

VILLAGE-BASED RESOURCE ECONOMY: SYNERGY OF VILLAGE-OWNED ENTERPRISES (BUMK), APPROPRIATE TECHNOLOGY, AND VALUE CHAINS FOR BERAU'S ECONOMIC INDEPENDENCE

EKONOMI SUMBER DAYA BERBASIS DESA: SINERGI BUMK, TEKNOLOGI TEPAT GUNA, DAN RANTAI NILAI UNTUK KEMANDIRIAN EKONOMI BERAU

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ABSTRACT

The economic independence of villages in Indonesia is still constrained by three interrelated structural problems: the potential of superior products that have not been optimally managed, unequal market access, and low adoption of appropriate technologies at the upstream value chain level. This research aims to develop an integrative model of synergy among Village-Owned Enterprises (BUMK), appropriate technology, and strengthening the value chain as an instrument of village-based economic independence, with a case study of Berau Regency, East Kalimantan. The novelty of the research lies in the formulation of the "Triple-Chain Convergence" model, which integrates three chains at once, namely the production chain (upstream), the technology chain (process), and the market chain (downstream), into one measurable SOE governance framework, different from previous studies that generally discussed the three aspects partially. The method used is a descriptive-analytical qualitative approach with document studies, triangulation of official secondary data (Ministry of Villages and Rural Development, BPS, Berau Regency Community and Village Empowerment Office), and systematic review of 18 Sinta- and Scopus-indexed journal articles published in 2022–2025. The results of the study show that BUMKs in Berau Regency, which totalled eight active pilot units at the 2024 East Kalimantan Bumdes Expo, face major obstacles to upstream value chain efficiency and digital literacy limitations, but show the potential for significant turnover increases when appropriate technology and digital platforms are adopted simultaneously. The theoretical contribution of this research is to expand the framework of Community-Led Development with a spiritual-ethical dimension from the perspective of economic Sufism, which positions BUMK not just as an administrative entity but as a testament (medium) of collective blessings. The practical implication is concrete policy recommendations for the Berau Regency Government in designing a roadmap for strengthening BUMK based on superior product clusters.

Keywords: BUMK; appropriate technology; value chain; economic independence; Berau Regency

ABSTRAK

Kemandirian ekonomi desa di Indonesia masih menghadapi tiga permasalahan struktural yang saling berkaitan, yaitu potensi produk unggulan yang belum dikelola secara optimal, ketimpangan akses pasar, dan rendahnya adopsi teknologi tepat guna pada rantai nilai hulu. Penelitian ini bertujuan mengembangkan model integratif sinergi antara Badan Usaha Milik Kampung (BUMK), Teknologi Tepat Guna (TTG), dan penguatan rantai nilai sebagai instrumen kemandirian ekonomi berbasis desa, dengan studi kasus Kabupaten Berau, Kalimantan Timur. Kebaruan penelitian terletak pada perumusan model "Konvergensi Rantai Tiga (Triple-Chain Convergence)", yang mengintegrasikan tiga rantai sekaligus, yaitu rantai produksi (hulu), rantai teknologi (proses), dan rantai pasar (hilir), ke dalam satu kerangka tata kelola BUMK yang terukur, sehingga berbeda dari penelitian sebelumnya yang umumnya membahas ketiga aspek tersebut secara parsial. Metode yang digunakan adalah pendekatan kualitatif deskriptif-analitis melalui studi dokumen, triangulasi data sekunder resmi (Kementerian Desa dan

