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Essential Elements for Community-Based Non-Timber Forest Products (NTFPs) Enterprises

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Abstract

Non-timber forest products (NTFPs) contribute substantially to rural livelihoods, food security, health, employment, cultural practices and household income, particularly in forest-dependent communities. However, converting NTFPs into sustainable community enterprises requires more than access to natural resources and growing market demand. This paper examines the essential elements required for viable and sustainable community-based NTFPs enterprises, with particular attention to sustainable supply, resource rights, governance, technology, management, finance, value addition and marketing. A systematic literature review covering 2000–January 2026 was undertaken using multidisciplinary academic databases and authoritative institutional sources. The review was informed by the PRISMA 2020 reporting framework and synthesized evidence according to ecological, institutional, technological, economic, financial and market dimensions. The findings indicate that enterprise success depends on the interaction of seven critical conditions: a sustainable and adequately assessed resource base; secure legal and customary access rights; effective community governance and equitable benefit-sharing; appropriate technology and value addition; competent management and innovation capacity; suitable finance; and reliable markets and value-chain relationships. Commercialization can generate incentives for conservation when communities capture meaningful economic benefits and have secure rights, but market expansion can also increase harvesting pressure where governance and monitoring are weak. The paper therefore proposes an integrated ecological–institutional–enterprise framework in which conservation, community livelihoods and commercial profitability are treated as mutually reinforcing objectives. Strengthening resource monitoring, community institutions, enterprise capabilities, tailored finance, technological upgrading and market access is essential for developing resilient NTFPs enterprises and inclusive forest-based bioeconomies in Eswatini and the wider Southern African region.

Keywords: Forest Enterprises; NTFPs; Sustainability; Value Chains; Community Development

Introduction

Non-timber forest products (NTFPs) encompass diverse biological products harvested from forests, other wooded land and trees outside forests, including wild foods, medicinal and aromatic plants, mushrooms, honey, fibres, resins, gums, seeds and nuts. The related term non-wood forest products (NWFPs) denotes biological products other than wood derived from these resources

(FAO, 2000, 2002, 2014). NTFPs contribute substantially to subsistence, food security, health, employment and household income, particularly among rural and forest-dependent communities, while functioning as livelihood safety nets during agricultural failure and economic shocks. They also provide inputs for enterprises engaged in processing, food, cosmetics, medicines, handicrafts and trade (Belcher et al., 2005; Ndoye and Sunderland, 2004; Shackleton et al., 2011). Nevertheless, commercialization does not inherently generate livelihood improvement or conservation benefits; outcomes are mediated by resource characteristics, production systems, markets, institutions, household strategies and value distribution along value chains (Belcher et al., 2005; Belcher and Schreckenberg, 2007). Dlamini and Geldenhuys (2009) established an important socioeconomic baseline, identifying 19 major NTFP-use categories. Subsequent scholarship has increasingly emphasized commercialization, value addition, innovation, inclusive value chains and forest-based bioeconomies (Lovrić et al., 2024; Magry et al., 2024; Rosenfeld et al., 2024). Innovation capacity, networking, knowledge management, institutional integration and financing are critical to enterprise upgrading (Dumenu et al., 2026). Accordingly, this paper develops a practical framework integrating sustainable supply, governance, benefit-sharing, technology, management, finance and marketing.

Methodology

Research design

A systematic literature review was conducted to identify and synthesize influential and relevant research on NTFPs, sustainable utilization, commercialization, innovation, enterprise development, value addition, value chains, forest governance, finance and market development. The review covered literature published between 2000 and January 2026. This period captures the development of contemporary NTFPs research from early commercialization and livelihood studies through the more recent emphasis on innovation, forest-based bioeconomies and enterprise upgrading. The review adopted an integrated perspective because NTFPs enterprises operate simultaneously within ecological, social, institutional, technological, financial and market systems. A purely ecological assessment cannot determine commercial feasibility, while a market or financial assessment cannot establish whether a resource can be harvested sustainably. Consequently, the review examined the interactions among these dimensions.

Search strategy

Literature was identified through multidisciplinary academic databases, including Web of Science, ScienceDirect, Emerald Insight and Inderscience, complemented by institutional publications from organizations such as the Food and Agriculture Organization of the United Nations (FAO) and relevant peer-reviewed journals. Reference lists of influential publications and systematic reviews were also examined to identify additional sources.
Search terms included combinations of 15 terms in Figure 1 below.

