SPATIAL ENTRAPMENT OF WOMEN WORKERS IN METROPOLITAN AREAS

Putri Halimah[1] and Chotib[2]

[1]School of Strategic and Global Studies, University of Indonesia, Indonesia
[2]University of Indonesia, Indonesia

ABSTRACT: Intercity integration in a metropolitan area forms a unified city that is interconnected like a mutualism symbiosis. Metropolitan areas provide opportunities for people between regions or between cities to connect with each other by doing non-permanent mobility. The purpose of this study is to identify how much potentially women are trapped spatially than men in some metropolitan areas in Indonesia. Spatial entrapment is a condition that is more common in women who trip in shorter distance and times during commuting between place of residence and place of work. This study uses micro data from the 2018 national labor force survey (SAKERNAS), which the survey was conducted by Indonesian Central Bureau of Statistics (BPS). The research approach is quantitative by using descriptive analysis to see the relationship between the independent variable and the dependent variable through bivariate cross tabulation analysis and graphics. Then, inferential analysis is used to determine the effect of independent variables on dependent variables inferentially. The inferential analysis model used in this study is multinomial logistics regression. The results show variables that influence the spatial entrapment of women workers are wage, work statues, and mode of transportation.

Keywords: Spatial Entrapment, Work Trip, Job Mobility, Gender Gap, Women Workers

1. INTRODUCTION

In many developing countries, migration from rural areas to urban areas because of the necessity to improve better life. Urban areas offer classier education, better social services, also better jobs. Gradually, urban areas are transformed into metropolitan areas. Within metropolitan areas, human mobility in terms of work happens quickly and easily which is supported by infrastructure progress. It increases of women labor market and advances dual career household. Naturally, this condition changes the social theory in the traditional society about men-breadwinner and women-homemaker [1].

This paper analyzes spatial entrapment of women's work trip in a household. Spatial entrapment is a condition where women's work trip shorter than men in distance and time [2]. Women tend to experience unwell-being in job mobility, because they prefer to get low wages than having travel further [3]. Spatial entrapment can prevent workers from getting jobs better, or limit them at lower paying jobs [4].

The Fig 1 shows the average wages per hour work since 2015 – 2019. Female workers in Indonesia earn lower wages than men. In 2015, women's wages per hour were IDR 11,119 ($ 0.79), while men earned IDR 13,458 ($ 0.96) per hour. Until 2019, women's wages were IDR 14,386 ($ 1.02) and men were IDR 16,588 ($ 1.18) per hour.

Another approaches argues that women's shorter work trip because of their role as a mother [2, 5].
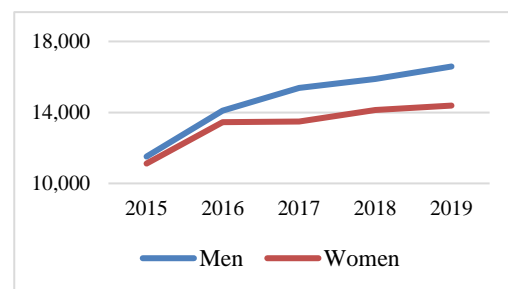

Fig 1. Average Wages Per Hour Work by Gender in Indonesia

The presence of children in the household also contributes to the reduction in income from trips attended by women [6], and also reduce a women's work trip but not a man's [7]. Some researchers find that occupational or industrial segmentation is a reason why women's work trip shorter. In metropolitan cities, labor market competition is fierce, for entering labor market women's skill are needed [8]. It means, high educated women are more wanted. Then, work trip cost becomes an increasing expenditure for them [9].

Based on that urban phenomenon, we research in three metropolitan areas in Sumatera Island, Indonesia. They are Mebidangro (Medan, Binjai, Deliserdang, Karo); Palapa (Padang, Lubuk Alung, Pariaman);, and Patung Raya Agung (Palembang, Banyuasin, Ogan Ilir, Ogan Komering Ilir). This paper highlights the problem of spatial entrapment on

dual career households with dependent variables are distance and time work trip. While, independent variables are income, age, education, working status, and transportation. To examine spatial entrapment, we use multinomial logit regression by SPSS 26. Data for the study is derived from raw data of National Labor Force Survey (SAKERNAS) 2018, Central Bureau of Statistics. The advantage of this study is knowing the factors that influence the movement of women workers. So, in the future, stake holder will be able to plan urban development in terms of transportation, wages and labor policies that provide more comfortable, safe and fair space for women workers. The limitations of this study are limited in the metropolitan area of the Sumatra Island, and the variables used are also still limited.

