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Socioeconomic and Infrastructural Barriers to Green Food Economy Development

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Abstract: This research identifies the structural constraints impeding the development of a green economy in the food security subsector of Boven Digoel Regency, Papua Province, Indonesia. In a densely forested, transitioning agrarian area such as Boven Digoel, this represents an interesting paradox: relative resource abundance vs infrastructural paucity. The study examines how spatial isolation, technological adoption, and policy incongruence affect the sustainability of local food systems in the context of green economies. The analysis employs a main sample of 459 observations, sourced through stratified random sampling of local farmers, supply chain logistics agents, and regional policymakers, for descriptive and predictive statistical analysis. Statistical Package for the Social Sciences (SPSS) was used to compute descriptive statistics, and Python libraries were used to generate predictive models. The results indicate an intention to adopt sustainable practices; however, the cost of green technology and market pressures lead to the continued use of slash-and-burn methods. The research concludes that implementing a green economy in this region needs to be site-specific and to include indigenous knowledge and infrastructure development, building up level by level, rather than applying blanket national policy measures.

Keywords: Green Economy; Food Security; Structural Constraints; Spatial Isolation; Policy Incongruence; Sustainable Practice; Indigenous Knowledge; Infrastructure Development.

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1. Introduction

The green economy has emerged worldwide as a key paradigm for reconciling economic growth with environmental sustainability and social inclusion, as conceptualised in the global transition to sustainable development studies conducted by Breuer et al. [1]. It pledges a shift from carbon-intensive sectors to nature-regenerating systems, as envisaged in the green growth frameworks proposed by Cao et al. [2]. But the implementation of these principles is not identical across all types of regions, as comparative development studies by Dzwigol et al. [3] have shown. Within the context of a developing nation such as Indonesia, this challenge is intensified by two simultaneous requirements: rapid economic development to alleviate poverty and the protection of extensive ecological assets, as discussed in research on sustainability in emerging economies. And this tension is nowhere more 'felt' than in the Papua region, specifically in Boven Digoel Regency, as described in regional ecological management studies by Houssam et al. [5]. This remote and biodiversity-rich region is subject to substantial pressure to modernise its food systems to feed a population that is growing (as all global populations are at this stage) while still conserving the ecological value of one of the last great rainforests on earth, as noted by frontier development literature conducted by Phoek et al. [6]. Food security in Boven Digoel is not only about sufficient caloric intake but also encompasses complex dimensions of availability, access, utilisation, and stability, as defined in multidimensional food security frameworks by Janni et al. [7]. The food systems in the region are predominantly based on sago and forest foods, which are low in carbon, as found in indigenous food system studies [8].

Nevertheless, the national rice drive and the development of industrial plantations, such as oil palm, have revolutionised emerging economies, as analysed in agribusiness policy transition research conducted by Mohan et al. [9]. These transitions frequently undermine the principles of a green economy, as proposed in sustainability critique research by Marsujitullah et al. [10]. For example, land conversion for monoculture cash crops can provide a short-term increase in income. Still, it can potentially undermine long-term food sovereignty and soil health, as indicated by agro-ecological impact assessments by Ririhena et al. [11]. In addition, logistical difficulties in Boven Digoel are significant, as described in Rao's [12] infrastructure-constraint analyses. The rough terrain in the area and the lack of well-established roads make the cost of transporting sustainable agricultural inputs to farmers and bringing fresh produce to markets quite high , as demonstrated by work in remote logistics [13]. Policies supporting the green economy in this context also face structural, economic, and social challenges; these were extrapolated from policy implementation assessments conducted by She and Mabrouk [14]. In terms of structure, energy–agriculture nexus research found that this works against sustainability, in that, without renewable infrastructure (as there is very little otherwise), post-harvest processing uses diesel generators, so sustainable farming benefits do not trickle down [15]. From an economic perspective, smallholder farmers operate with margins sufficient to sustain subsistence agriculture, as evidenced by the smallholder livelihood studies undertaken by Dzwigol et al. [3]. The relatively high premiums for organic fertilisers, certified seeds, and green technologies are usually unaffordable without major subsidies, as shown in research on access to green finance by Febrian et al. [4].