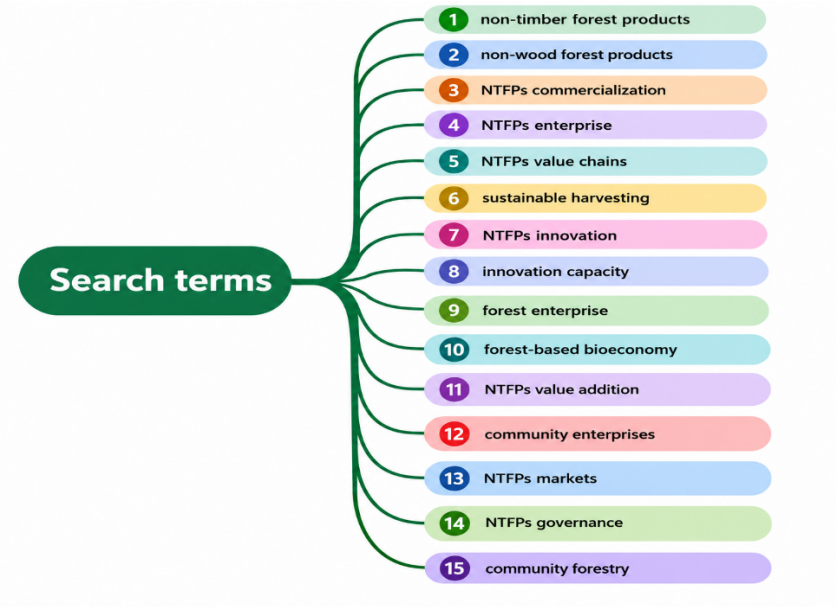


Fig. 1. Search terms

Boolean operators such as AND and OR were used to combine terms and capture literature spanning forestry, ecology, economics, development studies, business management, technology and policy.

Inclusion and screening

Peer-reviewed articles, books, chapters, systematic reviews and institutional reports published from 2000 to January 2026 were considered, prioritizing research on sustainable NTFP utilization, commercialization, livelihoods, enterprise development, innovation, governance, value chains and forest-based bioeconomies. Studies

were assessed for relevance, methodological transparency, empirical contribution and applicability to developing-country and community contexts. PRISMA 2020 guided transparent identification, screening, eligibility assessment, inclusion and evidence synthesis, enhancing methodological clarity, reproducibility and reporting completeness (Page et al., 2021). Evidence was subsequently organized into thematic categories.

Thematic framework

As part of the thematic framework, four principal themes were identified as presented in Figure 2.