2. LITERATURE REVIEW

Research on gender relations and spatial space has provided important information about the mobility of women workers. Research continues to develop in highlighting it so that a "spatial entrapment" thesis emerges. The thesis shows the limitations of the labor market and women's journey to work. Since the 1970s, researchers have found various case related to the relationship between travel behavior and gender. Women have shorter distance and time of travel [10]. The differences of gender show that work trip depends on where women work and live [3]. This difference is due to the activities carried out by women, their dual roles as mothers and money-earners. They are segmented in local labor markets [11]. Women have no choice to get better job away from home, or women's experiences are limited in a work career compared to his male counterparts in the industries.

On the other hand, because the labor market is indeed limited. when women try to enter the labor market and fix things that give disadvantages for women economically. First, it is about wages that discriminate against women. The discriminatory wage structure is triggered by the demand for labor in the company is smaller, but the more offer by women workers in certain sectors [12]. Although, workers are homogeneous theoretically, many industries hypothesize that women and men workers are totally different. Some industries provide low-wage, predominately female-dominated jobs. They hire women workers around the residents with a preference for women in mobility and limited skills have shown the entrapment of working by segmentation of local labor market.

Women workers reduce the time of wok trip because of their household responsibilities and the concentration of jobs in suburban areas [7]. Wheatley [5] describes about school-age children reflect the time or schedule of school will be entrapping women spatially, even highly skilled. The presence of children was significant for entrapping women worker. McQuaid and Chen [6] explain that women with two or three children will have work trip shorter. The age of the youngest child influences it, where the older the child, the less of traveling 30 min or more. Rapino [2] shows gender roles are significant in women's spatial entrapment. For married women, decreased of work trip time about 3% if having children under the age of five, decreased of work trip time about 11.5% if having children having children more than the age of five, and decreased of work trip about 5% if having no children in comparison with married men. Madden [3] explains that work trip lengths would be longer if women had the same job tenure, same wages, and same work hours.

Men have higher mobility in each marital status, single or married. Interestingly, married men will have higher mobility compared to unmarried women [13]. In the United Kingdom, Spain, and Australia, the proportion of total work time in mobility is twice more than women. While women do not experience spatial entrapment in Finland [14]. Other studies show there are no systematic differences between men and women moving towards larger companies when looking at potential experience, years of work, education, and working status, and only a few minor differences for some sectors, company age and part-time status [15]. Another study indicates that gender equality in work hours and in wage will make as long as work trip between women and men, or women's will be longer [3]. Gender work trip gap based on the differences in jobs status and wage, where bigger household responsibility does not indicate women's length of the work trip become shorter [16]. It supports another study that female workers have a relatively long work trip and that the presence of adults or other children in the household does not reduce women's work trip [17].

Gender also influence to work trip time and accessibility of workers. According to the study, women tend to spend more time on their commuting and have a more limited spatial range in urban areas compared to men. Mostly, women depend on public transportation as the main mode of transportation [18-19]. Transportation has the largest direct effect on the

time of workers' trip so that people with private transportation (drive own cars) has significantly shorter work trip times than those who use public transportation. There is reducing the gender difference in work trip time because men and women equally use public transportation. On the other hand, in the suburbs where transit hub design that connects people to the place practically does not exist. It causes workers to have to drive for work, and women do not have access to it [20].

3. METHODS

This research uses a quantitative approach to identify spatial entrapment of women worker mobility in a household. We present descriptive analyses by cross tabulation method, and inferential analysis by multinomial logistic regression method. This study uses the micro data from National Labor Force Survey (SAKERNAS) 2018, Central Bureau of Statistics. We research in three metropolitan areas in Sumatera Island, Indonesia. They are Mebidangro (Medan, Binjai, Deliserdang, Karo); Palapa (Padang, Lubuk Alung, Pariaman);, and Patung Raya Agung (Palembang, Banyuasin, Ogan Ilir, Ogan Komering Ilir). The number of samples represented was 3.637 households. Dependent variables and independent variables category are below.

