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Making Traceability Meaningful: A Focused Ethnography Of Digital Food Traceability Practices In Food Retailing

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Abstract

Digital food traceability now appears on retail shelves through QR codes, digital labels, certification links, batch records, provenance narratives, and, increasingly, AI-supported interfaces. Yet retailers and technology providers often treat traceability as a transparency device whose value follows automatically from data availability. This article challenges that assumption through a focused ethnography of digital traceability practices in food retailing. The study draws on a multi-actor corpus consisting of 67 interviews with consumers, retail actors, producers and suppliers, certification or regulatory actors, and technology providers, complemented by structured retail observations, field memos, and traceability artifact analysis. The findings show that traceability becomes meaningful only when retail actors translate technical and supply-chain data into consumer-readable assurance and actionable value. Five themes structure the analysis: traceability first enters consumer attention through product risk and retail cueing; trust depends on verifiable anchors rather than technological claims; value emerges when assurance turns into product, ethical, and decision utility; interface friction and data inconsistency convert transparency into ornamental labeling; and retail mediation performs the practical translation work between supply-chain records and consumer meaning. The article contributes to research on food retailing and consumer trust by explaining how digital traceability moves from data infrastructure to market meaning. It also refines the assurance-value distinction by showing that consumers can trust traceability without

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treating it as worth paying more for. The study argues that meaningful traceability requires synchronized data, credible verification, legible interface design, and trained retail mediation, not merely more technological sophistication.

Keywords: digital food traceability; focused ethnography; food retailing; consumer trust; perceived value; QR code; blockchain; retail marketing; supply-chain transparency

INTRODUCTION

Digital traceability has become a visible feature of food retailing. Shoppers now encounter QR codes on vegetable packs, blockchain claims on fresh produce, digital certificates for organic or halal products, batch records for dairy and meat, and online pages that promise to show where a product came from. Retailers present these artifacts as signs of transparency. Technology vendors describe them as infrastructures of trust. Consumers, however, do not respond to traceability by simply absorbing more data. They decide whether a label deserves attention, whether a page deserves belief, and whether the information changes the product's value relative to price, convenience, and competing options.

This distinction matters because food products contain credence attributes that consumers cannot verify through ordinary inspection. They cannot see pesticide residues, cold-chain failures, authentic local provenance, animal-welfare practices, or fair-return arrangements for farmers. Traceability systems can make these attributes visible, but visibility alone does not create meaning. A QR code can reassure a consumer, irritate a hurried shopper, or raise suspicion when the page looks like advertising. A certificate can strengthen trust when the number can be checked, but the same symbol can look ornamental when no verification link exists. The retail problem, therefore, concerns translation: how supply-chain data becomes consumer-readable assurance and market-relevant value.

Recent literature has moved quickly in this direction. Early work linked traceability to food-safety concerns and willingness to pay, especially in markets shaped by safety scandals and counterfeit claims (Xu & Wu, 2010; Zhang et al., 2012; Wu et al., 2015). Later research brought QR acceptance, blockchain, retailer choice, institutional trust, and organic food consumption into the debate (Kim & Woo, 2016; Garaus & Treiblmaier, 2021; Lin et al., 2021; Wang et al., 2021; Treiblmaier & Garaus, 2023). Current studies advance the field through blockchain QR code valuation, AI traceability assistants, fresh e-

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commerce, and green agricultural product purchase intention (Collart et al., 2025; Lu et al., 2025; Yang et al., 2025; Mei & Deng, 2026; Wang et al., 2026). Nevertheless, much of the literature still explains traceability through assurance: credible data reduces risk, builds trust, and supports purchase intention. That logic remains necessary, but it leaves one question underdeveloped: when does trusted traceability become valuable enough to shape choice, price acceptance, loyalty, or recommendation?

This article addresses that question through focused ethnography. It examines how consumers, retail staff, category managers, producers, certification actors, regulators, and technology providers make traceability meaningful in food retail settings. The study treats traceability not as a neutral technological feature but as a situated retail practice. Labels, shelf tags, QR pages, certificates, staff explanations, signal quality, and data synchronization all participate in meaning formation. This approach allows the article to move beyond a linear view of technology adoption and to show how traceability works, fails, or becomes merely decorative at the point of purchase.

