DYNAMISM OF SUSTAINABLE URBAN DEVELOPMENT: ECONOMIC, SOCIAL, AND ENVIRONMENTAL INTEGRATION IN JAKARTA CITY PLANNING

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ABSTRACT

The phenomenon of urbanization and rural-migration over the past few decades has become inevitable. Many factors affect the movement of the population, such as lack of job opportunities in origin, income inequality, and uneven development. Urbanization and the resulting migrations demand adequate facilities for migrants. The dynamism of sustainable urban development requires economic, social, and environmental integration to support and facilitate urbanites. Therefore, this study aims to identify the integration of urban development between economy, social and environment. The city that is the subject of the study is the city of Jakarta, which covers the period from 2015-2022. The data used is panel data by measuring urban development indicators against migration. So, the analysis used is also panel data regression. In addition, urban metabolic analysis is also used to identify the most critical indicators of urban development and regions for migrants. Then the author will propose mitigation measures based on an alternative scenario approach.

Keywords: economic, rural-migrant, social and environmental integration, urban development

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1. INTRODUCTION

Sustainable urban development will always be intertwined with the 3P conception, namely planet: balance of environment, humans: society, and profit: economy. Failure to overcome the 3Ps will have a bad impact on sustainable city development. Globally, cities are intended as centers of economic growth and development [1]. The rapid growth of the city is a contribution to urbanization and migration from the village to the urban area. Migration is caused by job opportunities, better living standards and adequate and good educational facilities and services [2]. Increased urbanization and migration, if not properly controlled, will create detrimental problems related to environmental and even economic challenges [3]. Therefore, urban development should not only be infrastructure development, but include our planned structure and include aspects of the 3Ps that are very important for any country to achieve proper development.

In various literature, it is revealed that urbanization is able to change the social, economic, and environmental dimensions of a country which has been discussed by several authors (Zeng & Chen [4]; Liu & Zhou [5]; Ibourk & Raoui [6]; Apostu [7]). In addition, urban populations can increase economic growth through urban contributions to Gross Domestic Product (GDP) [8]. Unfortunately, in the context of Indonesia, urbanization has not been able to increase its contribution to GDP [9]. It is recorded that the contribution of urbanization to GDP only ranges from 1% to 2%. In fact, the proportion of urban population in Indonesia reaches 53% or similar

to China, which is higher than other Asian countries such as India, Thailand, the Philippines and Vietnam [10]. It is estimated that Indonesia's population in urban areas in 2035 will reach 73%. China's urbanization contribution reaches 6% [11], Thailand 10% and Vietnam 8% to GDP contribution [12].

