

Review Article

Integrating Startups for Spices and Herbs Outlets With Cooperative Tourism: Utilizing Kerala's Cooperative Credit Sectors for Domestic Development

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A B S T R A C T

Tourism and agriculture remain central pillars of Kerala's socio-economic development, with the state's globally recognised spice heritage offering significant entrepreneurial potential. This study examines the feasibility and strategic development of spice and herb outlet start-ups integrated with cooperative tourism initiatives, supported by Kerala's cooperative banking sector. The research adopts an interdisciplinary approach, drawing insights from cooperative economics, tourism development, digital innovation, and network-based systems thinking to explore how community-driven enterprises can be scaled sustainably.

The paper analyses the role of cooperative banking institutions in providing inclusive financial support, facilitating access to credit, and strengthening rural entrepreneurship. It further investigates how digital technologies—such as real-time tracking, data analytics, and machine learning—can enhance supply chain efficiency, price transparency, and customer engagement in spice and herb retail ventures. By applying a network science framework, the study conceptualises the interconnected relationships between farmers, cooperatives, tourism stakeholders, and financial institutions, highlighting the importance of coordination and resilience within these systems.

Keywords: Cooperative, Tourism, Spices, Herbs, Economy

Introduction

Tourism and agriculture are two of the most significant contributors to Kerala's socio-economic development. Kerala, the "Land of Spices", has a long-standing reputation for its rich biodiversity, unique culinary heritage, and vibrant cooperative sector. The intersection of these strengths

presents a unique entrepreneurial opportunity: establishing spice and herb outlets as startups that are closely integrated with cooperative tourism initiatives, targeting both domestic and international tourists, as well as the broader public. The Kerala cooperative banking sector, with its deep roots in rural economies and inclusive financial practices, can play a crucial role in catalysing and sustaining such ventures.

The purpose of this research paper is to provide a comprehensive analysis of how spice and herb outlet startups, operating in synergy with cooperative tourism, can be developed and scaled with support from Kerala's cooperative banking infrastructure. Drawing on interdisciplinary insights from healthcare systems,¹ machine learning in resource management,² network science, price transparency and variability in services,³ and real-time tracking technologies,⁴ this study examines the challenges and opportunities in building resilient, efficient, and community-centred business models.

This paper is structured as follows: the first section reviews the conceptual foundations of cooperative sectors, tourism, and the spices and herbs economy in Kerala. The second section analyses the role of Kerala's cooperative banking sector as a financial enabler. The third section explores the integration of digital technologies, drawing parallels with healthcare system innovations. The fourth section presents a network science framework for understanding complex cooperative-tourism-agriculture systems. The final sections discuss policy implications, potential challenges, and recommendations for sustainable implementation, culminating in a conclusion that synthesises the findings and outlines directions for future research.

The Cooperative Model in Kerala

Kerala's cooperative movement is among the most robust in India, with deep historical roots and wide-ranging impacts on agriculture, banking, and rural development. The cooperative model emphasises collective ownership, democratic participation, and equitable benefit-sharing, making it particularly suited to sectors where community engagement and resource pooling are essential.¹ In the context of agriculture, cooperatives have enabled smallholder farmers to access credit, share resources, and collectively market their produce, thereby increasing bargaining power and reducing vulnerability to market shocks.

Tourism in Kerala: From Backwaters to Agro-Experiences

Kerala's tourism sector is globally renowned for its backwaters, cultural festivals, and eco-tourism initiatives.⁵ However, recent trends indicate a growing demand for experiential and agro-based tourism, wherein visitors seek authentic, participatory engagements with local food systems, medicinal plants, and agricultural traditions. Integrating spice and herb outlets into tourism circuits can deepen tourist experiences, diversify income streams for rural communities, and create new value chains linking agriculture, retail, and hospitality (Kohler & Ercole, 2019).

The Spices and Herbs Economy

Kerala's unique agro-climatic conditions foster the cultivation of a wide range of spices—black pepper,

cardamom, cinnamon, nutmeg, and turmeric—alongside medicinal herbs. These products are not only central to Kerala's culinary identity but also to its export economy. The global “wellness” and “organic” trends have further enhanced the marketability of Kerala's spices and herbs, creating opportunities for value-added products, agri-tourism, and educational experiences for tourists and the public.³

The Rationale for Cooperative Spice and Herb Outlets

The establishment of cooperative spice and herb outlets, strategically located along tourism corridors, can create mutually reinforcing synergies. Such outlets can serve as points of sale, education centres, and nodes for community-based entrepreneurship.⁶ By integrating with existing cooperative institutions and tourism operators, these outlets can offer curated experiences—farm tours, culinary workshops, and herbal wellness sessions—while ensuring fair prices and transparent value chains.