The article asks three research questions. First, how do consumers and retail actors encounter, display, and interpret digital food traceability in retail settings? Second, how do different actors construct trust and perceived value from traceability information? Third, which practices make traceability meaningful, and under what conditions does it become a mere symbolic label? The answer developed here centers on the concept of meaning translation: the practical work through which retail actors convert product data into credible, legible, and choice-relevant information.

LITERATURE BACKGROUND

Traceability as a retail signal

Signaling theory provides a strong point of departure because food markets contain information asymmetry between producers, retailers, and consumers (Spence, 1973). Traceability operates as a signal when it makes hidden attributes visible, costly to fake, or externally verifiable. Blockchain, QR codes, certification links, product passports, and digital provenance pages can all serve this signaling function. Yet the signal has to survive consumer interpretation. Treiblmaier and Garaus (2023) show that blockchain can signal quality, but brand familiarity conditions the effect. Collart et al. (2025) similarly shows that consumers value QR-code traceability for leafy greens, while the incremental premium for blockchain verification remains more nuanced than technology advocates often assume. These studies suggest that consumers do not reward technical architecture on its own; they reward usable proof.

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The stimulus-organism-response tradition adds a second layer. External retail cues shape internal evaluations, which then influence behavioral responses (Mehrabian & Russell, 1974; Donovan & Rossiter, 1982; Eroglu et al., 2001). In traceability contexts, QR codes, shelf tags, certificates, and provenance stories act as stimuli. Trust, perceived risk, perceived value, and interface ease form organismic evaluations. Purchase, willingness to pay, repeat purchase, and advocacy form responses. This sequence helps explain why a QR code can fail when consumers notice it but cannot extract meaning from it.

Assurance, trust, and institutional credibility

Consumer trust scholarship treats trust as a judgment about ability, benevolence, and integrity rather than a vague, favorable attitude (Mayer et al., 1995). Food traceability complicates this judgment because consumers evaluate several trust targets at once: the technology, the retailer, the producer, the certifier, and the regulator. Liu et al. (2019) show that trust shapes consumers' valuation of food traceability in China. Garaus and Treiblmaier (2021) demonstrate that blockchain-based traceability influences retailers' choices through trust. Wang et al. (2021) add a critical institutional dimension by showing that institutional trust shapes health and safety perceptions and repurchase intention for traceable fresh food.

This literature gives the assurance pathway strong empirical support. Consumers use traceability to reduce uncertainty about safety, authenticity, freshness, and contamination. Hsu et al. (2022) clearly demonstrate this in traceable fresh foods, while Dang and Tran (2020) link food-safety concerns, risk perception, trust, and habit in traceable pork. The present article accepts this logic but does not stop there. Assurance can make a product acceptable. It does not automatically make the product preferable or worth a price premium.

Perceived value, interface usability, and the limits of data abundance

Perceived value theory shifts the analytical focus from belief to utility. Consumers evaluate benefits against sacrifices, including price, cognitive effort, time, and uncertainty (Zeithaml, 1988; Holbrook, 1999). Yuan et al. (2020) connect traceability systems to consumer perceived value and purchase intention, and Nunes and Deliberador (2025) show that motivations to purchase traceable food extend beyond safety. Recent work on green agricultural products also places perceived value between digital traceability and purchase intention (Wang et al., 2026). These studies point to an underdeveloped

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mechanism: traceability matters commercially when data becomes useful, emotionally resonant, ethically relevant, or decision-efficient.

Research on interface traceability now strengthens this argument. Kim and Woo (2016) show that QR-code acceptance depends on technology-related perceptions. Lu et al. (2025) report that an AI traceability assistant promotes consumer engagement by enhancing the perceived ease of use of the system. Yang et al. (2025) show that AI-assisted traceability can reduce perceived foodborne risk, but their findings also imply a design burden: consumers must experience the interface as comprehensible and trustworthy. The managerial implication is plain. More data can increase transparency while reducing usability.