Pembangunan Daerah Tertinggal, BPS, serta Dinas Pemberdayaan Masyarakat dan Kampung Kabupaten Berau), dan tinjauan sistematis terhadap 18 artikel jurnal terindeks SINTA dan Scopus yang diterbitkan pada periode 2022–2025. Hasil penelitian menunjukkan bahwa BUMK di Kabupaten Berau, yang berjumlah delapan unit percontohan aktif pada Bumdes Expo Kalimantan Timur 2024, menghadapi kendala utama berupa rendahnya efisiensi rantai nilai hulu dan keterbatasan literasi digital, namun memiliki potensi peningkatan omzet yang signifikan apabila Teknologi Tepat Guna (TTG) dan platform digital diterapkan secara bersamaan. Kontribusi teoritis penelitian ini adalah memperluas kerangka Community-Led Development dengan dimensi spiritual-etis melalui perspektif tasawuf ekonomi, yang memposisikan BUMK bukan sekadar entitas administratif, melainkan sebagai amanah (wasilah) keberkahan kolektif. Implikasi praktisnya adalah penyusunan rekomendasi kebijakan yang konkret bagi Pemerintah Kabupaten Berau dalam merancang peta jalan penguatan BUMK berbasis klaster produk unggulan.

Kata Kunci: BUMK; Teknologi Tepat Guna; rantai nilai; kemandirian ekonomi; Kabupaten Berau.

1. INTRODUCTION

The village economy in Indonesia holds a paradox that has long been the focus of the local development literature: the wealth of natural resources and abundant local wisdom is inversely proportional to the low capacity of the village to control the added value of these resources (Ayuningtias & Rosid, 2026). This phenomenon is most evident in the value chain of village superior products, where villages generally only play the role of providers of low-value-added raw materials, while processing and distribution processes that provide significant profit margins are controlled by actors outside the village (Ayuningtias & Rosid, 2026). This condition causes economic value leakage, which makes development at the grassroots level run slowly.

Village-Owned Enterprises (BUMK), or in the national nomenclature known as Village-Owned Enterprises (BUMDes), are designed as a locomotive for transformation from dependence to village economic independence (Ayuningtias & Rosid, 2026; Hadin et al., 2024). Nationally, the urgency of institutional strengthening of BUMDes is increasingly urgent as the Industrial Revolution 4.0 era enters, which demands digital-based governance (Tarlani et al., 2023). However, a study of BUMDes governance in Indonesia shows that digitalisation has not had a significant impact on the development of the village economy evenly, because many BUMDes do not have adequate institutional capacity and digital literacy (Tarlani et al., 2023).

Berau Regency, East Kalimantan, represents a relevant context to examine this issue empirically. At the 2024 East Kalimantan Bumdes Expo, eight BUMKs from Berau Regency appeared to introduce the village's superior products, including BUMK Lolong Usaha Itam from Inaran Village, BUMK Bawa'Kemet from Bena Baru, BUMK Lanuk Permai from Long Lanuk, BUMK Sumber Cemerlang from Tubaan, and BUMK Unggul Bersama from Buyung-Buyung, with a number of BUMK winning the 2024 Building Village Award (Prokopim Berau, 2024). The Berau Regency Government also strengthens the institution of BUMK through the provision of a secretariat building so that administrative, financial, and business coordination management runs more professionally and transparently (ANTARA Kaltim, 2026). At the level of digital infrastructure, the expansion of the 4G BTS network and BAKTI Komdigi internet access to 3T areas such as Maratua Island also opens up digital literacy opportunities and assistance for MSMEs/BUMDes in the coastal area of Berau (East Kalimantan Review, 2026).

Previous research has tended to examine the three pillars—superior products, markets, and technologies—partially. The study of Nugroho and Sari (2023), for example, focuses on triple helix synergy in the development of local potential-based SOEs in Berau without including the dimension of measurable appropriate technology, while the study of Firdaus, Nugroho, and Aulia (2022) focuses on a participatory appropriate technology procurement model without explicitly linking it to value chain strategies and digital market expansion. This gap is the starting point of this research's novelty: the need for an integrative framework that unites the three pillars in one coherent and measurable model of BUMK governance.

Based on this description, this study aims to: (1) map the existing conditions of the value chain of village superior products in Berau Regency; (2) analyze the role of appropriate technology in overcoming the upstream value chain bottleneck; and (3) formulate an integrative model of "Triple-Chain Convergence" as a novelty contribution to SOE governance that synergizes production chains, technology chains, and market chains simultaneously towards measurable and sustainable village economic independence.

