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Drivers of Frugal Innovation in Traditional Craft Villages: A Conceptual Framework for Cost-Saving and Sustainable Local Development

Huyen Thi Thanh Le

Faculty of Business Administration, Academy of Policy and Development

Nam An Khanh urban area, An Khanh Commune, Hanoi, Vietnam

E-mail: huyenltt@apd.edu.vn

Huyen Thi Thanh Phan (corresponding author)

Faculty of International Economics, Academy of Policy and Development

Nam An Khanh urban area, An Khanh Commune, Hanoi, Vietnam

E-mail: phanhuyen2012@apd.edu.vn

Thu Le Kim Nguyen

High School for Gifted Students in Social Sciences and Humanities, VNU, Vietnam

Email: nguyenlekimthu35@gmail.com

Ngoc Nguyen Bao Tran

Kings Education School, England

Email: cblvk13.trannguyenbaongoc@gmail.com

Ngoc Khanh Huynh

Phan Chau Trinh High School, Danang, Vietnam

Email: Serenetheia.nova@gmail.com

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Abstract

Traditional craft villages are resource-constrained local production systems that combine cultural heritage, household-based production, intergenerational skills, local employment, and market competition. Although frugal innovation has been widely discussed as a way of creating affordable and resource-efficient solutions under scarcity, its antecedents in traditional craft villages remain insufficiently theorized. This conceptual paper develops a source-grounded model of factors affecting frugal innovation in traditional craft villages, with a focus on cost-saving innovation and sustainable local development. Building on the resource-based view, dynamic capability theory, the knowledge-based view, customer participation literature, social capital theory, and institutional support perspectives, the paper proposes eight antecedents of frugal innovation, including customer participation, customer demand, organic innovative culture, bricolage, knowledge management, empowering leadership, government support, and network embeddedness. Frugal innovation is conceptualized as the capability to reduce cost, focus on core functionalities, maintain adequate user value, save resources, and support local sustainable co-creation. The paper contributes by translating frugal innovation theory into a craft-village-specific framework, clarifying the theoretical logic of each antecedent, and providing a measurement foundation for future empirical testing among craft households, cooperatives, and micro and small enterprises. The proposed framework is intended for subsequent survey-based studies using PLS-SEM or CB-SEM and for policy discussions on how traditional craft villages can innovate affordably without weakening cultural and social value.

Keywords: frugal innovation, traditional craft villages, cost-saving innovation, bricolage, customer participation, network embeddedness, sustainable local development

1. Introduction

Traditional craft villages represent a distinctive form of local production system in Vietnam and in many emerging economies. They combine craft skills, household and micro-enterprise production, local employment, place-based reputation, cultural identity, and intergenerational knowledge transmission. In Vietnam, craft villages are also recognized in public policy as rural craft systems requiring conservation, training, production-space support, environmental treatment, trade promotion, and new product development support (Government of Vietnam, 2018; Prime Minister of Vietnam, 2022).

However, craft villages face a difficult innovation problem. They must adapt to changing customer preferences, quality standards, environmental expectations, digital channels, and price competition while operating with limited capital, fragmented production, informal management, and uneven access to technology. These conditions make standard corporate innovation models, which often assume formal R&D departments and substantial investment budgets, less suitable for understanding innovation in craft villages. A broader view of business innovation is therefore needed, one that includes new or improved products, business processes, marketing practices, organizational arrangements, and production

routines brought into use by firms (OECD/Eurostat, 2018).

Frugal innovation is highly relevant to this context because it explains how firms create useful, affordable, and resource-efficient solutions under scarcity. Weyrauch and Herstatt (2016) define frugal innovation through three criteria: substantial cost reduction, concentration on core functionalities, and optimized performance level. Subsequent reviews show that frugal innovation is linked to emerging-market constraints, affordability, resource efficiency, sustainability, and user-oriented value creation (Hossain, 2018; Pisoni et al., 2018). More recently, Rossetto et al. (2023) conceptualize frugal innovation capability as comprising three dimensions: focus on core functionalities, substantial cost reduction, and shared sustainable engagement.

