

The Effect of Relocation the Country's Capital on Poverty Rates Using System Dynamics (Case Study: Balikpapan City)

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Abstract: The relocation of the country's capital has a significant impact on the economy of the surrounding cities and caused rapid population growth and at the same time does not improve the city's environmental and planning capabilities. Data from the Central Statistics Agency shows that in the ten years from 2010 to 2020, the population of Balikpapan City increased by around 130,739 people and poverty in Balikpapan City in 2019 reached 15,780 people and in 2020 it reached 17,020 people. as many as 688,318 people. The increase in the number of poor people is caused by many factors, starting from inflation, Human Development Index (HDI), education, labor, unemployment rate, Gross Regional Domestic Product (GRDP), and average per capita expenditure. Dynamic systems have two main elements, namely Causal Loop Diagrams (CLD) and Stock Flow Diagrams (SFD). This research aims to determine the impact of moving the capital city from Jakarta to Nusantara on poverty levels in Balikpapan. The results obtained are based on the research graph, namely that moving the country's capital has a significant effect on the poverty level in the Balikpapan city, moving the country's capital resulted in population mobilization and an insignificant increase in the number of births. Along with increasing opportunities and employment opportunities. Minimize this condition, several efforts can be made, namely by carrying out campaigns on the use of contraceptives and family planning programs to reduce birth rates, especially for people who are classified as poor, as well as providing training and expanding job opportunities for local workers.

Index Terms: Capital Relocation; Relocation Impact, Population, Poverty Rate; System Dynamics

1. Introduction

A few countries in the world have taken steps to change the location of their capital cities and Indonesia is one example of a country that has done so [1]. The relocation of the country's capital has substantial implications for the economy of the surrounding cities. Various sectors will experience significant impacts, including environmental, and ecological aspects, as well as the overall economic sector in line with the shift in the country's capital [2]. DKI Jakarta Province is the center of the economy and government in Indonesia. According to Huynh (2020) in [3], this causes rapid population growth and simultaneously does not increase environmental and urban planning capabilities. Indications of elevated concentrations of constituents found in municipal sewage were identified in the sediments of rivers in Jakarta, implying the substantial transport of inadequately treated municipal sewage through the rivers that traverse Jakarta City.

When juxtaposed with chemical analyses of river sediments in other urban areas across Asia, the current findings reveal that sediments in Jakarta are among the most severely polluted in coastal urban regions [4], and threats related to climate change and seawater [5]. Areas directly adjacent to the sea will be the areas affected by floods [6]. Floods represent a significant stressor for manufacturing firms, constituting an additional challenge alongside the inherent competition they regularly encounter. The impact of flood exposure on manufacturing firms is multifaceted, encompassing both direct effects such as the cessation of production and indirect consequences like disrupted distribution channels [7]. This danger will become greater due to the phenomena of climate change and sea level rise. The coastal region of Jakarta exhibits a heightened reactivity to alterations in elevation adjustments, which are predicated on a local sea-level rise of 0.54 meters and land subsidence rates of 0.02. An analytical model underscores that the coastal topography of Jakarta lacks the inherent capability to effectively counteract the implications of sea-level rise [8]. The ramifications of this situation will extend uniformly across various sectors, yielding a cascade of effects that encompass a decline in the workforce, alterations in wage levels, fluctuations in investment volume, and impacts on other sectors affected by this issue. It is hoped that the relocation of one of these activity centers will help reduce the population of DKI Jakarta and solve other problems.

President Joko Widodo has initiated a proposal to relocate the National Capital from Jakarta to North Penajam Paser in 2019. The peak occurred when the President gave a state speech in celebration of the 74th Anniversary of the Independence of the Republic of Indonesia. Based on Law Number 3 of 2022 concerning the Capital of Nusantara (IKN) which came into force on 15th February 2022, the Capital of Nusantara was established as the nation's capital, and the Capital of Nusantara Authority was designated as a body equivalent to the ministry responsible for special regional government in the Capital of Nusantara. Balikpapan is one of the important cities in East Kalimantan Province. Balikpapan city is one of the entrance gates to the new national capital. Balikpapan city has two main transportation facilities, including Semayang Harbor and Sultan Aji Muhammad Sulaiman International Airport. The construction of a toll road in North Penajam Paser Regency, the Balang Island Bridge which will be a link to the Kariangau industrial area, and the Ministry of Public Works and Public Housing of the Republic of Indonesia (PUPR) in Balikpapan city strengthen Balikpapan as a city supporting the development of the nation's capital. The population of Balikpapan City has increased by around 130,739 people and poverty in Balikpapan City in 2019 reached 15,780 people and in 2020 it reached 17,020 people out of a total of 688,318 people. The increase in the number of poor people is caused by many factors, starting from inflation, Human Development Index (HDI), education, labor, unemployment rate, Gross Regional Domestic Product (GRDP), and average per capita expenditure.