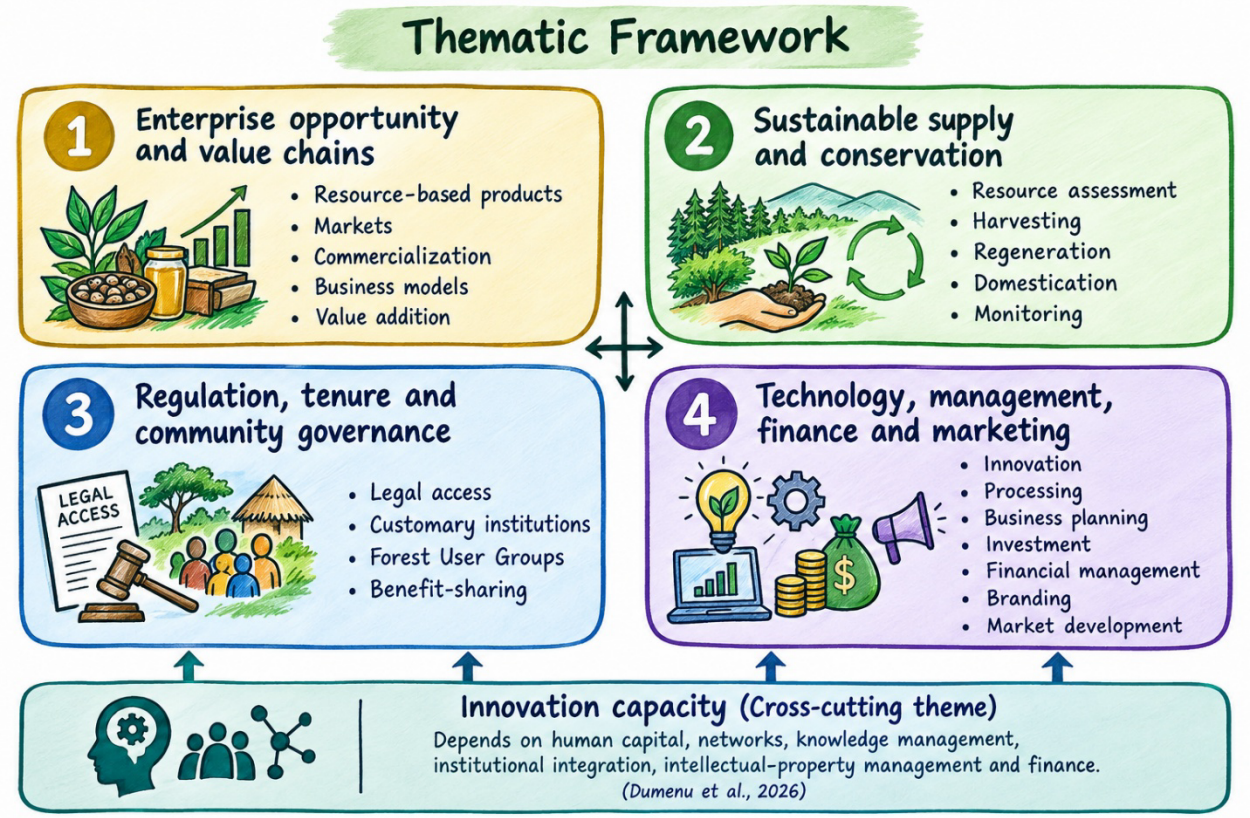


Fig. 2. Thematic framework

Innovation capacity was treated as a cross-cutting theme because enterprise innovation depends on human capital, networks, knowledge management, institutional integration, intellectual-property management and finance (Dumenu et al., 2026).

Analytical approach

The study adopted an integrated ecological–institutional–enterprise framework. Under this framework, NTFPs enterprise viability is assessed by examining certain questions as detailed in Figure 3.

The framework recognizes that commercialization is context-dependent. Differences in species biology, resource abundance, tenure, markets, governance, infrastructure, technology and enterprise capacity explain why similar NTFPs enterprises can produce different social, economic and environmental outcomes.

Results and Discussion

Enterprise opportunity, subsector and value-chain analysis

The first requirement for an NTFPs enterprise is a credible commercial opportunity. A commercially attractive product should have a sufficiently abundant and sustainable resource base, identifiable customers, competitive advantages, manageable production costs and potential to generate acceptable returns. Enterprise feasibility should therefore begin with an assessment of the entire value chain rather than focusing exclusively on the harvesting stage. The value chain may include resource owners, collectors, producers, aggregators, processors, transporters, wholesalers, retailers, exporters and consumers. Each actor performs particular functions and assumes different costs and risks. The distribution of value among these actors is a major determinant of whether community enterprises benefit from commercialization (Marshall et al., 2006; Ingram et al., 2014). A community may possess a valuable biological resource but still fail to establish a profitable enterprise if it lacks processing facilities, market information, transport, finance, bargaining power or technical capacity. Conversely, modest resources can sometimes generate significant value where enterprises successfully process, brand, differentiate and market products.