For traditional craft villages, frugal innovation should not be equated with simply making cheaper products. Rather, it refers to the capacity of craft producers to redesign products, processes, materials, packaging, marketing channels, and collaborative arrangements so that they can reduce cost and resource use while preserving core craft value. A craft producer may simplify non-essential design elements, reduce material waste, standardize quality control, share equipment, use affordable digital tools, or collaborate with local partners to lower marketing and distribution costs. Such practices are consistent with the resource-based view and dynamic capability theory because they require firms to mobilize existing resources and reconfigure them in response to environmental change (Barney, 1991; Teece, 2007).

Despite the relevance of this topic, the literature lacks an integrated conceptual model explaining which factors shape frugal innovation in traditional craft villages. Studies on frugal innovation often focus on technology ventures, large firms, healthcare, emerging-market products, or generic SMEs, whereas research on craft villages often emphasizes tourism, heritage, rural development, or environmental issues (Hieu & Rasovska, 2017; Hossain, 2018; Zeschky et al., 2011). This separation leaves a theoretical gap: traditional craft villages are exactly the type of resource-constrained, locally embedded, customer-sensitive production systems in which frugal innovation may naturally emerge, yet the antecedents of such innovation remain under-conceptualized.

Accordingly, this paper asks: What factors can explain frugal innovation in traditional craft villages, and how can these factors be organized into a conceptual model suitable for future empirical testing? The paper develops a model based on eight antecedents derived from the preliminary measurement table and strengthened through verified academic sources: customer participation, customer demand, organic innovative culture, bricolage, knowledge management, empowering leadership, government support, and network embeddedness. The main research result is therefore the proposed conceptual framework rather than an empirical test.

2. Theoretical Background

2.1 Innovation in Enterprises and Resource-Constrained Settings

Innovation is widely understood as a core mechanism through which enterprises adapt to environmental change, generate competitiveness, and improve performance. The Oslo Manual defines business innovation as a new or improved product or business process that differs significantly from previous products or processes and has been introduced to the market or brought into use by the firm (OECD/Eurostat, 2018). This broad definition is particularly suitable for traditional craft villages because innovation may occur through design changes, production improvements, customer communication, packaging, distribution, quality control, tourism-linked services, and organizational arrangements rather than through formal R&D alone.

The resource-based view explains innovation as a function of how firms mobilize valuable, rare, inimitable, and organizationally embedded resources (Barney, 1991). In craft villages, such resources include artisan skills, local reputation, heritage narratives, family knowledge, community trust, supplier ties, and customer relationships. Yet these resources do not automatically generate innovation. Dynamic capability theory suggests that firms must sense opportunities, seize them, and reconfigure resources when environments change (Teece, 2007). Under resource scarcity, this reconfiguration often depends on improvisation, knowledge sharing, leadership autonomy, and network collaboration rather than large-scale investment.

This resource-constrained view matters because traditional craft producers often innovate incrementally and pragmatically. Instead of developing radical technologies, they may reduce input waste, redesign product forms for new users, combine traditional manual skills with inexpensive digital marketing, or adapt local materials to new market segments. Such activities are modest in technological scale but important in economic and social value. They fit a frugal innovation lens because they emphasize affordability, essential functions, and resource efficiency (Soni & Krishnan, 2014; Weyrauch & Herstatt, 2016).

2.2 Frugal Innovation

Frugal innovation has developed as a research stream explaining how organizations create value under conditions of scarcity. It is often described as “doing more with less,” but the academic literature warns that frugality should not be reduced to low price or low quality. Weyrauch and Herstatt (2016) argue that an innovation should be considered frugal only when it simultaneously provides substantial cost reduction, focuses on core functionalities, and achieves an optimized performance level. This definition distinguishes frugal innovation from low-cost imitation because it requires adequate user value and functional reliability.

Systematic reviews show that frugal innovation is connected to emerging-market constraints, affordability, sustainability, local adaptation, and user-centered problem solving (Hossain, 2018; Pisoni et al., 2018). Zeschky et al. (2011) also emphasize that frugal innovation in

emerging markets often involves redesigning products and processes to fit local conditions and resource limitations. For craft villages, this logic is highly applicable because producers must balance authenticity, cost, durability, usability, and market adaptation.