According to research, minimizing poverty rates is done by increasing employment opportunities for low-income people worker [9]. The concept of relative poverty has evolved beyond mere income insufficiency and now encompasses multidimensional aspects, including but not limited to access to food, clothing, housing, education, recreation, healthcare, societal interaction, and personal capabilities [10]. This study incorporates established factors from prior research while introducing additional variables that exert an impact on poverty in the urban context of Balikpapan. It takes into consideration the repercussions of relocating the national capital, drawing insights from countries that have successfully undertaken such a shift [11], resulting in positive outcomes for the national economy and overall welfare.

System dynamics is a complex and structured analytical approach that uses causal-loop and stock-flow diagrams [12] to identify, analyze and explain complex relationships in a system. The system dynamics can generate scenarios that can become a reference for providing accurate solutions [13] and benefits, as well as recommendations for stakeholders in making policies to minimize the possible negative impact of moving the capital city on the problem of poverty in Balikpapan city.

2. Methodology

This research is divided into five main stages, namely problem identification, model development, verification and validation, model result, and scenarios development. An overview of the process of doing this research can be seen in the following flowchart diagram in Fig.1.

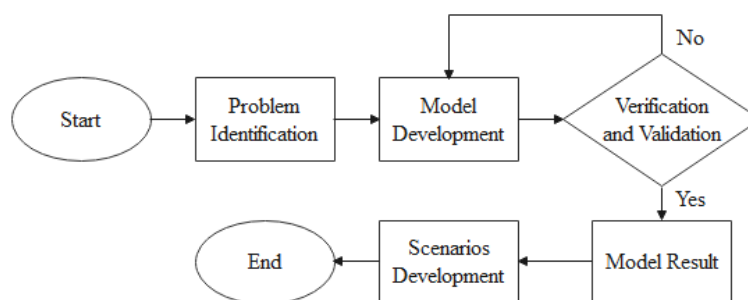


Fig. 1. Graphics of Existing Models

2.1. Problem Identification

The swift urbanization and industrialization, coupled with sweeping social and economic transformation, have given rise to numerous challenges in land use, encompassing concerns such as the non-agricultural utilization of farmland, land fragmentation, widespread use or abandonment of arable land, vacant rural residential land, and underutilization. These challenges have impeded the synergistic integration of "human-land-industry" systems and constrained the sustainable development of impoverished regions [14]. Identification of problems starts from looking at problems in the economic situation and welfare of migrants which have increased compared to before. This increase is supported by several factors, including better employment opportunities in the formal sector, higher income than in the place of origin, the ability to meet daily needs and save, as well as the positive perception of the majority of migrants regarding their welfare while moving [15]. These various conveniences make people migrate in droves, resulting in long-term effects [16], namely an increase in population but not balanced with job opportunities and high competition, thereby increasing the potential for poverty in Balikpapan City.

2.2. Model Development

Model development is based on factors covering 5 main research sectors, including workforce and population, employment, investment, companies, and poverty. The main factors causing poverty are inflation, human development index, consumer price index, population, health level, migration, education, labor force, unemployment rate, employment, gross regional domestic product, per capita expenditure, and investment, as well as continuing development factors related to research. Stock Flow Diagram (SFD) existing model can be seen in Fig.2.