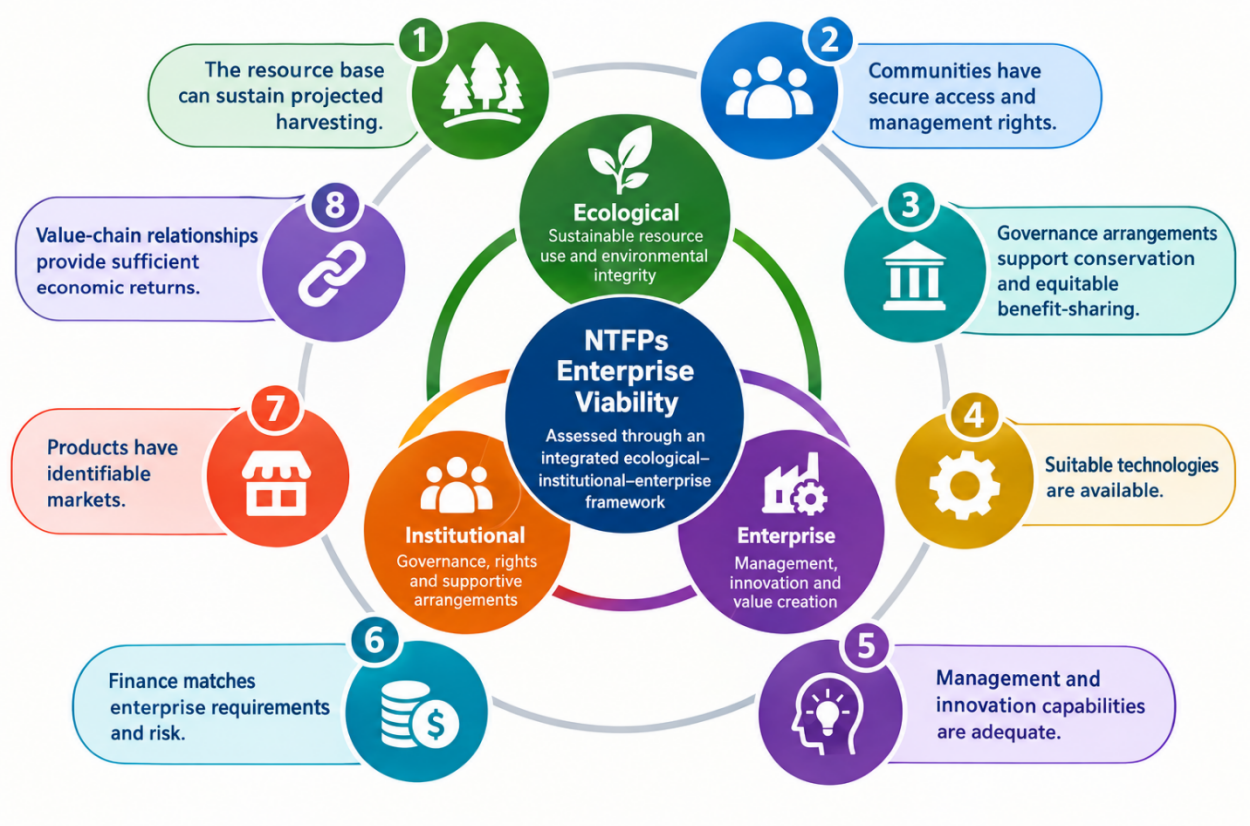


Fig. 3. Detailed Analytical approach

Enterprise opportunity assessment should therefore address at least ten questions as given in the framework in Figure 4.



Fig. 4. Enterprise opportunity assessment framework

These factors demonstrate that enterprise development should not be driven simply by the existence of a commercially popular species. Investment decisions should be based on an integrated assessment of ecological sustainability, institutional conditions, technology, finance, management and markets.

Sustainable supply of natural products

Sustainable supply is the ecological foundation of NTFP enterprises because biological resources are constrained by growth, reproduction, regeneration and ecosystem dynamics. Harvesting roots, bark, leaves, fruits, seeds or whole plants produces different ecological effects, while intensity, frequency and timing influence recovery (Ticktin, 2004; Peters, 2018). Commercial development should begin with resource identification, mapping and inventory across forests, woodlands, grasslands and wetlands. Standing stocks, harvesting levels, trade volumes, threats and priority areas should be assessed. Inventories should be combined with local and indigenous knowledge of resource distribution, seasonality, harvesting practices and abundance trends (Dovie et al., 2002; Shackleton et al., 2007). Monitoring should track abundance, regeneration, size structure, harvesting intensity, habitat condition and resource availability. Sustainable harvesting rules should define quantities, seasons, methods and frequency. Species-specific assessment is essential because NTFPs are not inherently sustainable; substantial ecological variation exists (Stanley et al., 2012).Adaptive management allows harvesting levels to be adjusted as evidence improves. Commercialization may increase collection pressure, although secure tenure and fair benefits can strengthen conservation incentives (Belcher and Kusters, 2004; Kusters et al., 2006; Atinga and Bannor, 2024). Domestication, nurseries, agroforestry and enrichment planting can supplement wild harvesting and provide supplies. Sustainable supply is therefore simultaneously an ecological, commercial and investment requirement.

Regulatory environment, tenure and Forest User Groups

NTFPs enterprises operate within formal legislation, customary rules, community institutions and market standards, covering resource access, harvesting, environmental protection, registration, taxation, safety, labour, trade, intellectual property and exports. Secure resource tenure is fundamental because legitimate access, management and benefit rights strengthen sustainable management and reduce conflict (Ostrom, 2005; Sikor et al., 2017; Robinson et al., 2021). Forest User Groups, cooperatives and community enterprises can support collective management where rules, accountability, participation, leadership and conflict resolution are effective. Customary institutions and traditional ecological knowledge should complement statutory governance. Regulation should be transparent, predictable and affordable, avoiding excessive transaction costs that discourage formalization and reduce returns (Tieguhong et al., 2016). Effective policy should clarify rights, simplify licensing, support registration, promote sustainable harvesting and strengthen monitoring. Transparent benefit-sharing and fair partnerships can enhance conservation incentives and community bargaining power (Nakanyete et al., 2025).

