

Meta Synthesis of Community Participation Model on Trans-Papua Road Development

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Abstract

The Trans Papua road infrastructure is not only for physical growth but also for social and economic improvement (social, cultural, and environmental relations). Trans Papua establishes a new economic development center that will boost the community's income but must also reduce social, cultural, and environmental issues. Increasing community and indigenous Papuan engagement reduces social disputes. Trans-development Papua raises environmental problems in addition to economic benefits. Environmental disputes are avoided by not disturbing Lorentz National Park, which has the most comprehensive biodiversity and environment in Asia and the Pacific. To achieve Indonesia's commitment to the Sustainable Development Goals, the policy model for future consequences must be examined (SDGs). This project intends to build a dispute resolution paradigm and cooperative implementation strategies for Trans Papua road development. It starts with bottom-up perception discussions, alternative possibilities, concept creation, and Trans Papua infrastructure execution plans. This initiative intends to maximize social-community capital to speed the building of functional and efficient infrastructure for the Papuan community. The predicted benefits help the government evaluate prior Trans Papua road construction plans and guide future decision-making to accelerate and reduce road conflicts.

Keywords: Road Infrastructure; Environmental Issues; Economic Development; Sustainable Development Goals; Indonesia.

1. Introduction

The building of the Trans Papua road infrastructure has been given significant attention by the central government in order to increase access to transportation and social and economic activities in the interior. The Lorentz National Park (TN) segment of the Trans Papua Road (Segment V), which was constructed through the park, has garnered much criticism. Conflicts, notably those emanating from the Papuan population, have proven an impediment to the rapid physical implementation of Trans Papua. Environmental non-governmental organizations are in the worldwide limelight because they may be included in the list of endangered organizations. Based on a study from the International Union for the Conservation of Nature (IUCN).

The UNESCO World Heritage Committee declared Lorentz National Park as a World Heritage Natural Site in 1999 with the letter number WHC/74/409.1/NI/CS/1999. Security issues, sociocultural issues, Zamin and Papua Natural Ecology (ZEPNAT) concerns, and other issues pertaining to the Papuan natural environment are only a few of the difficulties and obstacles experienced on the ground during the construction of the Trans Papua Road. When constructing roads, several aspects, including infrastructure, community support, and economic issues, must be considered. Since the community is both the target and the recipient of the impacts of development, as well as the topic of its execution, community participation in road construction must be included. Due to the many interests engaged in creating Trans

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Papua's infrastructure, conflicts may occur. The Orang Asli Papua's (OAP) aspirations, desires, and viewpoints, which are still centered on culture and the environment, are not yet aligned with a strategy that is overly economically focused. Evicted forest areas have an effect on the traditional lands of OAPs, where it is thought that social interactions, threats to community life from the loss of livelihood sources, and cultural sites that are fundamental to OAP identity are at risk.

From the standpoint of information and transparency of development, changes in activities, and environmental implications, it is possible to understand how the public views the growth of road infrastructure. This feature reflects a variety of local events associated with the creation of the Trans Papua Road. Positive perception, in contrast to negative perception, will result in a negative outlook, contrary to what is anticipated of the thing being observed or the established norms.

Positive perception is a person's evaluation of an item or piece of information with a positive outlook or in accordance with what is anticipated from the viewed object or existing rules. An individual's dissatisfaction with the premise of his observation may contribute to his bad impression. Individual happiness with the thing that serves as the basis of his perception, as well as individual knowledge and experience with the observed object, are the sources of a person's positive perception. Individual ignorance and a lack of individual experience with the observed thing may coexist, and vice versa. The community believes that the OAP community was not optimally involved in the planning and implementation process for the construction of the Trans Papua road, which has resulted in numerous incidents, criticisms, and conflicts, as well as the perception that the Papuan people are only used as a target audience for development. The low involvement and participation of indigenous peoples and OAP in communication and decision-making processes for planning and executing the construction of the Trans Papua Road has a significant influence on the socio-cultural and environmental changes experienced by OAP [1].

This research aims to develop a Trans Papua road infrastructure development implementation model that supports all stakeholder participation (central government, local government, and local Papuan communities). In the meantime, the specific aims of this study are: measuring the success rate of the current Trans Papua road infrastructure development; analyzing the perception of stakeholder involvement (central government, local government, and Papuan people) in the construction of the Trans Papua road in terms of economic, social, cultural, and environmental aspects; and Developing a conceptual model of the Trans Papua road Develop and understand a model of involvement in the execution of effective and efficient infrastructure development to maximize the presence of Trans Papua for the benefit of the Papuan people.

2. Literature Review

Since the province's incorporation into Indonesia, the Papua problem has been ongoing for almost five decades. During that time period, Papua was involved in several advances in a variety of sectors. Physical infrastructure, education, the economy, and health are the four primary sectors where progress is clearly occurring. This development rate, however, does not follow the same trajectory as the peace movement. Today, the fighting in Papua New Guinea continues. Development and peace have a very close connection that may lead in two directions: the creation of disruptions to peace, such as escalating acts of violence, which can derail development; and, furthermore, the failure of development will also result in the loss of peace. The contradiction of growth and peace in the Land of Papua is exemplified by the escalation of violence and the operations of the Armed Criminal Group (KKB) as well as the ULMWP (The United Liberation Movement for West Papua) movement, which is becoming more persistent. Again, progress has presented itself, yet it cannot be argued that it has yielded results, much less created a tranquil environment for all Papuans [2].

Numerous development-related incidents that happened in Papua New Guinea were studied. Papua New Guinea's government has difficulty in achieving the sustainable development goals (SDGs) due to these diverse issues. According to Johnson Kennedy [3], defense and the economy are interdependent factors. Without defense, there will be threats or disruptions, preventing a thriving economy. However, defense can only be expanded if the national wealth likewise rises. In addition to removing threats, defense initiatives must have a multiplier impact on the welfare of the populace, as shown by the TNI's assistance with infrastructure development in Papua. This demonstrates how a profitable military program may promote the economy and prosperity in a location where the private sector cannot or does not dare to participate owing to several hurdles.

Observing the situation of indigenous peoples in West Papua, culturally and philosophically, it can be claimed that as a social animal, Papuan humans, or in a specific language, it can be said that the customary law community in West Papua has undergone a cultural transition. Fundamentally and theatrically, about human connections with their cultural surroundings. The cultural shift in West Papua is larger in the application of the homo culturist function to fulfil the role of the homo economic and does not regard the human function as Homo humanicus, it may be inferred [3]. The facts demonstrate that the implementation of the Trans Papua road infrastructure development faces numerous obstacles on the ground, both in terms of geographical conditions; regulations on forest use across the Lorentz National Park conservation area, which is a UNESCO World Heritage site [4]; the security situation; and the participation of local

communities. Obviously, these concerns must be included in Trans Papua's development objectives while also taking social, cultural, and sustainable environmental factors into consideration [5].

However, one of the obstacles is that inhabitants in the depths of Papua seek more consideration for their needs in the construction of the Trans Papua road. A criticism of the link between environmental protection and sociocultural elements, as well as protests from the local Papuan people, especially those who dwell close to the road construction site. It is said that the building of the Trans Papua road has destroyed the zamin and ecological systems of flora and fauna that are naturally protected by the community [6].

