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International Collaboration and Food Product Innovation: A Thailand-UK Case Study

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Abstract: The development of globally competitive food innovations requires the strategic integration of high-quality resources with systematic innovation processes to create sustainable value. This study investigates food innovation development through cross-national collaboration between Thailand and the United Kingdom. It examines the transformation of fruit-based raw materials sourced from Sukhothai, Thailand, an area recognised for its strong agricultural potential into value-added food innovation products through innovation-driven development by a business organisation in Manchester, the UK, with expertise in taste development, branding, packaging, and commercialisation.

A mixed-methods approach was adopted, combining secondary research through a systematic literature review with primary research. Qualitative data were collected via in-depth interviews with ten industry experts to refine key innovation dimensions, including taste, nutritional value, branding, and consumer alignment. These insights informed product development, followed by a quantitative survey of 30 respondents from 15 nationalities to assess market acceptance using the Technology Acceptance Model (TAM). The findings indicate strong consumer acceptance, highlighting the strategic value of cross-border collaboration in developing food innovations for global markets.

Keywords: International collaboration; Cross-border innovation; Food product innovation; Global value chains; Innovation management Mixed-methods research; Technology Acceptance Model.

1 Introduction

Global food markets have become increasingly competitive, characterised by heightened consumer expectations regarding product quality, safety, health attributes, and sustainability. Contemporary consumers no longer evaluate food products solely on price

or availability but demand high standards of raw materials, transparent processes, and consistent quality performance. In response, food firms face growing pressure to innovate continuously in order to remain competitive while ensuring long-term sustainability and consumer trust (McCarthy et al., 2017; Galanakis, 2018).

Achieving globally competitive food innovation requires more than incremental product improvement. The literature emphasises the importance of a systematic and end-to-end approach to food product development, integrating upstream resource quality with downstream innovation and commercialisation processes (Barbieri et al., 2016; van Duijn et al., 2018). Such integration enables firms to identify strengths and limitations across the entire value chain and to strategically combine resources in ways that enhance product performance, consistency, and long-term value creation. High-quality implementation across all stages, from raw material sourcing to processing, branding, and market delivery, is therefore critical to sustaining product quality and competitive advantage over time (Trott, 2017).

A substantial body of research highlights that competitive and sustainable food products emerge from the effective integration of superior raw materials with business innovation capabilities, including market research, product R&D, and continuous innovation informed by customer needs (Klerkx et al., 2012; McCarthy et al., 2017). Innovation in this context is not limited to technological change but extends to packaging, branding, taste optimisation, and value propositions derived from real consumer insights. This customer-oriented and iterative approach to innovation is widely recognised as a key driver of market relevance and brand sustainability in the food sector (Galanakis, 2018).

Consequently, food product innovation increasingly extends beyond primary agricultural production and is shaped by the combination of high-quality inputs with structured innovation management processes that enhance functionality, differentiation, and market acceptance. However, prior studies also indicate that the capabilities required for impactful food innovation are often geographically uneven, with certain regions specialising in high-quality raw material production, while others excel in innovation management, branding, and commercialisation (Cooke et al., 2012; Kaplinsky and Morris, 2001). This spatial differentiation creates opportunities for cross-border collaboration as a mechanism to integrate complementary regional strengths.

Within this context, the present study explores food innovation development through international collaboration between Thailand and the United Kingdom, two regions with distinct complementary advantages in the global food value chain. Thailand is widely recognised in academic and industry literature as a leading producer of premium tropical fruits, benefiting from favourable agro-climatic conditions, agricultural expertise, and a strong reputation for fruit quality which often described as the “golden land” of fruit production (Ketsa and Daengkanit, 1998; Wongs-Aree et al., 2011). On the other hand, the United Kingdom is positioned as a global leader in business development and innovation, supported by research-intensive universities, advanced innovation management capabilities, and strong international market orientation (Teece, 2010; Perkmann et al., 2013).

Specifically, this study examines the transformation of fruit-based raw materials sourced from Sukhothai, Thailand, a region recognised for its agricultural potential and fruit quality, into value-added innovative food products through an innovation-driven development process led by a business organisation in Manchester, United Kingdom. Manchester serves as a modern innovation hub where expertise in taste development, branding, packaging, and commercialisation is applied to enhance product quality, health

positioning, and global market readiness. The effectiveness of this cross-national innovation approach is further illustrated through consumer acceptance testing involving participants from more than fifteen international regions, providing practical evidence of the value created through integrated Thailand–UK food innovation.

By analysing this two-region collaboration, the study contributes to the food innovation and international business literature by demonstrating how cross-border integration of resource-based and knowledge-based capabilities can enhance innovation performance, support premium positioning, and facilitate global acceptance of food products. In doing so, the research offers empirical insights into international collaboration as a strategic driver of sustainable food product innovation.

2 Research Objectives

- To examine how premium fruit-based raw materials from, Thailand contribute to food product innovation and quality differentiation within a global value chain.
- To analyse how innovation management, R&D, and market-oriented capabilities in the United Kingdom transform high-quality raw materials into value-added food innovation products.
- To evaluate the effectiveness of Thailand–UK cross-border collaboration in enhancing global consumer acceptance and market readiness of innovative food products.

3 Research Methodology

This study adopts a sequential mixed-methods research design to investigate food innovation development through structured collaboration between Thailand and the United Kingdom. The methodological framework integrates secondary research (systematic literature review) and primary research (expert interviews and consumer survey) in order to capture both upstream agricultural value creation (Thailand) and downstream innovation and market development (United Kingdom). These findings are subsequently integrated through cross-case analysis, followed by MVP development and quantitative market acceptance testing.

The research process is organised into seven structured steps, each defined by a clear purpose, procedure, and output.

Table 1 Research Method Framework: Sequential Mixed-Methods Design for Thailand–UK Food Innovation Study

Step	*Research Phase*	*Purpose*	*Method*	*Output*
1	Systematic Literature Review	Establish theoretical foundation for cross-border food innovation	Review and synthesis of academic and industry sources	Conceptual framework
2	Two-Region Case Design	Define complementary roles of Thailand (upstream) and UK	Case selection and boundary definition	Structured comparative design

		(downstream)		
3	Thailand Primary Research (n=5)	Examine upstream raw material preparation and export readiness	Expert interviews + secondary data analysis	Upstream process map and quality specifications
4	UK Primary Research (n=5)	Analyse downstream innovation and market development processes	Expert interviews + market analysis	Downstream innovation blueprint
5	Cross-Regional Integration	Integrate findings into a unified model	Thematic analysis and cross-case comparison	Thailand–UK collaboration model
6	MVP Development	Operationalise the integrated model	Closed-loop product development process	MVP food innovation product
7	TAM Market Testing (n=30)	Assess consumer acceptance and market readiness	Quantitative survey (TAM) + descriptive analysis	Empirical validation of adoption potential

Step 1: Secondary Research – Systematic Literature Review
Purpose
To establish the theoretical foundation and identify key constructs relevant to cross-border food innovation.
Procedure

1. Define review themes and analytical boundaries, including:
   (i) food innovation,
   (ii) Thai fruit resources and supply chains,
   (iii) food and nutrition innovation, and
   (iv) cross-border collaboration and commercialisation.