Focused ethnography as a response to a practice problem

Most traceability research still relies on surveys, experiments, or technology-adoption models. These methods identify relationships among trust, perceived risk, value, and purchase intention, but they often abstract traceability from the retail scene where consumers actually meet it. Focused ethnography fits the present problem because it examines a specific, bounded, technology-mediated practice rather than an entire cultural group (Knoblauch, 2005; Higginbottom et al., 2013). It allows the researcher to combine interviews, observations, field memos, and artifact analysis in a compressed but intensive field engagement. Here, that approach captures what consumers see, what staff explain, what QR pages display, and where verification breaks down.

Methodology

The study used focused ethnography to examine digital food traceability as a situated retail practice. The design aligned with the research problem because the study did not aim to describe an entire culture. It examined a bounded practice: how traceability artifacts, retail communication, verification systems, and consumer interpretation come together at the point of food choice. The fieldwork combined one-time semi-structured interviews with structured retail observations, field memos, and analysis of traceability artifacts.

The corpus integrated two interviewer datasets and a researcher's fieldnote file. The interview corpus contained 67 actor accounts: 35 consumers, 12 retail actors, 6 producers or supply-side actors, 7 certification or regulatory actors, and 7 technology providers or digital supply-chain specialists. The observation corpus contained two structured retail observation episodes and artifact inventories covering product

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packaging, shelf tags, QR pages, certificate links, screenshots, and field memos. The material covered premium and everyday food categories, including organic vegetables, coffee, meat, fish, dairy, baby food, honey, olive oil, bread, fermented drinks, rice, fruit, and local specialty products.

The fieldnote component was used to retain the ethnographic character of the study. It documented shelf placement, QR code visibility, staff mediation, consumer scanning behavior, interface loading issues, artifact inconsistencies, and researcher reflections. This material enabled the analysis to compare what participants said with how traceability was evident and operated in the retail aisle.

Sampling followed purposive and maximum-variation logic. Consumers varied in product involvement, age, digital literacy, and purchase motives. Retail actors included store managers, fresh-food category managers, customer-experience specialists, quality-assurance personnel, and frontline staff. Supply-side actors included producers, cooperatives, UMKM suppliers, and a distributor. Certification and regulatory actors contributed views on validity, audits, halal and organic claims, food safety, and standards. Technology providers explained QR architecture, interface design, blockchain or database integration, and data synchronization constraints.

Data analysis proceeded in six steps. First, the interviewer transcripts were normalized by removing erroneous question numbers and preserving the thematic structure of each interview. Second, the corpus was organized by actor group and empirical source. Third, the analysis used a hybrid coding strategy. Deductive codes were derived from the prior conceptual distinction between assurance and value pathways; inductive codes were derived from repeated readings of the transcripts, field memos, and artifacts. Fourth, the researchers built a matrix comparing product category, trust marker, value marker, interface friction, and purchase effect across actor groups. Fifth, themes were refined through constant comparison and negative case analysis, especially cases where traceability increased trust but failed to justify purchase or price premium. Sixth, the findings were integrated into a meaning translation model.

Trustworthiness was strengthened through source, actor, and artifact triangulation, as well as an audit trail. Interviews were compared with field observations and digital artifacts rather than treated as self-sufficient testimony. The analysis retained deviant cases, including impulsive buyers who scanned only for discounts, consumers who trusted established brands without scanning, and observation episodes where inconsistent dates undermined trust. All quotations in the findings were translated from Indonesian into English, and participant codes were anonymized. Before each interview,

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participants received an explanation of the study's purpose and provided verbal informed consent. Identifying details were removed during transcription and reporting.

Table 1 summarizes the empirical corpus and clarifies the analytic role of each data source, so the reader can see how interview accounts, retail observations, field memos, and traceability artifacts worked together rather than functioning as isolated evidence.