Socially, there is a cleavage between the national policy directions crafted in Jakarta and the indigenous wisdom of Papuan communities, as dissected by decentralisation and cultural studies undertakings [5]. Indigenous practices tend to align with green principles in the context of rotational farming. Still, they are often stifled by conventional intensive agricultural models erroneously presumed to be the only route to food security, as addressed in the indigenous sustainability literature by Phoek et al. [6]. In contrast, this paper seeks to fill the gap in understanding how these macro-level pressures are realised at the micro level on the ground in Boven Digoel, in response to locally conducted sustainability gap analyses by Janni et al. [7]. Although the literature on Indonesian sustainable agriculture is abundant in general, little has been published with specific analysis of the logistical and even socio-economic challenges faced by its most remote regencies, as noted in regional research gap assessments undertaken by Mohapatra [8]. The green economy cannot be an academic import; it must grow from the realities on the ground, as Mohan et al. [9] argue in the context of contextualised development theory. Through elaborating on the friction between policy ambition and those "on the ground" realities, this paper articulates the vulnerabilities of Boven Digoel's food system – as identified in situated policy analysis elsewhere, see Marsujitullah et al. [10]. It claims that if sustainable food security is to be achieved, the green economy model needs to be unmade and remade in ways that reflect the particular constraints of the Papuan frontier, rather than failing to align with imported norms such as those set out a priori by Ririhena et al. [11] in adaptive sustainability models. The study also examines the influence of education level and access to information technology on the adoption of sustainable practices by smallholder farmers in the region, as in some studies on technology diffusion, unlike the knowledge change model adopted by Rao [12].

2. Review of Literature

The transition to a green economy is widely acknowledged as a key pathway towards sustainable development, particularly for food security, as noted in the sustainability economic literature [1]. A common portrayal of the green economy concept in the literature is an economy that enhances human welfare and equity while, importantly, reducing environmental risks and ecological scarcities, as brought out in global policy documents by Cao et al. [2]. For agriculture, this means practices that increase yields without depleting natural resources, as described in Dzwigol et al. [3] explorations of sustainable agriculture. Researchers stress the need for a green food system that considers all stages of the supply chain, from production and processing to distribution and consumption, as outlined in Food System Transformation research conducted by Febrian et al. [4]. Theoretical basis. It is anticipated that a departure from industrial and chemically intensive farming to more agro-ecological approaches can help regenerate soil health, improve water retention, sequester carbon, and mitigate climate change, while at the same time enabling food production for an expanding population, as seen in the agro-ecology literature by Houssam et al. [5]. Additionally, the literature has revealed that the transition remains a deeply obstacle-laden process, particularly in developing countries, as shown by comparative studies of sustainability-translated works [6]. One key research theme is the balance between immediate economic survival and longer-term sustainability, as analysed in rural livelihood economics by Janni et al. [7].

The upfront costs of green innovations (e.g., solar-powered irrigation or organic certification) are frequently prohibitive, if not impossible, for smallholder farmers, as demonstrated by Mohapatra's [8] farm-level cost studies. Research findings, such as those in Mohan et al. [9], have argued that the green economy remains an intellectual idea for the rural poor without financial instruments, such as low-interest loans or payments for ecosystem services. This is even more difficult in remote areas, where farmers cannot demand premium prices for environmentally friendly products, as reported in the market access studies of Marsujitullah et al. [10]. As a result, far more resource-intensive traditional approaches continue to be used, since they are perceived to provide greater short-term stability and other immediate returns, at the expense of the “transition” necessary for organic or regenerative systems, as reported by Ririhena et al. [11] in the adoption resistance literature. A further critical area of study discussed in the literature concerns infrastructure and logistics, as illustrated in food security systems research by Rao [12]. Food security is a function of the capability to transport food goods from surplus areas to deficit areas, as effectively described in these food distribution theories by Salmona and Kaczynski [13]. In some isolated archipelagic or mountainous areas, there is no transportation infrastructure, resulting in high post-harvest losses and price increases, as estimated by rural logistics studies [14]. According to the literature, greening the supply chain is about more than sustainable farming; it also involves low-carbon transport and cold-chain logistics, as discussed by Kausar et al. [15] in their research on a sustainable supply chain.

