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VALUE CHAIN ANALYSIS AND VALUE CREATION OF *U NEULHEU*: AN ENTERPRISE-CENTERED CASE STUDY OF SANGRAI NATURAL TEUNOM MSME, ACEH JAYA

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Abstract

U Neulheu is a traditional Acehnese ground roasted-coconut seasoning whose economic value is created through small-scale processing and local distribution. This study conducted an enterprise-centered value-chain analysis of Sangrai Natural U Neulheu Teunom MSME, Aceh Jaya. Field observation and semi-structured interviews with the owner and three production workers were undertaken in August-September 2025, while the quantitative analysis used January-December 2025 production and cost records subsequently compiled for the final dataset. The analysis covered actor functions, product-information-financial flows, governance, cost structure, simple gross added value, the revenue-cost ratio, and raw-material price sensitivity. The chain comprised individual coconut suppliers, the MSME processor, eight outlets, and final consumers. In 2025, 9,600 coconuts supported sales of 2,075 kg. At IDR 50,000/kg, production cost was IDR 26,870.84/kg, gross added value was IDR 30,799.04/kg, processing surplus after depreciation was IDR 23,129.16/kg, and the R/C ratio was 1.86. Under a ceteris paribus coconut-price increase from IDR 1,900 to IDR 4,000 per fruit, cost rose to IDR 36,586.50/kg, surplus declined to IDR 13,413.50/kg, and the R/C ratio fell to 1.37. The main vulnerabilities were dependence on one milling machine, weather-sensitive drying, flood exposure, and incomplete downstream market records. Because suppliers, outlets, and consumers were not interviewed directly, quantitative value-capture findings apply only to the processor.

Keywords: *agroindustry; MSME; roasted coconut; value chain; value creation*

1. INTRODUCTION

U Neulheu, or ground roasted coconut, is a traditional Acehnese seasoning produced by drying, roasting, milling, and packaging mature coconut. The transformation gives the raw material a specific culinary function, greater convenience, and a marketable form. Previous research in Aceh has examined household income and added value (Saleh et al., 2022), marketing channels (Ramdhani et al., 2023), roasting and milling technology (Hartuti et al., 2023), drying and roasting effects on product quality (Hartuti et al., 2025), storage rancidity (Arpi, 2014), characteristics of coconut-processing enterprises (Lubis et al., 2022), and production-capacity and digital-marketing support (Saleh et al., 2024). These studies establish the technical and commercial relevance of U Neulheu, but production, marketing, quality, and enterprise performance have generally been treated as separate issues.

Aceh Jaya Regency provides a substantial raw-material base for coconut processing. Tables 5.2.1 and 5.2.2 of Kabupaten Aceh Jaya dalam angka 2024 report 5,207 ha of coconut area and 2,051 tons of coconut production in the regency. Teunom District accounted for 904 ha and 432 tons, equivalent to 21.06% of regency production (Badan Pusat Statistik Kabupaten Aceh Jaya, 2024, pp. 212, 216). This local resource base supports household agroindustries such as Sangrai Natural U Neulheu Teunom MSME, which converts coconuts into packaged seasoning and markets the product through local outlets.

The economic performance of such an enterprise depends not only on processing yield or income, but also on coordination among raw-material suppliers, the processor, outlets, and consumers. Value-chain analysis links actor functions, value addition, network structure, information and financial flows, governance, bargaining relationships, and upgrading constraints (Gereffi et al., 2005; Trienekens, 2011). Coconut value-chain studies likewise emphasize coordinated production, risk management, market access, and sustainability rather than isolated enterprise indicators (Citraresmi & Jusuf, 2019; Moreno et al., 2020; Suud et al., 2021; Zainol et al., 2023; Sanusi et al., 2024; Wahyudi et al., 2025).

A specific gap remains in the U Neulheu literature. Earlier studies have not integrated actor mapping; product, information, and financial flows; enterprise-level cost and value-creation calculations; bargaining

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position; and operational-risk evidence within one analytical account. The novelty of this study is therefore an enterprise-centered value-chain analysis that combines these dimensions for a traditional Acehnese roasted-coconut product. The term enterprise-centered is important: the study follows the immediate chain connected to one processor, but it does not claim to quantify margins or value capture for the entire upstream-to-consumer chain.