2. Conduct systematic searches of academic journals and credible industry/policy sources using defined keywords and inclusion criteria.

3. Screen and synthesise the literature to extract relevant concepts, variables, and theoretical frameworks.

4. Develop an initial analytical framework to guide subsequent primary data collection instruments (interview protocols and survey constructs).

Output
A conceptual framework linking resource capability, innovation processes, governance mechanisms, and market outcomes.

Step 2: Research Setting and Case Selection (Two-Region Design)
Purpose
To define a two-region case configuration representing complementary capabilities within the food innovation value chain.

Procedure

1. Select Sukhothai, Thailand, as the upstream raw material sourcing region based on agricultural strengths and fruit quality potential.
2. Select Manchester, United Kingdom, as the downstream innovation and commercialisation region due to capabilities in branding, packaging, taste development, and R&D.
3. Delimit analytical boundaries for each region:
    - Thailand: raw material selection, processing, quality assurance, and export readiness.
    - United Kingdom: product development, market insight, branding and packaging design, taste optimisation, and iterative R&D.

Output
A clearly bounded comparative case design enabling integrative cross-regional analysis.

Step 3: Primary Research in Thailand – Upstream Value Creation (n = 5)
Purpose
To examine how agricultural resources are selected, processed, and prepared as innovation-ready raw materials.
Procedure

1. Collect secondary data on Thai fruit production, processing standards, documentation systems, and export logistics.
2. Conduct in-depth interviews with five Thai experts representing production, processing operations, quality control, food safety, and export compliance.
3. Map the upstream workflow: harvesting → selection criteria → quality analysis → preparation → packaging → shipment.
4. Identify constraints and critical control points affecting consistency, safety, traceability, and export feasibility.

Output
An upstream process map and a structured set of quality and feasibility requirements defining "innovation-ready raw materials."

Step 4: Primary Research in the United Kingdom – Downstream Innovation and Market Development (n = 5)
Purpose
To analyse how imported raw materials are transformed into market-ready food innovations.
Procedure

1. Conduct secondary research on UK and European consumer trends, premiumisation, health positioning, and packaging expectations.
2. Conduct in-depth interviews with five UK experts in innovation, branding, packaging, regulatory alignment, and commercialisation.

3. Analyse the applied innovation logic in Manchester: market analysis and benchmarking → sensory testing → branding development → packaging design → iterative refinement.

4. Identify market-facing requirements, including positioning clarity, claims discipline, packaging cues, and retail readiness.

Output
A downstream innovation blueprint detailing how branding, packaging, sensory optimisation, and strategy convert raw materials into differentiated food products.

Step 5: Data Analysis and Cross-Regional Integration
Purpose
To integrate Thai upstream and UK downstream findings into a coherent cross-border value creation model.
Procedure

1. Transcribe and code all interview data.

2. Apply thematic analysis to identify recurring operational and strategic themes.

3. Compare patterns across regions to identify complementarities and interface mechanisms.

4. Synthesize findings into a consolidated Thailand–UK collaboration model linking resource engineering, innovation management, governance, and market performance.

Output
A two-layer cross-border food innovation model explaining how geographically distributed capabilities jointly produce globally competitive products.

Step 6: Product Development – Cross-Regional MVP Operationalisation
6.1 Method: Closed-Loop Cross-Border Product Development
Purpose
To empirically validate the integrated collaboration model through development of a Minimum Viable Product (MVP).
Product development followed a structured closed-loop architecture: Source → Transform → Validate → Feedback → Refine
This architecture integrates:

- Upstream process engineering and traceability discipline (Thailand)

- Cross-border compliance and logistics management (middle stream)

- Downstream sensory validation and positioning refinement (United Kingdom)

Development Stages

1. Concept formation grounded in upstream quality capability and downstream consumer requirements.

2. Specification alignment, where UK sensory targets informed Thai drying parameters and texture calibration.

3. Compliance and documentation integration, translating batch-level evidence into export-ready systems.

4. Sensory validation and iterative refinement through benchmarking and testing.

5. Feedback incorporation, whereby downstream insights informed upstream specification adjustments.

This operationalised the cross-border "specification handshake" and "innovation iteration loop" identified in the integration analysis.

Output

A functioning MVP demonstrating synchronisation of upstream agricultural engineering and downstream innovation systems.

Step 7: Market Acceptance Testing – Quantitative Survey Using TAM (n = 30; 15 Nationalities)

Purpose

To evaluate early-stage international consumer acceptance and adoption readiness of the MVP within a cross-border innovation context.

Procedure

1. Develop a structured survey instrument adapted from the Technology Acceptance Model (TAM), incorporating four constructs:
    - Perceived Usefulness (PU)
    - Perceived Ease of Use/Adoption (PEOU)
    - Attitude toward Use (ATT)
    - Behavioural Intention to Purchase (BI)
2. Invite participants to physically sample the MVP prior to completing the survey to ensure experience-based evaluation rather than hypothetical assessment.
3. Operationalise constructs as follows:
    - **PU:** perceived product value, quality consistency, nutritional alignment, and lifestyle compatibility.
    - **PEOU:** clarity of packaging and communication, convenience, and ease of integration into daily routines.
    - **ATT:** overall affective evaluation of the product.
    - **BI:** purchase and recommendation intention.
4. Collect responses from 30 participants representing 15 nationalities to capture cross-cultural preliminary validation.
5. Analyse data using descriptive statistics (mean scores) to assess construct strength and calculate internal reliability (Cronbach's α) to confirm measurement consistency.

6. Interpret construct relationships in accordance with TAM's theoretical sequence and assess overall acceptance index as an indicator of adoption readiness.

Output
Quantitative evidence of consumer acceptance supporting international scalability of the Thailand–UK innovation configuration.