Enterprise feasibility studies should therefore include a regulatory due-diligence component covering 12 elements in Figure 5:

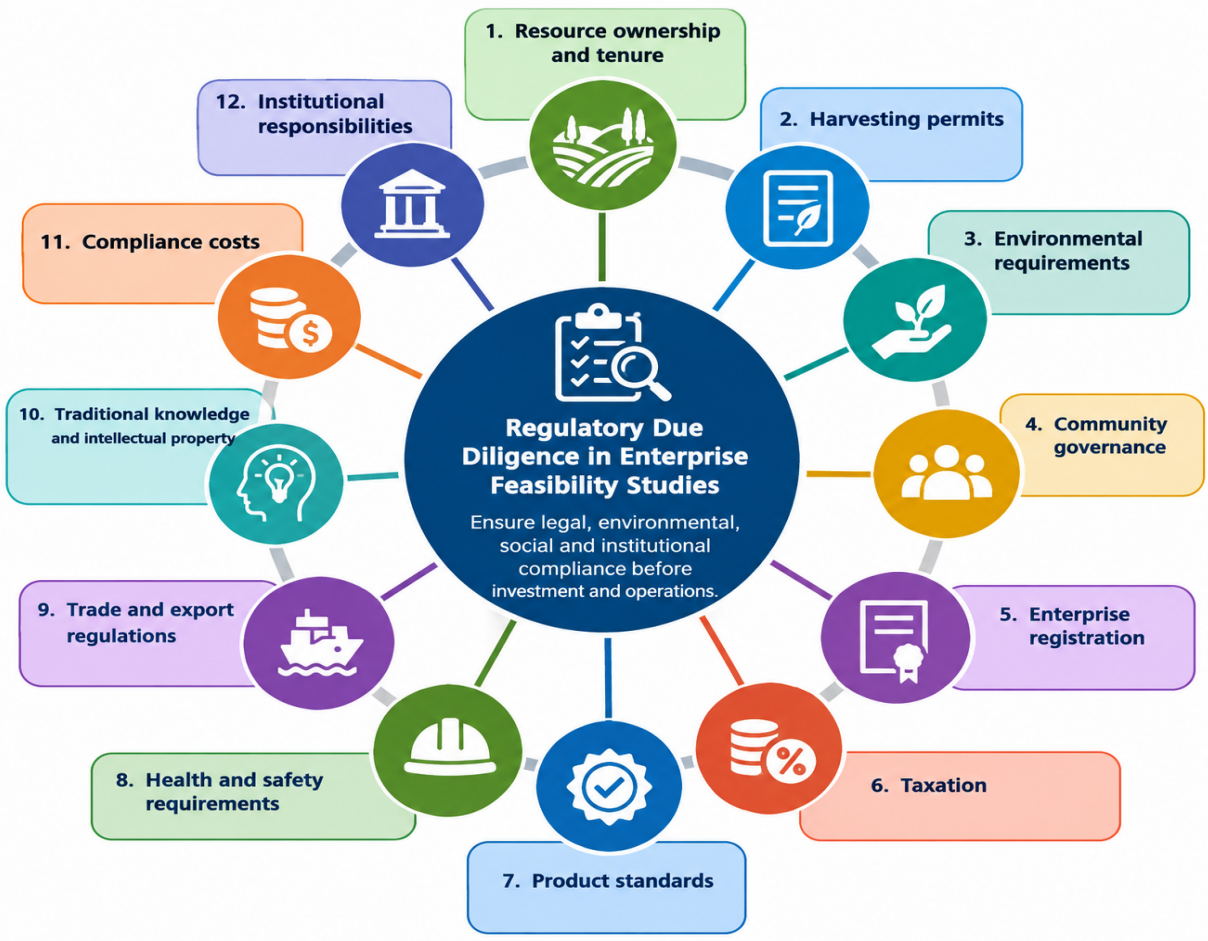


Fig. 5. Regulatory Due-Diligence component covering 12 elements

Equitable benefit-sharing and community participation

Community-based NTFPs enterprises should be structured so that those who manage and supply natural resources receive a meaningful share of economic value. Equitable benefit-sharing is both a social objective and an important conservation mechanism. Value distribution should be transparent. Enterprise agreements should identify the rights and responsibilities of resource owners, collectors, producers, processors, traders and community institutions. Where possible, communities should participate beyond raw-material collection by engaging in aggregation, processing, packaging, branding and marketing. The greater the level of value addition retained locally, the greater the potential economic contribution of the enterprise. However, moving into higher-value activities requires technology, skills, capital and market access. Collective action can strengthen bargaining power. Cooperatives and producer organizations can aggregate products, negotiate better prices, share equipment, access finance and develop common quality standards. Collective marketing can also reduce dependence on individual intermediaries. Gender and social inclusion should be incorporated into enterprise design. NTFPs often involve women and other groups in collection, processing and informal trade. Enterprise development should therefore ensure that benefits, training, leadership opportunities and decision-making are accessible to relevant community members.