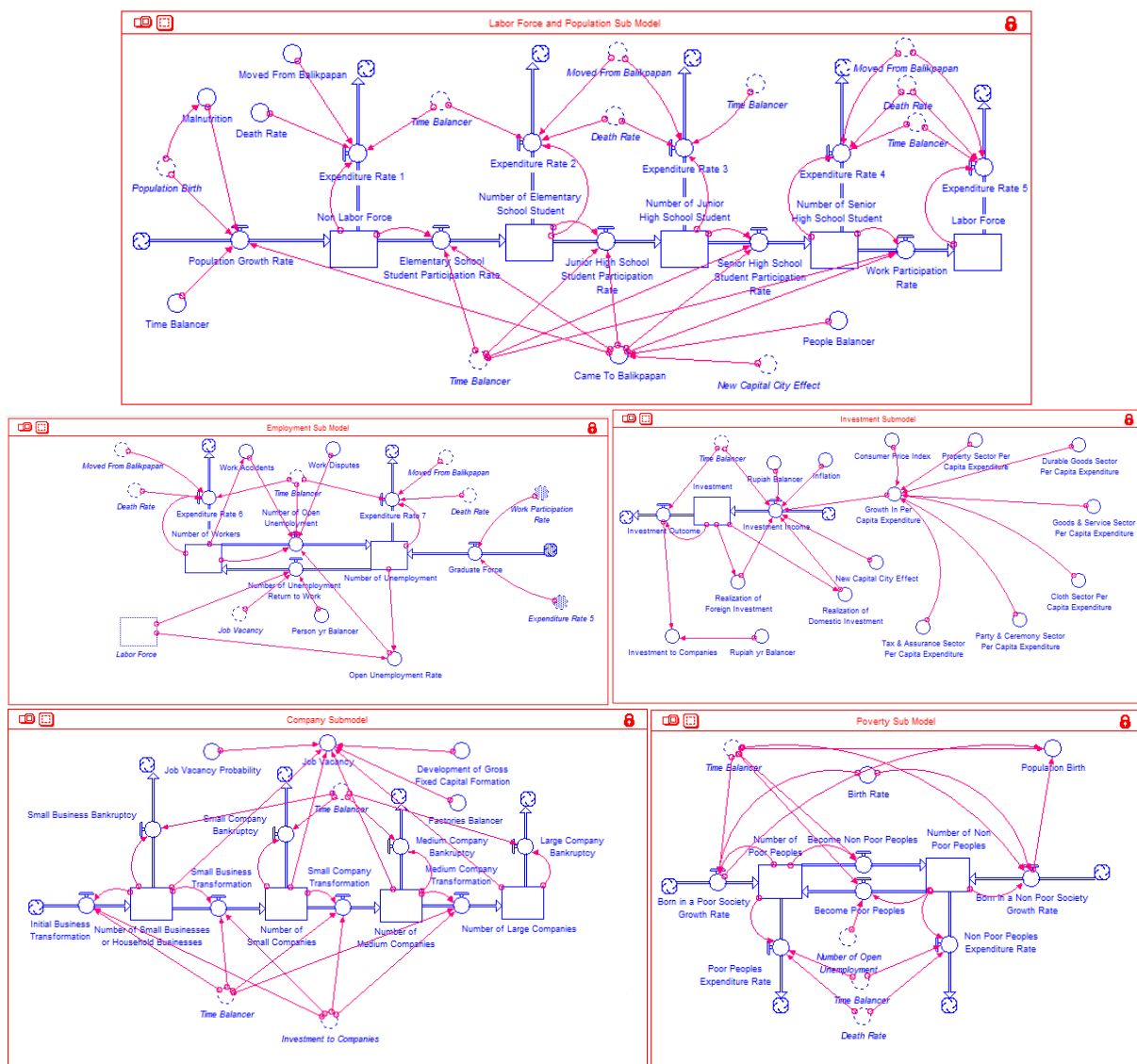


Fig. 2. Labor Force and Population (a) Employment (b) Investment (c) Company (d) and Poverty

The dynamic system itself consists of two main elements, namely the Causal Loop Diagram (CLD) and Stock Flow Diagram (SFD) [12]. Causal Loop Diagrams are used as a model to identify, solve, or prevent problems in a system by considering the relationship between interrelated factors. Stock Flow Diagram is a development of CLD that describes a system with two main elements, namely stock, and flow, which influence each other to form and maintain the stock.