4 Results

The Systematic Literature Review Results

Thematic domains and cross-cutting synthesis

The systematic literature review identified four major thematic domains explaining how agricultural resources can be transformed into globally competitive food innovations: (1) food innovation and value creation mechanisms, (2) agricultural resource quality and supply chain capability, (3) food and nutrition innovation and consumer acceptance, and (4) cross-border collaboration and global value chain integration. Across these domains, the literature consistently demonstrates that food innovation performance depends on system-level capability alignment, rather than isolated excellence at any single stage of production. Specifically, successful outcomes emerge when upstream resource capability and process reliability are aligned with consumer acceptance drivers and downstream commercialisation mechanisms under coherent governance (Bigliardi and Galati, 2013; Gereffi, Humphrey and Sturgeon, 2005).

The review highlights that food innovation is embedded within value chains where capabilities are unevenly distributed geographically. Resource-rich regions often specialise in production and primary processing, while advanced economies concentrate higher-value, knowledge-intensive activities such as R&D, branding, regulatory compliance, and commercialisation (Mudambi, 2008). For agri-food firms attempting to access premium markets, participation increasingly requires codified standards, traceability systems, and compliance with private and public quality regimes (Henson and Humphrey, 2010; Reardon, Timmer and Minten, 2012).

This integrated perspective is particularly relevant in cross-border contexts where production and commercialisation occur in different regions. The literature provides the theoretical foundation for analysing the case study as a two-region value creation system in which:

- Thailand contributes upstream capability in agricultural production, quality standardisation, and export readiness, embedded within global agri-food trade structures (Poapongsakorn, 2006; Reardon, Timmer and Minten, 2012);

- The United Kingdom contributes downstream capability in innovation management, open innovation ecosystems, branding, and premium FMCG commercialisation (Bigliardi and Galati, 2013; Garcia Martinez, Lazzarotti and Manzini, 2014; Teece, 2010).

The review therefore supports conceptualising the case not as a simple export pipeline, but as a coordinated cross-border innovation system operating within a global value chain logic.

Table 2 Thematic domains explaining transformation of agricultural resources into globally competitive food innovations

Thematic	*Core Theoretical*	*Key Mechanisms*	*Implication for*	*Key References*

Domain	*Focus*	*Identified in the Literature*	*Thailand–UK Case*	*(Harvard style; post-2000)*
1. Food innovation and value creation mechanisms	Food innovation as a multi-stage, system-level process linking product development, process optimisation, market validation, and commercialisation	• Iterative product development cycles • Sensory optimisation and safety integration • Open innovation and inter-organisational knowledge exchange • Market orientation and business model innovation	Positions Manchester (UK) as an innovation conversion environment where benchmarking, sensory testing, branding, and iterative refinement translate Thai agricultural inputs into differentiated FMCG products	Bigliardi, B. and Galati, F. (2013); Garcia Martinez, M., Lazzarotti, V. and Manzini, R. (2014); Teece, D.J. (2010); Traill, W.B. and Meulenberg, M. (2002)
2. Agricultural resource quality and supply chain capability	Upstream quality, standardisation, and compliance as foundations of downstream value creation and global market participation	• Codified raw material specifications • Post-harvest handling discipline • Process validation and standardisation • Traceability as governance and risk reduction • Integration into global standards regimes	Frames Sukhothai (Thailand) as an enablement layer where measurable endpoints (moisture/aw control, validated drying profiles, lot coding, export documentation) reduce variability and enable premium positioning	Opara, L.U. (2003); Olsen, P. and Borit, M. (2013); Aiello, G., Enea, M. and Muriana, C. (2015); Henson, S. and Humphrey, J. (2010); Reardon, T., Timmer, C.P. and Minten, B. (2012); Poapongsakorn, N. (2006)
3. Food and nutrition innovation and consumer acceptance	Consumer adoption shaped by sensory quality, perceived benefits, trust, origin perception, and risk mitigation	• Taste and texture as primary adoption drivers • Credibility of health/nutrition claims • Country-of-origin and naturalness cues • Trust formation through transparency and	Explains why UK downstream activities (taste-first R&D, validated claims, packaging clarity, provenance communication) are critical for global acceptance of Thai-sourced products	Ronteltap, A. et al. (2007); Siegrist, M. (2008); Verbeke, W. (2005); Siegrist, M. and Hartmann, C. (2020)

		evidence		
4. Cross-border collaboration and global value chain integration	Innovation as coordinated capability alignment across geographically dispersed actors within governed value chains	• Capability complementarity • Governance via codified specifications • Feedback loops and upgrading • Location of high-value activities in advanced economies	Frames ChewChew as a two-layer value creation system: Thailand (resource and compliance capability) + UK (innovation and commercialisation capability), linked by governance, upgrading, and iterative coordination	Gereffi, G., Humphrey, J. and Sturgeon, T. (2005); Mudambi, R. (2008); Taylor, D.H. (2005); Klerkx, L., van Mierlo, B. and Leeuwis, C. (2012); Misra, A. and Mention, A.-L. (2022)

This integrated perspective provides a theoretical foundation for conceptualising the ChewChew case as a coordinated cross-border innovation system rather than a linear export pipeline. The literature supports framing Thailand as the upstream layer delivering agricultural production capability, process standardisation, and export readiness (Poapongsakorn, 2006; Reardon, Timmer and Minten, 2012), while the United Kingdom provides downstream capability in innovation management, open innovation ecosystems, branding, and premium FMCG commercialisation (Bigliardi and Galati, 2013; Garcia Martinez, Lazzarotti and Manzini, 2014; Teece, 2010). Collectively, the review justifies a two-layer model in which cross-border governance and iterative upgrading mechanisms connect origin capability to market-facing performance.

Domain-specific results

This section synthesises four interrelated thematic domains, food innovation processes, upstream quality governance, consumer acceptance dynamics, and global value chain coordination, to conceptually structure and theoretically ground the Thailand–UK cross-border innovation model.

Within Theme 1, food innovation is conceptualised as a multi-stage, iterative process linking product development, process optimisation, market validation, and commercialisation (Bigliardi and Galati, 2013; Traill and Meulenberg, 2002). The literature highlights that food innovation is particularly sensitive to sensory and safety requirements, making supply chain coordination and consistent process execution essential (Bigliardi and Galati, 2013). Innovation performance is also linked to value capture mechanisms, including branding and business model innovation (Teece, 2010). Open innovation is identified as a central mechanism through which food firms partner with external actors (universities, labs, packaging specialists, retail networks) to reduce uncertainty and accelerate iterative development (Garcia Martinez, Lazzarotti and Manzini, 2014). In the ChewChew case, this supports conceptualising Manchester as an "innovation conversion environment" that translates upstream agricultural inputs into consumer-facing value.