2. LITERATURE REVIEW

2.1 Economic Independence of Villages and Village-Owned Enterprises

Village economic independence is not interpreted as economic isolation, but as the capacity of the village to manage its resources sovereignly, control its own product value chain, and build resilience to external economic shocks (Ayuningtias & Rosid, 2026). BUMK is positioned as a village corporation with a social spirit and a forum for economic ta'awun (help-help), not just an administrative instrument for rent-seeking (Ayuningtias & Rosid, 2026). This perspective is in line with the finding that the existence of village-owned enterprises is positively correlated with the achievement of the Development Village Index (IDM) in various regions of Indonesia, although the degree of its contribution is largely determined by the quality of governance and the capacity of human resources to manage it (Hadin et al., 2024).

The juridical basis of BUMK is sourced from Law Number 6 of 2014 concerning Villages as updated by Law Number 3 of 2024, which provides formal legitimacy to the establishment of business entities whose capital is wholly or mostly owned by villages/villages, as well as Regulation of the Minister of Villages Number 4 of 2015, which regulates the scope of business cooperation between BUMDes and external parties.

2.2 Value Chain of Village Superior Products

The value chain of village superior products is a series of integrated activities from the provision of raw materials, production, distribution, to final consumption (Ayuningtias & Rosid, 2026). The general characteristics of the village product value chain in Indonesia are characterised by the dominance of micro actors, high dependence on external raw materials, weak bargaining positions of producers, and limited access to technology and financing, so that added value is enjoyed more by actors outside the village (Ayuningtias & Rosid, 2026). The Kurniawan and Siregar (2024) study on cost efficiency through collective purchasing in coastal community-owned enterprises confirms that the consolidation of raw material procurement at the SOE level is able to significantly reduce input costs compared to individual procurement by individual MSMEs.

2.3 Appropriate Technology as a Production Enabler

Appropriate Technology (TTG) is defined as a technology that is developed with regard to the suitability of local conditions, economic affordability, ease of operation and maintenance, and environmental and social sustainability (Kumar, Smith, & Bansal, 2023, in Ayuningtias & Rosid, 2026). Identification of TTG needs should ideally use a participatory approach that directly involves producers, SOE managers, and technical assistants (Rahayu, Hidayat, & Putra, 2024, in Ayuningtias & Rosid, 2026). The service study at BUMDes Pakapasan Girang shows that the implementation of appropriate technology for water dredge control for the optimisation of BUMDes aquaculture has been successfully carried out through a collaborative empowerment model between Karang Taruna and BUMDes, emphasising that the success of TTG is highly determined by the degree of involvement of local communities in the procurement and operation process (IAI Sahid Research and Community Service Institute, 2025).

2.4 Market Digitalisation and BUMK Network Expansion

UNCTAD research (2023) noted that MSMEs that adopt digital technology have up to 40 per cent higher revenue growth compared to businesses that have not been digitised, while a World Bank report states that digitalisation has the potential to increase MSME turnover by up to 80 per cent in one year (quoted in the East Kalimantan Review, 2026). A case study of the digitisation of BUMDes through the development of a product catalogue website and WhatsApp integration for transactions shows real achievements in the form of improving the technical competence of management and the independence of marketing operations (Journal of Education and Community Service, 2024). However, the study of BUMDes governance in response to the Industrial Revolution 4.0 confirms that the impact of digitalisation on the village economy nationally is not significant due to institutional capacity constraints (Tarlani et al., 2023), so an integrative model is needed that does not only stop at the provision of digital tools, but integrates them with strengthening upstream value chains and production technologies.

2.5 Framework of Thinking: Triple-Chain Convergence Model

Based on the above literature review, this study proposes the conceptual framework of "Triple-Chain Convergence" as an original contribution. This model departs from the argument that a single intervention on one of the chains (production, technology, or market) without alignment with the other two chains tends to result in unsustainable partial improvements. The production chain (upstream) includes mapping village superior products (PUK) and strengthening the supply of local raw materials; the technology chain (process) includes the adoption of TTGs for efficiency and standardisation; and the (downstream) market chain includes marketing digitalisation and distribution network expansion. BUMK is positioned as a convergence node that unites the three chains in one governance unit, in line with the view that BUMK functions as a testament to the management of the village's collective economic mandate (Ayuningtias & Rosid, 2026).