From a sociocultural perspective, Trans Papua's expansion is viewed to be in opposition to the values of the local community, especially those of indigenous peoples. Some consider the Trans Papua road project to be damaging to the preservation of woods that have been conserved for a long time and are now a vital part of Papuan culture [7]. The difficulty in the socio-cultural sector is the community's participation in Trans Papua's development. Economically driven and technocratic techniques might be challenging to adapt into the vernacular of Papuan communities that still employ a natural approach [8].

Local Papuans' viewpoint is concerned by the fact that their forest is being utilised for road infrastructure development, which would impair the forest's natural function. It is anticipated that consideration of the ambitions of the community would result in a policy that is a mix of extensive conversation and negotiation of the perception of the wants of the people [9]. Similarly, confrontations between security forces and local groups are impacted by the absence of participation of indigenous peoples in the design and execution of the Trans Papua road development [10].

2.1. Zamin and Papua's Natural Ecology

According to the Indonesian Dictionary (KBBI), Zamin means land; nation; country. According to the Papuan people, Zamin, or land, is identity and identity. Land is akin to mama (Mother Nature), and land is life. On the ground (a mother's lap), a human child is born, lives, and dies; on the earth, a human kid is buried. This comparison illustrates a non-materialist culture's perspective [11]. This perspective relates to land ownership rights that are wrapped up in the history of the prior ancestral life experience of customary land rights. In the social structure of society, this notion creates a duty for every person to abide by customary laws so as not to annex (take ulayat rights) and even destroy land (forest) for no apparent reason, since damaging land (forest) is equivalent to harming mama (Mother Nature) [12].

For indigenous peoples, living naturally through exploiting land or forests (SDA) and natural nature is a cultural consensus that must be recognized and followed as a viewpoint of local knowledge in protecting and sustaining the natural environment's ecology [13]. Customary land rights are governed by community ownership based on family groupings or clans. In a patrilineal system (descending via the male kinship line), communal ownership in one continuous chain of kinship or family relationships is granted to the oldest son to manage the usage of land that may be passed on to the following generation [14]. A person with wide-ranging wisdom and senior status among all clans in an area. Ondoafi refers to customary rights based on customary rights ownership. An Ondoafi is a person who may negotiate community land ownership concerns with the government and the business sector, both locally and abroad.

Ecology is derived from the Greek words Oikos, which means home or dwelling, and logos, which means science or knowledge. Thus, the exact definition of the term "ecology" is the scientific study of nature as a habitat for living beings. Ecology may be seen as our shared home, or it can be viewed as the reciprocal interaction or relationship between living organisms in an ecological system [15]. Zamin and the ecology of Papua are regarded as the world's remaining lungs due to their vast forests, high soil fertility, and beautiful and enchanting natural beauty, such as the natural beauty of Raja Ampat, Cartenz Peak, or icebergs, and Taman Cenderawasih Bay National Park, which is home to whale sharks, among many others. All the above-mentioned natural resources are a source of life for Papuans, who consider nature as a mother who provides and sustains a life of social and familial connection, as well as intimate, positive, and harmonious ties with nature [16].

2.2. Ecological and Humanitarian Crisis Issues in Papua

The rich natural environment of Papua New Guinea is now being destroyed [15]. Companies involved in oil palm, gold, nickel, coal, wood, and oil mining are to blame for Papua's ecological devastation. The enormous woodland became more desolate. The marine, freshwater, forest, air pollution, and climate ecosystems are harmed. In addition, the Orang Asli Papua (OAP) have lost their community centre [16]. The local populace is growing more impoverished and marginalized. They become observers of the bourgeoisie's lavish lifestyle. In reality, capitalists do not see nature and the Papuan people as things for profit, but rather as cooperatives, producing and developing ideas and strategies connected to the welfare of the OAP community and eradicating the impression that the impoverished and disadvantaged are denied their right to existence [14].

The ninth Sustainable Development Goal (SDG) aims to construct resilient infrastructure, encourage inclusive and sustainable industrialization, and promote innovation [17]. The Indonesian government continues to stimulate the

construction of robust, high-quality, sustainable, and competitive infrastructure, especially road infrastructure in Papua. Promote economic growth and well-being with an emphasis on affordable and equal access for everyone. The objective is outlined in Presidential Regulation No. 59 of 2017 for the implementation of sustainable development objectives [18].

The archipelagic nation of Indonesia sees equitable infrastructure development as a criterion for attaining equitable development that must be felt at all levels of society [19]. President Joko Widodo's big vision promotes a fair and equal allocation of growth across Indonesia. Accelerating the construction of road infrastructure is one of the strategies being pushed to accomplish the Indonesia-centric vision. Transport infrastructure that offers economic, social, and national unity and integrity advantages [20]. Public understanding of equitable development is a crucial component in any development in the 3TP region. The opening of accessibility, the elimination of isolation, the reduction of logistics costs, and the equal distribution of new development centres are the foundation for enhancing the community's economy, which in turn increases the standard of living [21].

The government of Papua Island pays periodic attention to the situation of development disparity across areas, where circumstances in Papua are believed to still lack the supply of infrastructure for the fundamental requirements of the population, making it difficult to grow and develop [22]. The restricted accessibility of Papua Province's regencies/cities is due to difficult geographical circumstances, such as hilly and interior regions. In certain places, only pioneer air transportation is available, resulting in exorbitant rates for commodities in the region [23]. It is the government's goal to expedite the building of Trans Papua road infrastructure that is interconnected and capable of connecting all regions. The development of the Trans Papua road is primarily intended to promote the well-being of the Papuan people as a whole by improving the social and economic activities of inhabitants in the interior via increased access to transportation [24].

The government envisions that the building of the Trans Papua road infrastructure network would provide access to the interior of Papua. However, the acceleration of infrastructure development to give economic possibilities in rural regions must be supported with attempts to limit and mitigate environmental harm. Similarly, the awarding of indigenous peoples' rights must adhere to all appropriate processes [25]. Under the present administration's road infrastructure program, the Trans Papua road that has been constructed since the New Order regime continues to be constructed [26]. The existence of the Trans Papua Road not only links Papua Province's regencies and cities but also enables the establishment of new growth centres that may boost the local economy. New economic sectors may flourish with the reduction of transportation, commodities, and service costs. On the other hand, the growth of Papua's road infrastructure must be accompanied by tight laws, monitoring, and action against environmental devastation [27].

The facts demonstrate that the implementation of the Trans Papua road infrastructure development faces numerous obstacles in the field, including geographical conditions; forest use regulations related to the Trans Papua road access because it traverses the Lorentz National Park conservation area, which is a UNESCO World Heritage site; the security situation [28]; and the role of local communities surrounding the Trans Papua road. Obviously, these issues must be considered within the context of Trans Papua's development objectives, taking into consideration social factors, local community culture, and environmental sustainability.

The government has an interest in the development of the Trans Papua road in order to eliminate the isolation of the interior, decrease logistical costs, lower the high cost of living, boost the regional economy, and offer basic services to the population in Papua's numerous villages and districts. The policy goals include national and regional policies and financial assistance for Trans Papua [29].

3. Methodology

This study employs instruments derived from prior studies in the field in order to reach a thorough conclusion on the mechanism of public engagement in the setting of Papua New Guinea. The condition of the study object is determined by the development of the Trans Papua highway, which is connected to Zamin by ecological and natural factors. Because a single study is insufficient to give full input for policy improvement evaluations, the Meta-Synthesis analysis is a technique that synthesizes the findings of several qualitative studies to provide fresh insight and comprehensive suggestions on the phenomena of public policies (Figure 1).