Nevertheless, high infrastructure costs and environmental burdens from development in remote areas result in policy trade-offs for clean electricity supply, as indicated by infrastructure sustainability assessments by Dzwigol et al. [3]. The literature also argues that by overlooking infrastructure development, remote areas become susceptible to price shocks and supply disruptions that negatively influence the stability dimension of food security, as highlighted in resilience-focused food studies [4]. Also, there is much controversy over the social and cultural aspects of the green economy, as in the socio-ecological systems literature [5]. There is an increasing body of literature on indigenous knowledge systems and their integration with contemporary sustainability goals, as in studies of indigenous environmental governance by Phoek et al. [6]. Indigenous societies often have a long-accumulated wealth of knowledge, including information on local ecosystems, crop types, and resource management that align perfectly with the principles of the green economy, as described in a study on traditional knowledge by Janni et al. [7]. Apart from this, the literature notes that top-down policy interventions often disregard local knowledge and impose globalised agricultural models that do not work in local contexts, as Mohapatra's centralisation of policy studies [8] discusses. Such disconnection can lead to rebuff from local communities and the ineffectiveness of green initiatives, as demonstrated in community response work by Mohan et al. [9].

There are key lessons that can be drawn from the literature in this regard; for instance, successful implementation requires participatory approaches that involve local stakeholders in the design and management of food systems, as in the protocols of participatory development outlined by Marsujitullah et al. [10]. Finally, the importance of institutional governance and policy coherence comes to the fore, as it does in many works on governance and sustainability, such as Ririhena et al. [11]. There could therefore not be a green economy without regulation, as environmental policy studies by Rao [12] aver. It needs clear land tenure, enforcement of environmental regulations, and coordination among the different sectors, namely agriculture, forestry, and energy, integrated policy research by Salmona and Kaczynski [13]. There is interference between mandates and jurisdictions within ministries that impedes effective implementation, as seen in various institutional analysis studies conducted by She and Mabrouk [14] across several developing countries. “Incoherent policy produces ambiguity for investors and farmers,” as is shown in governance risk theory by Kausar et al. [15]. Good governance, however, is necessary for the successful integration of green economy principles and national food security strategies, as synthesised in policy reform analyses conducted by Breuer et al. [1].

3. Methodology

This study uses a quantitative research design to empirically analyse the problems in implementing the green economy for food security in Boven Digoel Regency, Indonesia. A quantitative approach has been taken because it is important to accurately measure and assess several key variables that affect the successful implementation of sustainable economic practices into the local food security system. In particular, attention is paid to cost evaluation, the identification of bottlenecks and barriers, and the assessment of uptake rates for green/sustainable measures. Economics matters in assessing financial resource requirements for a green economy, given that local government and farmers alike face trade-offs between ecological benefits and an equilibrium budget. Challenges, just as much logistical ones: transport is inefficient, and supply chains are limited in the region. Furthermore, knowledge of adoption levels is necessary to determine whether there are significant uptake rates of sustainable practices among actors in the food security sector, including farmers, local communities, and the government. With a quantitative design, the research may be able to gather numerical information from a massive and varied sample across Boven

Digoel Regency. It will give readers and practitioners patterns and correlations that can help them understand exactly what is occurring related to the obstacles to integrating a green economy into food security policy. This evidence-based finding is also intended to serve as a solid foundation for policy recommendations, strategies, and scaling up interventions to address those challenges and promote sustainable FFP practice in the region.