Chain	Focus of Intervention	Key Indicators	The Role of BUMK
Production Chain (Upstream)	PUK mapping, local raw material partnerships	Local supply volume (%)	Aggregators & Offtakers
Technology Chain (Process)	Standardization, Standardization	Post-harvest loss rate (%)	Technology transfer facilitator
Market Chain (Downstream)	Digitalisation, distribution expansion	Revenue growth (%/year)	Digital marketplace integrator

Figure 1. Conceptual Framework of the Triple-Chain Convergence Model

Source: Processed by researchers (2026), synthesised from Ayuningtias & Rosid (2026), Firdaus et al. (2022), and Tarlani et al. (2023)

3. METHODS

This study uses a descriptive-analytical qualitative approach with a single case study design in Berau Regency, East Kalimantan. The selection of this design is based on the characteristics of available data in the form of policy documents, local government performance reports, and related scientific publications, thus allowing for an in-depth analysis of complex and multifaceted contexts (Creswell & Creswell, 2023).

3.1 Data Collection Sources and Techniques

Data was collected through three main sources that were triangulated: (1) official secondary data from the Ministry of Villages, Development of Disadvantaged Regions, and Transmigration of the Republic of Indonesia and the Central Statistics Agency; (2) policy

documents and performance reports of the Berau Regency Government, including the Berau Community and Village Empowerment Office (DPMK) and the Cooperatives, SMEs, Industry and Trade Office; and (3) a systematic review of 18 Sinta 2–5 indexed journal articles and international databases published in 2022–2025 that discuss BUMDes/BUMK, appropriate technology, and village value chains. The study of primary documents in the form of the book *Village Economic Revolution: Integrative Strategies for Empowering BUMK in Driving the Local Economy Through the Synergy of Superior Products, Markets, and Technology* (Ayuningtias & Rosid, 2026) is the main reference because it contains contextual primary data of Berau Regency compiled by the author who also serves as a Policy Technical Analyst in the Field of Community Economic Business Empowerment, Natural Resources, and Appropriate Technology of DPMK Berau.

3.2 Data Analysis Techniques

Data analysis used the interactive model of Miles, Huberman, and Saldaña, which consisted of data condensation, data presentation, and conclusion drawn/verification on a cyclical basis. The validity of the data is strengthened through source triangulation (comparison of government, academic, and official media data) and theoretical triangulation (comparison of findings with at least two different theoretical frameworks, namely Community-Led Development and Value Chain Management). All references are managed using Mendeley's reference management application to ensure citation consistency and avoid duplication or plagiarism.

3.3 Triple-Chain Convergence Analytical Framework

The condensed data is mapped into three chains (production, technology, market) using an analytical matrix to identify bottlenecks in each chain as well as inter-chain interactions. The results of this mapping are the basis for the formulation of an integrative model and policy recommendations presented in the results and discussion sections.

4. RESULTS AND DISCUSSIONS

4.1 Profile and Distribution of BUMK in Berau Regency

Based on data from the 2024 East Kalimantan Bumdes Expo, eight BUMKs from Berau Regency participated in introducing village superior products from a total of 50 exhibition booths, which were attended by 10 districts/cities throughout East Kalimantan (East Kalimantan, 2024; Prokopim Berau, 2024). Table 1 presents the profiles of the eight SOEs along with their superior product bases.

Table 1. Profile of BUMK of Berau Regency at the 2024 East Kalimantan Bumdes Expo

Name of BUMK	Origin of the Village	Product/Sector Base
The Black Widow	Inaran Village	Locally processed products
Squirrelly	Bena Baru	Handicrafts & agro
Lanuk Permai	Long Lanuk	Village Superior Products
Excellent Resources	Tubaan	Local agroindustry
Excelling Together	Squirting	Village Superior Products

Source: Processed from Prokopim Berau (2024)

The participation of these eight BUMKs confirms that Berau Regency already has an active institutional base, but the scale of participation—eight out of dozens of villages in

Berau—indicates that the maturity level of BUMKs still varies greatly between villages, in line with the national pattern where of the total registered BUMDes, only a small percentage have "advanced" status (Kalimantan News, 2024, reports that 29 out of 1,705 BUMDes have advanced status in South Kalimantan as a comparison regional).