For the Meta-Synthesis analysis, a Meta-Aggregation strategy is used to answer research questions (review questions) by summing together diverse study outcomes (summarizing). Meta-ethnography with the purpose of gaining new insights or developing new theories to supplement current ideas. The examination of meta-syntheses is anticipated to give a more thorough knowledge of social phenomena, particularly practical research on the resolution of public policy conflicts. The study site is confined to Sekmen V of the Trans Papua route in Nduga Regency, Papua Province, which goes through Lorentz National Park in the Central Mountains area with isolated geographical circumstances at an altitude of 1,500–2,000 metres above sea level (Figure 2). It comprises 32 districts and 248 villages designated as undeveloped districts in line with Presidential Regulation No. 63 of 2019 on the Determination of Disadvantaged Regions for 2020–2024.

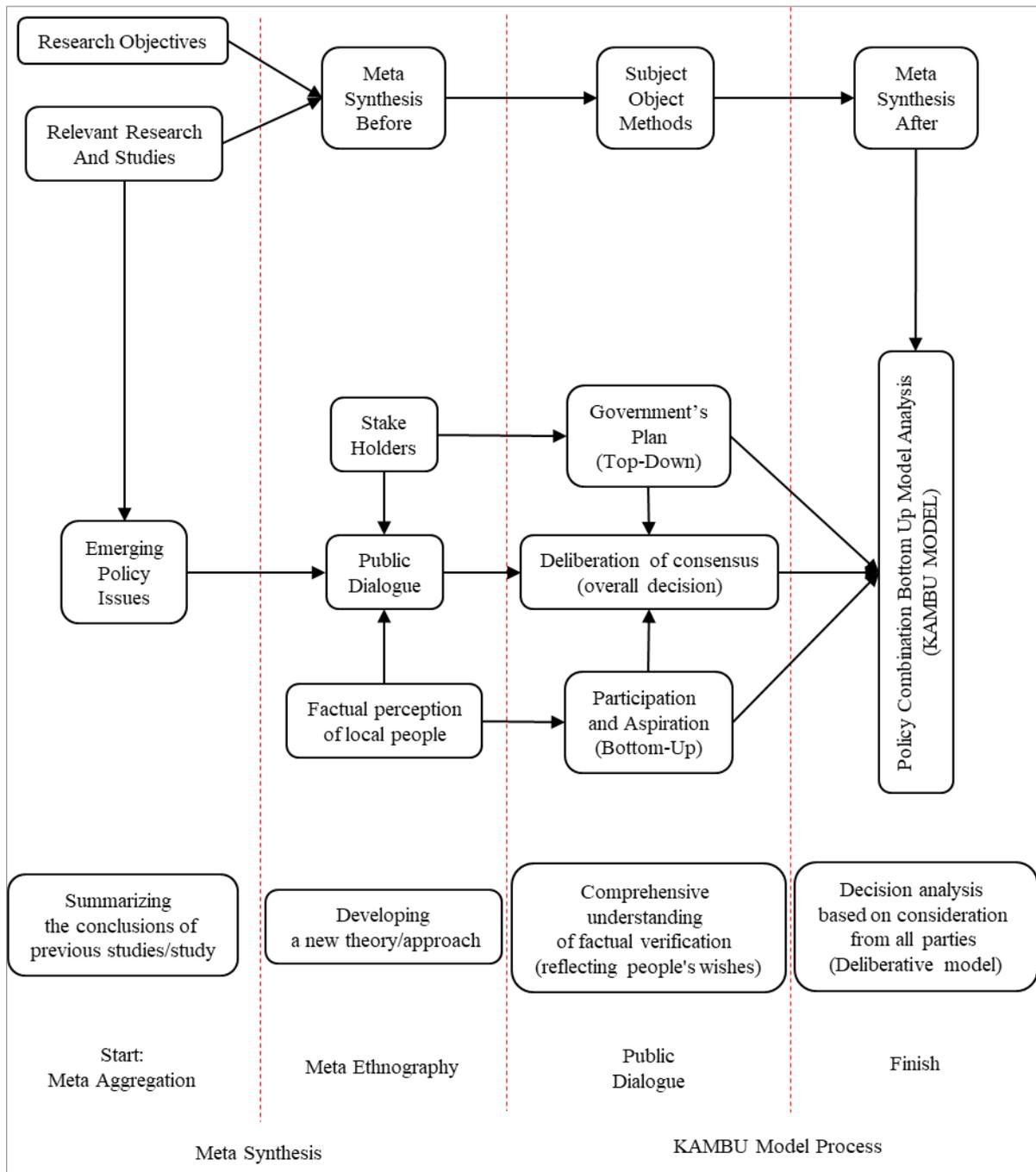


Figure 1. Flowchart of the KAMBU model metasynthesis method

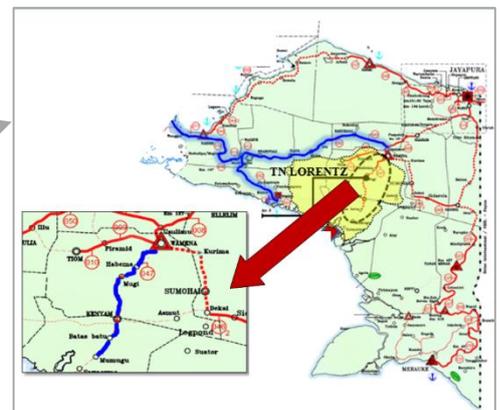


Figure 2. Location of the study

4. Results and Discussions

4.1. Emerging Issues Regarding Trans Papua Road Development

The construction of the Trans Papua road is certainly very meaningful for the Papuan people. Considering that the development of infrastructure such as roads is one of the urgent problems that the government must work on, because there are still people isolated in some areas of Papua, due to limited infrastructure so far [25, 30]. The President believes that the infrastructure development program, especially in Papua, will be able to increase mobility, lift the local economy, and ultimately improve the standard of living of its people. So, the construction of a road that connects the entire Papua region, which is called the Trans Papua road, with a length of about 4,330 kilometers. The road stretches from the city of Sorong in West Papua Province to Merauke in Papua Province.

The presence of the Trans Papua road has high economic value because it can cut the distribution time of goods, thus making the prices of basic commodities more affordable. So far, the price of basic necessities in Papua is relatively more expensive because they have to be transported by air. With the Trans Papua road, it will automatically reduce logistics costs, so that the prices of goods can also go down [31, 32]. At least there are some notes that must be considered so that the construction of the Trans Papua road is truly beneficial for the Papuan people. First, the construction of the Trans Papua road should not facilitate the exploitation of natural resources in Papua [33]. During the construction of the Trans Papua road, discordant voices have emerged, both from the Papuan people themselves and observers outside Papua, who question its benefits, especially for indigenous Papuans. Considering that during construction, illegal logging was still occurring in several places, even there were many camps for logging logs in the vicinity of Papua's Lorentz National Park, which should be a protected area [34].

Second, development should not threaten the Papuan economy. The existence of the Trans Papua Road on the one hand makes it easier for residents to access, but on the other hand, it is considered by many to even threaten the economy of the Papuans themselves. With the ease of infrastructure, more agricultural and livestock products from outside Papua will enter Papua. So that the results of plantations and livestock of indigenous Papuans are also threatened, because they have to compete with the booming of agricultural and livestock products from outside Papua. Here, it is necessary for the government to play a role in how to implement protection policies for the local people's economy [35].