Accordingly, this study aimed to analyze the value chain and value creation of U Neulheu at Sangrai Natural U Neulheu Teunom MSME. The specific objectives were to: (1) map actors and product, information, and financial flows; (2) quantify the processor's cost structure, gross added value, processing surplus, revenue-cost ratio, and sensitivity to coconut-price increases; and (3) assess governance, bargaining relationships, operational risks, and feasible upgrading priorities.

2. MATERIALS AND METHODS

2.1 Research object and analytical boundary

The unit of analysis was Sangrai Natural U Neulheu Teunom MSME in Rambong Payong Village, Teunom District, Aceh Jaya Regency. The analytical boundary began with the enterprise's procurement of mature coconuts from individual local suppliers, covered all in-enterprise processing activities, and extended to delivery through eight outlets and the reported connection to final consumers. Suppliers, outlets, and consumers were mapped as adjacent actors, but they were not direct interview units. The findings should therefore be interpreted as a single-enterprise case and not as a census of U Neulheu businesses in Aceh.

The observed processing inputs comprised coconuts, paid labor, plastic and cup packaging, seals, tape, fuel, LPG, electricity, oil, and transport-related operating inputs. Production equipment included a coconut grater, milling machine, sealer, plastic heater, tarpaulin, stove frame, wok, spatula, stainless-steel basin, scales, and gas cylinders. The cost calculation included recorded raw-coconut expenditure, paid labor for three production workers, packaging, other operating inputs, and aggregate equipment depreciation. Owner-management time, unpaid family labor, land or building costs, financing costs, tax, risk cost, and any unrecorded marketing expenditure were not included; consequently, the reported processing surplus is not equivalent to comprehensive accounting profit.

2.2 Study design and data collection

A descriptive-analytical single-case design was used because the research question required an in-depth examination of one information-rich enterprise, its internal transformation process, and the immediate relationships surrounding it. The design combined value-chain mapping with enterprise financial analysis and governance interpretation based on the frameworks of Gereffi et al. (2005) and Trienekens (2011).

The observation and interview stage was conducted in August-September 2025. The final quantitative dataset comprised the enterprise's January-December 2025 production and cost records that were subsequently compiled for manuscript analysis. Thus, the October milling-machine incident and the December flood-related interruption reported in the results came from retrospective monthly records rather than direct observation during the August-September field visit.

Four internal key informants were selected purposively: the owner and three paid workers directly involved in peeling, grating, drying, roasting, milling, weighing, and packaging. Semi-structured interview themes included input procurement, production sequence, labor allocation, output and sales recording, outlet relationships, price setting, payment flows, equipment constraints, weather exposure, and disruption events. Interview duration was not formally timed or standardized, which limits exact procedural replication. Information on suppliers and outlets was obtained from the owner, the outlet list, and business records; it was not independently verified through direct interviews with those actors.

The business documents reviewed included monthly production and sales records, raw-coconut purchases, labor payments, packaging expenditure, other operating costs, the recorded aggregate depreciation amount, and the list of distribution outlets. Data quality was checked by comparing owner explanations, worker descriptions, direct observation of the process, and the arithmetic consistency of input, output, revenue, and cost records. Secondary sources included official coconut statistics and relevant studies on coconut value chains, agroindustry, product quality, supply-chain risk, and upgrading.

2.3 Analytical procedure and calculation formulas

Value-chain mapping identified the sequence and functions of actors. Value-chain analysis then examined how product, information, and money moved; where transformation occurred; how costs and prices were

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formed; which actors controlled information or operating decisions; and which constraints limited upgrading. Value creation refers to the utility and economic value generated by transforming raw coconut into packaged U Neulheu. Value capture refers to the portion retained by a specific actor. Because supplier and outlet margins were unavailable, quantitative value capture was calculated only for the processor.

The financial calculations used a simple enterprise-level subtractive approach, not the full Hayami value-added procedure. Gross added value excluded raw materials and non-labor intermediate inputs from the selling price; labor compensation and depreciation were shown separately. The formulas were:

(1) TR = P x Q. TR is total revenue, P is the MSME selling price per kilogram, and Q is annual output sold.

(2) TC = C_rm + C_lab + C_pack + C_op + D. TC is recorded total production cost; the components are raw material, paid labor, packaging, other operating inputs, and depreciation.

(3) TC_kg = TC / Q. TC_kg is production cost per kilogram; all per-kilogram results use Q = 2,075 kg as the denominator.