Table 1. Data corpus and analytic role

Source	Coverage	Analytic role
Consumer interviews	35 consumers across fresh, organic, premium, local, import, family, senior, budget, allergy, and online-shopping segments	Captured consumer noticing, scanning decisions, trust formation, value judgment, willingness to pay, loyalty, and non-use cases
Retail actor interviews	12 store, category, promotion, QA, customer service, and digital marketing actors	Explained shelf display, staff mediation, retail communication, pricing, customer questions, and operational constraints
Producer/supply-side interviews	6 producers, suppliers, cooperatives, distributors, and farmer-side actors	Explained data generation, batch records, supply-chain documentation, verification limits, and market access
Certification/regulatory interviews	7 auditors, certifiers, halal/quality actors, food safety or regulatory actors	Explained institutional trust, standards, claim validation, certification gaps, and verification practices
Technology-provider interviews	7 QR, traceability, UI/UX, blockchain, and digital supply-chain actors	Explained data architecture, interface design, system usability, synchronization, and technology limits
Retail observations and artefacts	2 structured observation cases plus artifact inventory: labels, QR pages, shelf tags,	Grounded interview claims in retail practice, visual display, scanning friction, and data consistency checks

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	certificates, screenshots, field memos	

Table 2 presents the codebook that guided the focused ethnographic analysis. It links each code family to an operational meaning and to empirical indicators observed in interviews, retail settings, and traceability artifacts.

Table 2. Analytic codebook used in the focused ethnography

Code family	Operational meaning	Illustrative indicators
Traceability encounter	How traceability becomes visible to consumers in a retail scene	QR code, shelf tag, label, call to action, product category, first visual attention
Scanning decision	Why actors scan, explain, ignore, or avoid traceability information	Time pressure, product risk, promo, QR size, trust in brand, curiosity
Credibility anchoring	Sources that stabilize belief in traceability claims	Certification, regulator link, batch number, lab result, date, producer identity, retailer reputation
Assurance construction	How traceability reduces perceived risk and authenticity doubt	Safety, cold chain, pesticide residue, halal, organic, contamination, counterfeit risk
Value conversion	How traceability becomes worth choosing or paying for	Freshness, quality, ethical support, local identity, health value, convenience, price justification
Interface readability	How design affects comprehension and engagement	Mobile-friendly page, summary, visual map, PDF burden, technical terms, load time
Artefact friction	Material or technical constraints that disrupt meaning	Small QR, low signal, poor lighting, slow page, oversized PDF, broken link
Data inconsistency	Contradiction between physical and digital claims	Different batch/date, outdated QR page, stale certificate, inconsistent shelf tag

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Retail mediation	How staff, shelf design, and retail scripts translate traceability	Staff explanation, tablet demonstration, shelf talker, cashier knowledge, customer service
Ornamental labeling	When traceability becomes symbolic rather than meaningful	Generic story, marketing-heavy page, no verification, gimmick, label
Outcome response	Behavioral consequences of meaning or failure	Purchase, price premium, repeat purchase, recommendation, abandonment, complaint
Institutional boundary	How regulatory confidence and certification legitimacy condition interpretation	BPOM, halal, organic, lab, auditor, official link, state, or third-party trust

Findings

The analysis produced five themes. Together, they show that meaningful traceability does not emerge from data exposure alone. Consumers and retail actors construct meaning through a sequence of noticing, credibility anchoring, value conversion, and retail mediation. The same artifact can operate as assurance, value, friction, or ornament depending on how actors encounter it in practice.

Traceability first enters consumer attention through product risk, premium status, and retail cueing

Consumers did not treat QR codes as universally relevant. They noticed traceability when the product carried a higher perceived risk, a higher price, family health relevance, freshness sensitivity, or authenticity uncertainty. Organic vegetables, meat, fish, dairy, baby food, honey, premium coffee, local rice, and imported fruit repeatedly triggered attention. Routine snacks, cheap staples, and heavily processed foods rarely justified the effort of scanning. This pattern confirms that traceability begins as a selective retail encounter. Consumers ask whether the product deserves further investigation before they ask whether the data deserves trust.