Third, the construction of the Trans Papua road needs to pay attention to the construction of village roads. As we know that the Trans Papua road project only connects districts or cities. So that the benefits are not directly felt by residents as long as the connecting road between villages is not feasible. In fact, the road between villages and districts is actually more needed by Papuans to support various business activities such as distributing plantation and livestock products to the market.

Fourth, the development process must involve local residents, both in terms of planning and implementation. In this case, the central government must evaluate how far the involvement of local Papuans has been accommodated in the construction of the Trans Papua road. Have you really followed the principle of involving local communities? If it is not fulfilled, it should be repaired immediately. The involvement of local residents in the development process is also important as a form of fulfilling Indonesia's commitment to the Sustainable Development Goals (SDGs). This means that there must be local community involvement in any development planning.

Fifth, it takes seriousness in building. So far, the process of constructing the Trans Papua road is still incomplete at several points. Aka jumping from one place to another. At some points, the construction is seen to be inefficient because the road is longer, over hills, and winding. In fact, there are other roads that are closer and relatively flat so that they are more efficient. The impression of being less serious can also occur because the organization of the implementing work unit is not focused due to the workload being too heavy and extensive. For example, the work unit at Balai Bina Marga, Sorong City, whose work area must cover Sorong City to the border of Sorong Regency, even to Tambrauw Regency. The work area that is too wide makes it difficult to allocate time and energy to control the quality and efficiency of development [36].

Sixth, it is necessary to provide a large budget allocation. In order to complete the construction of the Trans Papua road which stretches from Sorong to Merauke, it requires a large budget. Moreover, to build a proper road with asphalt, and not just to connect the road from Sorong to Merauke [37].

4.2. The Condition and Function of the Trans Papua Road

The Trans Papua Route is a national road that spans 3,421 kilometres from Sorong City in West Papua Province to Merauke in Papua Province, including 2,351 kilometres in Papua Province and 1,070 kilometres in West Papua Province. The majority of the 1,746 km Trans Papua route is located in the BPJN Wamena region, while the remaining 605 km is located in the BPJN Jayapura region. As indicated in the picture below, the Trans Papua road in the BPJN Wamena region in 2021 will consist of 616 km of asphalt construction, 1,120 km of compacted soil construction, 103 km of land construction, and 10 km of still forest.



Figure 3. Comparison of Trans-Papua Road Conditions

The neighbourhood experiences a boost in transportation connectivity immediately. Increasing access to transportation services for everyone previously accessible on foot, such as health, education, and commercial facilities. Two-wheeled vehicles are currently compatible with commercial vehicles such as multipurpose taxis and motorcycle taxis. Public transportation performance is relatively superior and cost-effective (efficient and effective). The distribution of commodity items for community requirements in Nduga Regency has been streamlined, prices have fallen compared to before the creation of Trans Papua, and the public consumption index has grown along with the variety of available commodities.

4.3. Local Community Social Condition

According to Presidential Regulation No. 63 of 2020, along with 22 other districts in Papua Province, the Nduga Regency is categorized as an undeveloped region. The community has not been able to optimize for daily life because of isolation and limited access to public services; low human resource capacity; limited access to financial institutions, markets, and economic activities; low accessibility and connectivity to growth centres; lack of understanding of sustainable management of natural resources and assets; and lack of attention. Prior to the development of the Trans Papua road, the Nduga settlement was physically isolated and could only be accessed with limited regularity by aircraft. The daily requirements of basic items are carried by aircraft, causing the cost of basic and vital goods to become unreasonable relative to the realities of the Nduga Regency's population. In 2020, there will be around 106,533 people living in 32 districts. 70,771 people will be employed, 658 people will be unemployed, and the bulk of educated people will not have completed primary education (SD).

The community's income level is well below the poverty line. Prior to the construction of the Trans Papua road, the bulk of the population relied on an agricultural system that had been maintained for centuries, in addition to processing plantation commodities, chopping wood, selling pigs, and hunting forest items. People's economic activities and community orientation have altered as a result of the development of roads, since they now sell forest goods outside of Nduga to improve their revenue. In addition, it makes it simpler for people of productive age to travel temporarily to Wamena and Jayapura in search of better-paying work. The very high newborn mortality rate of 31 fatalities in 2015 is attributed to inadequate care. At the very least, the presence of Trans Papua infrastructure, particularly in the Wamena-Habema-Kenyam-Mumugu sector, has an effect on productivity and connection. The connection between villages and districts within the district allows basic services, which contributes to a rise in the community's life expectancy from 54.82 in 2018 to 55.27 in 2020.

Figure 4 depicts the planning and execution hierarchy of the approach. Beginning with the aims hierarchy (Y), expectations (Socio-Economic Justice (Y1)), and sustainable development (Y2), people's living comfort (Y3) follows (Y3). The economic (X1), socio-cultural (X2), and environmental (X3) aspects are the catalysts for achieving objectives and goals (X3). Indicators for the activity of each element are shown in Figure 5, where government organizations, economic players, local communities, and academics serve as effect receivers (outcomes) and actors. The actors and effect receivers utilise a Likert scale to evaluate the impact (1 = disagree, 2 = disagree, 3 = moderately agree, 4 = agree, and 5 = strongly agree). The indicator of output satisfaction is the percentage of the highest scale comparison value of the perception outcomes multiplied by one hundred percent.