Rossetto et al. (2023) advance the literature by proposing a scale for frugal innovation capabilities. Their capability-based perspective identifies three dimensions: focus on core functionalities, substantial cost reduction, and shared sustainable engagement. This is especially relevant to craft villages because frugal innovation is not merely a product attribute. It is an organizational and inter-organizational capability embedded in production routines, local partnerships, customer interaction, and community-based resource use.

In this paper, frugal innovation in traditional craft villages is defined as the capability of craft households, cooperatives, and micro and small enterprises to develop affordable, durable, easy-to-use, culturally meaningful, and resource-efficient products and processes through cost reduction, focus on core functions, resource saving, and sustainable local co-creation. This definition is grounded in the three criteria of Weyrauch and Herstatt (2016), the review-based understanding of Hossain (2018) and Pisoni et al. (2018), and the capability dimensions of Rossetto et al. (2023).

2.3 Traditional Craft Villages as Local Production Systems

Traditional craft villages can be understood as geographically concentrated communities where craft skills, product identities, production routines, and cultural meanings are transmitted over time. Their economic significance lies not only in producing craft goods but also in maintaining local employment, supporting rural livelihoods, strengthening tourism linkages, and preserving cultural identity. In Vietnam, Decree No. 52/2018/ND-CP establishes policy foundations for rural craft development, including support for production premises, environmental protection, training, product development, and trade promotion (Government of Vietnam, 2018). Decision No. 801/QD-TTg further recognizes craft-village conservation and development as relevant to rural restructuring, employment, living standards, cultural preservation, and new rural development (Prime Minister of Vietnam, 2022).

The craft-village context differs from conventional small-firm settings in several ways. First, knowledge is highly tacit and often transmitted through family, apprenticeship, and community relations. Second, products carry symbolic and aesthetic meaning, so innovation must protect core cultural value while improving market relevance. Third, production is frequently fragmented across households and small workshops. Fourth, producers depend on local networks of suppliers, traders, tourism actors, associations, and government agencies. These features mean that frugal innovation in craft villages is not only a firm-level capability but also a network-embedded and institutionally shaped process (Granovetter, 1985; Nahapiet & Ghoshal, 1998).

These characteristics make craft villages both promising and challenging sites for frugal innovation. Scarcity, tacit knowledge, improvisation, and dense local ties can stimulate

cost-saving creativity, but weak formal management, limited market intelligence, hierarchical leadership, environmental pressure, and insufficient support can constrain innovation. A conceptual model for this context must therefore integrate customer-related forces, internal organizational capabilities, resource recombination, knowledge management, leadership autonomy, government support, and network embeddedness.

3. Literature Review and Proposition Development

This section develops the conceptual model by linking the eight constructs in the preliminary measurement table to verified theoretical and empirical sources. The aim is to avoid unsupported claims and to ensure that each construct is anchored in established literature before being adapted to the traditional craft-village context.

3.1 Customer Participation

Customer participation refers to the involvement of customers in providing information, expressing needs, evaluating ideas, and co-developing products. However, customer participation does not always generate uniformly positive outcomes. Its effectiveness may depend on customer roles, product newness, and the level of conflict arising during the development process (Wang et al., 2020). Fang (2008) distinguishes customer participation as an information resource from customer participation as a co-developer and shows that different forms of customer participation can influence new product innovativeness and speed to market in different ways. Chang and Taylor (2016), in a meta-analysis, further show that the effect of customer participation depends on the stage of new product development, with participation in ideation and launch stages being especially useful. Cui and Wu (2017) also distinguish customer involvement as an information source from customer involvement as co-developers, indicating that customer involvement should be treated as a nuanced construct rather than a simple positive input.

In traditional craft villages, customer participation is highly relevant because craft products are design-sensitive, experience-based, and often customized. Domestic customers, tourists, wholesalers, retailers, and export buyers can provide information about aesthetic preferences, functional use, durability, packaging, price thresholds, and cultural expectations. Such participation can help craft producers identify which product features are essential and which can be simplified without weakening perceived value. Therefore, customer participation can guide frugal innovation by reducing uncertainty, revealing core functionalities, and supporting user-oriented cost-saving redesign (Fang, 2008; Chang & Taylor, 2016; Cui & Wu, 2017).