4.2 Upstream Value Chain Critical Points: A Raw Material Case Study

The analysis of the value chain of village superior products in Berau confirms the national pattern identified by Ayuningtias and Rosid (2026), namely the high dependence on external raw materials and the weak bargaining position of village producers. The case study of "the high cost of batik due to raw materials" documented in the national value chain study illustrates a general pattern where village business actors buy raw materials at retail prices from outside the village because they do not have a collective procurement mechanism (Ayuningtias & Rosid, 2026). Data from the Ministry of Maritime Affairs and Fisheries (2024) show that post-harvest losses in the small-scale capture fisheries sector still reach 20–30 per cent, mainly due to suboptimal handling and preservation techniques—a finding that is relevant for coastal villages in Berau such as Bohesilian Village in Maratua District, which relies on the marine and fisheries sector (Bisnis.com, 2026).

Kurniawan and Siregar's (2024) study on input cost efficiency through collective purchasing in coastal community-owned enterprises is a relevant current empirical reference: the implementation of a collective raw material procurement scheme by community business entities has been proven to reduce input costs and strengthen producers' bargaining positions against external suppliers. These findings strengthen the argument that SOEs in Berau need to shift from a passive role as a seller of finished products to an active role as an aggregator of raw materials in the upstream chain.

4.3 The Role of Appropriate Technology in Overcoming Production Bottlenecks

The service study at BUMDes Pakapasan Girang shows a collaborative empowerment model for the implementation of appropriate technology to control water turbidity for the optimisation of BUMDes aquaculture, which involves Karang Taruna as a technical implementing partner (IAI Sahid Research and Community Service Institute, 2025). This kind of collaborative model is relevant to be adapted in Berau, considering that the fisheries and marine sectors are one of the economic bases of coastal villages that face similar technical constraints. In addition, the expansion of BAKTI Komdigi's telecommunication infrastructure to 3T areas such as Maratua Island has opened 4G BTS that serve hundreds of users with high network reliability, as well as being a technical prerequisite for the adoption of digital technology in the market chain (Bisnis.com, 2026; East Kalimantan Review, 2026).

Table 2 visualizes the projection of potential improvement in the performance indicators of BUMK Berau if appropriate technology and digitalization are adopted simultaneously, synthesized from the empirical findings of UNCTAD (2023) and the World Bank as cited by the East Kalimantan Review (2026), as well as data on foreign tourist visits to Maratua Island which increased from 220 people in 2020 to 4,294 people in 2024 as a proxy indicator of regional economic growth based on digital connectivity (East Kalimantan Review, 2026).

Table 2. Indicators of the Impact of Technology Adoption and Digitalisation on the Performance of MSMEs/BUMK

Categories	Value	Rod Visualization
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Digitised MSME income growth (UNCTAD, 2023)	40 %	
Potential to increase MSME turnover (World Bank estimate)	80 %	
Post-harvest losses of small-scale fisheries (KKP, 2024)	25 %	
Maratua foreign tourist growth 2020→2024 (proxy ×19.5)	100 %	

Source: Processed from UNCTAD (2023) and World Bank in East Kalimantan Review (2026); Ministry of Maritime Affairs and Fisheries (2024); Bisnis.com (2026). Note: The foreign tourist score is normalised to a scale of 100 for comparative visualisation purposes.

The data in Table 2 confirm that technological and digital interventions have a substantial impact on the MSME/MSE level, but the high post-harvest losses (20–30 per cent) show that market digitalisation alone is not enough without strengthening production technology in the upstream chain—this is the core argument of the Triple-Chain Convergence model proposed by this study.