Table 1 The Category of Dependent Variables and Independent Variables

Dependent Variables	Category
Distance (dist)	1. Men > Women
	2. Men < Women
	3. Men = Women
Time (time)	1. Men > Women
	2. Men < Women
	3. Men = Women
Independent Variables	Category
Income (inc)	1. Men > Women
	2. Men < Women
	3. Men = Women
Education (educ)	1. Men > Women
	2. Men < Women
	3. Men = Women
Age (age)	1. Men > Women
	2. Men < Women
	3. Men = Women
Women work status (workstat)	1. Formal
	2. Informal
Women mode of transportation (trasnp)	1. Public transportation
	3. Private transportation
	4. Others

3.1 Research Model

Multinomial logistic regression analysis method is an analysis method that represents the relationship between qualitative or categorical response variables (more than 2 categories) with one or several independent variables. Research using this analytical method because the independent variables and the categorical independent variables are very suitable to be used to see the independent variables on the accepted variables. The model used in this study is as follows. Logit function from the differences of distance and time work trip between men and women consists of:

i. Logit function for Y = 1 relative to logit function for Y = 3

$$\ln\left[\frac{P\,(Y=1|x)}{P\,(Y=3|x)}\right] = \beta_{10} + \beta_{11}\,inc1 + \beta_{12}\,inc2 + \beta_{13}\,age1 + \beta_{14}\,age2 + \beta_{15}\,educ1 + \beta_{16}\,educ2 + \beta_{17}\,workstat1 + \beta_{18}\,transp1 + \beta_{19}\,transp2 + \varepsilon \qquad (1)$$

ii. Logit function for Y = 2 relative to logit function for Y = 3

$$\ln\left[\frac{P\,(Y=2|x)}{P\,(Y=3|x)}\right] = \beta_{20} + \beta_{21}\,inc1 + \beta_{22}\,inc2 + \beta_{23}\,age1 + \beta_{24}\,age2 + \beta_{25}\,educ1 + \beta_{26}\,educ2 + \beta_{27}\,workstat1 + \beta_{28}\,transp1 + \beta_{29}\,transp2 + \varepsilon \qquad (2)$$

Category Y=3 is the comparison. The value of probability is obtained from the logistic function of the logit model of the dichotomy above. Thus the probability values for each category are:

$p_1 = pr\,(Y=1\,/\,x) = \left[\frac{e^{zi}}{1+\,e^{zi}+\,e^{z2}}\right]$; probability of man's distance and time are more than women

$p_2 = pr\,(Y=2\,/\,x) = \left[\frac{e^{z2}}{1+\,e^{zi}+\,e^{z2}}\right]$; probability of man's distance and time are less than women

$p_3 = pr\,(Y=3\,/\,x) = \left[\frac{1}{1+\,e^{zi}+\,e^{z2}}\right]$; probability of men's and women's are equal

4. RESULTS

In the model significance test, the value of the final intercept is 0.00, meaning that at least one independent variable influences the dependent variable significantly. Partial test results show that income, women work status, and mode of transportation significantly influence the distance and time of work of women. In the R^2 coefficient, Nagelkerke's value is 0.638 for distance and 0.625 for time, meaning that the variability of the independent variable explains 63.8% of the distance variable, and 62,5% of the time variable.

Table 2 in below shows the descriptive analysis results of relationship between independent variable and dependent variable (distances). We can see that men's wage more than women's trigger men's work trip distance longer 66,1%. While, when women's

wage more than men's wage only 34,9% cause women's work trip distance longer. Then, when there is an equality wages between women and men

Independent Variable		Men > Women	Men < Women	Men = Women
Income	Men > Women	66,1%	4,6%	29,3%
	Men < Women	23,8%	34,9%	41,3%
	Men = Women	19,6%	4,0%	76,4%
Education	Men > Women	49,2%	6,3%	44,5%
	Men < Women	41,1%	12,6%	46,3%
	Men = Women	46,9%	7,4%	45,8%
Age	Men > Women	46,2%	8,0%	45,8%
	Men < Women	44,9%	10,8%	44,4%
	Men = Women	47,5%	7,6%	44,9%
Women's work status	Formal	22,6%	29,7%	47,7%
	Informal	50,9%	4,0%	45,2%
Women's mode of transportation	Public	6,7%	80,5%	12,9%
	Private	2,0%	21,3%	2,7%
	Others	2,4%	42,8%	12,1%

conclude an equality distance about 76,4%.