Proposition 1 (P1): Customer participation positively affects frugal innovation in traditional craft villages.

3.2 Customer Demand

Customer demand refers to market pressure for better quality, competitive prices, functional value, added value, responsiveness, and adaptation. Market orientation theory argues that

understanding customer needs and competitor conditions helps firms create superior customer value and improve performance (Narver & Slater, 1990). Innovation research also shows that market orientation and strategic orientation can influence the direction and type of innovation pursued by firms (Atuahene-Gima, 1996; Zhou et al., 2005).

In craft villages, customer demand is often paradoxical. Customers may value traditional handmade identity but also expect consistent quality, modern usability, safe materials, environmental responsibility, digital purchasing channels, and reasonable prices. This type of demand is directly connected to frugal innovation because craft producers must improve value while controlling cost. When customers require high quality at competitive prices, producers are pushed to reduce non-essential costs, focus on core product functions, simplify production flow, and redesign products around user value (Narver & Slater, 1990; Weyrauch & Herstatt, 2016; Rossetto et al., 2023).

Proposition 2 (P2): Customer demand positively affects frugal innovation in traditional craft villages.

3.3 Organic Innovative Culture

Organic innovative culture describes a flexible, participative, and learning-oriented organizational climate that encourages experimentation, new ideas, and tolerance of mistakes. Chenhall et al. (2011) explicitly link organic innovative culture to innovation within a management-control-system framework, emphasizing consensus seeking, participative decision-making, support for new ideas beyond formal responsibilities, and tolerance of mistakes. Bueschgens et al. (2013), in a meta-analytic review, also show that organizational culture is systematically associated with innovation outcomes.

In traditional craft villages, organic innovative culture may appear when workshop owners, master artisans, cooperative leaders, and family-business heads encourage artisans and workers to discuss product improvements, test new materials, learn from failed designs, and combine traditional motifs with modern uses. Such culture is not automatic because many craft enterprises are small, family-based, and hierarchical. When participative and learning-oriented norms exist, producers are more likely to experiment with low-cost process improvements and practical redesigns. Hence, organic innovative culture supports frugal innovation by creating a social climate for cost-saving experimentation (Chenhall et al., 2011; Bueschgens et al., 2013).

Proposition 3 (P3): Organic innovative culture positively affects frugal innovation in traditional craft villages.

3.4 Bricolage

Bricolage refers to making do by applying combinations of resources at hand to new problems and opportunities. Baker and Nelson (2005) conceptualize entrepreneurial bricolage as resource construction under constraints, showing how entrepreneurs create solutions by recombining available resources rather than waiting for ideal resources. Davidsson et al.

(2017) later develop and validate a behavioral measure of entrepreneurial bricolage, making the construct suitable for quantitative entrepreneurship research.

Bricolage is central to frugal innovation because both concepts assume resource scarcity and creative recombination. In craft villages, producers often innovate by using existing tools in new ways, combining family labor with local supplier relationships, adapting leftover materials, modifying traditional production routines, and creating workable solutions without costly investment. This logic aligns with recent SME research suggesting that network embeddedness may influence innovation performance through resource bricolage (Li & Shafait, 2025). Bricolage therefore explains the behavioral mechanism through which craft producers turn scarcity into practical, low-cost innovation (Baker & Nelson, 2005; Davidsson et al., 2017; Li & Shafait, 2025).

Proposition 4 (P4): Bricolage positively affects frugal innovation in traditional craft villages.

3.5 Knowledge Management

Knowledge management concerns how organizations create, store, share, integrate, and apply knowledge. Nonaka (1994) conceptualizes organizational knowledge creation as a dynamic process involving tacit and explicit knowledge, while Grant (1996) argues that knowledge is a central basis of the firm. Liao et al. (2007) show that knowledge sharing and absorptive capacity are associated with innovation capability, and Lam et al. (2021) provide evidence linking organizational culture, knowledge management, and innovation capability in an open-innovation context.