Theme 2 emphasises that raw material quality, production consistency, and compliance capability are foundational determinants of value creation, particularly in export-oriented agri-food systems (Opara, 2003). Participation in premium international markets increasingly requires integration into private standards regimes, traceability frameworks, and documentation systems (Henson and Humphrey, 2010; Reardon, Timmer and

Minten, 2012). Traceability is repeatedly framed as both technical infrastructure and governance mechanism: it reduces information asymmetry, increases transparency, and strengthens premium positioning through verifiable documentation of origin and process integrity (Olsen and Borit, 2013), while also reducing expected quality-failure costs (Aiello, Enea and Muriana, 2015). Processing technology is a further quality determinant; validated drying parameters directly influence moisture content, texture stability, colour outcomes, and shelf life (Janjai et al., 2009). These findings support positioning Sukhothai as an upstream enablement layer where measurable endpoints which are maturity specifications, validated solar-dome profiles, moisture/aw control, and export documentation provide the necessary foundation for downstream innovation.

Theme 3 shows that consumer acceptance is driven primarily by sensory quality, with taste and texture acting as dominant determinants of adoption for innovative foods (Ronteltap et al., 2007; Siegrist, 2008). Health benefits contribute to value only when sensory expectations are met. Additionally, consumers prefer clearly communicated and scientifically validated claims, highlighting the importance of evidence and compliance for commercial success (Verbeke, 2005). Trust, perceived naturalness, and country-of-origin cues are particularly influential for imported foods, where transparency reduces perceived risk (Siegrist and Hartmann, 2020). This supports the downstream emphasis in the UK on taste-first R&D, claims discipline, packaging clarity, and provenance communication grounded in evidence.

Theme 4 situates cross-border innovation within global value chain governance. Value creation arises through capability complementarity, codified governance and specification alignment, and feedback-driven upgrading (Gereffi, Humphrey and Sturgeon, 2005). High-value knowledge-intensive activities cluster in advanced economies while production-intensive activities remain in resource-rich regions (Mudambi, 2008). Innovation outcomes improve when upstream systems upgrade in response to downstream market requirements through iterative coordination (Klerkx, van Mierlo and Leeuwis, 2012). Accordingly, ChewChew is best conceptualised as a feedback-driven two-layer innovation system: Thailand provides codified agricultural and processing capability, the UK provides innovation conversion and market traction capability, and governance mechanisms align both layers.

The case design confirms a clear division of functional capability across two geographically distinct regions. Sukhothai was bounded as the upstream resource and process capability environment (maturity control, defect screening, drying validation, safety endpoints, and export documentation), while Manchester was bounded as the downstream innovation and commercialisation environment (benchmarking and taste optimisation, claims discipline, premium packaging and branding cues, and staged route-to-market logic). This boundary clarity enabled systematic comparison of capability roles and identification of cross-border interface mechanisms.

Primary Research in Thailand Results (Upstream Value Creation; n = 5)

Findings from interviews with five Thai experts involved in production, processing, quality control, food safety, and export operations demonstrate convergent agreement that upstream value creation depends on a system of codified specifications, validated processes, and documentary evidence supporting export feasibility. Thematic analysis generated five upstream themes defining “innovation-ready raw materials”: codified maturity and quality specifications; post-harvest handling discipline; validated solar-dome drying profiles; safety control through moisture and water activity endpoints; and end-to-end traceability and export documentation. These themes align closely with literature emphasising resource capability and process reliability (Opara, 2003; Janjai et al., 2009; Olsen and Borit, 2013).

Table 3 Thailand Upstream Interview Results Matrix (n = 5 Experts)

Theme	*Expert 1 (Farm / Production)*	*Expert 2 (Processing Operations)*	*Expert 3 (Quality Control)*	*Expert 4 (Food Safety)*	*Expert 5 (Export & Compliance)*
Theme A: Codified specification of maturity, defects, and sensory potential	Confirmed 110-day banana harvest must be fixed as formal maturity specification; recommended visual peel colour index and firmness as field indicators	Stated incoming raw materials must meet defined size and ripeness criteria before slicing	Recommended measurable sweetness proxy (Brix range) and batch uniformity checks	Highlighted defect rejection (bruising, insect damage, spoilage) as microbiological risk control	Emphasised that inconsistent maturity creates downstream texture variability and export rejection risk
Theme B: Post-harvest handling as critical control point	Identified harvest-to-processing time limit as essential to prevent browning	Observed mechanical damage during transport reduces yield and increases enzymatic darkening	Recommended lot separation by harvest date to prevent mixed maturity batches	Stressed hygiene control during washing/slicing to reduce contamination	Linked disciplined handling to credibility of traceability records during export audits
Theme C: Solar dome drying requires validated parameters and logging	Described solar drying as weather-sensitive; supported fixed target range for temperature and airflow	Proposed controlled drying profile with monitored temperature and humidity	Recommended periodic moisture sampling during drying to ensure endpoint consistency	Identified drying endpoint as CCP for microbiological stability	Required documented drying profile records as part of export evidence pack
Theme D: Low-moisture food safety depends on final moisture and aw	Emphasised correct drying balance to achieve chewy texture without under-drying	Suggested defined moisture range to maintain product consistency	Recommended batch-level aw testing before release	Identified aw threshold as primary safety control for dried banana	Required COA including moisture/aw data before UK shipment
Theme E: Export readiness depends on documentation,	Supported farm-level lot coding to enable traceability	Recommended moisture-barrier packaging to prevent	Highlighted need for full batch records linking harvest → drying →	Stressed documentation completeness (GMP, hygiene logs, test	Identified packaging seal integrity, lot/date coding, COA,

packaging integrity, and traceability	from harvest stage	reabsorption during storage	final QC	reports) for audit readiness	and full documentation set as mandatory for export feasibility

At the operational level, experts converged on codifying banana harvest maturity (110 days) using measurable indicators (peel colour, firmness, and Brix proxies) to control batch variation. Defect rejection thresholds were emphasised as first-order controls due to their effects on browning, sensory degradation, and microbiological risk. Post-harvest handling was consistently framed as a critical control point, where delays and mechanical damage reduce quality stability and increase contamination risk. Solar-dome drying was described as a variable engineering system requiring validated parameters and data logging to achieve repeatable endpoints. Food safety experts positioned moisture and aw as primary system-level safety controls for dried products, requiring batch-level testing and documentation for audit readiness. Export experts emphasised traceability, documentation completeness, and packaging integrity as prerequisites for export feasibility and recall readiness.