2.3. Verification and Validation

The model that has been created will enter the model verification and validation stage. When the model is simulated, it needs to be verified that the model is free from bugs and other errors, with a tolerable error rate so that the model can run smoothly. To guarantee the applicability of the formulated System Dynamics (SD) model, it is imperative to undertake structural validation, a process essential for affirming the dependability of the SD model. This form of validation serves as a method to substantiate the rationality and dependability of the structure inherent in the developed model. Structural validation, as a test, aims to validate the soundness of the structure of the developed model. This verification process is a meticulous examination of the model's ability to effectively analyze real-world situations, focusing on the coherence of the pertinent knowledge embedded within the developed model [17]. Model verification is an important process in ensuring the accuracy and consistency of the model used [18]. This process involves checking the mathematical formulation used in the model as well as checking the units used to measure the variables in the model. The success of model verification can be measured by the accuracy in identifying and correcting possible errors in the model, as well as ensuring that the model follows the relevant research logic. Model validation aims to ensure that the simulation model developed can represent the real system. Model validation in this research was carried out using the mean comparison method [19]. The validation process involves comparing the average output of the real system with the average output of the simulation results using the formula (1).

$$E1 = \frac{|\bar{S}-\bar{A}|}{\bar{A}} \quad (1)$$

3. Result and Discussion

3.1. Model Result

The model simulation is carried out using an initial model that has been created with a target time of up to 17 years, which will cover the model until 2035. The aim is to see data visualization for the next 17 years which will later be projected by the simulation because the government is targeting the construction of the capital to be completed. This fact is stated in Law No.3 of 2022 concerning the nation's capital. Data visualization for 17 years can be seen in Fig.3.

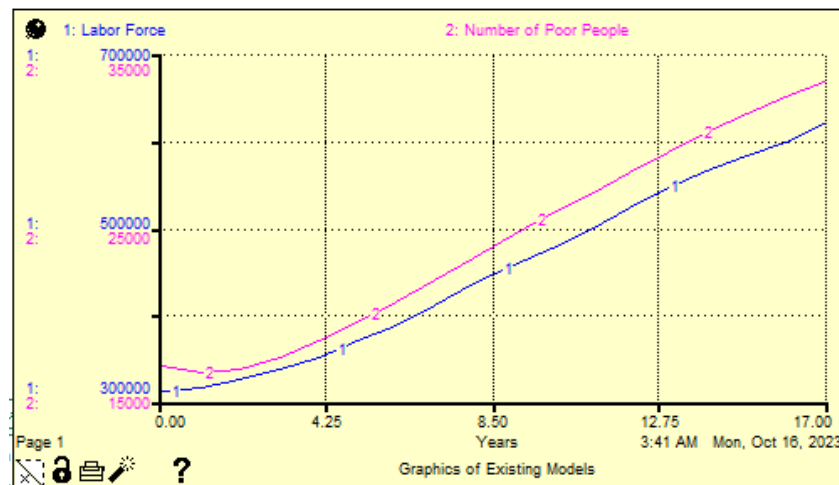


Fig. 3. Graphics of Existing Models

Based on these findings, the next steps involve the verification and validation of the model. The verification process entails utilizing the features provided by the dynamic systems program in STELLA 9.1.3 [20]. The outcomes indicate that the model has successfully undergone the verification process, as the constructed model units are coherent, and the employed mathematical formulas are automatically confirmed through testing the consistency of these units. The validation results for the labor force variable have an E1 of 0.024 and the variable number of poor people has an E1 of 0.026. If $E1 \leq 5\%$, this means that the model to be valid, indicating that the initial model simulation results do not have significant differences with the real system [19].

3.2. Scenario Development

The model scenario development stage is carried out to simulate the possibilities that will occur. The scenario development from the initial model consisted of 5 scenarios representing 5 sub-models in this research, namely labor force and population sub-model, employment sub-model, investment sub-model, company sub-model, and poverty sub-model. The time frame used is 17 years, namely from 2018-2035. Scenario planning focuses on the workforce and poverty in the city of Balikpapan to minimize the poverty rate as a result of moving the country's capital to the Nusantara. This scenario is based on simulation data and actual data where it was found that poverty in Balikpapan city fluctuates and tends to increase.