(4) D = sum[(P_i - S_i) / L_i]. This is the straight-line expression for equipment depreciation. The enterprise supplied only an annual aggregate of IDR 1,515,000; item-level purchase dates, residual values, and useful lives were unavailable for independent recomputation, so the recorded aggregate was retained.

(5) CR = Q / N and OV_c = CR x P. CR is output conversion per coconut, N is the recorded number of coconuts, and OV_c is output value per coconut.

(6) GVA_kg = P - C_rm,kg - C_pack,kg - C_op,kg. GVA_kg is simple gross added value per kilogram before labor and depreciation.

(7) PS_kg = P - TC_kg. PS_kg is processing surplus after recorded depreciation; it should not be interpreted as comprehensive net profit.

(8) R/C = TR / TC. An R/C value greater than 1 indicates that recorded revenue exceeds recorded production cost.

A deterministic ceteris paribus sensitivity test replaced the base coconut price of IDR 1,900 per fruit with IDR 4,000 while holding output, selling price, labor, packaging, operating costs, and depreciation constant. This scenario measures exposure to raw-material price changes; it is not a forecast and does not capture possible output or selling-price responses.

Bargaining position was interpreted qualitatively using four indicators: availability of alternative partners, switching costs, price-setting authority, and dependence on actor-specific information or market access. The labels used in the results are therefore indicative classifications based on the available evidence, not statistically estimated bargaining-power scores.

2.4 Methodological limitations

The study has four principal methodological limitations. First, it covers one enterprise, so analytical insights cannot be generalized statistically to all U Neulheu processors. Second, only the owner and workers were interviewed directly; supplier, outlet, and consumer accounts were not collected. Third, outlet purchase prices, retail prices, payment terms, restocking frequency, product-return arrangements, and supplier margins were not documented. Fourth, the cost dataset primarily contains recorded explicit costs and an aggregate depreciation figure. These limitations restrict full-chain value-capture measurement and require cautious interpretation of governance and profitability.

3. RESULTS AND DISCUSSION

3.1 Actor structure and enterprise-centered governance

The immediate chain connected to the enterprise comprised individual local coconut suppliers, the MSME processor, eight independent outlets listed by the enterprise, and final consumers. The exact number of suppliers was not systematically recorded. The outlets performed retail or local distribution functions, but their locations, types, and restocking frequency were not available in a complete dataset. The MSME was the best-documented actor because the owner and workers were interviewed directly and the processor's production and cost records were available.

Table 1. Actors, functions, governance interpretation, and evidence basis

Actor	Organizational form and function	Value/cost and indicative governance position	Evidence basis and boundary
Coconut suppliers	Individual local suppliers provide mature coconuts and raw-material continuity.	Revenue comes from coconut sales. Position is indicatively moderate because alternatives exist, but seasonal price and quality affect the processor.	Owner interview and purchase records; supplier count, costs, and margins were not directly verified.

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Actor	Organizational form and function	Value/cost and indicative governance position	Evidence basis and boundary
MSME processor	Owner-managed enterprise with three paid workers; grates, dries, roasts, mills, weighs, packages, schedules production, and delivers products.	Captures the documented processing surplus and controls transformation and its own selling price, but depends on one mill, weather, working capital, and outlet access.	Direct owner/worker interviews, observation, and production-cost records.
Outlets/distributors	Eight independent outlets display and resell packaged U Neulheu and connect the enterprise to consumers.	Possess downstream demand information. Margin and bargaining strength cannot be quantified because purchase and retail prices were unavailable.	Owner report and outlet list only; no direct outlet interviews.
Final consumers	Purchase and use U Neulheu as a ready-to-use seasoning.	Influence demand through preferences for taste, price, convenience, and availability.	Inferred from the reported sales channel; consumers were not surveyed.

Source: primary data and business records, processed (2025).

This actor structure is short, but its coordination is not trivial. The processor is the central transformation node and the only actor for which value creation can be quantified. In governance terms, transactions appear predominantly market-based, with relational elements arising from repeated communication and trust between the enterprise and outlets. The evidence is not sufficient to assign a formal global-value-chain governance type to every transaction, but it supports analysis of coordination, information asymmetry, and dependency (Gereffi et al., 2005; Trienekens, 2011).

3.2 Product, information, and financial flows

Product moved downstream from raw coconuts to grated coconut, dried and roasted material, milled U Neulheu, packaged product, outlets, and consumers. This physical and functional transformation is the foundation of enterprise-level value creation because it changes the product's form, use, convenience, and readiness for sale. Similar coconut-processing studies show that processing technology and additional inputs can substantially increase value beyond the raw commodity (Mardesci et al., 2021; Abdurrasyid et al., 2025).