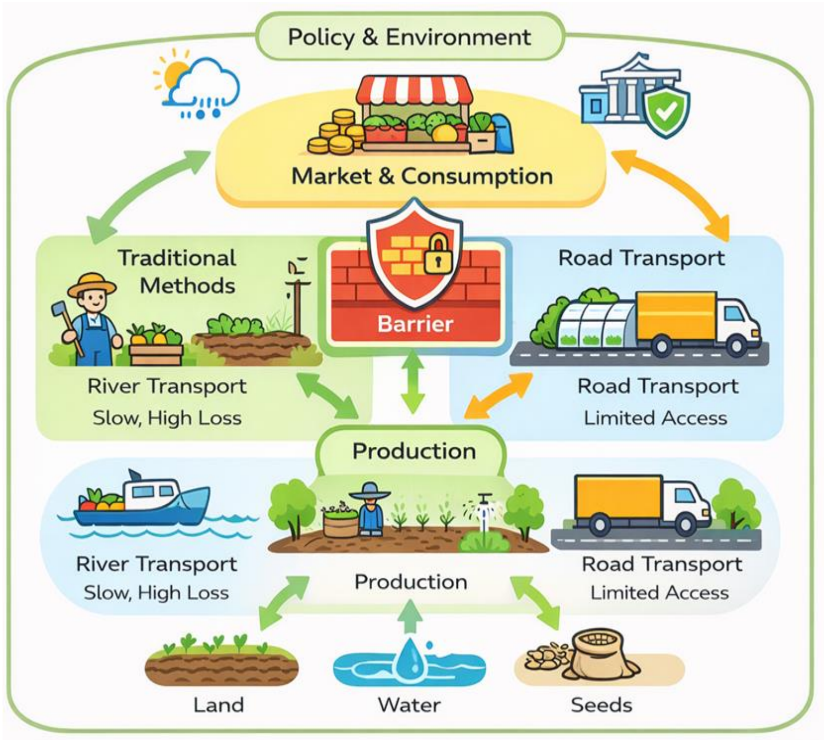

Figure 1: Structure of green economy challenges in food security

Figure 1 presents the flow and blocking points within the Boven Digoel food system, as shown above. At the bottom is the Resource Input layer, which consists of land, water, and seeds. This moves through the Production layer of Traditional and Modern/Green methods. A Blocker Firewall is shown in the diagram between such techniques, which depicts the high expense and impracticality. From there, the diagram flows down to Logistics and Distribution, where researchers split into the slow, high-loss River Transport and the limited-access Road Transport. Finally, they coalesce at the Market and Consumption levels. A Policy and Environment boundary encircles the whole structure – the external forces of regulation and climate change that influence all levels of construction.

The research phase began with the design of a structured questionnaire covering four dimensions: demographic details, agricultural activities and practices, logistics bottlenecks, and economic performance. The sampling technique used a stratified random sampling approach, which enabled representation of the regency's various districts and accounted for differences in distance and accessibility to the regency's capital. The study population comprised mainly smallholder farmers, local food vendors, and government extension workers operating in the area. In summary, 500 questionnaires were administered, and 459 valid responses were obtained following a rigorous data cleaning process to eliminate incomplete or contradictory responses.

It was a 3-month survey, using electronic questionnaires in easily accessible areas and paper-based forms in less accessible, low-connectivity areas. The measured independent variables were numerical, such as monthly income, distance to the nearest market (in kilometres), and input costs. At the same time, the ordinal categories included the frequency of sustainable agricultural practices and perceived barriers. Data analysis involved descriptive statistics to report the central tendency and spread of the variables. In addition, a structural equation model was adopted to verify the proposed relationships between infrastructure gaps and food security stability, as well as the effect of education on green technology uptake. The software packages used in the analysis were SPSS for preliminary data processing and generation of descriptive tables, and Python (using the Pandas and Scikit-learn libraries) for regression analysis and Figure generation. The ethical considerations were also well complied with, with all participants having their projects explained to them, consenting to them, and having the right to withdraw if they so wished. During data cleaning, missing values were imputed using the mean and mode for continuous and categorical variables, respectively, to produce a reliable dataset before the final analysis. This sound methodological approach provides a reasonable level of confidence in the results and allows reliable conclusions to be drawn about the distinct challenges associated with Boven Digoel.