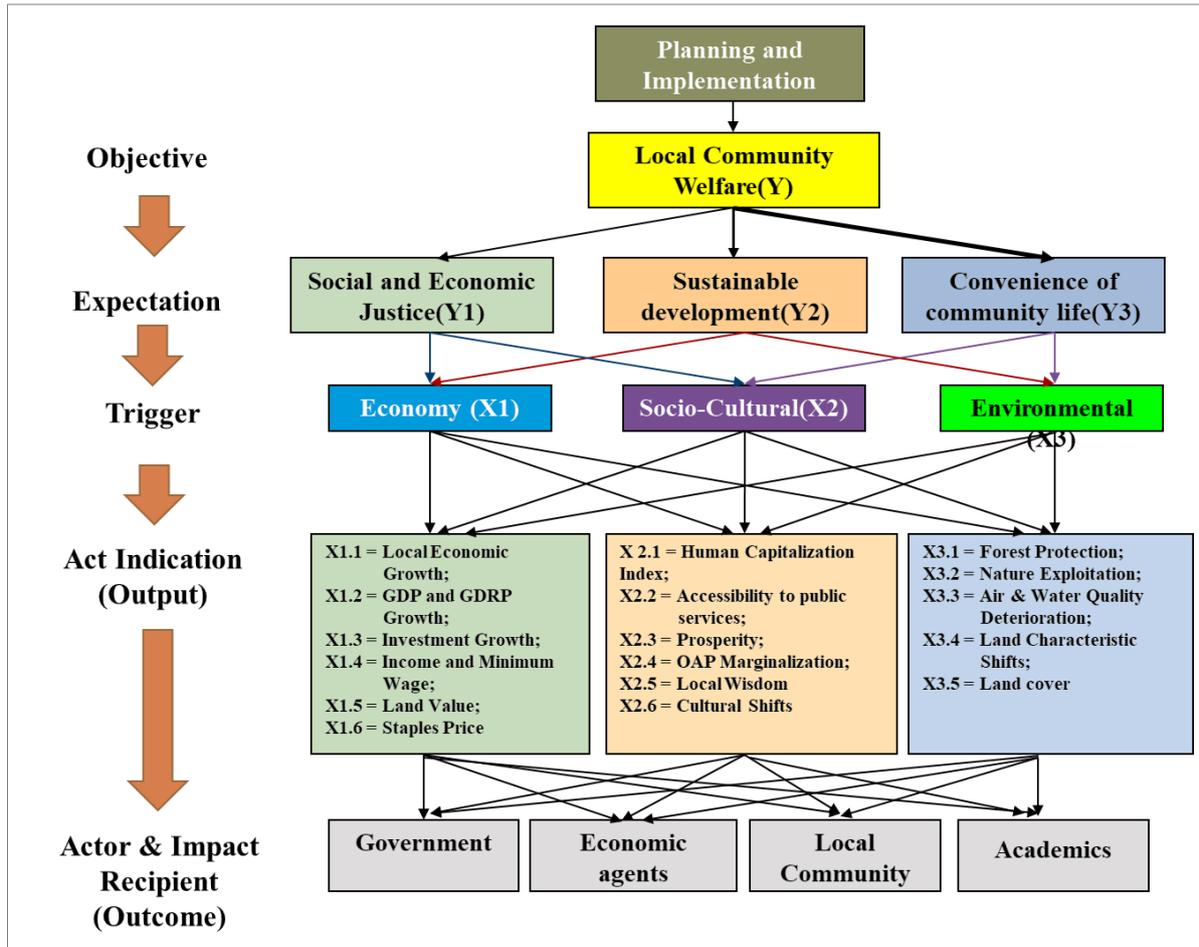


Figure 4. Hierarchy of Planning and Implementation Goals

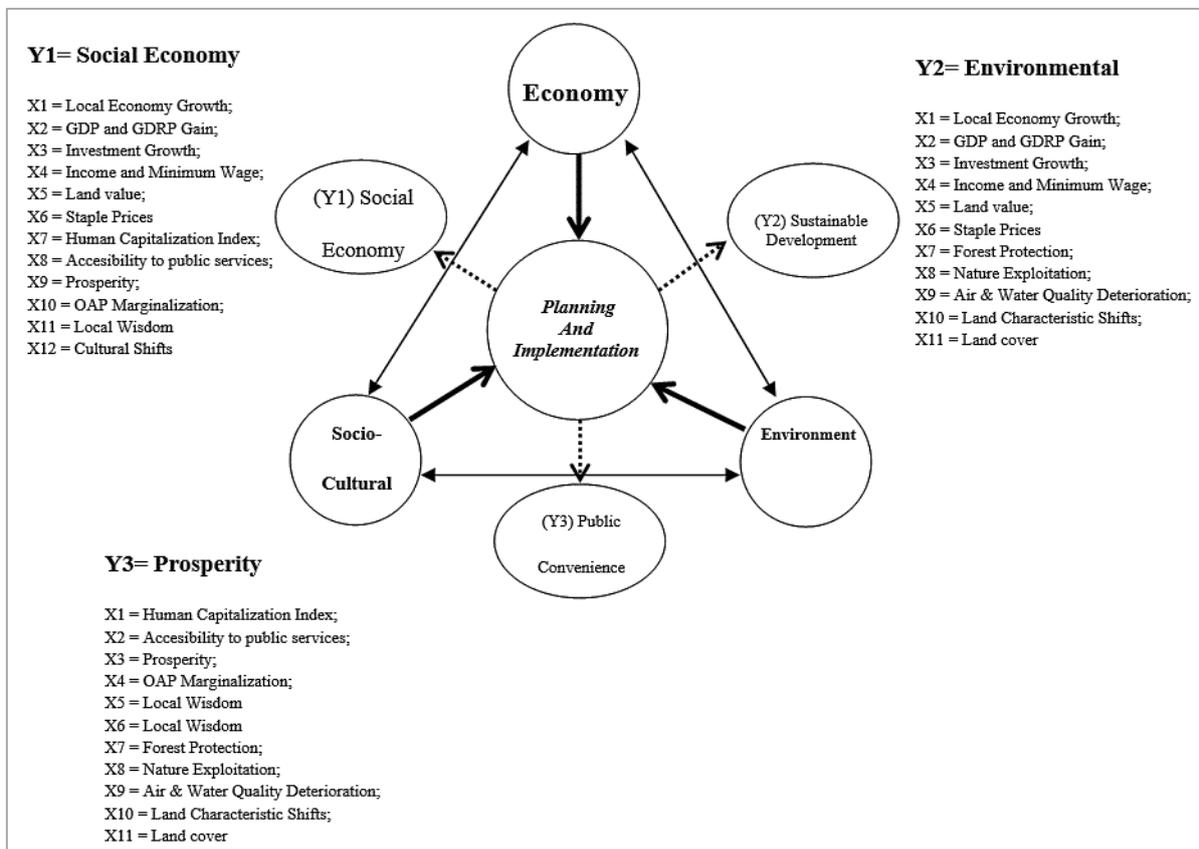


Figure 5. Planning and Implementation Structure

The realisation of the KAMBU model commences with implementation inputs and perceptions by incorporating regulatory factors (Laws, Presidential Decrees, Decrees, Provincial/Kab/City Regional Regulations), & policies (vision & mission, Presidential Instruction No. 9 of 2020), and community participation (OAP, Customary Stakeholders) into the SOM method (subject, object, method). The object is Zamin and Natural Papuan Ecology (welfare), and the method is a combination of bottom-up model analysis (KAMBU) to achieve the output goal, namely community welfare, which is determined by indicators of social and economic justice (Y1), sustainable development (Y2), and people's living comfort (Y3), which are determined by the Y factor as a function of X1, X2, and X3 (Figure 6).