Information moved in both directions. Suppliers reportedly communicated availability, quality, and price; the MSME communicated raw-material requirements and purchase decisions. The MSME informed outlets about availability and delivery, while outlets reportedly communicated restocking needs and general consumer response. However, no standardized outlet sales reports or consumer-feedback database existed. This asymmetry leaves the outlets closer to demand information, while the processor retains superior knowledge of cost, capacity, and production risk.

Financial flow moved upstream: consumers paid outlets, outlets paid the MSME, and the MSME paid for coconuts, labor, packaging, energy, and transport. Because payment terms, outlet purchase prices, retail prices, supplier costs, and actor-specific margins were not documented, the analysis does not infer the amount of value captured by outlets or suppliers. It establishes only their financial roles and quantifies the processor's recorded cost and surplus.

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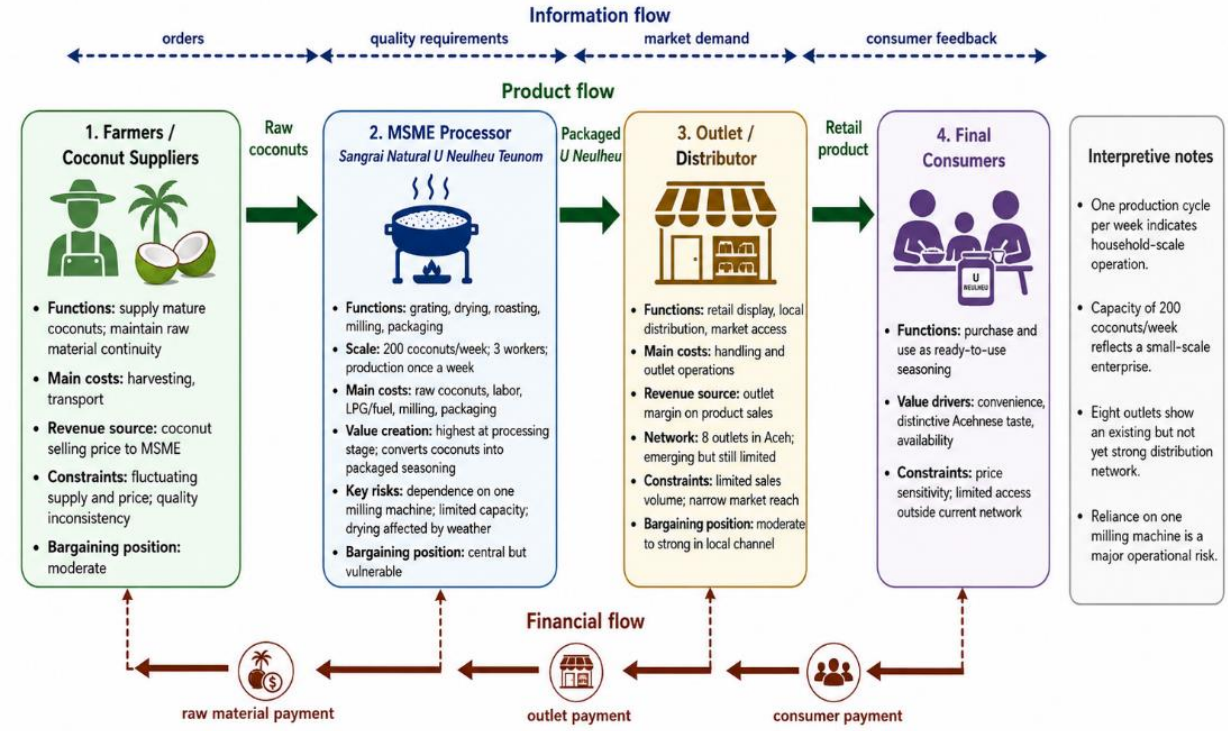
Figure 1. Value Chain Map of U Neulheu Roasted Coconut in Aceh

Case study: Sangrai Natural U Neulheu Teunom MSME



Source: adapted from field data and value-chain analysis framework.