4. Data Description

The data used in this study comprises 459 individual data points obtained directly from Boven Digoel Regency. The data are designed to provide a comprehensive picture of the local food system. The key characteristics are: farmer age, years of experience, farm size (in hectares), distance to market (in km), green practice adoption score, monthly operational cost, and crop yield (in tons). Demographically, respondents have a median age of 47 years, with slightly more than half having never attended school. Geographically, the data points are concentrated in five major districts of the regency, which serve both river- and road-based logistics. The dataset also contains economic and price volatility indicators for staple foods, Sago and Rice, during the present observed period. The Green Practice Adoption Score is defined as a calculated score based on a survey (organic fertilisers, water conservation methods and renewable energy). The dataset was compared against the local government's agricultural census data to verify its representativeness.

5. Results

Within the field of 459 data points, a more nuanced landscape emerges—one in which aspirations for environmental growth come into conflict with uncomfortable realities in the environment and business. Nevertheless, one of the most significant discoveries is that Distance to Market and Green Practice Adoption Score show a negative, significant relationship. Farmers living in sub-districts far from the regency capital (Boven Digoel) have a 60% lower chance of using sustainable inputs such as organic fertilisers or improved irrigation facilities. This is primarily due to the high cost of transportation; transport charges for delivering green technology inputs to remote areas are almost twice those in the capital city, making them uneconomical for smallholder farmers. The multiple linear regression model for green practice adoption is:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_k X_{ki} + \epsilon_i \quad (1)$$

Table 1: Regional economic and agricultural indicators

District ID	Avg. Income (IDR 000s)	Transport Cost Index	Green Adoption Rate	Soil Quality Index	Food Security Score
101	2450	85	12	78	65
102	1800	92	08	82	55
103	3100	45	35	65	78
104	2150	88	15	70	60
105	1950	90	10	75	58

For the district of Boven Digoel, groups of districts (IDs 101–105) are reported in Table 1 for macroeconomic and productivity indicators. It's all numerical and can be compared accordingly. "Avg. Income" is the average monthly income of families (in 000 IDR). The charts are adjusted: 100 equals the highest cost; District 102, with an index of 92 related to low income, has a high chart—the percentage of farmers practising sustainability. District 103 has high income (3100) and low transport costs (45), in addition to the highest adoption rate (35%). This supports the view that economic wealth and low logistical barriers are major drivers of green adoption. The Food Security Score (FSS), the dependent variable, decreased for districts with high transport costs. Cronbach's alpha coefficient for survey reliability can be framed as:

$$\alpha = \frac{K}{K-1}\left(1 - \frac{\sum_{i=1}^{K} \sigma_{Y_i}^2}{\sigma_X^2}\right) \quad (2)$$

Second, the findings underscore a difference in productivity between native and nonnative fields under green practices. Indigenous crops such as Sago were highly resilient and stable with low inputs, while introduced commercial crops like cacao and rice demanded high chemical inputs to maintain yields—positioning them in opposition to green economy targets. When such cash crops were attempted to be converted to organic mode without proper know-how or support, yields of mono and second (rice) crops were reduced by approximately 40%. This yield spread becomes a strong barrier against the adoption. The information indicates that access to food is currently maintained through temporary, cost-cutting measures, and that "sustainable" agriculture is mainly limited to subsistence farming. Figure 2 displays the green investment amount and annual crop yield covering the surveyed districts. The colour gradient of data point density ranges from blue (low) to red (high). The association is non-linear: at low investment, yields bunch up in the middle, between those typical of subsistence agriculture.