A consumer who bought premium coffee and hydroponic vegetables explained that attention moved first to geographic identity and safety claims: 'Fresh commodities, organic vegetables, and premium products consistently trigger my interest in checking origin and food-safety claims' (KONS-01). Another consumer who purchased beef and

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seafood linked traceability to perishability: 'I deliberately choose fresh animal products and local seafood because these product groups carry a very high risk of spoilage' (KONS-02). The fieldnotes confirmed this pattern. In the olive oil observation, two premium buyers scanned the code because the shelf talker promised a lab report. One bought after reading the evidence; another walked away when the page loaded slowly.

Retail cueing also shaped attention. QR codes positioned at eye level, accompanied by a short call to action, performed better than small codes hidden on the back or bottom of packages. In the vegetable observation, several consumers failed to scan because the QR code sat below the shelf, and the lighting made the plastic packaging reflective. Traceability, therefore, entered cognition through a material retail arrangement: shelf height, label size, lighting, wording, and perceived product stakes.

Trust depends on verifiable anchors, not technological claims

Consumers rarely trusted traceability merely because it looked digital. They searched for anchors that connected the claim to a credible external source: certification logos, regulator links, batch numbers, laboratory results, harvest or production dates, producer identity, and retailer reputation. Technology supplied access, but verification supplied belief. This finding sharpens the trust literature by showing how consumers operationalize trust at the shelf: they look for something they can check, recognize, or hold accountable.

KONS-01 placed third-party validation above producer claims: 'Third-party validation builds the highest level of trust in my cognitive structure as a buyer.' KONS-02 named government and halal or food-safety marks as the strongest psychological assurances for meat and fish. KONS-03 trusted organic and non-GMO labels only when the QR page included downloadable certificates. Across actor groups, consumers described unauthenticated stories as suspicious, even when the interface looked polished. One consumer rejected an attractive farm story because it lacked a certificate number and seemed like stock photography.

Certification and regulatory actors explained why this skepticism makes sense. They distinguished traceability that looks valid to consumers from traceability that holds up administratively. A label can display origin, producer name, and safety claims, yet still lack a functioning verification chain. Technology providers made a similar point from another angle: the QR page can only display what upstream actors enter and update. The old problem of data integrity, therefore, survives inside the new interface. A blockchain or

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QR page can strengthen trust only when the input data and verification links remain credible.

Traceability becomes valuable when assurance converts into product, ethical, and decision utility

Trust did not automatically translate into willingness to pay. Consumers distinguished between a product that felt safe and a product that deserved a premium. The value threshold rose when traceability showed concrete product quality, freshness, health benefit, ethical production, local farmer support, environmental contribution, or decision efficiency. This finding refines the assurance-value distinction. Assurance removes doubt; value creates preference.

KONS-03 expressed this distinction with unusual clarity: 'A merely trusted product provides basic safety, while a product worth a premium must prove real health benefits and ethical contribution to local farmers and ecological sustainability.' KONS-04 tied value to local culture and farmer welfare, while KONS-02 tied it to cold-chain evidence and hygienic handling. Several consumers accepted a 20 to 30 percent price premium when traceability provided transparent origin, harvest date, lab results, or proof of fair economic return. Yet they refused to pay more for generic narratives, slow PDF reports, or data that did not change their judgment of quality.

Value also appeared as decision utility. Consumers valued traceability when it reduced hesitation at the shelf. They did not want a database; they wanted a fast answer: Where did this product come from? When was it harvested? Who verified it? Is it safer or fresher than the alternative? This pattern aligns with perceived-value theory because consumers weighed benefits against cognitive effort. A long technical report increased transparency but also increased sacrifice. A concise summary with a verification link increased both assurance and usability.

Interface friction and data inconsistency convert transparency into ornamental labeling

The data repeatedly show a failure mode: traceability becomes ornamental when the artifact calls attention to transparency yet fails to deliver usable proof. Consumers used words such as 'gimmick', 'label decoration', or 'marketing ornament' when QR pages relied on generic stories, excessive visuals, stale data, or unverifiable documents. Interface friction accelerated this failure. Small codes, weak signal, poor lighting, slow pages, oversized PDFs, and technical jargon interrupted the translation process.