In education we can see that the higher women's education will make the higher distance (12,6%) or same distance (46,3%) of women's work trip. On the other hand, there is not significantly different about age for women's work trip distance. Informal work status for women make a gender gap for distance, it is about 50,9%. Then, formal work status gives the longer distance for women about 29,7%. The last is about mode of transportation. Mostly, women workers use public transportation for going through longer distance.

Table 2 Descriptive Analysis Results between Independent Variables and Dependent Variable (Distances)

Based on table 3 we can see how independent variables influence dependent variables (times). Income, work status, and mode of transportation present significantly value. Women's work trip times will be longer than men are caused by getting more income (33%), formal work status (27,9%), and public transportation (80,3%). Although the higher education women have able to increase the times of working (12,4%), but men's time still longer (40,8%). Likewise, the age shows less effect for women times.

Table 3 Descriptive Analysis Results between Independent Variables and Dependent Variable (Times)

Independent Variable		Men > Women	Men < Women	Men = Women
Income	Men > Women	65,3%	4,6%	30,0%
	Men < Women	23,6%	33,0%	43,4%
	Men = Women	19,4%	4,4%	76,2%
Education	Men > Women	48,3%	6,6%	45,1%
	Men < Women	40,8%	12,4%	46,8%
	Men = Women	46,4%	7,1%	46,5%
Age	Men > Women	45,7%	7,8%	46,5%
	Men < Women	44,1%	10,5%	45,4%
	Men = Women	47,9%	8,0%	44,1%
Women's work status	Formal	22,1%	27,9%	50,0%
	Informal	50,4%	4,2%	45,5%
Women's mode transportation	Public	6,6%	80,3%	13,1%
	Private	1,7%	20,0%	3,1%
	Others	2,6%	43,5%	11,8%

Table 4 Multinomial Logistic Regression Analysis (Distances)

Distance	Men > Women			Men < Women		
Parameter Estimates						
	B	Std. Error	Exp(B)	B	Std. Error	Exp(B)
Income						
Men > Women	1,922	0,118	6,836***	0,808	0,219	2,244***
men < women	1,245	0,179	3,472***	1,837	0,225	6,280***
Education						
Men > Women	0,074	0,116	1,077	-0,271	0,202	0,762
men < women	-0,109	0,119	0,897	0,07	0,183	1,073
Age						
Men > Women	0,06	0,181	1,062	0,048	0,307	1,049
men < women	-0,066	0,223	0,936	-0,038	0,372	0,962
Women's work status						
Formal	-2,194	0,135	0,111***	2,591	0,244	13,345***
Women's mode of transportation						
Public	0,639	0,241	1,895**	0,634	0,614	1,885
Private	0,438	0,126	1,550***	0,097	0,424	1,102

) significant at 5%   *) significant at 1%

Table 4 shows the results of multinomial logistic regression analysis for the distances. The tendency of women with higher incomes to travel farther is 6,280 times greater.

That is, when men's income is higher in the household, women are 6,836 times more likely to be spatially trapped in distance. Then, formal work is also able to provide encouragement to women to make further work trips by 13,345 times. While other variables with significant influence do not show too high a gap.

Table 5 in below shows the results of multinomial logistic regression analysis for the time. The result shows the similarity to the previous one. Income or wage influence women's work trip in time. The higher income, the longer time of women's work trip. Even so, women with higher incomes will still be trapped in travel time. Because, when a man's income rises, he has 6,368 times the opportunity to increase his travel time, and women is 5,443 times. Likewise, with formal employment status can increase women's travel time 10,070 times longer. While other variables do not provide a significant difference in numbers.