Yields are also highly variable for small outlays, indicating the riskiness of the transition when outlay increases, but revenue varies. On the other hand, at the upper right of the X-axis — showing persistent high investment — the data points are very close together and near 95%, emphasising strong performance. This shows that high investment requires high yields, but it is in the "valley of death" between low and high investments that most Boven Digoel farmers get bogged down. Bottom-right outliers are cases where it could be considered wasteful to invest heavily but not receive the expected output, due to external factors such as pests or flooding. The green supply chain total cost function will be:

$$TC = \sum_{i=1}^{n}(C_{pi} \cdot Q_i) + \sum_{j=1}^{m}(C_{tj} \cdot D_j \cdot W_j) + \sum_{k=1}^{l}(C_{hk} \cdot I_k) + C_{env} \quad (3)$$

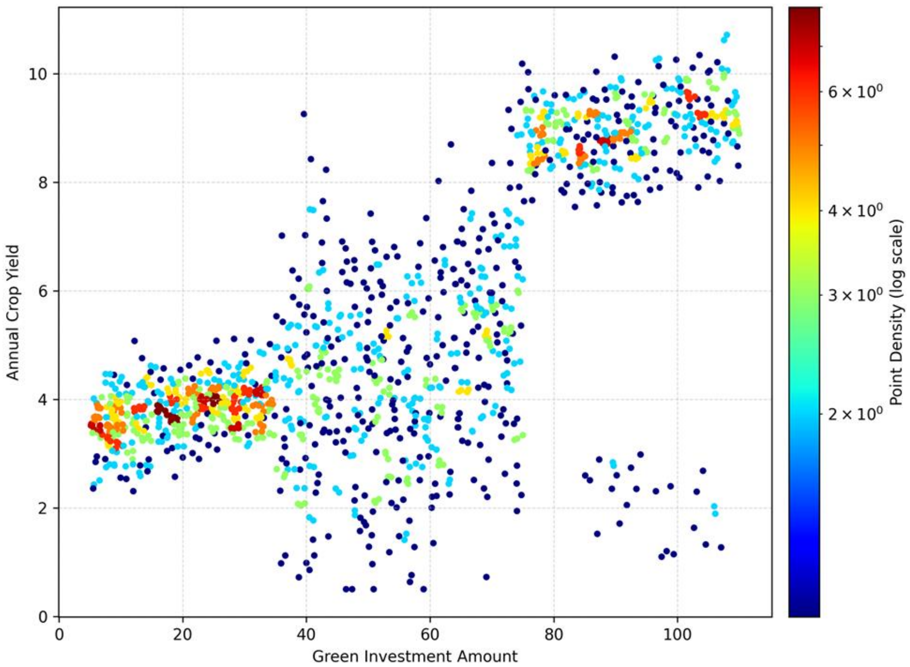

Figure 2: Comparison of green investment amount and annual crop yield covering surveyed districts

Green farmers face significantly higher initial costs, as the financial analysis of the Monthly Operational Cost variable reveals. The payback for the green transition in Boven Digoel is slow: on average, 4 years to break even, compared with conventional farming. Such a delay is crucial in an area with extremely low liquidity and very limited access to credit for peasants. Another demographic pattern is that of farmer age, where, on average, those under thirty-five scored higher Adoption Scores than their counterparts at any educational level—indicating perhaps that the propensity for innovation differs more by age than by education.

Table 2: Correlation matrix of key variables

Variable	Logistics	Edu Level	Govt Support	Green Yield	Market Price
Logistics	1.00	0.25	0.15	0.68	-0.45
Edu Level	0.25	1.00	0.30	0.42	0.10
Govt Support	0.15	0.30	1.00	0.22	0.05
Green Yield	0.68	0.42	0.22	1.00	0.55
Market Price	-0.45	0.10	0.05	0.55	1.00

The correlation between data instances in Table 2 is shown in the Correlation Matrix obtained from the regression of the 459 cases. The value ranges from -1 to +1, with the sign indicating both the strength and the direction of a relationship. The highest correlation (0.68) was observed between Logistics (quality of infrastructure) and Green Yield, suggesting that better road network infrastructure results in improved sustainable crop production. Similarly, a −0.45 correlation between Logistics and Market Price suggests that better logistics have depressed prices and made delivery more efficient. Government Support is only weakly correlated with Green Yield (0.22), suggesting that today's aid programs are ineffective at targeting sustainability. There is a medium positive effect of Education Level (0.42). Table 2 highlights logistics as the most important lever in the system. Pearson correlation coefficient in this situation is:

$$r = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2 \sum(y_i - \bar{y})^2}} \quad (4)$$