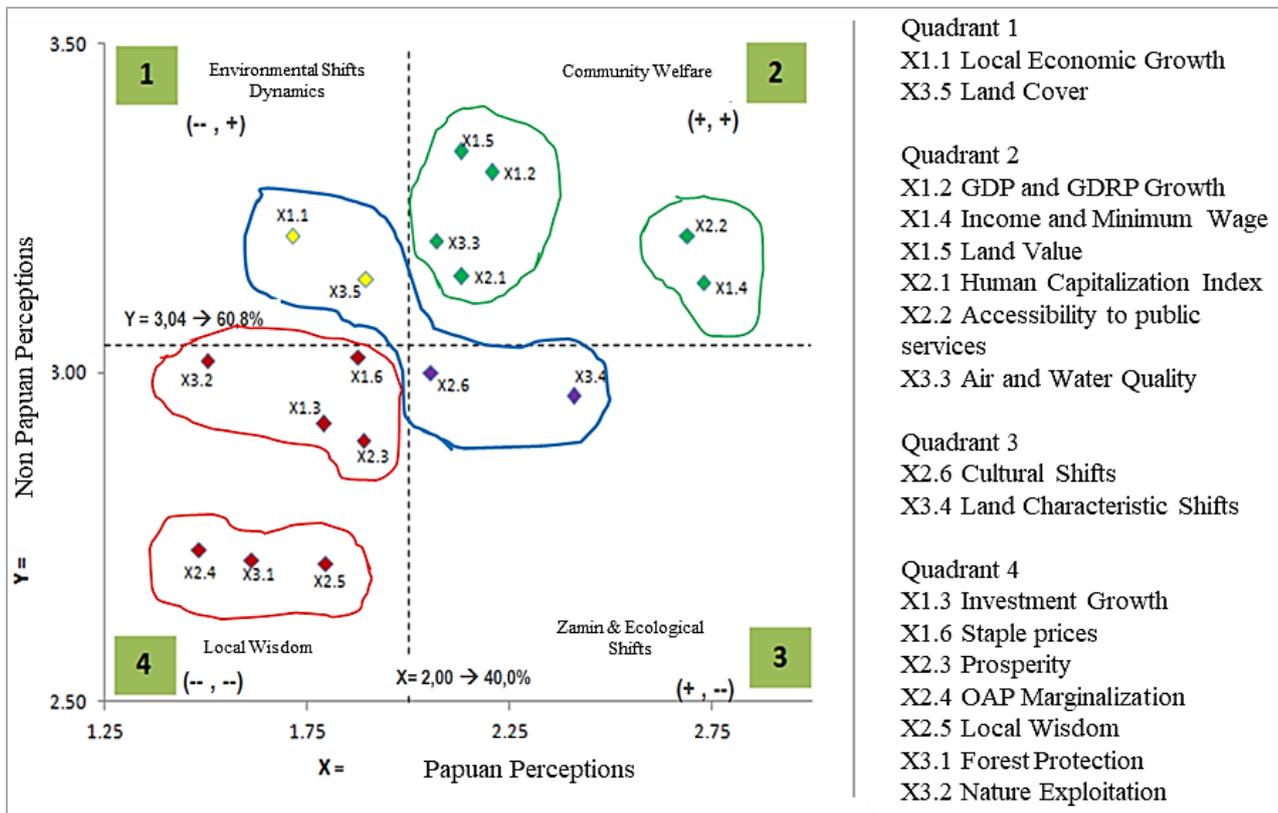


Figure 6. Development Impact "Gaps" Simulation

The factualization of the gap that occurs in the implementation of the Trans Papua road construction (Segment V) is a problem that is the persistence of implementation in the form of criticism by local communities and traditional leaders according to the results of community perceptions. Research results in the form of perceptions are mapped in a quadrant system where the X axis is the perception of the Papuan people and the Y axis is the perception of the non-Papuan people. The average perception is obtained by the X-axis value (the satisfaction indicator based on the Likert scale is worth 2.00 (40% satisfaction level) and the Y-axis satisfaction indicator based on the Likert scale is worth 3.04 (60.8%). The distribution map of economic indicators (X1) consists of 6 variables; socio-cultural (X2) consists of 6 variables; and the environment (X3) consists of 5 variables. mapped in quadrant 1 (dynamics of economic and environmental changes, namely X1.1 and X3.5); quadrant 2 (community living comforts, namely X1.2, X1.4, X1.5, X2.1, X2.2, X3.3); quadrant 3 (dynamics of natural and ecological changes, namely X2.6 and X3.4), which requires control of plans and implementation impacts; and quadrant 4 (local wisdom, which requires joint efforts in social and economic aspects, namely X1.3, X1.6, X2.3, X2.4, X2.5, X3.1 and X3.2).

Quadrant 2 is an indicator that is above the average satisfaction for Papuans and non-Papuans. It is this indicator that needs to be maintained, if needed, increased to the maximum. Quadrant 4 solutions, which are problems and obstacles to the smooth implementation of development, as well as quadrants 1 and 3 with different perceptions, can be negotiated in the application of an efficient and effective decision solution development model process, namely the Combination of Bottom Up Model Analysis (KAMBU), between the clarity of different views and problem solving, creating ideas and program indications that end in execution or implementation plans.

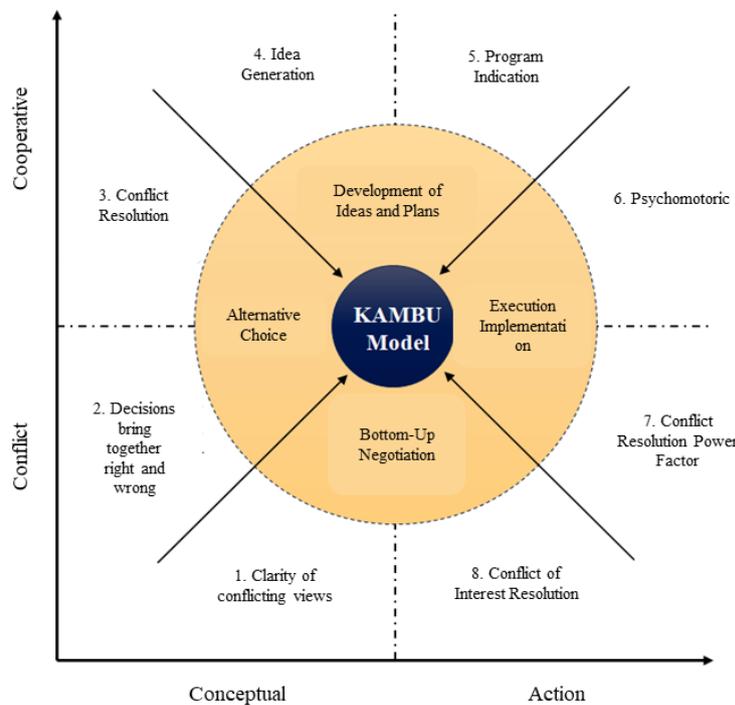


Figure 7. KAMBU Modeling Process

In the future, it is necessary to optimize the involvement of community capital in a Papuan context, such as human and economic resources as well as social capital and ZEPNAT capital (Zamin and Natural Papuan Ecology).

4.4. Improvisation on Regional Sectors

The trend of decreasing poverty rates by region in Papua shows a decline from year to year. This is due to the impact of the construction of the Trans Papua road, which makes the flow of goods and services easier, thereby reducing the cost of goods and services. Thus, the economic cycle can run more easily and reduce poverty (Table 1).

Table 1. Annual Regional Poverty Level

Regency/City	Percentage of Poor People by Regency/City (Percent)						
	2015	2016	2017	2018	2019	2020	2021
Merauke	11.1	11.08	10.81	10.54	10.35	10.03	10.16
Jayawijaya	39.48	39.66	38.62	38.66	38.33	37.22	37.09
Jayapura	14.69	13.49	13.01	13.44	13.13	12.44	12.13
Nabire	24.37	26.03	25.38	25.17	24.81	24.15	23.83
Kepulauan Yapen	27.7	27.54	26.82	27.17	27.13	26.30	26.09
Biak Numfor	27.23	26.99	25.44	25.72	25.50	24.57	24.45
Paniai	37.43	39.13	37.40	37.35	37.16	36.71	36.59
Puncak Jaya	37.45	37.31	36.01	36.27	35.71	34.74	36.00
Mimika	16.20	14.72	14.89	14.55	14.54	14.26	14.17
Boven Digoel	19.5	20.82	19.90	20.35	19.66	19.41	19.90
Mappi	26.96	26.64	25.75	25.64	25.50	25.04	26.05
Asmat	28.48	27.79	27.16	27.41	26.60	25.49	24.83
Yahukimo	41.26	40.62	39.33	39.25	38.82	37.34	37.64
Pegunungan Bintang	31.55	31.52	30.60	30.75	30.51	30.15	30.46
Tolikara	34	33.63	32.73	33.14	32.90	32.04	32.60
Sarmi	13.85	13.74	13.75	14.51	14.41	13.87	13.84
Keerom	15.83	17.15	16.69	16.90	16.83	16.32	16.00
Waropen	31.41	31.25	30.82	30.53	30.95	29.54	29.85
Supiori	39.25	37.99	37.40	39.22	38.79	36.91	37.91