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The field memo on olive oil captured this friction. The QR code sat on the back of the bottle, partly obscured by a promotional label. The page displayed a useful summary, but the lab report appeared as a 12-page PDF that loaded slowly in a weak 4G corner. One buyer valued the evidence; another abandoned the purchase because the page stalled. The vegetable observation offered a more serious breakdown. The physical package claimed 'harvested this week', while the QR page showed a harvest date 10 days earlier. Staff explained a cooperative update delay, but the inconsistency produced visible doubt among buyers.

These cases show that traceability can damage trust when it exposes operational disorder. Transparency raises expectations. If the digital page contradicts the package, consumers do not merely ignore the system; they reinterpret the whole claim as unreliable. The problem does not lie in digital traceability as such. It lies in the failure to synchronize retail displays, supply chain data, and consumer-facing communications.

Retail mediation performs the translation work between supply-chain data and consumer meaning

Retail actors played an active role in making traceability understandable. Staff demonstrations, shelf talkers, tablet displays, short scripts, and category placement helped consumers move from noticing to comprehension. In the vegetable observation, proactive staff scanned the QR code on a tablet, showed farmer photos and harvest dates, and opened a residue-test summary when a young mother asked about pesticide risk. Buyers accepted the information more readily when staff could explain what the evidence meant. By contrast, cashiers lacking knowledge could not support the assurance claim at checkout.

Retail managers described traceability as both a product-differentiation device and a trust-management tool. Fresh-food managers valued it most for categories where quality and safety uncertainty remained visible: seafood, meat, organic vegetables, honey, rice, and premium imported goods. Digital marketing actors emphasized interface clarity and customer experience. QA actors emphasized consistency between batch records, shelf tags, and QR pages. These positions reveal a distributed capability rather than a single technology. Meaningful traceability requires producers to generate accurate data, certifiers to validate claims, technology providers to design readable pages, and retailers to translate evidence at the shelf.

This translation work defines the central finding of the article. Traceability becomes meaningful when technical proof, institutional credibility, retail mediation, and consumer

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relevance converge. Without that convergence, the QR code remains a visible but weak symbol.

Table 3 consolidates the cross-theme evidence by connecting consumer accounts, retail or artifact evidence, and the analytic interpretation generated from the focused ethnographic comparison.

Table 3. Cross-theme evidence matrix

Theme	Consumer evidence	Retail/artifact evidence	Analytic interpretation
Selective attention	Consumers scan mainly for risky, fresh, premium, organic, family-health, or authenticity-sensitive products	Eye-level display and explicit shelf talkers increased scanning; hidden QR codes reduced scanning	Traceability begins as a situated retail cue, not as a universally used technology
Verifiable trust	Consumers seek certificates, regulator links, harvest dates, lab reports, producer identity, and batch numbers	Certification and QA actors emphasize auditability and evidence consistency	Trust depends on credible anchors rather than the digital format itself
Value conversion	Price premium depends on freshness, health, local support, ethical value, or decision speed	Retail staff and interface design convert data into a consumer-readable utility	Assurance removes risk, but value creates preference and price justification
Ornamental failure	Consumers distrust generic farm stories, vague claims, stale pages, and	Small QR codes, slow PDFs, weak signal, and inconsistent dates	Transparency fails when usability and data synchronization fail

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	marketing-heavy interfaces	disrupt scanning and credibility	
Retail mediation	Consumers rely on staff explanations when pages or certificates need interpretation	Staff tablets, shelf tags, and QA scripts help translate traceability evidence	Meaningful traceability operates as a retail capability distributed across actors

Integrative model

The themes lead to a model for translating meaning. The model does not treat traceability as a direct stimulus that automatically produces trust and purchase. It shows a sequence: artifacts must first be noticed, then anchored in credible evidence, then translated through interface and retail mediation, and finally converted into meaningful consumer outcomes. The same sequence also contains a failure path. Weak design, inconsistent data, and unverifiable claims redirect traceability from trust to suspicion.