The Role of Kerala Cooperative Banking Sectors as Financial Enablers

Cooperative Banking: Structure and Principles

Cooperative banks in Kerala operate under a federated structure, with Primary Agricultural Credit Societies (PACS) at the grassroots, District Cooperative Banks (DCBs) at the regional level, and the Kerala State Cooperative Bank (KSCB) at the apex. These banks adhere to cooperative principles—member ownership, democratic control, one-member-one-vote, and profit-sharing—and prioritise financial inclusion, rural credit delivery, and socio-economic development.¹

Financing Startups in the Spices and Herbs Sector

Startups in the spices and herbs sector require access to affordable credit, working capital, and risk management instruments. Cooperative banks, with their established rural presence and knowledge of local contexts, are uniquely positioned to provide tailored financial products, such as crop loans, working capital loans, and credit guarantees.⁷ Furthermore, cooperative banks can facilitate group lending, joint liability groups, and revolving funds for collective ventures.¹

Integrating Financial Services with Cooperative Tourism

Tourism-linked agricultural startups have distinct financial needs: upfront investments in infrastructure (retail outlets, processing units, experiential spaces), seasonal working capital, and cash flow management. Cooperative banks can design hybrid financial products that bundle credit with insurance, digital payments, and value chain financing. By leveraging their social capital and extensive networks, these banks can also de-risk lending through community-based monitoring and participatory appraisal.

Ensuring Equity and Inclusion

A key challenge in startup financing is ensuring equitable access for marginalised groups—women, scheduled castes, and smallholder farmers. Cooperative banks' democratic governance structures and social mandates can help overcome exclusionary barriers.⁸ By embedding social performance metrics and participatory evaluation, cooperative banks can promote inclusive entrepreneurship and ensure that benefits are widely shared.

Digital Transformation: Lessons from Healthcare System Innovations

Real-Time Tracking and Inventory Management

Healthcare systems, especially during crises such as the COVID-19 pandemic, have demonstrated the importance of real-time tracking of assets and inventory.⁴ Spices and herbs outlets, particularly when integrated with tourism, face similar challenges—fluctuating demand, perishable inventory, and the need for efficient logistics. Technologies such as Bluetooth Low Energy (BLE) tracking, RFID, and smartphone-based inventory management can be adapted from hospital settings to manage stocks, optimise supply chains, and reduce waste.

As Rodrigues observes, the use of real-time tracking solutions, such as fingerprinting, can improve operational efficiency, reduce costs, and enhance responsiveness to emergencies. In the context of spices and herbs outlets, these technologies can ensure traceability, quality assurance, and timely replenishment, thereby enhancing both the tourist experience and profitability.

Digital Platforms for Price Transparency

The healthcare sector's move towards price transparency, mandated by regulatory bodies, provides valuable lessons for the agri-tourism-retail nexus. Perfilyeva demonstrates how transparent pricing, enabled by digital platforms, can reduce information asymmetries, empower consumers, and foster competition.⁹ Spice and herb outlets can leverage similar models—online price dashboards, e-commerce integration, and consumer feedback systems—to build trust, differentiate on quality, and ensure fair returns for producers.

Machine Learning for Demand Forecasting and Resource Allocation

Predicting tourist flows, sales volumes, and inventory requirements is a complex task, akin to forecasting patient length of stay in ICUs.² Machine learning techniques—random forests, LSTM, and BERT—have proved effective in healthcare resource management and can be repurposed for the spices and herbs retail sector. By analysing historical sales data, tourist footfall, and seasonality patterns, startups can optimise staffing, procurement, and promotional strategies.

Building Resilient, Adaptive Systems

Complex healthcare systems are characterised by high interdependencies, dynamic flows, and vulnerability to shocks. Spice and herb outlets, operating at the intersection of agriculture, tourism, and retail, must similarly build resilience against demand fluctuations, supply disruptions, and external shocks (e.g., pandemics and climate events). Drawing on network science and system-wide monitoring, startups can identify bottlenecks, build redundancy, and design adaptive business processes.