3.3 Cost structure, value creation, and financial feasibility

The enterprise recorded sales of 2,075 kg in 2025. This annual output is the denominator for all per-kilogram calculations. At the MSME selling price of IDR 50,000/kg, total revenue was IDR 103,750,000. Recorded costs totaled IDR 55,756,997, consisting of IDR 54,241,997 in raw material, paid labor, packaging, and operating inputs plus IDR 1,515,000 in aggregate depreciation.

Table 2. Recorded cost structure and processing surplus in 2025

Component	Classification	Annual value (IDR)	Value (IDR/kg)	Share of selling price (%)
Selling price/revenue	Revenue	103,750,000	50,000.00	100.00
Raw coconuts	Variable input	18,240,000	8,790.36	17.58
Paid production labor	Variable/paid labor	14,400,000	6,939.76	13.88
Packaging	Variable input	13,800,000	6,650.60	13.30
Other operating inputs	Variable input	7,801,997	3,760.00	7.52
Equipment depreciation	Recorded fixed allocation	1,515,000	730.12	1.46
Total production cost	Recorded total cost	55,756,997	26,870.84	53.74
Processing surplus after depreciation	Revenue minus recorded cost	47,993,003	23,129.16	46.26

Note: per-kilogram values use 2,075 kg as the denominator; displayed values are rounded to two decimals. Owner-management time and other unrecorded implicit costs are excluded. Source: business records, processed (2025).

Raw coconut was the largest single recorded cost, but packaging was also material: packaging absorbed 13.30% of selling price, close to paid labor at 13.88%. Packaging should therefore not be treated as a minor overhead. Size rationalization, supplier comparison, and bulk or refill formats could improve efficiency, provided that product protection, food safety, shelf life, and consumer acceptance are maintained.

Table 3. Conversion, value-creation, and feasibility indicators

Indicator	Calculation basis	Result
Recorded coconut input	Raw-material purchase record	9,600 coconuts

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Indicator	Calculation basis	Result
Annual output sold	Sales record	2,075 kg
Output conversion	2,075 / 9,600	0.216 kg/coconut
Output value per coconut	0.216 x IDR 50,000	IDR 10,807.29/coconut
Simple gross added value	Selling price - raw material - packaging - other operating inputs	IDR 30,799.04/kg
Paid labor compensation	Paid labor / output	IDR 6,939.76/kg
Business surplus before depreciation	Gross added value - paid labor	IDR 23,859.28/kg
Processing surplus after depreciation	Selling price - recorded total production cost	IDR 23,129.16/kg
Revenue-cost ratio	IDR 103,750,000 / IDR 55,756,997	1.86

Source: business records, processed (2025).

The recorded 9,600 coconuts are equivalent to 48 average batches of 200 coconuts. The usual description of one batch per week indicates an operating rhythm rather than exactly 52 uninterrupted production weeks. Therefore, the analysis uses the actual annual raw-material total and does not extrapolate 200 coconuts across 52 weeks. The conversion result of 0.216 kg per coconut and the output value of IDR 10,807.29 per coconut demonstrate economic transformation, but the difference from the IDR 1,900 purchase price is not profit because labor, packaging, operating inputs, and depreciation must be paid.

The simple gross added value was IDR 30,799.04/kg. After paid labor and recorded depreciation, processing surplus was IDR 23,129.16/kg. The R/C ratio of 1.86 means that each IDR 1.00 of recorded production cost was associated with IDR 1.86 of revenue. This supports the financial viability of the recorded processing activity, but it does not measure full accounting profitability because several implicit and unrecorded costs were excluded.

Table 4. Ceteris paribus sensitivity to a coconut-price increase

Indicator	Base: IDR 1,900	Stress: IDR 4,000	Change/interpretation
Raw-coconut price (IDR/fruit)	1,900	4,000	+110.53%
Annual raw-material cost (IDR)	18,240,000	38,400,000	+20,160,000
Total cost (IDR/kg)	26,870.84	36,586.50	+9,715.66
Simple gross added value (IDR/kg)	30,799.04	21,083.37	-9,715.67
Processing surplus (IDR/kg)	23,129.16	13,413.50	-42.01%
R/C ratio	1.86	1.37	Remains >1, but narrows materially

Note: output, product price, labor, packaging, other operating costs, and depreciation are held constant. Source: authors' calculations from business records (2025).

The stress scenario reduced processing surplus by approximately 42.01% and lowered the R/C ratio from 1.86 to 1.37. The activity remained above the recorded-cost break-even threshold under the stated assumptions, but its buffer narrowed substantially. This result identifies raw-material price volatility as a major enterprise risk and supports supplier diversification, purchase scheduling, quality-price specifications, and periodic cost-based product-price review.