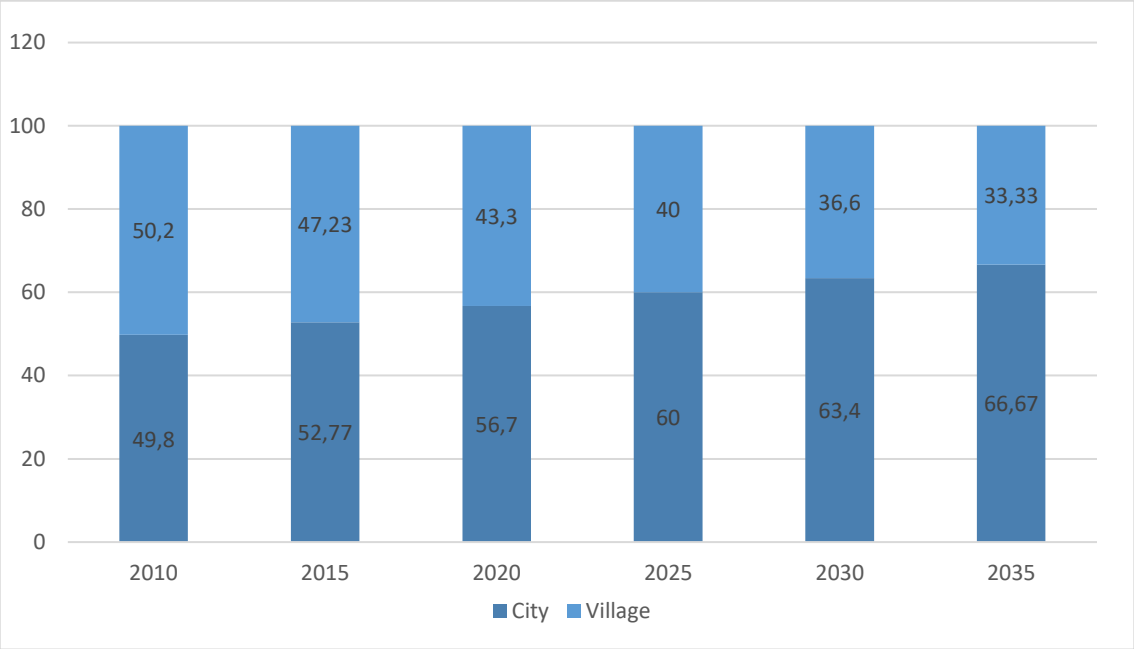

Figure 1. Prediction of the Percentage of Urban and Rural Population in Indonesia 2010-2035
Source: Adapted from [13]

Although later in some countries urbanization and migration contribute to very high GDP growth. Inversely proportional to Indonesia which has not contributed too much to GDP. This problem is allegedly caused by urbanites who come dominated by people with low education. Highly educated people also come as urbanites to the city, but the number is relatively small compared to the highly educated urbanites [10]. Another problem caused by the urban population that continues to increase is reducing the contribution of agriculture to GDP, recorded from 2020 accounting for 10.20% and in 2021 by 9.85% [9]. Migration from villages to urban areas is due to the shift of farm workers to unskilled workers in urban areas. Exposure to uncontrolled urbanization and failure to address these problems will lead to the risk of social instability [2], Inadequate infrastructure [12], labor exploitation [14], pollution [15], water sanitation [11], Environmental health, and climate change [16].

In Indonesia, one of the cities that become a destination for urbanites and migrants is the city of Jakarta as it is recorded that Jakarta is still the province with the largest population reaching 10.8 million people, followed by Bekasi with 3.4 million people, Surabaya with 2.9 million people, Bandung with 2.6 million people, Tangerang City with 2.3 million people, and Medan with 2.3 million people.