Technology, value addition and innovation

Technology and innovation are essential for transforming NTFPs into competitive, higher-value products. Appropriate technologies from propagation, harvesting and processing to extraction, packaging, labelling and transport should match enterprise scale, costs, skills, maintenance, energy availability, environmental performance and expected returns. Value addition can transform raw fruits, seeds, leaves and fibres into dried products, oils, extracts, powders, foods, beverages, cosmetics, medicines and crafts, where regulations permit. Ingram et al. (2019) identify technology, infrastructure, finance, skills and market information as key factors influencing the processing capacity of small and medium NTFPs enterprises. The forest-based bioeconomy further expands opportunities in food, health, cosmetics, biotechnology and emerging markets, moving beyond conventional timber-based models (Lovrić et al., 2024). Innovation extends beyond equipment to product, process, organizational, marketing and financial innovation. The innovation-capacity framework of Dumenu et al. (2026) highlights human capital, networking, knowledge management, intellectual-property management, institutional integration and financing capacity. Innovation Platforms linking producers, processors, researchers, government, financiers and buyers can facilitate joint problem-solving and NTFP value-chain upgrading (Auch and Pretzsch, 2020).

Enterprise management and business planning

A community NTFPs enterprise requires professional management even when ownership is collective. Management systems should integrate resource procurement, production, processing, quality control, finance, human resources, marketing and risk management. A business plan should clearly describe the 12 key components in the diagram in Fig 6.



Fig. 6. A typical NTFPs Business Plan

The business plan should connect the ecological resource base to production capacity and market demand. Production targets should never exceed demonstrated sustainable supply. Management capacity is particularly important in community enterprises because collective ownership can create challenges concerning accountability, decision-making, procurement and financial control. Clear governance arrangements, record keeping, internal controls and transparent reporting are therefore essential. Community members should receive training in resource inventory, sustainable harvesting, procurement, processing, quality assurance, bookkeeping, business planning, financial management and marketing.

Financial sustainability and investment readiness

Financial viability determines whether an enterprise can survive beyond initial donor or project support. Financial assessment should include capital expenditure, operating expenditure, revenue, cash flow, profitability and risk.Start-up finance may be needed for buildings, equipment, licenses, product development, packaging, training and market establishment. Working capital is required for raw materials, labour, transportation, utilities, packaging and marketing. Financial projections include the elements listed in Figure 7.



Fig. 7. Financial Projections and Financial Viability Framework for Forest-Based Enterprises

Community enterprises frequently struggle to obtain conventional loans because they lack collateral, financial histories or predictable cash flows. Appropriate financing may therefore include community savings, cooperative finance, grants, equity, concessional loans, development finance and blended finance. Finance should match the biological and commercial characteristics of the enterprise. Seasonal products may generate substantial income during harvesting periods but require working capital during periods of low revenue. Lenders and investors should therefore assess cash-flow cycles rather than applying standardized lending models. Investment readiness also requires documentation. Enterprises should maintain resource inventories, permits, management profiles, historical financial records, market information, buyer agreements, equipment quotations and evidence of sustainable raw-material supply. Financial viability and ecological sustainability are interdependent. Depletion of the resource base increases future procurement costs and may eventually destroy the enterprise. Conversely, profitable enterprises can provide communities with incentives to maintain the resource base.

Marketing and sales

Marketing is a major determinant of NTFPs enterprise success. A sustainable resource and technically competent production system are insufficient if products cannot be sold profitably.

Market analysis should identify customer needs, demand, prices, competitors, product specifications, quality requirements, distribution channels and seasonal fluctuations. Enterprises should avoid producing first and searching for customers later.

A market-oriented strategy comprises 10 critical interconnected actions as presented in Fig.8.



Fig. 8. A market-oriented strategy

Value addition should be central to marketing. Products can be differentiated through quality, origin, sustainable sourcing, cultural identity, processing, packaging and branding. Certification and sustainability claims may create market opportunities where consumers are willing to pay for responsibly sourced products. However, certification costs and compliance requirements should be assessed carefully to ensure that they do not outweigh the benefits for small enterprises (Shanley et al., 2002, 2008).

Community enterprises should also seek direct relationships with processors, retailers, institutional buyers and consumers where feasible. Reducing unnecessary intermediaries can improve producer margins, although intermediaries may provide valuable functions such as aggregation, finance, transport and market information. Digital technologies provide new opportunities for NTFPs marketing. Social media, online marketplaces, mobile communication, digital payment systems and e-commerce can improve access to customers and market information. However, digital approaches require connectivity, digital skills and organizational capacity. Market development should occur at multiple levels. Local markets may provide accessible entry points, while national, regional and international markets can offer opportunities for specialized products. Regional trade within Southern Africa may be particularly relevant for community enterprises seeking to expand beyond local demand.

Value-chain governance

Value-chain governance determines how information, risks, costs and benefits are distributed. Community enterprises may remain trapped at the lowest-value stage when they sell unprocessed products to intermediaries. Value-chain analysis should therefore identify each actor's function, costs, margins, risks, bargaining power and contribution to final product value. Where feasible, communities should seek opportunities for upgrading.
Three forms of upgrading are particularly relevant:

- product upgrading, through improved quality or new products;
- process upgrading, through improved technology and efficiency; and
- functional upgrading, through movement into higher-value activities such as processing, packaging or marketing.