3.4 Production scale, capacity, and operational risk

The enterprise normally processed approximately 200 coconuts in a batch and operated around one batch per week. Interviews indicated that this rhythm was both capacity-driven and demand-driven: three workers completed all stages, drying depended on weather, equipment was simple, and production responded to outlet restocking. The schedule should therefore be understood as an adaptive household-enterprise pattern rather than fixed industrial throughput.

A second weekly cycle would increase nominal handling capacity from 200 to 400 coconuts per week, but the available evidence is insufficient to translate that scenario into output or revenue. Additional labor time, drying capacity, milling reliability, working capital, and confirmed outlet demand would all be required. The appropriate first step is therefore a monitored pilot cycle rather than an unqualified expansion claim.

Monthly records showed that output fell to 120 kg in October 2025 when the sole milling machine was damaged. No documented backup machine or formal external processing arrangement was available. In December 2025, the record showed zero production because flooding disrupted the business location. These events identify two distinct exposure pathways: a technical bottleneck after roasting and an environmental

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interruption affecting the production site. Weather-dependent drying adds a third pathway because prolonged rainfall may delay processing and change moisture conditions before roasting. These risks are consistent with evidence that coconut chains are sensitive to raw-material quality, continuity, process reliability, and climatic or logistical disruption (Citraresmi & Jusuf, 2019; Moreno et al., 2020; Wahyudi et al., 2025).

Table 5. Operational evidence and implications for value-chain continuity

Risk area	Recorded or reported evidence	Implication
Usual batch rhythm	Approximately 200 coconuts; three workers; weather-dependent drying; outlet-driven restocking	Household scale and limited capacity flexibility
Milling bottleneck	One machine; October output recorded at 120 kg following damage; no formal backup documented	Single-point failure interrupts post-roasting flow
Flood exposure	December record showed zero production due to flooding	Site-level continuity risk
Drying conditions	Drying relies on weather	Potential delay and product-moisture variability
Market data	Eight outlets but no complete restocking, retail-price, or outlet-sales database	Production planning remains reactive

Source: interviews, observation, and monthly business records, processed (2025).

3.5 Distribution, bargaining position, and information control

The eight outlets demonstrate an existing local route to market, but outlet count alone does not prove a strong distribution network. A stronger assessment would require outlet location, type, geographic coverage, restocking frequency, sales volume, payment timing, and return data. In the absence of those indicators, the network is described more cautiously as an emerging local distribution network.

The MSME's position toward suppliers is classified as indicative-moderate. The owner reported access to more than one local source, which reduces dependence on a single supplier, but seasonal availability, quality variation, and price increases constrain switching and negotiation. Toward outlets, the position is indicative-moderate-to-weak: the MSME controls production and its quoted selling price, whereas outlets control immediate access to consumers and hold superior information on sell-through. Written supply agreements, payment terms, return rules, and price-setting procedures were not documented, so the classification remains provisional.

Table 6. Information control, price influence, and dependency by actor

Actor	Principal information controlled	Price influence	Dependency
Suppliers	Availability, quality, and asking price of coconuts	Influence raw-material price; exact negotiation pattern undocumented	Processor can switch among local sources, but seasonality constrains choice
MSME processor	Production cost, capacity, recipe/process, inventory, and quoted product price	Controls transformation and enterprise selling price	Depends on suppliers, one milling machine, weather, and outlet access
Outlets	Restocking need, sell-through, and consumer response	Retail price and margin not documented; influence cannot be quantified	Depend on processor supply but retain downstream information advantage
Consumers	Preferences and willingness to purchase	Individual price control not measured	Depend on product availability through outlets

Source: enterprise interviews and records, interpreted using Gereffi et al. (2005) and Trienekens (2011).

The marketing configuration resembles producer-retailer-consumer and producer-intermediary-retailer-consumer channels reported for roasted coconut in Bireuen (Ramdhani et al., 2023). However, the present case differs by combining channel mapping with processor-level cost, value-added, feasibility, governance, and disruption analysis. Research in Bireuen also emphasizes value-chain development and local industrial characteristics (Lubis et al., 2022; Desparita et al., 2025), while broader coconut studies show that marketing options, management performance, sustainability indicators, and resilient coordination are central to upgrading (Arifin, 2022; Suud et al., 2021; Sanusi et al., 2024).