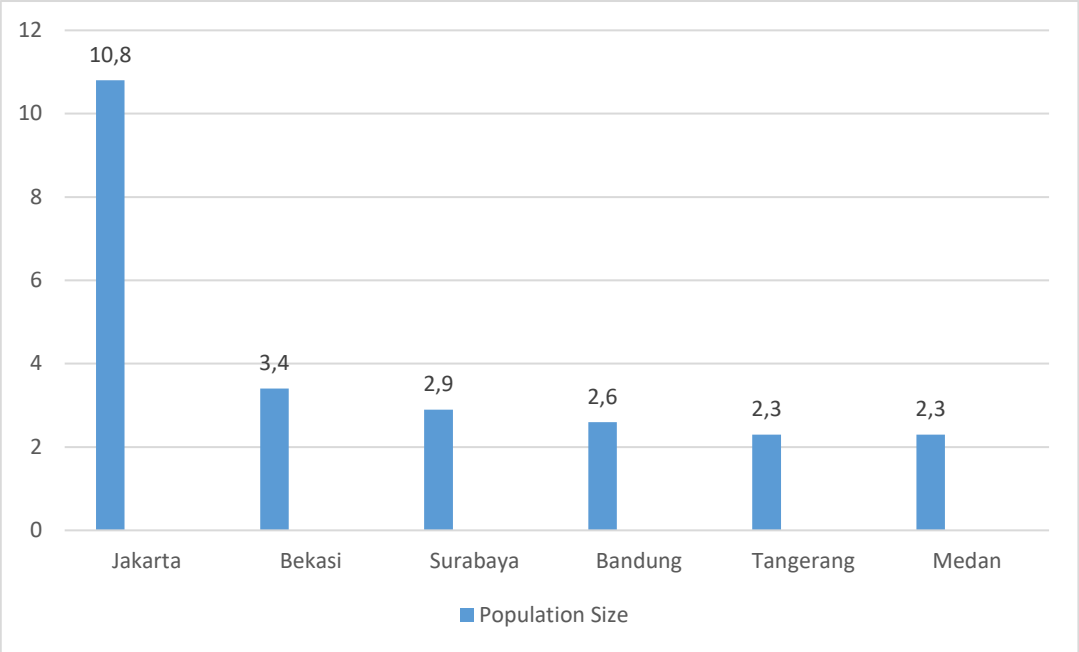

Figure 2. Urbanization of Jakarta City
Source: Adapted from [13]

It is relevant that only a few cities in Indonesia can provide good facilities for urban people, especially those who are looking for high income and a better life. Therefore, a sustainable urban development model needs to be carried out. So that it is not centralized in Jakarta as an urban and migration destination city.

In particular, this study will seek answers to the following questions: How should Indonesia plan for urban development in relation to rural-urban migration? To address this problem, the following objectives are formulated: to establish dynamic interactions between rural-urban migration and urban development and to facilitate structured urban planning based on alternative scenarios and to suggest appropriate mitigation measures for sustainable urban development.

2. RESEARCH METHODS

The impact of rural-urban migration on urban development needs to be studied through three stages: *first*, establishing a correlation between urban migration and urban development indicators using panel data analysis. This study will establish on the empirical dynamic interaction between rural-urban migration and urban development indicators in Jakarta, Indonesia. Jakarta is a well-known metropolitan city in Indonesia and became the capital of Indonesia before the existence of IKN. Jakarta is divided into several parts, namely: Thousand Islands (KS), East Jakarta (JT), South Jakarta (JS), Central Jakarta (JP), West Jakarta (JB), North Jakarta (JU), and DKI Jakarta (DKI) (Central Statistics Agency, 2022). Jakarta has become the center of migration due to historical conditions that have occurred from the past to the present. Previously, Jakarta was known as the city of Batavia during the Netherlands government's tenure. So, it is natural for Jakarta to attract job opportunities for skilled, semi-skilled, or unskilled migrants. The projected population of the city will reach 11.24 million people by 2045. With a dependency ratio of 40.18% in 2022, however, this is projected to continue to increase to 49.62% in 2040 [13]. Although there is a natural decline in the productive population, migration to cities is the main source of population growth. The rapid growth of migration necessitates the need to examine the dynamics of urban planning for the influx of migrants from villages and cities, both identifying impacts and causes during periods of high growth. The author chose the city of Jakarta as the study area, because it experienced rapid migration from all cities, even until now Jakarta has become the center of urbanization in Indonesia. This is the same as neighboring countries and even other developing countries are all experiencing equally high migration growth, so this study can be developed in cities around the world.

The level of migration in the study is a bound variable and an indicator of urban development as an exogenous variable. Through extensive literature review, the author identifies 14 indicators of urban development consisting of: education, housing, health, transportation, poverty facilities, water, industry, large-scale industrial units, job opportunities, bank credit flows, loans and financial assistance, community welfare, energy, and population land use. Each measurement identifier has a relevant measurement dimension, which will be described in the following table

The author integrates three main domains of urban development. The 14 development indicators will be classified in social, economic, and environmental categories that will lead to sustainable urban development. With an effort to provide empirical evidence linking urban migration and urban development indicators through panel data regression analysis. This model provides an estimate of each cross-zone indicator:

Urban Migration Rate (UMR): $A_0 Social_{um} * Economic_{um} * Enviroment_{um}$

$$(UMR) = \alpha_0 + \alpha_1 (edu)_{um} + \alpha_2 (hou)_{um} + \alpha_3 (heal)_{um} + \alpha_4 (Tran)_{um} + \alpha_5 (pf)_{um} + \alpha_6 (wat)_{um} + \alpha_7 (inf)_{um} + \alpha_8 (isiu)_{um} + \alpha_9 (emp)_{um} + \alpha_{10} (fobc)_{um} + \alpha_{11} (lafa)_{um} + \alpha_{12} (cwf)_{um} + \alpha_{13} (en)_{um} + \alpha_{14} (pop)_{um} + €t$$

Panel data analysis we chose to use a structural approach that allows to empirically identify relevant observation variables and can assess well both for the main variables and for the latent variables. Thus it is possible to accurately assess each latent variable as a weighted sum of the observed set of variables [17]. Such an approach makes it possible to accurately measure latent variables and avoid sample bias.

The Moment Analysis Structure device is used to analyze the data. By modeling the Equation Model Structure (SEM). In particular, the SEM approach involves the development and testing of two sub-models: Structural and measurement models using factorial analysis, the main goal of the measurement model is the construction of the latent variable size, by testing the reliability and validity of each observed variable in explaining the total variance of each latent variable. After the latent variable is constructed, we perform a weighted least squares regression on the structural model to test the causal relationship between the independent latent variable in the build and the dependent variable constructed.

3. LITERATURE REVIEW

3.1 Urban Development: Interaction and Dynamism of Village-City Migration

The lack of scientific urban planning poses various challenges for civil authorities to cope with future urban development. Development must be based on a structured model and balance the dual impact on migrant influx and urban development [18]. Therefore, currently the conception of sustainable urban development is the main concern for the government to determine the right policies and as developers in facing the natural resource crisis due to urban expansion and urbanization changes that are so rapid and irreversible. Development is expected not only to have an impact on economic improvement but also to care about the urban environment to urban society for indigenous people or migrants. The study shows that the planned development accommodates better education and health care systems, strong energy systems, pollution reductions, increased employment opportunities and infrastructure [19].

Instead, the authors found that random migration had a detrimental impact on cities. The study of Horo and Punia [20] showed various environmental impacts: pollution, sanitation, etc. another study by Rabiul Ansary [21] showed that sudden migration is affected by asymmetric events (political uncertainty, ease of movement, terrorism, etc.) that have an impact on urban planning. Bengston et al. [22] believed that urbanization that is growing so rapidly will have an impact on natural infrastructure and buildings, environmental health and human welfare. Bhatt [23] argued that urban development will have a significant impact on climate change with an increase in temperature and more extreme weather even causing floods. The UN illustrates that large-scale rural-urban migration and the expansion of built-up areas have resulted in many urban villages where many migrants live under pressure. Douglas et al. [24] found that water scarcity, more crime, antisocial activities to high pollution and others.

However, the growing concern about the socio-environmental impact of urban growth in the 1970s and 1960s shows concern about the impact of urbanization and the importance of managing growth [25]. These concerns are closely related to quality of life, preservation of the community, efficient urban forms, urban revitalization, and affordable transportation and housing options. This research was conducted as an effort to alternatively prototype sustainable urban planning that can increase positive impacts and prevent negative impacts through optimal utilization and increased gradation of migrant workers [26].

3.2 Urban Metabolic Analysis Model: Drivers of Migration and Indicators of Sustainable Urban Development

Migration mostly occurs with a purpose, where rural people move to urban areas due to positive attraction or negative encouragement. Some researchers identify that there is a force behind rural-urban migration. Gugler's [27] study shows that Chinese migrants occur as a result of seeking health, life satisfaction, and better income opportunities. Douglas et al. [24] stated that better environmental conditions, facilities that benefit banks, hospitals and educational institutions, income generation, better climatic conditions, and the position of communities helping migrants to urban areas provide security and long-term sustainability. Hoffmann et al. [28] emphasized rural communities moving towards cities in search of better income opportunities and the availability of financial institutions to run small-scale businesses, better lives for their children and improve access to resources.