For craft villages, knowledge management has a dual character. It includes traditional tacit knowledge about materials, techniques, symbols, and finishing quality, but it also includes new knowledge about customer preferences, digital tools, certification, packaging, tourism services, environmental standards, and export requirements. Without mechanisms for sharing and integrating such knowledge, craft villages may possess valuable know-how but fail to transform it into cost-saving innovation. Knowledge management supports frugal innovation by codifying reusable solutions, diffusing production improvements, integrating customer feedback, and combining heritage knowledge with new market knowledge (Nonaka, 1994; Grant, 1996; Liao et al., 2007; Lam et al., 2021).

Proposition 5 (P5): Knowledge management positively affects frugal innovation in traditional craft villages.

3.6 Empowering Leadership

Empowering leadership refers to leader behaviors that give employees responsibility, autonomy, encouragement, and discretion in work-related decisions. Ahearne et al. (2005) show that leadership empowerment behavior can influence employee self-efficacy, adaptability, customer satisfaction, and performance. Liden et al. (2008) also include empowerment as an important dimension within servant leadership, emphasizing leader behaviors that help followers develop and take responsibility.

In craft villages, leaders may be household heads, workshop owners, master artisans, cooperative managers, or village business leaders. Their leadership style shapes whether workers and younger artisans contribute practical ideas or merely follow established routines. When artisans are empowered to solve problems, they may identify ways to reduce waste, simplify production steps, improve durability, respond to customer requests, or redesign products for new uses. Empowering leadership therefore supports frugal innovation by mobilizing distributed practical knowledge and encouraging fast, local, low-cost problem solving (Ahearne et al., 2005; Liden et al., 2008).

Proposition 6 (P6): Empowering leadership positively affects frugal innovation in traditional craft villages.

3.7 Government Support

Government support includes financial support, tax incentives, training, innovation programs, marketing assistance, public procurement, infrastructure, legal frameworks, and digital transformation support. Government programs can be especially important for SMEs because such firms often lack internal resources for formal innovation. Doh and Kim (2014) show that government financial support can influence SME innovation in regional industries, while Kim et al. (2016) analyze the role of government support systems in product innovation in the service industry.

In Vietnam, the policy context is particularly relevant for craft villages. Decree No. 52/2018/ND-CP provides support mechanisms for rural crafts, including land and production premises, environmental treatment, training, trade promotion, and new product development (Government of Vietnam, 2018). Decision No. 801/QD-TTg approves the program for conservation and development of Vietnam's craft villages for 2021-2030, linking craft-village development to employment, rural restructuring, living standards, cultural preservation, and new rural development (Prime Minister of Vietnam, 2022). Government support can therefore reduce the cost and risk of frugal innovation by enabling shared infrastructure, training, e-commerce adoption, certification, exhibitions, environmental upgrading, and collective branding (Doh & Kim, 2014; Kim et al., 2016).

Proposition 7 (P7): Government support positively affects frugal innovation in traditional craft villages.

3.8 Network Embeddedness

Network embeddedness refers to the extent to which firms are connected through frequent interaction, long-term ties, trust, shared norms, transparency, coordination, and common goals. Granovetter (1985) argues that economic action is embedded in social relations, while Nahapiet and Ghoshal (1998) explain that social capital facilitates access to knowledge and organizational advantage. Lin et al. (2009) operationalize network embeddedness in R&D consortia through structural, relational, and cognitive dimensions, including interaction frequency, mutual trust, and shared coordination patterns.

Traditional craft villages are inherently networked production systems. Producers rely on suppliers, subcontractors, traders, tourism operators, associations, cooperatives, customers, and local authorities. Strong network embeddedness can support frugal innovation by reducing transaction costs, facilitating shared equipment or marketing, spreading low-cost technical knowledge, enabling joint procurement, and supporting collective responses to environmental or market pressure. Recent SME studies also show that network embeddedness is positively associated with innovation performance and may operate through resource bricolage (Dogbe et al., 2020; Li & Shafait, 2025).

Proposition 8 (P8): Network embeddedness positively affects frugal innovation in traditional craft villages.

4. Proposed Conceptual Framework

The proposed model positions frugal innovation as the dependent construct and identifies eight theoretically grounded antecedents: customer participation, customer demand, organic innovative culture, bricolage, knowledge management, empowering leadership, government support, and network embeddedness. The dependent construct is defined through cost reduction, focus on core functionalities, optimized performance, resource saving, durability, ease of use, and shared sustainable engagement (Weyrauch & Herstatt, 2016; Rossetto et al., 2023).