Table 5 Multinomial Logistic Regression Analysis (Times)

Parameter Estimates						
Times	Men > Women			Men < Women		
	B	Std. Error	Exp(B)	B	Std. Error	Exp(B)
Income						
men > women	1,851	0,116	6,368***	0,716	0,214	2,047***
men < women	1,202	0,178	3,326***	1,694	0,221	5,443***
Education						
men > women	0,040	0,115	1,041	-0,119	0,195	0,887
men < women	-0,092	0,118	0,912	0,154	0,181	1,167
Age						
men > women	-0,009	0,181	0,991	-0,073	0,295	0,929
men < women	-0,151	0,222	0,860	-0,124	0,361	0,884
Women's worker status						
Formal	-2,220	0,135	0,109***	2,310	0,229	10,070***
Women's mode of transportation						
Public	0,511	0,238	1,666**	0,201	0,619	1,223
Private	0,351	0,126	1,421**	-0,199	0,402	0,819

) significant at 5%   *) significant at 1%

5. DISCUSSION

The city center becomes a magnet for people in the surrounding area to come to cities with the aim of improving the economy, because in the city center there are various industries, offices, businesses and trade. The location theory pioneered by Von Thunen states that the main factor that determines location selection (land use) is the land rent / purchase price.

This urban transformation will form a pattern of the existence of a core city as a center of urban activity in the economic, administrative, political, and the existence of satellite cities as a buffer in providing space for abundance of activities in the core city, such as more affordable housing [21].

Movement of people from villages to cities or between cities is common today. Progress in the construction of facilities and infrastructure that support the need for transportation causes the pattern of human movement to be faster and integrated. Mobility or human movement that occurs continuously is a modern phenomenon that occurs in urban areas, especially in metropolitan cities, industrial sites, offices, and businesses are concentrated there. The large number of industries and businesses makes the demand in the labor market increase, thus attracting individuals to do work by commuting, not only from villages to cities but also to travel long distances between cities [22].

Various theories regarding the development of urban structures which state that the city center or central business district (CBD) will experience development until it reaches the periphery that converts agricultural land into residential land for workers. The CBD area offers broader employment opportunities with higher incomes, and the sub-urban area offers the availability of settlements at affordable prices. The existence of cohesiveness between urban areas will certainly affect the pattern of movement of travel (mobility) of the community, because there will be workers from suburban areas who come to do job mobility. Demographic, social and economic characteristics have an influence on a person's mobility patterns. The demographic characteristics of the sexes show that compared to men, women tend to experience inequality in mobility, because they prefer to get wages below the average, rather than choosing to travel further [6].

According to the results in this study, independent variables such as income or wages, women's work status, and mode of transportation influence the pattern of women's mobility significantly. The higher wages, formal work status, and using public transportation increase women's work trip in distance and time. However, women workers are not used to using private transportation because of limitation of ability in having own cars and drive it. In Indonesia, car have a similarity price with house. This research support previous research that state women more trapped spatially than men in distance and also time of working trip. Others independent variables, age and education does not influence significantly for women's worker mobility.

It shows that metropolitan areas in Sumatera Island describe a gender gap, inequality for participate in labor market. Gap of wages between

men and women has a domino effect on the economy indirectly. women with low wages are unable to compete with male workers. even though they are able to increase company productivity. dependence on public transportation makes women trapped in work that only has access to the transit hub. they cannot work for long distances and long periods of time if there is no access to public transportation. therefore, transportation facilities in metropolitan cities need to be improved, such as the use of LRT. However, Palembang Cities has LRT transportation in in the city, but the transportation network has not been connected to the suburbs. Mostly, workers use traditional transportation such as tugboat to down the river, or buses to get to where they work.

6. CONCLUSIONS

Research findings show spatial entrapment in women workers are caused by income, women work status, and mode of transportation. Men's wage more than women's trigger men's work trip distance longer 66,1%. While, when women's wage more than men's wage only 34,9% cause women's work trip distance longer. Then, when there is an equality wages between women and men conclude an equality distance about 76,4%. Women's informal work status causes 50,9% men's distance work trip be longer. And 80,5% using for public transportation cause women's work trip in distance longer. Same as the length of work trip, wages, work status, and mode transportation influence how far women go to work.

To overcome spatial entrapment in metropolitan areas in Sumatera Island, it needs cooperation from various sectors, such as governments, companies, and other stakeholders in determining wage eligibility for women workers, increasing transit hubs for public transportation networks, and a labor market that is wide open and fair for women.

7. ACKNOWLEDMENTS

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