Hossain [29] observed that migrants are moving to urban areas due to the high death rate in their villages and the poor health and hygiene systems. Dubey et al. [26] state that migration occurs due to changes in political and security conditions affecting neighboring cities. Bhatt [23] highlights that the workforce migrating to urban areas is increasingly scarce resources and the degradation of rural environments. Thus, the drivers of migration are divided into two parts: *first*, the forces that create resource scarcity. Thus, diverting attention to the local village or town which is largely driven by "drivers". *Second*, the power that creates attraction to the city and is inspired by the impact of attraction. In other words, the reason "attraction" refers to the increase in the capacity of the individual and the reason "push" refers to the deterioration of the individual's condition. It is now important to study the dynamics of attraction and push in urban development because improvement mechanisms can be observed after confirming the results of urban migration. In this process, the main challenge faced by urban planners is to measure the indicators that help measure urban development related to sustainable urban planning [16]. The implementation of sustainability indicators is used as an instrument to analyze the impact of urbanization on urban development with several resolutions.

In the early 1970s, the concept of sustainable urban development was adopted by ideological planners to formulate an approach that aimed to include environmental issues and socio-economic impacts. Banerjee [30] created work frameworks and assessment tools using a set of different indicators to measure the current state of affairs or other changes in urban development. Over the past decade, researchers have used several indicators to analyze sustainable migration, namely land-use indicators [2], transport indicators [31], environmental indicators [4], and socio-economic indicators [32]. Today, a wide variety of indicators are used around the world to monitor sustainable urban development that varies according to explicit goals in various geographical locations.

Urban development can produce both negative and positive impacts due to rapid migration in socio-economic and environmental contexts. Although a large number of macro-level global studies have been conducted, some authors are observing an integrated model to address urban development planning with migration issues in India [33]. Therefore Roy and Thangaraj [2] integrated development indicators with migration and ensure the sustainability of the city.

Table 1. Sustainable Cities Indicators

Urban Development Measures	Indicator	Measure
Economic	1. Credit Loans 2. Financial Aid	1. Number of Bank Branches, Community-owned housing 2. Saving, Loans Received and Taken, Revolving funds bounds.
Environment	1. Water 2. Energy 3. Industry/Factory 4. Large-Scale Industry 5. Transportation	1. City Water Supply (water purchased elsewhere) 2. Number of Households, Amount of Electricity used, kerosene, Solar Power and Other Energy Sources. 3. Total Volume Small and Medium-Sized Industries 4. The total volume of industry is large 5. Total Number of multi-shaft vehicles
Social	*1. Education* 2. Health *3. Housing* 4. Welfare 5. Public Facilities 6. Population 7. Employment	1. Number Junior High School, High School, College. 2. Number of Hospitals (Government and Private), Medical Stores (Pharmacies etc.), Blood Bank (PMI), Number Government Doctors and Community Primary Health Services. 3. Number of Livable Hosing 4. Index Gini Ratio. 5. Number of Jobs, Playgrounds, Lakes and Parks. 6. Number Population census consisting of men and women. 7. Formal and Informant Workers

3.3 Urban Mapping and Alternative Scenario Approaches for Sustainable Urban Development

Alternative scenario-based planning stimulates various possible scenarios and examines their impact on urban zones. Dubey et al. [26] observed that cities should make planning based on scenarios so that the country can control investment, plan for sustainable development in the long term, control unnecessary spending and infrastructure destruction efforts etc. This prevention is very important for developing countries like Indonesia. Therefore, an alternative approach to zone-specific urban planning will help developers and the government in designing cities optimally [29].

The ultimate goal of sustainable urban development is to find a balance between the environmental, economic, and social aspects of urban areas without sacrificing the well-being of the community and suggest specific policies for key areas [27]. Progressive urbanization and long-winded migration challenges can be overcome by creating urban development models and institutionalizing best urban growth management practices. Sustainability indicators, composite indices and integrated assessment models are some of the tools used to promote sustainable development [34].