The logic of the model is multi-level. Customer participation and customer demand define the market direction of innovation. Organic innovative culture and empowering leadership create an internal climate for experimentation and autonomy. Bricolage and knowledge management provide the behavioral and knowledge-processing mechanisms through which existing resources and dispersed know-how are transformed into workable solutions. Government support and network embeddedness operate as external enablers that reduce constraints, expand access to resources, and facilitate collective learning (Barney, 1991; Grant, 1996; Granovetter, 1985; Teece, 2007).

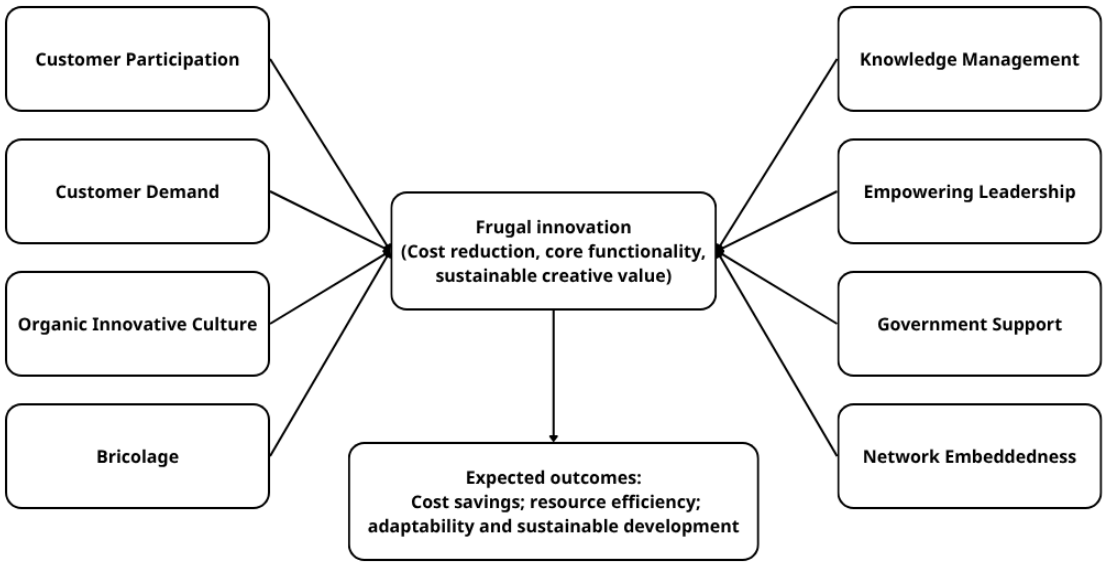

Figure 1. Proposed conceptual model of factors affecting frugal innovation in traditional craft villages

Source: Authors

Table 1. summarizes the propositions

Proposition	Expected relationship	References
P1	Customer participation -> Frugal innovation	Fang (2008); Chang and Taylor (2016); Cui and Wu (2017)
P2	Customer demand -> Frugal innovation	Narver and Slater (1990); Atuahene-Gima (1996); Zhou et al. (2005)
P3	Organic innovative culture -> Frugal innovation	Chenhall et al. (2011); Bueschgens et al. (2013)
P4	Bricolage -> Frugal innovation	Baker and Nelson (2005); Davidsson et al. (2017); Li and Shafait (2025)
P5	Knowledge management -> Frugal innovation	Nonaka (1994); Grant (1996); Liao et al. (2007); Lam et al. (2021)
P6	Empowering leadership -> Frugal innovation	Ahearne et al. (2005); Liden et al. (2008)
P7	Government support -> Frugal innovation	Doh and Kim (2014); Kim et al. (2016); Government of Vietnam (2018); Prime Minister of Vietnam (2022)
P8	Network embeddedness -> Frugal innovation	Granovetter (1985); Nahapiet and Ghoshal (1998); Lin et al. (2009); Dogbe et al. (2020); Li and Shafait (2025)

Source: Authors

5. Discussion

The proposed framework contributes to frugal innovation research by extending the concept to a heritage-based, household-oriented, and locally embedded production context. Much

frugal innovation research examines emerging markets, firms, products, or SMEs in general, but traditional craft villages differ because their innovation must protect cultural meaning while addressing cost, quality, usability, and sustainability pressures. The framework therefore clarifies how frugal innovation can be understood as both cost-saving innovation and cultural-value-preserving innovation (Hossain, 2018; Pisoni et al., 2018; Weyrauch & Herstatt, 2016).