Mamberamo Raya	29.71	29.52	29.88	30.10	29.13	28.38	28.78
Nduga	35.89	38.47	37.29	38.13	38.24	36.72	37.18
Lanny Jaya	41.97	41.68	39.60	40.06	39.52	38.13	38.73
Mamberamo Tengah	35.54	38.36	36.38	37.02	36.93	36.41	36.76
Yalimo	35.88	35.80	34.97	35.45	34.52	32.82	33.25
Puncak	38.74	38.58	37.46	38.15	38.24	36.96	36.26
Dogiyai	29.1	31.21	30.36	30.48	31.12	28.62	28.81
Intan Jaya	41.34	43.73	42.23	42.71	42.92	40.71	41.66
Deiyai	45.74	45.11	43.63	43.49	43.65	41.76	40.59
Kota Jayapura	12.22	12.06	11.46	11.37	11.49	11.16	11.39
Provinsi Papua	28.17	28.54	27.62	27.74	27.53	26.64	26.86

In addition to the poverty rate, the development of the Trans Papua Road has reduced construction cost indices in all areas of Papua. Prior to the construction of the Trans Papua Road, commodities and services had to traverse difficult and remote terrain, which required a great deal of fuel and time and therefore increased production costs. The Trans Papua Road has greatly simplified the transfer of goods and services (Table 2).

Table 2. GRDP AT Constant Price by Regency/Municipalities (Million Rupiahs)

Regency/City	Before Trans Papua	After Trans Papua
Merauke	7535267.61	10055727.95
Jayawijaya	3794403.35	4484665.27
Jayapura	7268623.46	9326091.81
Nabire	4491578.1	5780043.41
Kepulauan Yapen	2387025.7	2753113.29
Biak Numfor	3336779.27	3230874.63
Paniai	1450064.84	1788468.71
Puncak Jaya	846840.99	965167.02
Mimika	7704441.9	9184986.38
Boven Digoel	2825437.95	3154258.24
Mappi	1454308.74	1852417.93
Asmat	1221840.21	1531069.35
Yahukimo	1232487.3	1512488.74
Pegunungan Bintang	1121087.41	1391967.49
Tolikara	882032.19	1053227.36
Sarmi	1406009.78	1808359.29
Keerom	1639939.29	1970455.05
Waropen	1123721.45	1460792.74
Supiori	642278.98	766772.45
Mamberamo Raya	768817.46	991152.26
Nduga	619065.89	790847.01
Lanny Jaya	922590.33	1158519.07
Mamberamo Tengah	601609.94	748176.86
Yalimo	596674.99	764516.7
Puncak	643130.03	825111.83
Dogiyai	684444.69	871427.82
Intan Jaya	647041.28	755934.81
Deiyai	679523.76	821635.25
Kota Jayapura	18098530.41	22423210.66

Similarly, a rise in GDRP compliance was seen in the majority of areas. This information indicates that the development of the Trans Papua Road has had a substantial and equitable effect on the socioeconomic sector. As mentioned in the Trans Papua Road's construction aims, it can be claimed that the current condition of affairs is moving in the direction of achieving this purpose.

5. Conclusion

With the construction of the Trans Papua road transportation infrastructure in Segment V in Nduga Regency, connectivity and contact across regions have increased. Access to the mobility of more people, goods, and services has transformed the community's social conditions. The expansion of a city's economic activity dynamics has, as one of its key impacts, the facilitation of public access to service hubs. In turn, this has an effect on reducing poverty rates and increasing HDI and life expectancy. However, the building of the Trans-Papua Road is seen as having negative consequences. Specifically, the consequences of Papua Natural Ecology Zamin on environmental concerns, signs of exploitation of natural resources (timber and mining), damage to the Nothofagus forest of Lorentz National Park, protection of biodiversity, and a decrease in land carrying capacity are discussed. In addition, the marginalization of OAP has an effect on individuals' means of sustenance. Trans Papua's development has impacted the socioeconomic conditions of the society by fostering more social interaction across rising regional areas. Moreover, greater accessibility and mobility of people, goods, and services have both positive and negative implications for social and economic fairness, quality of life, and sustainable development. The Bottom Up Model Combination Analysis is the model used to provide efficient and effective decision solutions. In the future, it will be essential to maximize the involvement of community capital in the Papuan environment, including human and economic resources, social capital, and the ZEPNAT model (Zamin and Papua Natural Ecology).

6. Declarations

6.1. Author Contributions

Conceptualization, Z.K.; methodology, Z.K.; formal analysis, Z.K.; resources, Z.K.; data curation, Z.K.; writing—original draft preparation, Z.K.; writing—review and editing, Z.K.; visualization, Z.K.; supervision, M.Y.J., M.S.P., M.I.R.; project administration, Z.K.; funding acquisition, Z.K. All authors have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

The data presented in this study are available in the article.

6.3. Funding

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6.5. Conflicts of Interest

The authors declare no conflict of interest.

7. References

- [1] Campbell, M. (2017). Infrastructure planning in Papua. Centre for Tropical Environmental & Sustainability Science (TESS) Available online: <https://researchonline.jcu.edu.au/52946/1/52946%20Campbell%202017.pdf> (accessed on August 2022).
- [2] Hasan, H., & Nugroho, Z. (2022). Towards a Peaceful Papua with an Inclusive Development Approach. *Jurnal Ilmiah Hubungan Internasional*, 56–66. doi:10.26593/jihi.v0i00.5973.56-66. (In Indonesian).
- [3] Johnson Kennedy, P. S. (2018). Defense Program in Encouraging the National Economy Case Study of the Trans Papua Road Construction. *Jurnal Ilmiah Manajemen Publik Dan Kebijakan Sosial*, 2(1). doi:10.25139/jmnegara.v2i1.1077. (In Indonesian).
- [4] Sianipar, B., & Somantri, G. R. (2022). Development and Democratization in Papua. *Journal of Positive School Psychology*, 6(8), 225-231.
- [5] Pamungkas, C. (2017). The Campaign of Papua Peace Network for Papua Peace Land. *Jurnal Ilmu Sosial Dan Ilmu Politik*, 21(2), 147. doi:10.22146/jsp.30440. (In Indonesian).
- [6] Druce, S.C. (2020). Political Impasse vs. Economic Development: A History and Analysis of the West Papua Conflict in Indonesia. *Managing Conflicts in a Globalizing ASEAN*, Springer, Singapore. doi:10.1007/978-981-32-9570-4_5.