In the past, traditional development approaches had been challenged and scenario-based planning had become very important because it facilitated policymakers to forecast and mitigate conflicts between urban growth subsystems. This alternative approach includes scattered cities, compact cities, suburban cities, corridor cities and transit-oriented development [35]. In addition, scenario-based planning allows policymakers and governments to prepare for an uncertain future and prevent them from the unintended surprise impact of their city planning policies. Andersson et al. [14] explain that scenario-based planning methods are the main instrument of urban planning because planning policies are often carried out over a longer period of time such as 10, 20 to 50 years and are based on assumptions of future and present conditions, thus causing a lot of uncertainty in achieving policy goals [15].

Sustainability refers to the preservation of the existence of ecosystems and their services, while meeting human needs, while urban development refers to any activity that improves the quality of life by depleting natural resources and damaging natural areas [19]. Therefore, the concept of urban development based on alternative scenarios is considered a solution to minimize bad externalities caused by the widespread urbanization of the ecosystem [36]. Urban growth

management policy is a framework or tool to manage urban growth by addressing its impact on natural areas and the environment. Urban growth management policies that can lead to the development of environmentally and socially sustainable urban areas.

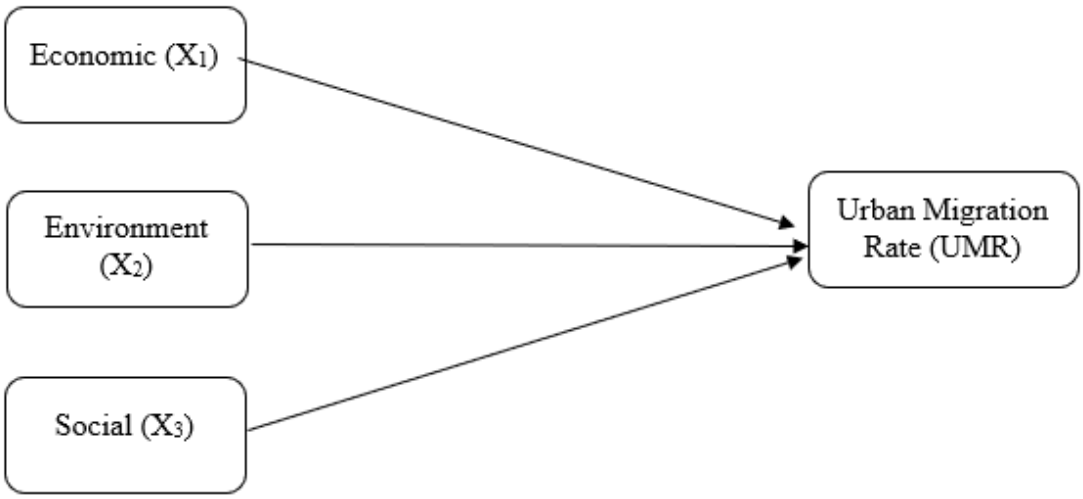

Figure 3. Conceptual Framework

4. RESULT AND DISCUSSION

Descriptive statistics identify that there is significant variation in each variable that is different in each indicator. The average value of Jakarta's urban migration rate in recent times is 1,846% with a deviation of 0.5%. Meanwhile, other important indicators in measuring urban migration such as education, community welfare and credit flows, savings, and financial assistance with an average value of 980,400, 0.404, 14553.00, 2860,620 respectively and financial assistance of 4227,000 with a standard deviation of 2.9, 0.011, 7325,574, 1523,119, and 268,228 respectively.