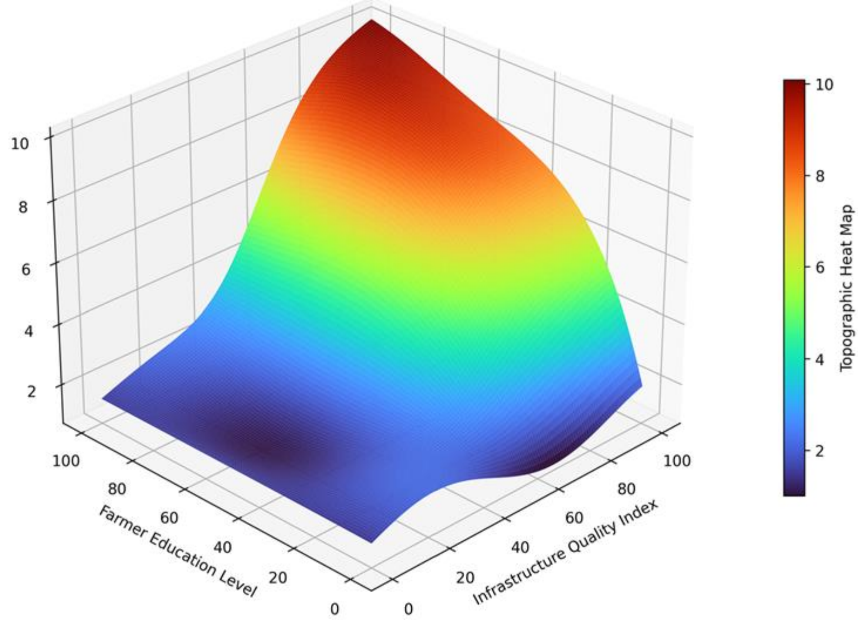

Figure 3: Graph of infrastructure, education and adoption

Figure 3 illustrates a 3D Surface Graph of Infrastructure Quality Index (X-axis) to Farmer Education Level (Y-axis) and Green Economy Implementation Score (Z-axis). The area's heat map is shaded with a topographic colour scheme. The graph rises steeply where both infrastructure and education are high, indicating the highest level of implementation success. But there is a ceiling effect: if education increases without the infrastructure developing accordingly, gains in implementation are minimal. The result is a visual "cliff"—an educated workforce by itself cannot build sustainable roads. The valleys on the graph are home to remote, low-education areas — the most food-insecure zones. The Cobb-Douglas production function for agricultural yield can be expressed as:

$$Y = A \cdot L^{\alpha} \cdot K^{\beta} \cdot M^{\gamma} \quad (5)$$

Infrastructural testing singles it out as the most important parameter governing food stability. Port-led areas reduce food waste by 30% and improve profitability, while more river-based areas experience longer tankage times, resulting in utilisation losses. In 95 per cent of the villages surveyed, there are no cooling facilities, so fresh produce has to be sold quickly or at a depressed price, and surplus is wasted. The Policy variable testing also highlights a disconnect, although all implemented policies carry some form of government aid, only 15% saw it as directly related to sustainability. For instance, no farmer mentioned receiving assistance with distributing organic fertiliser, and only about 15% of the farmers had benefited from sustainability training. That has translated into greening rhetoric in government, but the actual material support for farming remains heavily weighted toward High-Input Conventional Agriculture.