The model also contributes by integrating several theoretical perspectives. The resource-based view explains why local skills, reputation, and materials matter; dynamic capability theory explains why these resources must be reconfigured; the knowledge-based view explains how tacit and explicit knowledge support innovation; social capital theory explains how networks provide access to resources and knowledge; and institutional support perspectives explain why policy support matters for resource-constrained SMEs (Barney, 1991; Grant, 1996; Granovetter, 1985; Nahapiet & Ghoshal, 1998; Teece, 2007). This integration is important because frugal innovation in craft villages cannot be explained by resource scarcity alone.

Practically, the framework suggests that craft producers should not wait for large investments before innovating. They can start by listening systematically to customers, identifying core product value, reducing unnecessary cost, reusing available resources, sharing knowledge among artisans, empowering workers to solve production problems, and collaborating with local partners. These actions are consistent with the frugal innovation emphasis on affordability, core functionality, and optimized performance (Rossetto et al., 2023; Weyrauch & Herstatt, 2016).

For policymakers, the model implies that support for craft villages should move beyond cultural preservation alone. Preservation remains important, but craft villages also need innovation-enabling conditions: training, design support, digital marketing support, environmental treatment, shared infrastructure, product certification, trade promotion, and network platforms. These forms of support can lower the cost and risk of innovation and align with Vietnam's policy direction on rural craft development and craft-village conservation (Government of Vietnam, 2018; Prime Minister of Vietnam, 2022).

For future empirical research, the framework can be tested through surveys of craft households, cooperatives, and micro and small craft enterprises. Researchers can adapt the item pool in Appendix A, conduct translation and back-translation, pilot the questionnaire, test reliability and validity, and use PLS-SEM or CB-SEM to evaluate the proposed relationships. Because all constructs may be measured through self-report surveys, future studies should address common method bias through procedural remedies such as anonymity, psychological separation of predictor and criterion variables, and statistical checks such as full collinearity VIF or marker-variable procedures.

6. Conclusion

This conceptual paper proposes a theoretically grounded model of factors affecting frugal

innovation in traditional craft villages. The framework identifies customer participation, customer demand, organic innovative culture, bricolage, knowledge management, empowering leadership, government support, and network embeddedness as important antecedents. Frugal innovation is conceptualized as cost-saving, resource-efficient, user-oriented, and sustainability-sensitive innovation that preserves core craft value while improving affordability and adaptability. By grounding each construct in verifiable literature and adapting it to the craft-village context, the paper provides a safer and more coherent foundation for future research. The next step should be empirical validation using survey data from craft households, cooperatives, and small craft enterprises.

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Author contributions

Dr. Huyen Thi Thanh Le designed the research model, discussion, conclusion, research summary, and research synthesis (including sections 3, 4, 5, and 6). Dr. Huyen Thi Thanh Phan prepared the introduction and literature review (including sections 1 and 3). Student Thu Le Kim Nguyen was responsible for the theoretical basis section 2.1, drawing the model, and summarizing Table 1. Student Ngoc Nguyen Bao Tran was responsible for the theoretical basis section 2.2 and the references. Student Ngoc Khanh Huynh was responsible for section 2.3 and the references.

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Competing interests

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Obtained.