- [7] Viartasiwi, N. (2018). The politics of history in West Papua - Indonesia conflict. *Asian Journal of Political Science*, 26(1), 141–159. doi:10.1080/02185377.2018.1445535.
- [8] Suryawan, I. N. (2017). *Papua versus Papua*. Labirin, Bantul, Yogyakarta, Indonesia.
- [9] May, R. J. (2021). Fifty Years after the ‘Act of Free Choice’: The West Papua Issue in a Regional Context. Working/Technical Paper, ANU Department of Pacific Affairs (DPA) formerly State, Society and Governance in Melanesia (SSGM) Program, Australian National University, Canberra, Australia. doi:10.25911/PFMY-Z964.
- [10] Sloan, S., Campbell, M. J., Alamgir, M., Engert, J., Ishida, F. Y., Senn, N., ... & Laurance, W. F. (2019). Hidden challenges for conservation and development along the Trans-Papuan economic corridor. *Environmental science & policy*, 92, 98-106. doi:10.1016/j.envsci.2018.11.011.
- [11] Weiss, M. L. (2020). Indonesia in 2019: Democracy and its critics. *Asian Survey*, 60(1), 109–116. doi:10.1525/AS.2020.60.1.109.
- [12] Manusawai, J., Pattiselano, F., & Manusawai, H. (2017). *Alternative Landscape Utilization at the Bird’s Head Peninsula of Papua: Resource Extraction vs. Ecotourism*. Repository Universitas Papua, Manokwari, Indonesia.
- [13] Pugu, M. R., Yani, Y. M., & Wardhana, W. (2020). Infrastructure Development at the Papuan Border: Efforts to Ensure Human Security and Combat Illegal Trafficking across Borders. *Masyarakat Indonesia*, 45(1), 76-92.
- [14] Iskandar, D. A. (2021). 20 years Collaborative Governance and Action Research: Evaluation Process of the Regional Spatial Planning of Mappi Regency, Papua. *Jurnal Pengabdian Kepada Masyarakat (Indonesian Journal of Community Engagement)*, 7(2), 111. doi:10.22146/jpkm.46412.
- [15] Subagiyo, A., Adam, U. S., & Wicaksono, A. D. (2019). Transborder Movements of Borderland People in Indonesia - Papua New Guinea (Case Study: Iwur District, Pegunungan Bintang Regency). *IOP Conference Series: Earth and Environmental Science*, 328(1). doi:10.1088/1755-1315/328/1/012033.
- [16] Putri, A. C. (2022). *Strategy of the Free Papua Organization in Getting International Support in 2016-2020*. Ph.D. Thesis, Universitas Islam Indonesia, Yogyakarta, Indonesia. (In Indonesian).
- [17] Siburian, E. E., & Afriansyah, A. (2018). Sport Diplomacy and State Sovereignty: Case Study on Indonesia’s Effort to Guard the Sovereignty of Papua. *Yustisia Jurnal Hukum*, 7(1), 54. doi:10.20961/yustisia.v0i0.19696.
- [18] Manurung, H., & Bainus, A. (2019). Process and Resolution of the Papua Problem. *Central European Journal of International & Security Studies*, 13(4), 1-23.
- [19] Blades, J. (2020). *West Papua: The Issue That Won't Go Away for Melanesia*. Lowy Institute, Sydney, Australia.
- [20] Iriyena, P., Naukoko, A. T., & Siwu, H. F. D. (2019). Analysis of the Effect of Road Infrastructure on Economic Growth in Kaimana Regency 2007-2017. *Jurnal Berkala Ilmiah Efisiensi*, 19(02). (In Indonesian).
- [21] Lantang, F., & Tambunan, E. M. B. (2020). The Internationalization of “West Papua” Issue and Its Impact on Indonesia’s Policy to the South Pacific Region. *JAS (Journal of ASEAN Studies)*, 8(1), 41. doi:10.21512/jas.v8i1.6447.
- [22] Webb-Gannon, C. B. (2019). *Riots in West Papua: why Indonesia needs to answer for its broken promises*. Faculty of Social Sciences-Papers, University of Wollongong Australia, Wollongong, Australia.
- [23] Wangge, H. R., & Webb-Gannon, C. (2020). Civilian resistance and the failure of the Indonesian counterinsurgency campaign in Nduga, West Papua. *Contemporary Southeast Asia*, 42(2), 276–301. doi:10.1355/cs42-2f.
- [24] Kusumawardhani, I., & Afriansyah, A. (2020). Free Papua Organization: Belligerent, Combatant, or Separatist? Proceedings of the 3rd International Conference on Law and Governance (ICLAVE 2019). doi:10.2991/aebmr.k.200321.040.
- [25] Gaveau, D. L. A., Santos, L., Locatelli, B., Salim, M. A., Husnayaen, H., Meijaard, E., Heatubun, C., & Sheil, D. (2021). Forest loss in Indonesian New Guinea (2001–2019): Trends, drivers and outlook. *Biological Conservation*, 261. doi:10.1016/j.biocon.2021.109225.
- [26] Mudd, G. M., Roche, C., Northey, S. A., Jowitt, S. M., & Gamato, G. (2020). Mining in Papua New Guinea: A complex story of trends, impacts and governance. *Science of the Total Environment*, 741, 140375. doi:10.1016/j.scitotenv.2020.140375
- [27] Novario Irawan, M. (2019). *Jurisdiction overview of separatism handling in Indonesia (case study of handling separatism in papua)*. PhD Thesis, Universitas Muhammadiyah Jember, West Java, Indonesia. (In Indonesian).
- [28] Kambu, Z., Jinca, M. Y., Pallu, M. S., & Ramli, M. I. (2022). Perspectives of the Local Communities on the Development of Trans-Papua Road Infrastructure. *Civil Engineering Journal (Iran)*, 8(5), 999–1010. doi:10.28991/CEJ-2022-08-05-011.
- [29] Kambu, Z., Jinca, M. Y., Pallu, M. S., & Ramli, M. I. (2022). Community Perceptions on Sustainable Development of Road Infrastructure Trans Papua, Indonesia: Case Study of Nduga Regency. *KRESNA: Jurnal Riset dan Pengabdian Masyarakat*, 2(1), 97-110.
- [30] Rochmyaningsih, D. (2021). Massive road project threatens New Guinea’s biodiversity. *Science*, 374(6565), 246–247. doi:10.1126/science.acx9345.

- [31] Yamamoto, Y., & Matsumoto, K. I. (2022). The effect of forest certification on conservation and sustainable forest management. *Journal of Cleaner Production*, 132374. doi:10.1016/j.jclepro.2022.132374.
- [32] Fauzi, F. Z., Murti, A. A. G. B., Imamah, L. A., & Hapsari, N. (2019). Infrastructure Development in Papua: Features and Challenges. *Policy & Governance Review*, 3(3), 225. doi:10.30589/pgr.v3i3.162.
- [33] Valder, P. G. (1967). Reports – Australian Rhododendron Groups. *Gastronomía Ecuatoriana Y Turismo Local*, Sydney, Australia, 1(69), 5–24.
- [34] Spadaro, D. A., King, J., Angel, B., McKnight, K. S., Adams, M. S., Binet, M. T., ... & Stauber, J. L. (2022). Probabilistic risk assessment of mine-derived copper in the Ok Tedi/Fly River, Papua New Guinea. *Science of the Total Environment*, 810, 151219. doi:10.1016/j.scitotenv.2021.151219.
- [35] Pangau-Adam, M., Slowik, J., Trei, J. N., & Waltert, M. (2021). Negative Effects of Logging on Bird Dispersed Plants in Northern Papuan Lowland Forest, Indonesia. *Tropical Conservation Science*, 14. doi:10.1177/19400829211031171.
- [36] Eksekutif Nasional WALHI. (2021). Analysis of Influence of Development Plans Trans Papua Road Priority Project (Mp-31) on Socio-Ecological Aspects of Papua Road. *Wahana Lingkungan Hidup Indonesia*, Jakarta, Indonesia. Available online: https://www.walhi.or.id/uploads/buku/WALHI%20-%20Riset%20Jalan%20Trans%20Papua%20MP-31_ebook.pdf (accessed on May 2022).
- [37] Demianus Ijje, J. (2020). Notes for the Construction of the Trans Papua Road. *Detik News: Online Magazine*. Available online: <https://news.detik.com/kolom/d-5192311/catatan-untuk-pembangunan-jalan-trans-papua> (accessed on June 2022).