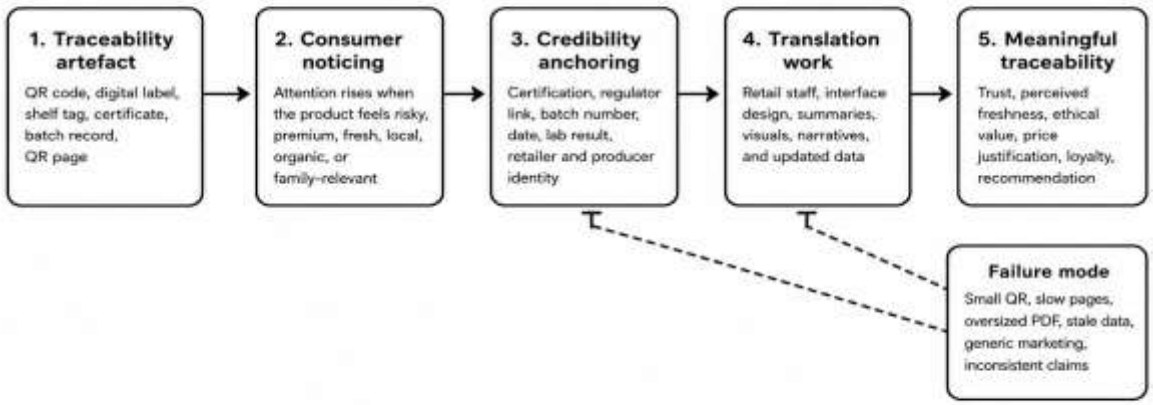


Figure 1 visualizes this meaning-translation sequence and shows how traceability artifacts can move toward credible consumer value or, when verification and usability fail, slide into ornamental labeling.

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DISCUSSION

From signaling to meaning translation

The findings support signaling theory but also expose its real limits. Traceability works as a signal because it communicates unobservable attributes such as origin, freshness, handling integrity, and certification status (Spence, 1973). Yet the field data show that the signal does not travel intact from producer to consumer. It passes through packaging design, shelf placement, network quality, staff explanation, document structure, certification accessibility, and consumer time pressure. Prior blockchain studies often emphasize signal credibility and tamper resistance (Galvez et al., 2018; Sander et al., 2018; Treiblmaier & Garaus, 2023). This study adds a more mundane but decisive layer: credible signals still fail when consumers cannot read, verify, or use them during shopping.

This insight helps explain why Collart et al. (2025) find consumer value in blockchain-based QR-code traceability but do not imply a simple premium for technological sophistication. Consumers in the present study cared less about whether the backend used blockchain than whether the interface showed a verifiable harvest date, lab result, certificate, or cold-chain indicator. The signal, therefore, needs translation, not merely encryption or decentralization.

Assurance is necessary, but perceived value decides commercial strength

The study deepens the dialogue between trust and perceived value. Existing work shows that trust mediates the effects of traceability on retailer choice, repurchase, organic food consumption, and risk reduction (Garaus & Treiblmaier, 2021; Liu et al., 2019; Wang et al., 2021; Duong et al., 2024). The present findings support those results. Consumers used traceability to reduce anxiety about residues, counterfeit claims, cold-chain failure, contamination, and false local identity. Nevertheless, the data also show that trust sets a floor rather than a ceiling. A trusted product becomes acceptable; a valuable product becomes preferable.

This distinction matters for willingness to pay. Yuan et al. (2020), Nunes and Deliberador (2025), and Wang et al. (2026) position perceived value as a mechanism that links traceability to purchase intention. The present study explains how that mechanism forms. Value emerged when data provided product utility, such as freshness and quality; system utility, such as faster decision-making; and altruistic utility, such as support for farmers, animal welfare, and local ecology. Consumers drew a clear distinction between a claim that calms them and one that justifies paying more. Retailers who treat traceability

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as assurance alone leave money on the table. Retailers who exaggerate value without proof damage trust.