1. Increasing The Campaign For The Use of Contraception and Family Planning Program

The gradual transformation of discourse, shifting from the advocacy of a "small family" to the endorsement of the contemporary "smart couple," exemplifies a global trend wherein the message of limiting fertility undergoes a rebranding process to emphasize the postponement and spacing of births under the guise of health. This repackaging aligns with the agenda of funding agencies that promote contraceptive adoption framed within the context of women's health. However, beneath this discursive makeover, a persistent economization of life and health prevails. The Smart Couple campaign serves as a manifestation of the conceptual interweaving of health and socioeconomic status, both within local discourses encapsulated by the notion of being "smart" and in broader global discussions surrounding women's health and economic development [21]. Poverty in the city of Balikpapan is fluctuating and tends to increase. This scenario was created by reducing the initial value of births. The results obtained show that reducing the birth rate alone is not good enough to minimize the flow of births which continues to increase. There is a need for extra action from stakeholders to reduce the flow of births using various methods, one of which is by promoting contraceptive campaign programs, family planning programs, and similar programs to minimize births to poor people.

2. Facilitate Information and Increase Job Vacancies

Following the adjustment for endogeneity in the availability of the internet, the estimations derived from the aggregated dataset indicate a marginal positive impact of the internet on unemployed job seekers, albeit lacking statistical significance, with a discernible temporal delay. A nuanced examination, stratified by socio-economic characteristics, reveals a notably positive and statistically significant influence of the internet specifically for male job seekers who have endured four months of unemployment [22]. The results obtained in the form of an increase in the number of poor people continue to increase every year. Many factors can influence this, starting from a lack of education, job vacancies that are still concentrated and uneven, as well as other factors that require other actions from stakeholders such as holding educational seminars about job vacancies, increasing entrepreneur training to create new jobs or other more relevant methods better minimize the number of poor people.

3. Increase Investor Interest in Investing

The examination of results pertaining to markets within nations operating under distinct legal systems, namely civil law and common law, brought to light discernible variations in investor behaviors. These distinctions, although less pronounced than those observed between emerging and developed markets, predominantly centered on responses to news related to the exclusion of companies from sustainability indices, with no significant variance noted in reactions to inclusions. It was discerned that adverse reactions to exclusion announcements exhibited greater intensity in markets within countries adhering to civil law systems [23]. An increasing inflation rate in a country can increase the money supply in the macroeconomy. The relationship between inflation, unemployment, and capital accumulation gives rise to a nuanced, hump-shaped correlation between long-term inflation and aggregate capital. This discovery aligns seamlessly with empirical observations derived from a cross-sectional analysis spanning 76 countries, revealing a non-monotonic connection between inflation and the investment-to-GDP ratio. Furthermore, these outcomes are corroborated by empirical findings drawn from U.S. data, illuminating the impacts of long-term inflation on capital, unemployment, and real interest rates [24]. The results obtained show that investing is not enough to reduce the number of poor people. More efforts are needed, such as guaranteeing investor rights and maintaining price stability in the market. Stable prices of goods on the market with low inflation are expected to increase purchasing power and stabilize interest rates, thus increasing investors' interest in investing without fear of reducing returns or investment profits. It is hoped that more investors will be able to invest in Balikpapan and open new companies that can absorb more workers.

4. Make it Easier For Investors to Develop Companies

The industry policies instituted by the government exert a notably asymmetrical impact on investor sentiment within the stock market. In comparison to entities or sectors unaffected by these policies, the endorsement of industry policies induces an upswing in investor sentiment both at the individual firm and industry-wide levels, while the imposition of restrictive industry policies precipitates a decline in investor sentiment. The response of investor sentiment is more pronounced under supportive policies. This sway in investor sentiment, triggered by the exogenous shock of industry policies, significantly influences a company's cross-industry M&A behavior, consequently steering the cross-industry flow of capital. This outcome underscores the role of an ineffective capital market as a mediating