Schimetka and Ingram (2024) emphasize the relationship between value-chain governance and landscape governance, demonstrating that NTFPs commercialization must be considered within wider resource-management systems.

Fair contracts and partnerships can help community enterprises obtain predictable prices, technical assistance and market access. However, contracts should be transparent and should not transfer disproportionate risks to producers.

Integrated NTFPs enterprise framework

The findings support an integrated framework based on seven mutually dependent pillars, as presented in Figure 9.

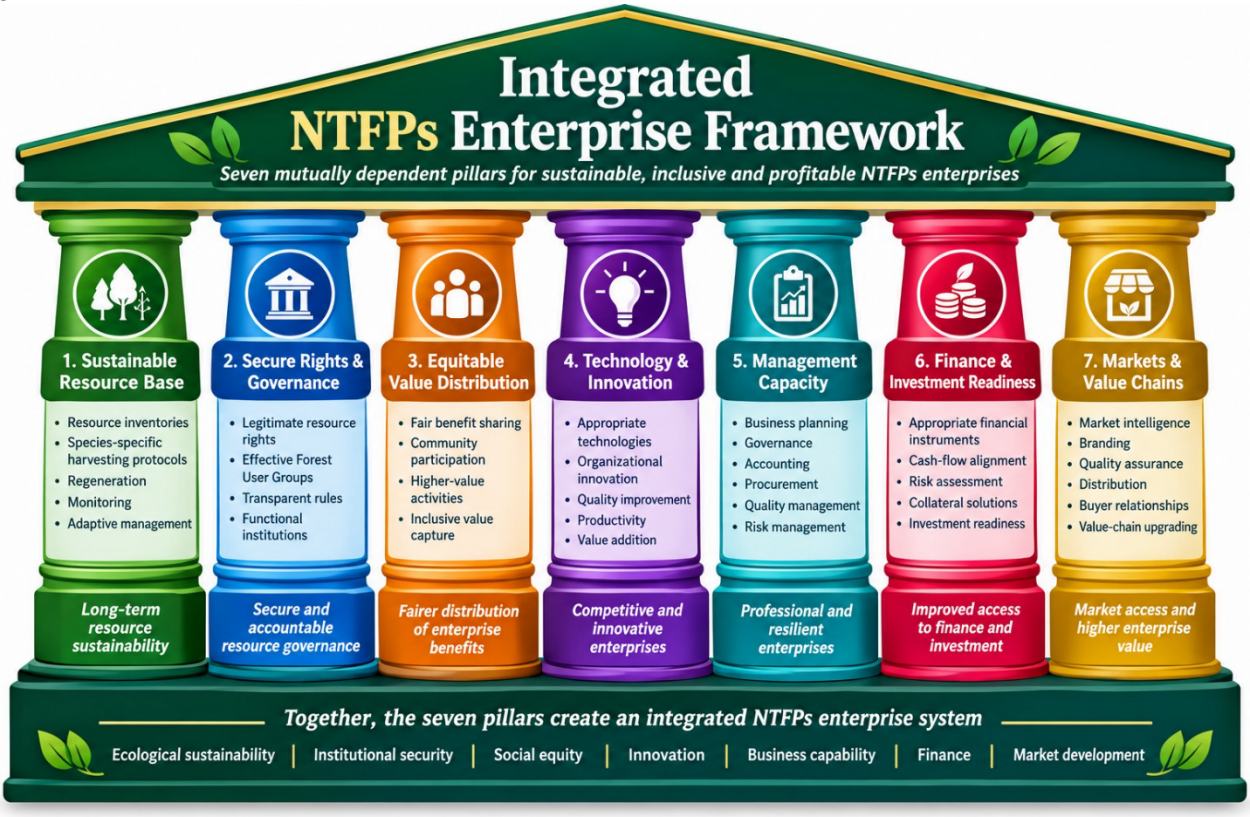


Fig. 9. Integrated NTFPs enterprise framework

These pillars are interdependent. Strong market demand without sustainable supply can accelerate resource depletion. Sustainable resources without markets provide limited income. Technology without finance cannot be adopted. Finance without sound governance can increase commercial and social risks. Secure tenure without enterprise capability may not generate substantial economic value. The integrated framework therefore proposes that investment decisions should satisfy minimum conditions across all seven dimensions before commercialization or scaling occurs.

Recommendations

The review culminated in 15 essential elements as briefly highlighted below.