4.4 Institutional Strengthening: Secretariat and Governance of BUMK

The Berau Regency Government, through the Regency Secretary, emphasised the importance of the existence of the BUMK/BUMKam secretariat building as a professional, transparent, and sustainable centre for village business management, in order to support operations, administration, finance, and coordination of business activities (ANTARA Kaltim, 2026). This policy is consistent with the findings of Tarlani, Saraswati, Akliyyah, R, and Dananjaya (2023) that the governance indicators of BUMDes in responding to the Industrial Revolution 4.0 era are largely determined by institutional readiness, not solely the availability of technology. In addition, the momentum of promoting BUMK Berau products at national events such as the 33rd National Family Day (Harganas) at the East Kalimantan level, which is centred in Berau, is also a non-digital marketing instrument that expands the exposure of village products to a wider audience (Berau Portal, 2026).

4.5 Synthesis: Triple-Chain Convergence Model for Berau

The synthesis of the findings in sections 4.1–4.4 results in an integrative model visualised in Figure 2. This model emphasises that BUMK Berau needs to move from a silo approach (handling production, technology, or marketing separately) to a convergent approach where all three chains are managed in the same governance unit, with the BUMK secretariat as the coordination node.

Stages	Production Chain	Technology Chain	Market Chain	BUMK Node
Stage 1 (0–6 months)	Mapping of PUK & local suppliers	TTG needs assessment	Mapping of existing market channels	Establishment of the secretariat
Stage 2 (6–12 months)	Collective procurement partnerships	Priority TTG pilot (e.g. drying/cooling)	Digital catalogue creation & social media	Manager training
Stage 3 (12–24 months)	Medium-term supply contracts	TTG replication to other village clusters	Marketplace integration & retail partnerships	Evaluation & scaling

Figure 2. Roadmap of Three Chain Convergence in BUMK Berau Regency

Source: Developed by the researcher (2026) based on the synthesis of Ayuningtias & Rosid (2026), Kurniawan & Siregar (2024), and ANTARA Kaltim (2026)

The novelty of this research lies in the affirmation that the success of one chain without convergence with the other two chains results in fragile improvement. For example, marketing digitalisation without strengthening the production chain will only accelerate the depletion of low-quality products due to high post-harvest losses; On the contrary, the adoption of production technology without a digital market strategy will result in a surplus of products that are not absorbed by the market. It is this argument that distinguishes this research's contribution from precedent studies that tend to emphasise one of the three dimensions.

4.6 Critical Discussion and Limitations

Although the Triple-Chain Convergence model offers a coherent integrative framework, this study has methodological limitations that need to be critically acknowledged. First, the data used is secondary and mostly comes from media reports and policy documents, so it has not been validated through direct quantitative measurement of the financial performance of SOEs in the field. Second, generalisation of the model to all villages in Berau Regency requires caution given the significant geographical variation between coastal villages (such as Maratua) and inland villages, which have different value chain characteristics and technological challenges. Third, the financing aspects and fiscal incentive schemes for the implementation of TTG have not been discussed in depth and require further research that focuses more on the village microfinance aspect.

5. CONCLUSION

This study concludes that the economic independence of villages in Berau Regency requires an integrative approach that synergises production chains, technology chains, and market chains simultaneously through BUMK as a convergence node. The findings show that the eight pilot SOEs in Berau have shown positive initial institutional capacity, but still face critical points in upstream value chain efficiency and high post-harvest losses, while the potential for market digitalisation has not been adequately balanced with the strengthening of production technology. The Triple-Chain Convergence model proposed in this study contributes novelty in the form of a governance framework that integrates the three chains in one measurable roadmap, different from the precedent approach that tends to be partial.

Based on these findings, this study recommends: first, the Berau Regency Government needs to expand the procurement scheme for collective raw materials based on BUMK to suppress economic value leakage in the upstream chain; Second, the priority of investment in

appropriate technology should be directed to post-harvest technology (drying and cooling) considering the high losses in the fisheries and agriculture sectors of coastal villages; third, strengthening the BUMK secretariat needs to be accompanied by a sustainable digital literacy program so that the adoption of online marketing platforms runs effectively; and fourth, further research is recommended using quantitative methods or mixed-methods with direct surveys of SOE managers to validate the Triple-Chain Convergence model empirically and measure its impact on Village Original Income more precisely.

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