Network Science Approach to Cooperative Tourism-Agriculture Systems

Understanding Complex Systems

Kohler and Ercole characterise hospitals as complex, scale-free, small-world networks, where performance depends not only on individual elements but also on system-wide interactions. Similarly, a cooperative network of spice and herb outlets, embedded in tourism circuits, can be modelled as a weighted, directional network: nodes represent outlets, farms, tourist attractions, and cooperative institutions; edges represent flows of goods, tourists, information, and finance.

Identifying Hubs, Bottlenecks, and Vulnerabilities

Network analysis reveals critical nodes (hubs) and bottlenecks whose failure or overload can disrupt system function. In the context of spices and herbs outlets, hubs may include major tourist destinations, central processing units, or key co-operative institutions. Bottlenecks may arise at transportation links, regulatory checkpoints, or inventory management stages. By mapping network topology, startups and policymakers can prioritise investments in infrastructure, redundancy, and contingency planning.

Enhancing System Resilience and Efficiency

Scale-free, small-world networks are robust to random failures but vulnerable to targeted attacks on hubs. Cooperative startups must therefore balance the efficiency gains of centralisation (e.g., centralised procurement, distribution) with the resilience benefits of decentralisation (e.g., multiple sourcing, distributed retail points). Real-time data flows, enabled by digital technologies, can improve coordination, reduce delays, and optimise resource allocation.

Metrics for Performance and Impact

Traditional performance metrics—sales, tourist footfall, and profits—capture only part of the system's functioning. Network science offers holistic metrics: degree distribution, betweenness centrality, clustering coefficients, and assortativity. These can be used to evaluate not only economic outcomes but also social capital formation,

knowledge diffusion, and inclusivity within the cooperative network.^{1,2}

Integrating Stakeholder Perspectives

Complex systems are shaped by diverse stakeholders—farmers, entrepreneurs, tourists, cooperative members, and policymakers. Participatory mapping, stakeholder analysis, and embedded governance structures can ensure that multiple perspectives are integrated into network design and management, reducing the risk of counter-intuitive or inequitable outcomes.

Policy Implications and Institutional Support

Enabling Regulatory and Institutional Environments

For spice and herb outlet startups to thrive, supportive policy frameworks are essential. This includes streamlined licensing, food safety and quality standards, land-use approvals, and incentives for agri-tourism. Cooperative banks and government agencies can collaborate to provide entrepreneurship training, market linkages, and branding support.

Fostering Innovation and Knowledge Transfer

Continuous innovation is vital for competitiveness. Cooperative institutions can facilitate knowledge exchange—best practices in cultivation, processing, retailing, and customer engagement—through workshops, digital platforms, and cross-learning with other sectors. Partnerships with research institutions and universities can drive product development and process improvements.

Leveraging Digital Public Good Infrastructure

Kerala's high digital literacy and robust public digital infrastructure—such as Aadhaar, Unified Payments Interface (UPI), and e-governance—can be harnessed to streamline financial transactions, identity verification, and data management for cooperative startups.^{3,4} Public-private partnerships can further expand internet connectivity, digital skills, and cybersecurity awareness.

Inclusive Growth and Gender Empowerment

Women play a significant role in spice and herb cultivation, processing, and retail. Policies and programmes that empower women—access to credit, leadership roles in cooperatives, targeted training—can multiply social and economic benefits. Similarly, affirmative action for marginalised communities can ensure broad-based participation and benefit-sharing.

Challenges and Risk Mitigation

Addressing Market Volatility and Price Variability

The spices and herbs sector is prone to price fluctuations due to seasonality, global market dynamics, and supply-

demand imbalances. Cooperative startups can mitigate these risks through forward contracts, minimum support prices, and collective bargaining. Digital platforms can enhance transparency, reduce information asymmetries, and facilitate real-time price discovery.

Managing Operational Complexities

Integrating retail, tourism, and agriculture involves complex logistics—procurement, inventory, staffing, and customer service. Lessons from hospital equipment management—such as smartphone-based tracking and gateway-less architectures—can be adapted to improve efficiency and reduce overheads. Standard operating procedures, staff training, and digital dashboards can facilitate smooth operations.

Ensuring Quality and Compliance

Tourists and international customers have high expectations for quality, safety, and authenticity. Cooperative outlets must adhere to food safety regulations, organic and fair-trade certifications, and traceability standards. Digital tools—QR codes, blockchain for provenance, and customer feedback systems—can enhance trust and compliance.¹¹

Building Adaptive Capacity

External shocks—pandemics, extreme weather, and policy changes—can disrupt supply chains and tourist flows. Building adaptive capacity requires scenario planning, diversification of markets and products, and investment in social capital.¹² Cooperative structures, with their collective governance and mutual support, are inherently more resilient to shocks.