3.6 Analytical contribution: beyond chain mapping

Chain mapping identifies who participates and where the product moves. The present analysis goes further by linking that map to three directional flows, processor cost formation, simple gross added value, processing surplus, the R/C ratio, sensitivity to raw-material prices, information control, and documented disruption points. This integration is the principal analytical contribution of the case.

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The chain is functional because coconuts can be transformed and delivered to consumers, but it is vulnerable rather than demonstrably robust. Evidence of robustness would require backup capacity, stable and measured outlet performance, repeatable quality control, documented agreements, and recovery performance across multiple disruptions. The current case instead shows that relatively attractive processor-level value creation coexists with fragile equipment, environmental exposure, and incomplete market information.

3.7 Value-chain upgrading priorities

Upgrading should be staged so that market expansion does not exceed reliable processing capacity. Technological foresight for coconut agroindustry highlights the importance of process innovation, quality systems, value-added products, and coordinated market development (Grass Ramírez et al., 2023). For U Neulheu, the priorities in Table 7 translate those general directions into enterprise-level actions.

Table 7. Staged value-chain upgrading priorities

Upgrading type	Suggested horizon	Recommended direction
Process upgrading	0-6 months	Establish preventive maintenance; secure a backup milling option; pilot protected or mechanical drying; standardize drying moisture, roasting time, and batch records.
Product upgrading	0-12 months	Review packaging size and material efficiency without reducing protection; standardize labeling, shelf-life information, and quality checks; assess relevant food-safety and certification requirements.
Governance upgrading	0-6 months	Record supplier price/quality, outlet purchase and retail prices, restocking, payment timing, returns, and consumer feedback; develop simple written supply and outlet terms.
Functional upgrading	6-18 months	Build direct and digital sales, customer and reseller databases, and a monthly cost-capacity-sales dashboard; prior digital-marketing initiatives in Acehnese roasted coconut provide a relevant direction (Saleh et al., 2024).
Channel upgrading	6-18 months	Map the performance of the existing eight outlets before piloting additional souvenir shops, reseller networks, marketplaces, or nearby urban markets; expand only after capacity and continuity tests.

Source: authors' synthesis based on case evidence and relevant literature.

Process and governance upgrading should precede major channel expansion. A backup mill and improved drying address the two most direct operational constraints, while consistent outlet and supplier records reduce information asymmetry. Product and functional upgrading can then support differentiated packaging, quality assurance, direct sales, and digital marketing. Product-quality studies show that drying and roasting conditions materially affect sensory and physicochemical characteristics, while storage management is relevant to rancidity control (Arpi, 2014; Hartuti et al., 2025).

3.8 Study limitations and interpretive boundary

The evidence supports detailed conclusions about the processor, but only indicative conclusions about adjacent actors. No direct supplier, outlet, or consumer interview data were available, and margins outside the MSME were not measured. The cost analysis excludes several implicit costs, and the raw-material sensitivity test holds all other variables constant. Future studies should interview multiple suppliers and outlets, record actor-specific prices and payment terms, verify equipment depreciation item by item, and compare several U Neulheu processors to test whether the governance and cost patterns observed here recur across locations.

4. CONCLUSION

The enterprise-centered U Neulheu chain connected individual coconut suppliers, Sangrai Natural U Neulheu Teunom MSME, eight outlets, and final consumers. The MSME was the central transformation actor and the best-documented governance node. Product, information, and financial flows functioned across the chain, but incomplete downstream records and reliance on informal coordination limited the transparency of market performance.

For the processor, the available records showed a selling price of IDR 50,000/kg, production cost of IDR 26,870.84/kg, simple gross added value of IDR 30,799.04/kg, processing surplus after depreciation of IDR 23,129.16/kg, and an R/C ratio of 1.86. When coconut price was increased to IDR 4,000 per fruit in a ceteris paribus scenario, surplus declined to IDR 13,413.50/kg and the R/C ratio to 1.37. These results demonstrate processor-level value creation and raw-material-price exposure; they do not quantify value capture by suppliers or outlets.

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The immediate priorities are a backup milling arrangement, improved drying and process standards, packaging-cost review, systematic supplier and outlet records, and simple written trading arrangements. The main limitation is that direct evidence came only from the owner and production workers. Subsequent multi-actor and multi-enterprise research is needed before conclusions can be extended to the complete U Neulheu value chain in Aceh.

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