Table 2. Descriptive Analysis

No	Variable Indicators	Mean	Maximum	Minimum	SD
1	Population Growth Rate	1.846	2.690	1.170	0.545
2	Number of Banks	4227.000	4454.000	3723.000	268.228
3	Savings	2860390087.620	4312215549.000	2588793.100	1523911753.119
4	Credit	1453142000.000	2006089851.000	1704357.000	732575062.474
5	Privately Owned Homes	22.160	25.020	21.180	1.373
6	Water Supply	604698291.625	635819589.000	560382856.000	20755735.491
7	Education	5305.400	6158.000	4980.000	380.888
8	Health	30620.875	36939.000	4975.000	9984.267
9	Housing	47.832	50.670	45.040	11721.703
10	Welfare	0.404	0.423	0.394	0.011
11	Public Facilities	5.046	5.046	5.046	0.000
12	Population	10596106.600	10748230.000	10467629.000	94488.759
13	Number of Households	4792805.600	5577978.000	3179044.00	968002.336
14	Energy Use: Gas, Kerosene.	534.000	534.000	534.000	0.000
15	Employment	4767104.800	4875102.000	4875102.000	78339.793
16	Transportation	20350245.000	21856081.000	21856081.000	1037585.484
17	Small-Scale Industries	57913.200	62929.000	62929.000	10031.600
18	Large-Scale Industries	2117.000	2117.000	2117.000	0.000

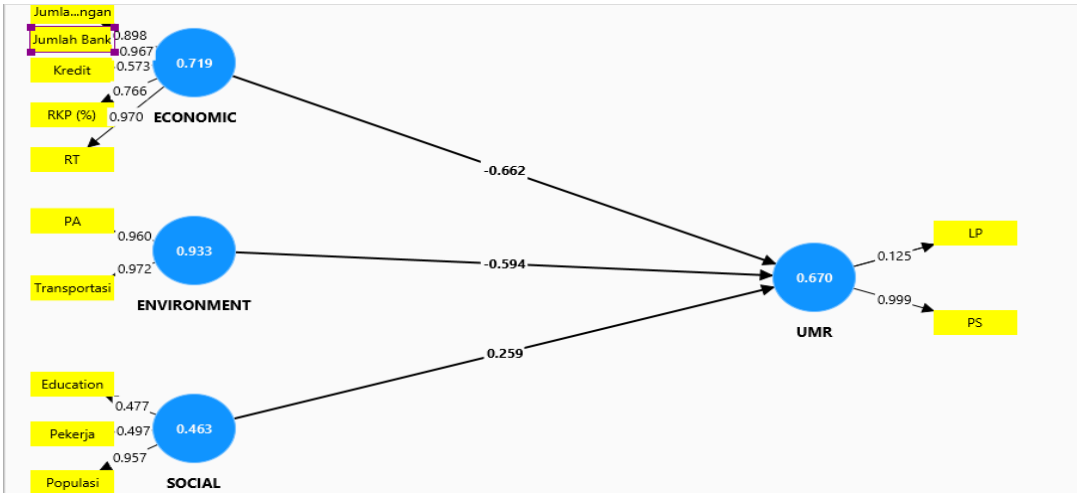

Figure 4. Structural Evaluation

In this stage of analysis, it was found that the relationship between variables was examined by paying attention to the value of the path coefficient. It is not surprising that the UMR (Urban Migration Rate) shows a strong positive correlation with social indicators, and a negative correlation with economic and environmental indicators. If pay attention to the economic variable only with a coefficient path of -0.662, it means that each variable indicator, both from the number of banks, savings, credit flows, to private home ownership, is insufficient for migrants or the facilities provided have not been able to be enjoyed by migrants and there are no special rules for migrants to take advantage of banking facilities and other welfare schemes. In line with the variables economic, the environment variable also has a coefficient path of -0.594. Means that the water supply in Jakarta is not all the migrants enjoy it. In addition, transportation that is quite dense according to this research has a positive value also has an impact on air pollution which is the main challenge.