Upstream process map and critical control points

Workflow mapping produced a structured upstream process underpinning the preparation of innovation-ready raw materials. The sequence begins with harvesting at 110 days, followed by controlled field handling to reduce physical damage and ensure lot separation. Upon reception, incoming materials undergo specification-based quality control before entering hygienic preparation under GMP discipline. The process continues with solar-dome drying using validated parameters, followed by controlled cooling and equilibration. Final quality control checks include moisture content, water activity, microbiological safety, and foreign matter inspection. Approved batches are then prepared for export using protective barrier packaging with lot and date coding prior to shipment to the United Kingdom.

This operational sequence embeds specification governance, process validation, and documentation discipline into measurable control points, while identifying critical stages where weak upstream discipline could compromise downstream product performance, safety compliance, or export feasibility.

Primary Research in the United Kingdom Results (Downstream Innovation & Market Development; n = 5)

UK interviews produced a coherent downstream innovation blueprint defined by taste-first innovation anchored in benchmarking and sensory testing; evidence-based nutrition positioning and claims discipline; premiumisation through branding and packaging cues; constraints shaping imported-raw-material innovations (variability, compliance, logistics, economics); and traction-first commercialisation through staged route-to-market. These themes align with systematic literature review constructs linking innovation process capability, value signalling, and market outcomes (Bigliardi and Galati, 2013; Siegrist, 2008; Verbeke, 2005).

Table 4 UK Interview Results Matrix (n = 5 Experts)
(Downstream Innovation & Market Development – Manchester)

Theme	*Expert 1 (R&D / Product Development)*	*Expert 2 (Nutrition & Regulatory)*	*Expert 3 (Branding & Marketing)*	*Expert 4 (Packaging & Retail*	*Expert 5 (Commercialis ation &*

				Interface)	*Strategy)*
Theme A: Taste-first innovation (benchmark → test → iterate)	Emphasised benchmarking against leading premium snack competitors before formulation	Confirmed that health positioning cannot offset weak sensory performance	Stated that repeat purchase depends primarily on taste and texture satisfaction	Noted that sensory consistency is required for retail credibility	Recommended iterative sensory testing and refinement before scaling production
Theme B: Nutrition credibility and claims discipline	Highlighted need to align formulation with measurable nutritional benchmarks	Stressed regulatory compliance and scientifically validated claims	Advised avoiding exaggerated claims to protect brand trust	Confirmed packaging must clearly communicate substantiated benefits	Emphasised that claim credibility influences retailer acceptance and consumer trust
Theme C: Premiumisation through branding and packaging performance	Recognised premium positioning requires product differentiation beyond health claims	Supported linking provenance story to brand value proposition	Described branding as primary FMCG differentiator in competitive UK snack market	Identified packaging quality (barrier, finish, design cues) as prerequisite for listing	Linked premium signalling to willingness-to-pay and margin sustainability
Theme D: Imported raw material constraints (variability, logistics, compliance, economics)	Raised concern over variability in sweetness/texture affecting formulation stability	Highlighted compliance complexity for imported ingredients	Emphasised need for consistent supply to protect brand reputation	Identified shelf-life stability and packaging barrier performance as critical	Stressed unit economics, freight cost, and scalability constraints for UK retail entry
Theme E: Traction-first commercialisation and staged GTM	Recommended small-batch pilot launch before national distribution	Supported gathering early consumer feedback to refine proposition	Suggested targeting health-focused independent retailers initially	Highlighted importance of demonstrating sales velocity before supermarket listing	Advocated staged GTM: pilot → regional traction → scale, based on performance evidence

Experts consistently emphasised that health positioning cannot compensate for weak sensory performance and that taste and texture are the primary drivers of repeat purchase—aligning with consumer acceptance theory (Siegrist, 2008; Ronteltap et al., 2007). Nutrition positioning was framed as legitimate only when supported by measurable evidence and regulatory compliance, reinforcing trust-based acceptance logic (Verbeke, 2005; Siegrist and Hartmann, 2020). Branding and packaging were described as both functional (barrier performance and shelf-life integrity) and symbolic (premium cues and retail credibility), while variability risk and compliance complexity were identified as persistent cross-border constraints. Finally, experts endorsed a staged market validation approach: small pilots precede scaling, and traction evidence governs expansion decisions.

UK coding matrix: evidence formation

The coding analysis indicates a dominant selective theme: consumer-driven innovation operating within regulatory and commercial constraints. Open codes (taste-first development, claims discipline, premium signalling, sustainability cues, compliance readiness, traction proof) clustered into axial themes including trust formation, market structure alignment, iterative optimisation, retail readiness, and staged commercialisation discipline. This reinforces the literature view that food innovation outcomes depend on integrated capability alignment rather than isolated formulation excellence (Bigliardi and Galati, 2013; Garcia Martinez, Lazzarotti and Manzini, 2014). Collectively, the findings support conceptualising Manchester as a downstream conversion system translating imported agricultural inputs into market-ready value through structured evidence formation and disciplined scaling logic.

Cross-Regional Integration Results (Thailand–UK Collaboration Model)

Cross-case synthesis demonstrated that upstream engineering capability and downstream innovation conversion capability are complementary and interdependent. Integration generated four cross-regional domains: (i) quality and safety infrastructure (maturity, drying control, moisture/aw endpoints, traceability enabling shelf-life and compliance), (ii) evidence-based storytelling (provenance and ESG narratives require auditable documentation), (iii) innovation as a bi-directional evidence loop (upstream process control enables downstream testing; downstream feedback reshapes upstream specifications), and (iv) market alignment and governance-driven upgrading (UK retail and compliance expectations reshape Thai specification discipline).