Case Study: A Model Framework for Spices and Herbs Outlet Startups in Kerala

Value Chain Integration

A robust model for spice and herb outlets in Kerala would integrate the following components:

- **Production:** Sourcing from member farmers, adhering to organic and sustainable practices.
- **Processing:** Value addition through sorting, grading, drying, grinding, and packaging, preferably at community-owned facilities.
- **Retail:** Outlets located at key tourist destinations, transportation hubs, and online platforms.
- **Tourism Linkages:** Curated farm tours, culinary experiences, herbal wellness sessions, and educational workshops.
- **Financial Services:** Credit, insurance, digital payments, and working capital support from cooperative banks.
- **Digital Infrastructure:** Inventory management, price transparency, customer engagement, and traceability tools.

- **Governance:** Democratic management through cooperative societies, with strong representation for women and marginalised groups.

Business Model Canvas

- **Key Partners:** Cooperative banks, tourism operators, farmer producer organisations, government agencies, and research institutions.
- **Key Activities:** Sourcing, processing, retailing, tourism experiences, marketing, quality assurance, and digital management.
- **Value Propositions:** Authentic Kerala spices and herbs, curated experiences, fair prices, community empowerment, transparency.
- **Customer Segments:** Domestic and international tourists, local residents, online consumers, and wellness and culinary enthusiasts.
- **Channels:** Physical outlets, e-commerce platforms, tourism circuits, social media.
- **Revenue Streams:** Product sales, experiential packages, workshops, and online sales.
- **Cost Structure:** Procurement, processing, staffing, logistics, marketing, technology, compliance.

Impact Metrics

- **Economic:** Sales growth, income generation, job creation, export revenues.
- **Social:** Member participation, gender inclusion, capacity building, community development.
- **Environmental:** Adoption of sustainable practices, reduction in food waste, biodiversity conservation.
- **Systemic:** Network connectivity, resilience, knowledge diffusion, stakeholder satisfaction.

Discussion

Synergies and Systemic Benefits

The integration of spice and herb outlets with cooperative tourism, supported by Kerala's cooperative banking infrastructure, offers multiple synergies:

- **Value Capture:** From farm to retail, more value remains within local communities.
- **Resilience:** Mutual support and collective action buffer against shocks.
- **Innovation:** Cross-sectoral learning fosters process and product innovations.
- **Sustainability:** Agro-ecological practices and local value chains reduce environmental footprints.
- **Cultural Preservation:** Showcasing culinary and medicinal traditions strengthens cultural identity.

Parallels with Healthcare and Other Complex Systems

Drawing on insights from healthcare system management, network analysis, and machine learning, the design of cooperative spices and herbs outlets can benefit from the following:

- **System-Wide Monitoring:** Real-time data collection and analysis for decision support.
- **Adaptive Governance:** Feedback loops and participatory management ensure agility.
- **Continuous Learning:** Embedded evaluation and knowledge sharing drive improvement.
- **Digital Transformation:** Leveraging technology for efficiency, transparency, and user engagement.

Limitations and Areas for Further Research

While this paper provides a conceptual and analytical framework, empirical validation through pilot projects, longitudinal studies, and comparative analyses is needed. Specific areas for further research include:

- **Impact Assessment:** Quantitative evaluation of economic, social, and environmental outcomes.
- **Technology Adoption:** User acceptance and effectiveness of digital tools in rural and tourism settings.
- **Policy Design:** Optimal regulatory frameworks and incentive structures.
- **Scalability and Replicability:** Lessons for other regions and sectors.

Conclusion

The confluence of Kerala's cooperative heritage, rich spices and herbs economy, and dynamic tourism sector creates a unique opportunity for sustainable, inclusive entrepreneurship. By establishing cooperative spice and herb outlets integrated with tourism circuits and leveraging the financial and social capital of Kerala's cooperative banking sector, it is possible to create resilient, adaptive, and impactful business models. Insights from healthcare systems, network science, and digital innovation provide valuable guidance for managing complexity, building resilience, and maximising value for all stakeholders.

The successful implementation of such initiatives requires coordinated action—policy support, institutional collaboration, technological innovation, and community participation. In doing so, Kerala can not only strengthen its own rural economies and tourism offerings but also provide a replicable model for sustainable development worldwide.

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