Table 3. Structural Evaluation

Hypothesis	**Path Coefficient**	**P Value**	**95% Interval Randomness path Coeficient**		**F Square (0.02 Low, 0.15 Moderate, 0.35 High)**
			Lower Limit 2.5%	**Upper Limit 97.5%**	
Economic -> Urban Migrant Rate	-0.662	0.963	-0.172	0.939	0.042
Social -> Urban Migrant Rate	0.259	0.003	-0.321	0.520	1.994
Environment -> Urban Migrant Rate	-0.594	0.910	-0.157	0.353	0.084

The Social variable shows the expected results that migrants can take advantage of facilities such as adequate vocational education to the population related to their network to enter labor-intensive areas. In addition, education and employment indicators were 0.477, 0.497 respectively. This means that education, employment, and population are important factors in migration to Jakarta. As a note that the social variable has an *f-square* value of 1,994, it means that the influence is highly categorized, in fact, this shows the driving force of migrants to go to Jakarta due to education, job opportunities that demand labor-intensive values. With indicators such as education, and employment providing benefits as the main pulling factor of the availability of adequate resources in Jakarta, so that migrants feel benefited when migrating. Unfortunately, environmental and economic conditions are inadequate for migrants to get a welfare scheme. So, social factors in the form of education and job opportunities are the main motives for migrants to improve their standard of living to a decent life.

Therefore, from the results of the analysis explained, there are still many problems faced by Jakarta such as economic problems related to the availability of credit, or savings for migrants. Then the number of bank availability is still insufficient and adequate for the needs, especially migrants who are not able to access banking facilities [4]. In addition, environmental problems such as the scarcity of adequate clean water availability, with a large enough population, there will be a drought if there continues to be a scarcity of clean water [1], [3]. Coupled with the lack of clean water, it will also have an impact on health for the people of Jakarta. Transportation will have an impact on pollution due to better perceived job opportunities in Jakarta, pollution will be an additional problem for Jakarta residents, especially for migrants. From the identification of these problem points it is necessary to plan wisely, so that presenting alternative planning and effective mitigation measures can help policymakers and developers save costs and plan cities comprehensively.

From the identification of existing problems, the author offers several alternative scenarios, including: first, banks need to introduce structured loan or savings products, especially for migrants with flexible regulations to reduce their economic burden. In addition, the government needs to provide measures such as water management installations to migrant communities and can create awareness about wastewater and its control measures [11], [2]. In addition, the government also needs to encourage an environmentally friendly energy-based public transportation system and emphasize the use of public transportation, because awareness of traffic regulations can solve pollution and traffic problems. As education becomes a major driver for migrants, the government needs to voluntarily initiate educational institutions and companies to adopt schools and provide the necessary infrastructure and education support for migrants [6], [7]. Thus, developing cities, where technical institutions can harness their potential and produce innovative technologies to meet urban challenges.

5. CONCLUSIONS

The study identifies that the main drivers of migration are education and employment opportunities, which will also have an impact on the availability of transportation, housing, water supply, health, credit flows, and savings for migrants. The availability of facilities for migrants will have an impact on welfare and economic growth even though it is not directly felt. With migrants heading to Jakarta, the city faces positive and negative consequences due to migrant activities, and this has an impact on sustainable city development in three aspects, namely: *economic*, *environmental*, and *social*. The magnitude of migration can be overcome through adequate development planning and optimal use of resources. This will happen if stakeholders in each agency have a multidimensional approach and are involved in the planning and implementation of city plans. The authors suggest that it is necessary to increase the capacity of migrants through training, or create awareness to encourage government policies such as sustainable cities and sustainable urban health. For this reason, providing structured involvement for workers, therefore the sustainability of the city is guaranteed. Finally, although the urban planning system strives to make a robust plan, migration changes will occur constantly with its dynamic nature making its implementation repetitive, thereby reducing negative impacts. The limitations of this study have not been able to map the scale of sustainable development priorities in areas in Jakarta. It is hoped that further research will be able to map the priority development period for urban areas to provide adequate and effective urban planning for stakeholders.

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