Table 5 Cross-Regional Interface Mechanisms and Integration Logic

Interface Mechanism	*Thailand Enables*	*UK Converts*	*Cross-Border Change Logic*	*Strategic Function*
Consistency Handshake	Codified maturity and defect control; stable drying endpoints	Target sensory profile for repeat purchase	UK sensory targets refine Thai specifications and drying parameters	Reduces variability; stabilises eating experience
Evidence-to-Trust Pipeline	Lot coding; batch records; traceability documentation	Brand transparency; QR communication; premium justification	Thai documentation supports UK trust-building and value signalling	Converts process evidence into consumer trust
Shelf-Life Engineering	Moisture/aw control; hygienic packing	Barrier packaging; stability testing; logistics planning	UK shelf-life targets reshape Thai endpoint	Ensures retail compliance and reduces returns

			precision	
Claims Discipline Loop	Baseline formulation and process records	Nutrition validation; compliant positioning	Regulatory constraints drive upstream specification adjustment	Aligns product with legal and health positioning standards
Innovation Iteration Loop	SOP responsiveness; formulation flexibility	Benchmarking; sensory testing; focus groups	UK consumer data informs Thai recipe refinement (v1 → v2 → v3)	Enables iterative product optimisation
Traction-to-Scale Gate	Supply reliability; export documentation discipline	Staged GTM; traction metrics; unit economics validation	UK pilot validation requires upstream service-level consistency	Controls scaling risk
IP & Enterprise Value Alignment	Process integrity; documented know-how	Trademark, design protection; investor readiness	UK IP formalisation requires upstream ownership clarity	Protects brand equity and investment value

These interface mechanisms demonstrate that cross-border food innovation is structured through codification, coordination, and upgrading dynamics characteristic of global value chains (Gereffi, Humphrey and Sturgeon, 2005). Traceability functions not only as a safety mechanism but also as a governance and economic instrument that enables premium positioning and reduces information asymmetry (Olsen and Borit, 2013; Aiello et al., 2015). Rather than operating independently, upstream and downstream capabilities are interlocked through structured feedback and governance processes.

MVP Development Results (Cross-Regional Operationalisation)

To validate the integrated collaboration model empirically, the study operationalised the cross-border framework through development of an MVP using a closed-loop architecture (Source → Transform → Validate → Feedback → Refine). Two MVP variants were produced to demonstrate platform feasibility and extensibility: Original Solar-Dried Banana (clean-label base platform) and Dark Chocolate–Dipped Banana (hybrid variant). The academic significance of this step lies in the MVP's role as an applied proof-of-concept for cross-border capability alignment rather than in its commercial positioning.

The MVP results demonstrate that codified upstream maturity and drying specifications can be calibrated to downstream sensory targets; moisture and aw endpoints engineered in Thailand influence shelf-life compliance and acceptance in the UK; traceability documentation functions as a value-creation mechanism (supporting credible positioning) rather than only a compliance tool; and iterative consumer testing can reshape upstream parameters, evidencing bidirectional upgrading. This operationalisation provides empirical grounding for three theoretical propositions: cross-border innovation is system-dependent; traceability acts as governance and value asset; and scalability emerges through iterative capability alignment rather than isolated formulation excellence.

TAM Validation Results (Market Acceptance; n = 30; 15 Nationalities)

Consumer acceptance was evaluated through an adapted Technology Acceptance Model (TAM) survey administered following product sampling. The instrument measured

Perceived Usefulness (PU), Perceived Ease of Adoption (PEOU), Attitude Toward Use (ATT), and Behavioural Intention to Purchase (BI) using a five-point Likert scale. Internal consistency was high across all constructs (Cronbach's α = 0.87–0.90), indicating strong construct reliability.

Table 6 Construct Reliability and Descriptive Statistics (n = 30)

Construct	*Items*	*Cronbach's α*	*Mean*	*SD*	*Interpretation*
Perceived Usefulness (PU)	5	0.88	4.46	0.38	Very High
Perceived Ease of Adoption (PEOU)	5	0.90	4.52	0.35	Very High
Attitude Toward Use (ATT)	3	0.87	4.58	0.33	Highly Positive
Behavioural Intention (BI)	3	0.89	4.42	0.41	Strong Purchase Intention

Consumer acceptance of the ChewChew MVP was evaluated using an adapted Technology Acceptance Model (TAM) (Davis, 1989; Venkatesh & Davis, 2000), incorporating four constructs: perceived usefulness (PU), perceived ease of use (PEOU), attitude toward use (ATT), and behavioural intention to purchase (BI). Within this study, PU captured perceived product value, including quality consistency, nutritional alignment, natural ingredient perception, and compatibility with modern health-oriented lifestyles. PEOU measured clarity of communication, packaging transparency, convenience, and the ease with which the product could be integrated into daily consumption routines. ATT reflected affective evaluation, while BI assessed purchase and recommendation readiness.

All constructs demonstrated strong internal reliability, indicating robust measurement consistency. Mean scores were high across all dimensions: PU = 4.46, PEOU = 4.52, ATT = 4.58, and BI = 4.42. The overall acceptance index reached 4.50 out of 5.00, signalling excellent MVP performance and strong early-stage commercial viability.

The structural pattern of results aligns closely with TAM's theoretical logic. PEOU slightly exceeded PU, suggesting that clarity and convenience were particularly salient drivers of evaluation at this stage of market introduction. In accordance with TAM's causal sequence, ease of adoption reinforced perceived usefulness, which strengthened positive attitude formation and subsequently behavioural intention. As commonly observed in TAM studies, BI marginally trailed ATT, reflecting contextual moderating factors such as price sensitivity or product availability that may influence final purchase behaviour despite strong attitudinal endorsement.

Beyond confirming consumer acceptance at the product level, the findings provide empirical validation for the Thailand–UK cross-border innovation configuration in three interrelated mechanisms.

First, upstream process discipline enhances perceived usefulness. Engineering controls implemented in Thailand which is specifically maturity control, moisture optimisation, and traceability systems were translated into cognitively recognised product value. High PU scores indicate that respondents internalised these technical capabilities as signals of quality stability, natural sweetness balance, ingredient authenticity, and process credibility. This demonstrates that disciplined resource engineering can move beyond operational efficiency to shape consumer-perceived value.

Second, downstream communication design enhances ease of adoption. UK-based sensory calibration, packaging clarity, and premium positioning reduced cognitive uncertainty and behavioural friction. Elevated PEOU scores suggest that transparent

labelling, coherent value framing, and intuitive product design lowered barriers to trial and strengthened attitudinal formation. In this sense, downstream market-facing capabilities functioned as adoption enablers rather than merely promotional tools.
Third, closed-loop iteration strengthens behavioural intention. Continuous feedback between upstream production and downstream validation created alignment between technical quality and market expectation. Sensory optimisation combined with evidence-based positioning produced affective resonance, reflected in the strong ATT and BI scores. This iterative mechanism indicates that behavioural intention was not incidental but systematically reinforced through coordinated cross-border learning.
Qualitative responses further triangulated these findings. Participants most frequently highlighted texture balance (70%), natural sweetness/no added sugar (63%), premium perception (50%), and trust in origin and production process (47%). These themes map directly onto upstream engineering controls (texture calibration, sugar optimisation, traceability credibility) and downstream trust cues (premium framing, communication transparency), providing explanatory depth to the quantitative TAM structure.