factor in the process of capital flow, guided by national industry policies. Moreover, the extent of the impact of investor sentiment on the capital flow direction of listed companies, under the exogenous shock of industry policies, is contingent upon the degree of equity financing dependence and management equity incentives. This phenomenon is rooted in the premise that acquirers relying on equity financing possess an incentive to align with investor sentiment [25]. Investment can absorb the existing workforce in an area, thereby contributing to reducing the unemployment rate. Increased investment will open up opportunities for workers to find jobs that suit their skills, which will ultimately help in overcoming the problem of unemployment in the area. Investment is not only a factor in economic growth, but can also act as a social driver that reduces unemployment levels and improves the welfare of local communities. Company development is very important to open more job vacancies. The large number of open job vacancies can absorb the workforce more optimally thereby reducing the unemployment rate, but this is not enough to reduce the number of poor people quickly because when investors invest in company development, investors will look at the economic conditions in the region, the per capita income, stable, as well as other factors that support people's purchasing power. Stakeholders need to create policies to support this so that the number of poor people can be reduced more optimally, both in the long and short term.

5. Providing Training and Expanding Job Opportunities

Comprehensive groundwork for securing the optimal position commences during the initial phases of fellowship training. Deliberate contemplation and meticulous planning empower the candidate to hone skills and tailor experiences, thereby optimizing the application for a specialized job track or niche. Familiarity with the overarching timeline and interview expectations equips fellows to ultimately attain the desired employment [26]. Demonstrating a pivotal role in the employment outcomes of individuals, generic competencies and interpersonal skills, encompassing relational and communication abilities as well as motivation and attitude towards job search, have been identified as influential factors in shaping the trajectory of individuals within the labor market [27]. The results obtained prove that providing training to increase experience and skills [28] can reduce the number of unemployed. Providing training and expanding job opportunities can further reduce the number of poor people. The number of poor people is closely related to the level of open unemployment, because the majority of poor people come from people who do not have jobs, with training and job expansion, people who do not have jobs can be helped to expand their skills and have the opportunity to compete both domestically and abroad so that it is hoped that it can reduce the number of poor people in the city of Balikpapan. Comparison of Labor Force Scenarios and Number of Poverty Scenarios can be seen in the Fig.4.

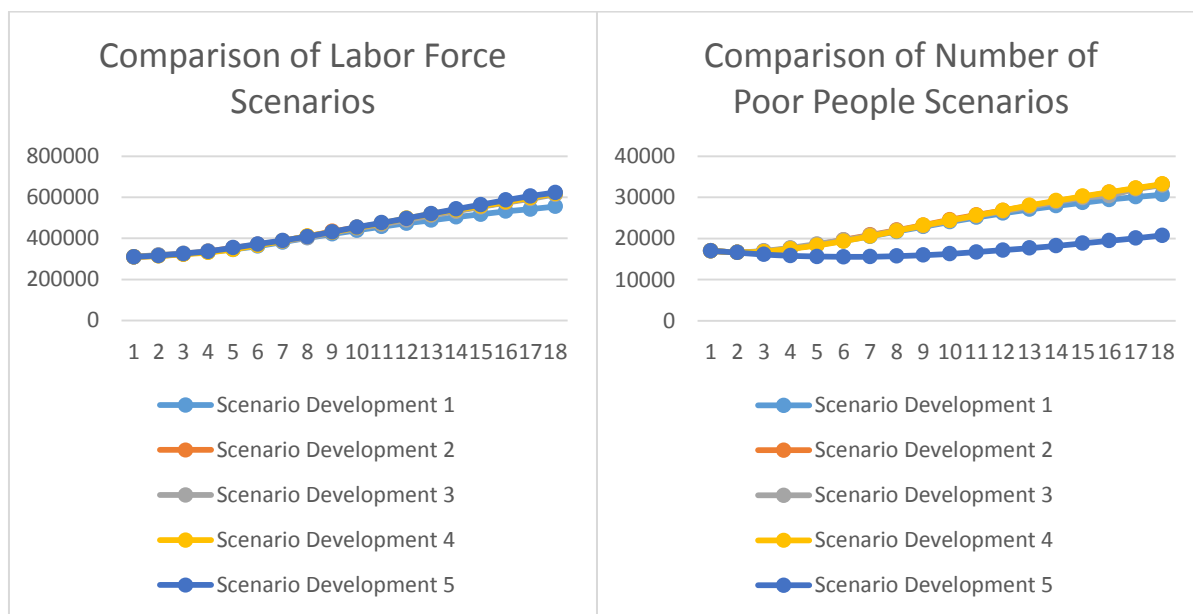


Fig. 4. Comparison of Labor Force Scenarios (a) and Number of Poverty Scenarios (b).

