and indirect effect of degrees of satisfaction with physical and situational attributes on walking and public transport safety (Walk\_Safety and PT\_Safety). However, aimed for the indirect effects, it is obvious that the situational attributes had much larger effects (0.092) on the mediator as compared to physical attributes (0.027). Moreover, marital status had a greater effect on PT\_safety (0.319) as compared to Walk\_Safety (0.312). The condition characteristics with the mediating impact of marital status play an important role in the protection understanding of the female population can be assumed.



**Figure 2** Impact of Situational and Physical Attributes on Public Transport Safety

The bootstrapping results for the above SEM model suggests that situational attributes have significant p-value for the direct as well as indirect effects. However, walking and public transport safety is greatly influenced by the lack of satisfaction with situational attributes under the meditating effect of marital status. It can be inferred that degree of frustration with social characteristics affect the experience of walking and health and discourages people from using public transport.

**Table 4** Statistical Description of Path Models Used in SEM

Hypo	Path	$\beta$	SE	T-Value	P Value
<b>Direct Effects</b>					
H1	Marital Status -> PT_Safety	0.319	0.035	9.103*	0.000
H2	Marital Status -> Walk Safety	0.312	0.038	8.241*	0.000
H3	Physical -> Marital Status	0.027	0.069	0.395	0.693
H4	Physical -> PT_Safety	0.078	0.062	0.631	0.528
H5	Physical -> Walk Safety	0.092	0.052	1.253	0.211
H6	Situational -> Marital Status	0.092	0.042	2.163*	0.031
H7	Situational -> PT_Safety	0.074	0.039	1.151	0.250
H8	Situational -> Walk_Safety	0.074	0.039	1.268	0.205
<b>Indirect Effects</b>					
H9	Physical -> Marital Status -> PT_Safety	0.009	0.022	0.391	0.696
H10	Physical -> Marital Status -> Walk_Safety	0.009	0.022	0.381	0.703
H11	Situational -> Marital Status -> PT_Safety	0.009	0.014	2.146*	0.032
H12	Situational -> Marital Status -> Walk_Safety	0.009	0.014	2.076*	0.038

• Note : \* indicates  $p < 0.05$

#### 4. CONCLUSION

A lack of physical and social fulfilment may be the explanation for the deterrent of women in the public transport culture. This finding suggests that the services, such as signs, lighting and cctv, which provide users security while walking down the street must be enhanced. In turn, creating a fun atmosphere in the back lanes and pedestrian lanes would solve the situation and promote health. In addition, the results show that the situation characteristics with the mediating effect of marital status play a major role in the protection

perception of the female population. The elimination of marital experience will lead to the rise in safety and security in circumstances. In turn, the main factor that influences the expectations of protection and discourages the use of public transportation for women is the degree of frustration with situational qualities and, considering the marital status, it intensifies. It indicates that good walkability promotes the use of public transport for women in particular. Urban design through revitalization process in the urban areas are crucial in elevating the image of the city. Other than improving walkin experience it will definetly encourages more people to walk especially among women and mothers with children. It is an evident all over the world, the revitalization of city through urban designs improve the quality of the city, increase walkability and walking experiences by having more eyes on the street reduce crime intentions and thus improving the value of the property of the area. These findings suggest the need to improve street development further in relation to increase of frequency in the use of public transportation among women users.

**Appendix**

1) Exogenous Variables

Degree of Satisfaction with Public Transit Services, Physical and Situational Attributes

- Accessible = Accessibility with public transport
- Affordable = Affordability to public transport
- Comfortable = Level of comfort while travelling with public transport
- Efficient = Efficiency of public transport
- Near\_Home = Availability of public transport near home
- No\_PvtCar = Unavailability of Private Car
- CCTV = Availability of CCTV at Public Transit Stops & its surroundings
- Good\_Lighting = Presence of good lighting at Public Transit Stops & its surroundings
- Good\_View = Good view at transit stops
- Police\_Security = Availability of police security at Public Transit Stops & its

- Signage = Availability of transit information in the form of signs
- Women\_Wait = Availability of women-only waiting areas at transit stops
- Dirty\_Enviro = Dirty environment at Transit stops and its surroundings
- Drunk\_People = Presence of drunk people at transit spots and its surroundings
- Loitering = People loitering at transit stops and its surroundings
- Quite\_Area = Absence of people at Transit stops and its surroundings
- Vandalism = Act of vandalism and bad behavior in public transport areas

2) Mediated Variable

Degree of Satisfaction with using public transport w.r.t marital status of women

- Married = Degree of public transit satisfaction for married women
- Single = Degree of public transit satisfaction for single women
- Widow = Degree of public transit satisfaction for widow women

3) Endogenous Variables

- PT Frequency = Frequency of public transit usage
- Walk\_Safety = Degree of safety satisfaction while walking to public transport
- PT\_Safety = Degree of safety Satisfaction While using public transport

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