1. **Establish resource-monitoring systems before commercialization.** Resource inventories should establish species abundance, distribution, regeneration, harvesting intensity and ecological threats.
2. **Develop species-specific sustainable harvesting protocols.** Guidelines should specify allowable quantities, harvesting methods, seasons, frequency and plant parts that can be removed.
3. **Strengthen community tenure and governance.** Communities and Forest User Groups should receive secure and clearly defined rights to manage and benefit from NTFPs resources.
4. **Institutionalize equitable benefit-sharing.** Enterprise agreements should clearly define how benefits are distributed among resource owners, collectors, processors and other value-chain participants.
5. **Integrate resource assessments into business planning.** Enterprise production targets should be based on demonstrated sustainable supply rather than anticipated market demand alone.
6. **Promote domestication and cultivation.** High-demand species should be cultivated or enriched where technically and economically feasible to reduce pressure on wild populations.
7. **Invest in appropriate technology.** Priority should be given to technologies that improve harvesting, drying, storage, processing, quality, packaging and product development.
8. **Strengthen enterprise management.** Community enterprises should receive training in governance, procurement, accounting, financial management, record keeping, business planning, quality assurance and risk management.
9. **Develop tailored financial instruments.** Loans, grants, equity, concessional finance and blended-finance mechanisms should be designed around the cash-flow characteristics and collateral constraints of community NTFPs enterprises.
10. **Strengthen market intelligence and value-chain participation.** Enterprises should systematically assess demand, prices, competitors, customer preferences and market channels.

11. **Promote value addition and branding.** Community enterprises should move progressively from raw-material sales toward processing, packaging, branding and differentiated products where economically feasible.
12. **Use digital technologies strategically.** Digital market information, social media, e-commerce, digital payments and traceability should be promoted where connectivity and skills permit.
13. **Strengthen partnerships.** Producer organizations should develop relationships with research institutions, government agencies, financial institutions, processors, retailers and private-sector buyers.
14. **Promote interdisciplinary research.** Long-term research should address species-specific regeneration, harvesting thresholds, climate impacts, market economics, consumer demand, value-chain governance and enterprise performance.
15. **Develop NTFPs enterprise-readiness indicators.** Future work should establish standardized indicators covering ecological sustainability, social inclusion, institutional capacity, innovation, financial viability and market readiness.

A practical NTFPs enterprise-readiness assessment should ultimately answer seven questions: Can the resource be harvested sustainably? Does the community have secure rights? Can value be retained locally? Is appropriate technology available? Does the enterprise have the capacity to manage and innovate? Can suitable finance be obtained? Is there a reliable and profitable market? Only enterprises capable of demonstrating satisfactory performance across these dimensions should proceed to large-scale commercialization.

Conclusion

Community-based NTFPs enterprises have substantial potential to contribute to rural livelihoods, biodiversity conservation, local economic development and inclusive forest-based bioeconomies. However, the evidence demonstrates that successful commercialization requires considerably more than the presence of valuable biological resources or market demand. Sustainable supply is the foundation. Resource inventories, species-specific harvesting protocols, regeneration, domestication where appropriate, long-term monitoring and adaptive management should be established before and during commercialization. The ecological limits of each resource must be understood because harvesting impacts vary according to species biology, plant part, intensity, frequency and environmental conditions. Secure tenure and effective governance are equally important. Communities require legitimate rights to access, manage and benefit from resources. Forest User Groups and community enterprises need transparent rules, accountability and mechanisms for equitable benefit-sharing. Formal regulations should support rather than unnecessarily constrain responsible community enterprise. Technology and innovation provide pathways for value addition and competitiveness. Appropriate processing, storage, packaging and product-development technologies can transform low-value raw materials into higher-value products. Innovation should also encompass business models, marketing, digital systems, partnerships and organizational processes. Management and finance determine whether enterprises can operate sustainably. Community enterprises require sound business plans, financial records, professional management and appropriate investment structures. Financing instruments should recognize seasonal cash flows, limited collateral and the relatively high transaction costs of small community enterprises. Finally, marketing and value-chain development are essential. Enterprises must understand customers, product requirements, prices and competition. Branding, quality assurance, value addition, digital marketing, collective action and direct buyer relationships can improve market access and increase the share of value retained locally. The central conclusion is therefore that ecological sustainability, community governance and commercial profitability should not be treated as separate objectives. Properly designed NTFPs enterprises can create reinforcing relationships among conservation, livelihoods and enterprise development. However, this outcome depends on appropriate institutions, sustainable harvesting, investment, innovation and equitable value-chain governance. For the wider Southern African region, NTFPs enterprise development should therefore be positioned within broader strategies for sustainable forest management, rural industrialization, climate resilience, biodiversity conservation and the forest-based bioeconomy.

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CSD and NNK conceived the concept, wrote and approved the manuscript.

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Ethics approval
Not applicable.

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