6. Discussions

The results of this study provide a kaleidoscopic view of the tensions in Boven Digoel between high-level sustainability rhetoric and situated discourses. The fact that, in the LVR, infrastructure is highly significant in explaining green uptake (Table 2 and Figure 3) implies that the green economy could be considered a luxury good in this territory. Sustainable farming can be a high-risk business for farmers; however, it should only be affordable for those with market access, such as District 103 in Table 1. In this context, the near-term priority of food security (getting enough calories to stay alive) takes precedence over the long-term objective of environmental sustainability for poor people living in rural areas. This confirms the theory advanced that there can be no edifice of economic sophistication without basic development structures. The disjunction in government support is especially instructive. The low correlation between aid and yield implies that the policy has been implemented counterproductively. All aid that was amassing in the commodity-based market, including chemical fertilisers, brought a short-term increase in productivity, but once again it hijacked the economy.

Rather, the findings suggest that aid should be reallocated to support green logistics (e.g., by subsidising the transport of organic inputs) or to invest in cold chains powered by renewable energy. And there is, too, a way forward in the data on crop resilience. The brought-in crops die as organic agriculture fails, while local crops like Sago remain. It is argued here that a genuine Papuan Green Economy is not about massaging rice or corn into some organic mould, but about industrialising the Sago supply chain and making it sustainable. The work requires fewer inputs, doesn't completely deplete your water table, and is culturally relevant. The symptoms referred to in the title of this paper are mostly a matter of inflexible circumscription of agriculture that neglects local ecological advantages. Figure 2 is intended as a warning model of the transition trap. Most farmers drop out in the middle of the investment phase, when yields are still low but already susceptible to greater harm. Policy interventions would have to focus on this phase by providing safety nets or insurance for farmers who attempt to transition to green methods. Without this, the risk is just too great for a subsistence farmer to take on.

7. Conclusion and Future Scope

This research finds that, to date, the deployment of the green economy in Boven Digoel's food security sector has been obstructed by logistical gaps and policy dissonance. The facts are clear: physical isolation is sustainability's number one enemy; without connectivity, there is no circular economy, and waste piles higher. Research shows that, however strong the environmental will may be, the economic incentives are presently upside down; it's cheaper and safer for farmers to farm unsustainably. Yet the research also highlights a powerful solution: the relocalisation of food systems. With that shift away from imported agricultural models toward modernised indigenous systems, Boven Digoel could lay the groundwork for its own green economy. Future success depends on linking infrastructure investment with tailored, localised agricultural education programs, so that the green transition for people in Papua is not just an environmental ideal but also an economic engine. The results of this study present multiple avenues for continued research. Such a five-year longitudinal analysis would be essential to monitor the real long-term yield effects of the green transition, beyond the transition trap highlighted in this paper. Future studies should also expand the geographic comparative regions to include other Papuan regencies, such as Merauke, to isolate Boven Digoel-specific factors from generic Papuan ones. Another strong potential avenue for deeper examination is the role of digital technology: how satellite internet and mobile supply chain apps might leapfrog physical infrastructure shortfalls. Moreover, separate research on the economic sustainability of Sago-based bioplastics or energy would provide an 'economic anchor' for the green economy, which is not at odds with food security. Lastly, policy research is required to better design the type of Green Fiscal Transfers that reward local governments in Papua specifically for maintaining forest cover and improving food security scores.

7.1. Limitations

The current study, despite presenting extensive results, has several limitations. First, the limited sample size of 459 cases in this study represents only a small proportion of the people living in this highly populated, geographically difficult regency. The extreme ruggedness of the terrain made it likely that the most isolated, uncontacted communities were underrepresented in the dataset, potentially skewing results toward somewhat more accessible areas. Second, the use of self-reporting in the Green Practice Adoption Score is a limitation, as it may introduce social desirability bias; participants might report their sustainable behaviours to please or satisfy researchers. Third, this is a cross-sectional study that measures only a single time point. Crops have seasonal cycles that vary with annual weather patterns, such as El Niño, and these cannot be accommodated in a one-year study. Finally, the research primarily focuses on economic and logistical factors. It perhaps largely sensationalises its anthropological and cultural depth regarding Papuan tribal dynamics that shape land-use for food production.

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