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The Publication Ethics Committee of the Macrothink Institute.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

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The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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Appendix A. Measurement item pool for future empirical testing

Construct	Indicative item	References
Customer participation	Customers often provide information about needs and preferences.	Fang (2008); Chang and Taylor (2016); Cui and Wu (2017)
	Customer participation is important for product development activities.	Fang (2008); Chang and Taylor (2016); Cui and Wu (2017)
	Customer participation is an important part of the product innovation process.	Fang (2008); Chang and Taylor (2016); Cui and Wu (2017)
	Customers' creative efforts play an important role in product innovation.	Fang (2008); Chang and Taylor (2016); Cui and Wu (2017)
Customer demand	Customers often require higher-quality products and/or services.	Narver and Slater (1990); Atuahene-Gima (1996); Zhou et al. (2005)
	Customers require competitive pricing for high-quality products and/or services.	Narver and Slater (1990); Atuahene-Gima (1996); Zhou et al. (2005)
	Customers have high expectations for both functional value and added value.	Narver and Slater (1990); Atuahene-Gima (1996); Zhou et al. (2005)
	Customer feedback is a key driver of new product development strategies.	Narver and Slater (1990); Atuahene-Gima (1996); Zhou et al. (2005)
Organic innovative culture	The enterprise emphasizes consensus seeking and participative decision-making.	Chenhall et al. (2011); Bueschgens et al. (2013)
	Managers are encouraged to develop new ideas beyond their formal responsibilities.	Chenhall et al. (2011); Bueschgens et al. (2013)
	The enterprise tolerates mistakes and learns from them.	Chenhall et al. (2011); Bueschgens et al. (2013)
Bricolage	We are confident in finding workable solutions using existing resources.	Baker and Nelson (2005); Davidsson et al. (2017)
	We use any existing resource that seems useful for a new problem or opportunity.	Baker and Nelson (2005); Davidsson et al. (2017)
	We combine existing resources with inexpensive resources available to us.	Baker and Nelson (2005); Davidsson et al. (2017)
	We recombine resources to accomplish new challenges.	Baker and Nelson (2005); Davidsson et al. (2017)
Knowledge management	The enterprise creates new knowledge for application across activities.	Nonaka (1994); Grant (1996); Liao et al. (2007); Lam et al. (2021)
	The enterprise integrates different knowledge sources.	Nonaka (1994); Grant (1996); Liao et al. (2007); Lam et al. (2021)
	The enterprise encourages sharing practical production and market knowledge.	Nonaka (1994); Grant (1996); Liao et al. (2007); Lam et al. (2021)
Empowering leadership	My manager gives me responsibility to make important decisions about my job.	Ahearne et al. (2005); Liden et al. (2008)
	My manager encourages me to handle important work decisions independently.	Ahearne et al. (2005); Liden et al. (2008)
	My manager gives me freedom to handle difficult situations in the way I think best.	Ahearne et al. (2005); Liden et al. (2008)
Government support	The enterprise has received government financial support, including tax reduction.	Doh and Kim (2014); Kim et al. (2016); Government of Vietnam (2018)
	The enterprise has received government support for innovation opportunities.	Doh and Kim (2014); Kim et al. (2016); Government of Vietnam (2018)
	The enterprise has received support for marketing, exhibitions, or public procurement.	Doh and Kim (2014); Kim et al. (2016); Prime Minister of Vietnam (2022)
	There are relevant policies supporting digital transformation or product development.	Kim et al. (2016); Government of Vietnam (2018); Prime Minister of Vietnam (2022)
Network embeddedness	Firms in the village interact with one another frequently.	Granovetter (1985); Lin et al. (2009); Dogbe et al. (2020)
	There are long-standing relationships among partners.	Granovetter (1985); Lin et al. (2009); Dogbe et al. (2020)
	Partners highly trust one another.	Nahapiet and Ghoshal (1998); Lin et al. (2009)
	Partners follow shared norms, coordination patterns, and common goals.	Nahapiet and Ghoshal (1998); Lin et al. (2009); Li and Shafait (2025)
Frugal innovation	The enterprise achieves substantial cost reduction in product or process innovation.	Weyrauch and Herstatt (2016); Rossetto et al. (2023)
	The enterprise focuses on core product/service functionalities rather than unnecessary features.	Weyrauch and Herstatt (2016); Rossetto et al. (2023)
	The enterprise saves organizational resources in production or operations.	Rossetto et al. (2023)
	The enterprise develops durable and easy-to-use products/services.	Weyrauch and Herstatt (2016); Rossetto et al. (2023)
	The enterprise cooperates with local partners to create sustainable value.	Rossetto et al. (2023)

Source: Authors