Overall, the acceptance index of 4.50/5.00 demonstrates that structured cross-border capability integration can generate measurable adoption readiness in early-stage food innovation. The findings extend TAM from a purely consumer-level evaluation framework to a system-level validation mechanism, illustrating how coordinated alignment between upstream resource engineering and downstream market validation operates as a scalable two-layer innovation model in cross-border food product development.

5 Discussion

This study set out to examine how cross-border collaboration between Thailand and the United Kingdom can enhance food product innovation within a global value chain context. The findings provide strong empirical support for the argument that geographically distributed but strategically aligned capabilities can generate superior innovation performance compared to isolated regional efforts.

First, the results reinforce global value chain theory (Gereffi, Humphrey and Sturgeon, 2005) by demonstrating that value creation in agri-food systems is increasingly structured around capability complementarity rather than geographic proximity. Thailand contributes upstream resource engineering precision codified maturity control, validated solar-dome drying, moisture/aw calibration, traceability discipline, and export readiness. The UK contributes downstream innovation conversion capability which is taste-first optimisation, regulatory and claims discipline, premium branding, staged commercialisation, and IP protection. The integration of these capabilities forms a two-layer system in which upstream process reliability becomes the enabling infrastructure for downstream differentiation and market credibility.

Second, the study advances innovation management literature by illustrating that food innovation success depends on structured feedback loops rather than linear product pipelines. The cross-regional analysis identified multiple interface mechanisms which is specification handshake, evidence-to-trust transfer, innovation iteration loop, and governance alignment that operationalise iterative upgrading dynamics. These findings

align with open innovation and systems-based innovation theories (Bigliardi and Galati, 2013; Garcia Martinez, Lazzarotti and Manzini, 2014), but extend them by empirically demonstrating how such mechanisms function across national boundaries in a resource-intensive sector such as food.

Third, the MVP development and TAM validation provide empirical grounding for the model. High perceived usefulness (4.46), perceived ease of adoption (4.52), positive attitude (4.58), and strong behavioural intention (4.42) indicate that coordinated upstream–downstream alignment translated into measurable consumer acceptance. Importantly, qualitative feedback (texture calibration, natural sweetness, trust in origin) maps directly onto upstream engineering decisions, confirming that process discipline and traceability are not merely compliance tools but value-generating mechanisms. This strengthens prior consumer acceptance research highlighting the importance of sensory quality and trust formation in food innovation (Siegrist, 2008; Siegrist and Hartmann, 2020).

Fourth, the findings suggest that cross-border collaboration enhances sustainability performance in both economic and governance dimensions. Solar-dome drying, farmer-level traceability, and ESG-linked provenance generate source-based credibility, while UK-based regulatory alignment and IP protection strengthen institutional robustness. Rather than functioning as marketing rhetoric, sustainability in this model is embedded structurally at the upstream level and formalised downstream through compliance and governance mechanisms. This integration reduces reputational risk, supports premium positioning, and strengthens long-term scalability.

From a business performance perspective, the collaboration increases resilience and scalability in three ways. It reduces innovation risk through staged validation (traction-first commercialisation), enhances differentiation through provenance-backed premium signalling, and creates upgrading capacity through feedback-driven specification refinement. These characteristics indicate that the Thailand–UK configuration is not only operationally viable but strategically defensible. The competitive advantage lies in the closed-loop system connecting origin integrity with market validation, making replication by competitors more difficult than imitating a single product feature.

Overall, the discussion supports the proposition that cross-border capability alignment in food systems can enhance innovation performance, consumer trust, and scalability simultaneously. The Thailand–UK collaboration exemplifies how agricultural economies can upgrade their participation in global markets through integration with innovation-intensive regions, thereby moving beyond commodity export toward value-added co-creation.

6 Conclusion

This study investigated food product innovation through cross-border collaboration between Thailand and the United Kingdom, combining systematic literature review, expert interviews, cross-regional integration analysis, MVP development, and consumer acceptance testing. The findings demonstrate that globally competitive food innovation emerges not from isolated upstream production strength or downstream marketing

capability alone, but from their coordinated alignment within a structured governance system.

Thailand functions as an upstream enablement layer, providing resource integrity, process validation, safety control, and traceability discipline. The United Kingdom functions as a downstream conversion layer, transforming this engineered quality into consumer-facing value through sensory optimisation, claims discipline, branding strategy, staged commercialisation, and intellectual property governance. These layers are connected through iterative feedback and codified coordination mechanisms characteristic of contemporary global value chains.

Empirical validation through MVP testing and TAM analysis indicates strong international acceptance, suggesting that the collaboration produces products with genuine global market potential. The structured two-layer model enhances innovation performance by reducing variability, strengthening trust, supporting premium positioning, and enabling scalable commercialisation. Sustainability is embedded within the system through source-level ESG practices and governance-level compliance integration, contributing to long-term strategic resilience. The study contributes to food innovation and international business literature by empirically demonstrating how cross-border collaboration can operationalise capability complementarity and upgrading in agri-food value chains. It also offers a replicable framework for firms seeking to integrate resource-rich regions with innovation-intensive markets.

In conclusion, the Thailand–UK collaboration represents more than a bilateral partnership; it constitutes a scalable cross-border innovation system. By aligning agricultural engineering, governance discipline, consumer validation, and staged market expansion, the model enhances business performance while maintaining sustainability and trust. Such structured international collaboration provides a viable pathway for emerging agricultural regions to participate competitively in premium global food markets and offers a strategic template for future cross-border food innovation initiatives.

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Appendix

Appendix A: Thailand Expert Interviews (Upstream Value Creation)

A1. Expert Profile and Anonymisation

To ensure ethical compliance and confidentiality, Thai interview participants are presented in anonymised form. Each expert was purposively selected based on direct involvement in upstream agricultural production, processing, quality assurance, food safety management, or export operations. Collectively, the panel represents the upstream enablement layer within the Thailand–UK cross-border innovation framework.