Developing scenarios by increasing campaigns for the use of contraceptives and family planning to reduce the number of poor people as well as developing scenarios by providing training and expanding job opportunities can help minimize the number of poor people and increase the labor force compared to existing conditions and other scenarios. These two scenarios are the basis for developing the best scenario with the hope of minimizing the number of poor people and maximally increasing the labor force. Data visualization for the best scenario can be seen in Fig.5.

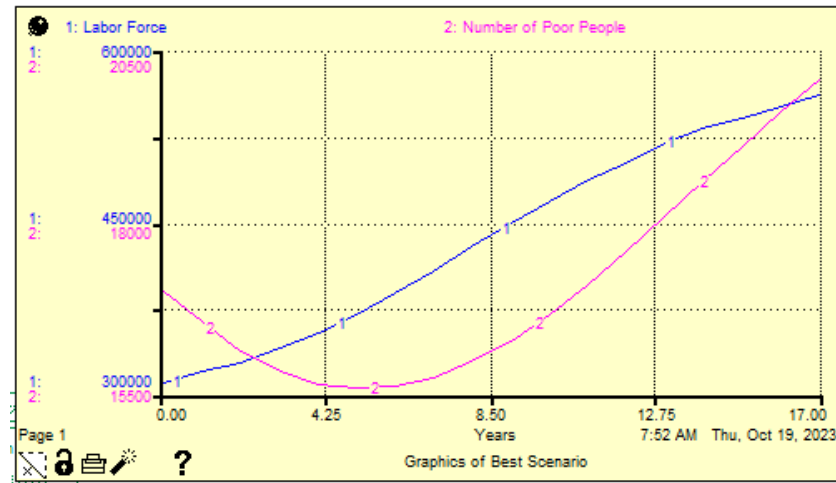


Fig. 5. Graphics of Best Scenario

The best scenario can reduce the number of poor people while also stabilizing the labor force compared to existing conditions. The best scenario in this research can be used as a reference in decision-making by stakeholders to minimize poverty in the city of Balikpapan by supporting labor force productivity.

4. Conclusion

Based on the research results shown in the graph, the move of the country's capital from Jakarta to Nusantara has had a negative impact in the form of a significant increase in the number of poor people in the Balikpapan city. Population mobilization is expected to occur in the next few years which will give rise to other problems in the form of an increase in the number of births and reduced employment opportunities. The solution to minimize this increase requires implementing policies to campaign for the use of contraceptives and family planning programs, especially for people who are classified as poor, as well as providing training and expanding job opportunities for the unemployed and local workers. The best scenario that can be implemented with a poverty alleviation policy is to carry out a campaign for the use of contraceptives and the Family Planning (KB) program to reduce birth rates, especially in families who are classified as poor and improve certification programs and increase education and employment. , training for the poor. workers, especially local workers, to have quality experience and make it easier to find work both domestically and abroad to reduce the number of unemployed in Balikpapan city.

Balikpapan city as the gateway to Nusantara or the new capital city needs special attention. The government can collaborate with various parties to try to minimize the increase in poverty rates due to the relocation of the capital city in the hope of preventing Balikpapan City from experiencing more complicated problems in the future. Therefore, a comprehensive development approach is essential, focusing not only on income but also on factors such as employment opportunities, individual skills and talents, development prospects, and more. The physical environment and infrastructure are critical to personal advancement and therefore require government intervention. Education is now emerging as an important and less harmful pathway to poverty alleviation and overall development. Therefore, providing incentives for educational efforts for relatively poor communities is very important. Given the diverse nature of relative poverty, attention must also be directed to health, employment and other components. In particular, government support should be increased for the youth demographic, given their limited wealth accumulation and greater financial needs [10]. The government can also collaborate with other countries that have a track record of success in resolving similar or more complex problems, so that more complicated problems can be prevented as early as possible before it is too late.

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