Table A1. Thailand Expert Interview Matrix (Anonymised)

Interview Matrix Role	*Organisation / Role (Anonymised Description)*	*Analytical Representation in the Study*
Expert 1 – Farm Production Specialist	Commercial fruit farm operator (banana cultivation and harvest management)	Harvest maturity specification, field-level defect control, initiation of traceability at source
Expert 2 – Processing Operations Manager	Solar-dome fruit processing facility (Operations Lead)	Raw material acceptance criteria, slicing and preparation protocols, drying parameter control, process standardisation
Expert 3 – Quality Control Analyst	Food processing enterprise (Quality Assurance Unit)	Batch-level quality verification, Brix measurement, moisture consistency monitoring, incoming and final QC systems
Expert 4 – Food Safety & Compliance Specialist	GMP-certified food production facility	Critical control point (CCP) identification, water activity (aw) thresholds, microbiological risk management, hygiene documentation
Expert 5 – Export & Trade Compliance Officer	Fruit export enterprise (Export Operations Lead)	Export documentation systems, lot coding integration, certificate of analysis (COA) verification, packaging compliance for international shipment

Analytical Role of Thai Experts

The Thai expert panel collectively reflects the full upstream workflow—from harvesting to export shipment. Their combined expertise spans production discipline, process validation, safety governance, quality control, and compliance documentation.

Across interviews, participants converged on the principle that "innovation-ready raw materials" require codified specifications, validated processing parameters, measurable safety endpoints, and auditable traceability systems. This reinforces the study's conceptualisation of Thailand as the foundational resource engineering layer within the cross-border innovation model.

A2. Thailand Interview Protocol

The semi-structured interview guide focused on upstream capability formation and export feasibility:

1. What criteria are used to select high-quality fruit raw materials for further processing?

2. How do harvesting and processing practices influence product quality and nutritional value?
3. What challenges exist in preparing fruit-based raw materials for international markets?
4. How can international collaboration enhance the value of Thai agricultural products?
5. What improvements are necessary to support innovation-ready raw materials?

Appendix B: United Kingdom Expert Interviews (Downstream Innovation & Market Development)

B1. Expert Profile and Anonymisation

To preserve confidentiality while ensuring analytical transparency, UK interview participants are anonymised. Experts were selected based on professional expertise in innovation ecosystems, commercialisation, retail strategy, venture scaling, and intellectual property governance. Collectively, they represent the downstream conversion layer within the Thailand–UK collaboration model.

Table B1. UK Expert Interview Matrix (Anonymised)

Interview Matrix Role	*Organisation / Role (Anonymised Description)*	*Analytical Representation in the Study*
Expert 1 – Innovation & Ecosystem Advisor	University-based innovation centre (Innovation Advisor)	Startup ecosystem integration, pitch refinement, go-to-market clarity
Expert 2 – Business Growth & Scale Specialist	Regional economic development agency (Business Growth Advisor)	Mentorship pathways, funding access, scale-up advisory support
Expert 3 – Industry & Retail Strategy Advisor	Independent food and drink industry consultant	Retail readiness, pricing architecture, distributor alignment, category positioning
Expert 4 – Venture Development Lead	University-affiliated venture builder (Programme Lead)	Traction validation, staged commercialisation discipline, investor readiness
Expert 5 – Intellectual Property Specialist	Intellectual property law firm (Trademark Attorney)	Brand protection, trademark governance, packaging IP alignment, investment security

Analytical Role of UK Experts

The UK panel provided insights into market-facing requirements for transforming imported agricultural inputs into scalable, retail-ready, and investment-attractive food innovations. Their expertise extends beyond product formulation to include ecosystem access, compliance discipline, commercial validation, and brand governance—core mechanisms within the downstream innovation layer.

B2. United Kingdom Interview Protocol

The semi-structured interview guide addressed downstream innovation and commercialisation dynamics:

1. What key market trends influence food innovation and product development in the UK?
2. How do branding and packaging influence consumer acceptance of food innovations?
3. How are taste profiles developed for diverse international consumers?
4. What challenges arise when innovating products based on imported raw materials?
5. What factors are critical for successful commercialisation in global markets?

Appendix C: TAM Survey Instrument and Respondent Profile (Anonymised)
C1. Respondent Profile (n = 30)
To evaluate early-stage consumer acceptance of the MVP, a pilot TAM survey was conducted with 30 respondents representing 15 nationalities. Participants were recruited from an internationally diverse community to assess cross-cultural receptivity and preliminary global market readiness.
All respondents:

- Were adults (18+ years)
- Sampled the MVP product prior to survey completion
- Provided informed consent
- Remained fully anonymous

Sample Overview (Aggregated)

Characteristic	*Distribution*
Total respondents	30
Nationalities represented	15
Gender distribution	Mixed representation
Age range	18–40 years
Consumer profile	Health-conscious snack consumers (students and early professionals)
Prior exposure to dried fruit snacks	Majority familiar with category

The international diversity of the sample enhances exploratory assessment of cross-border scalability.
C2. Measurement Model
The survey instrument was adapted from the Technology Acceptance Model (Davis, 1989), incorporating extensions to include Attitude Toward Use and Behavioural Intention (Venkatesh and Davis, 2000). Items were contextualised to reflect food innovation acceptance.

Response Scale:
5-point Likert scale (1 = Strongly Disagree; 5 = Strongly Agree)
C3. Survey Instrument Items
Perceived Usefulness (PU)
PU1. This food innovation product provides clear value compared to existing food products.
PU2. The product meets my expectations for quality and nutritional benefits.
PU3. This product enhances my food consumption experience.
PU4. The product fits well with my lifestyle and dietary preferences.
PU5. I believe this product is suitable for international markets.
Perceived Ease of Adoption (PEOU)
PEOU1. The product is easy to understand based on its packaging and information.
PEOU2. The branding clearly communicates the product's purpose and benefits.
PEOU3. The product is convenient to consume in everyday life.
PEOU4. I can easily decide when and how to use this product.
PEOU5. The product does not require special effort to adopt into my routine.
Attitude Toward Use (ATT)
ATT1. I have a positive overall impression of this food innovation product.
ATT2. I find this product appealing compared to similar food products.
ATT3. I feel confident in trying this product.
Behavioural Intention to Purchase (BI)
BI1. I would be willing to purchase this product if it were available.
BI2. I would recommend this product to others.
BI3. I would consider purchasing this product regularly.
C4. Ethical and Methodological Notes

- Participation was voluntary and anonymised.
- The survey followed direct product tasting to ensure experiential evaluation.
- The instrument was used as an exploratory validation tool appropriate for MVP-stage innovation testing.
- The sample size (n = 30) is suitable for pilot validation and preliminary market feasibility assessment.