Interface design has become part of food trust governance

The findings push interface design into the center of trust governance. QR-code acceptance research already shows that perceived usefulness and ease of use shape consumer response (Kim & Woo, 2016). AI traceability research now extends this point by showing that AI assistants can improve engagement through perceived system ease of use (Lu et al., 2025) and can influence perceived risk mitigation (Yang et al., 2025). The present ethnography adds field detail to that argument. Interface failure does not merely reduce convenience; it changes the moral reading of the claim. A slow PDF, a missing certificate number, a stale date, or a generic story makes consumers suspect greenwashing, careless data governance, or retail opportunism.

This interpretation also revises a common managerial assumption. Retailers often believe that giving more information equals more transparency. Consumers in this study preferred layered information: a short physical summary, a fast mobile landing page, and optional deeper evidence. They wanted a hierarchy of meaning rather than a dump of records. Technical completeness without readable prioritization created cognitive cost.

Retailers as translators, not mere distributors of traceability data

The article reframes digital traceability as a retail marketing and operations capability. This capability includes data collection, evidence validation, interface design, staff training, category placement, and real-time correction of inconsistencies. Qian et al. (2020) show that traceability systems involve governmental, corporate, and consumer perspectives. The present study shows how those perspectives converge in the retail aisle. Producers generate data, certifiers legitimate claims, technology vendors host and visualize information, but retailers orchestrate the consumer encounter.

This orchestration creates a practical tension. The more traceability becomes a marketing asset, the more it risks becoming a symbolic decoration. The study's negative cases matter here. When the packaging claimed a recent harvest while the QR page showed an older date, transparency exposed a governance gap. When lab reports appeared as large PDFs, transparency created friction. These details would disappear in a survey model, yet they define whether traceability becomes meaningful in practice.

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Contributions and implications

The article makes three theoretical contributions. First, it extends research on traceability signaling by introducing meaning translation as the practice by which signals become usable and credible in retail settings. Second, it refines the assurance-value distinction. The data show that trust and perceived value overlap, but consumers do not collapse them. They can believe a claim without treating the product as worth a premium. Third, it contributes to retail marketing management by treating traceability as a distributed capability rather than a backend system. This capability depends on coordination among producers, certifiers, technology providers, and retail staff.

The managerial implications are direct. Retailers should design traceability as a layered communication system: a visible physical summary, a fast QR landing page, and deeper verification for consumers who want evidence. They should train frontline staff to answer basic questions about origin, certification, harvest date, and batch records. They should audit consistency between packaging, shelf tags, QR pages, and dashboard records before launching traceability claims. Technology providers should reduce friction by avoiding oversized PDFs, using mobile-first design, and presenting certificates through verifiable links. Producers and cooperatives should treat data updates as a market-facing responsibility, not merely as compliance paperwork. Certifiers and regulators should support public verification mechanisms that ordinary consumers can understand.

For emerging food retail markets, the implication becomes stronger. Institutional trust varies across contexts, and consumers often treat formal certification and retailer reputation as substitutes for direct technical knowledge. Traceability systems should therefore build credibility through recognizable institutional anchors. Blockchain and AI can help, but they do not remove the need for locally meaningful proof.

Limitations and future research

The study has limitations. The interview corpus was broad and multi-actor, but the observation corpus contained two intensive retail cases rather than a long-term ethnographic immersion across many stores. This limitation fits the focused ethnography design, yet future research should extend observation across different retail formats, regions, and product categories. The study also relied on interpreted and translated interview excerpts. Future work can combine ethnographic observation with screen recordings of QR use, eye-tracking at shelves, or transaction data linking scanning behavior to purchase outcomes.

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Future research should quantitatively test the meaning translation model. A SEM design could examine whether credibility anchoring and interface readability mediate the relationship between traceability artifacts and perceived value, and whether product-risk category moderates the assurance pathway. Experiments can manipulate QR placement, certificate accessibility, narrative style, and PDF burden to identify what actually changes willingness to pay. Cross-national research should examine how institutional trust changes the relative importance of certification, retailer reputation, and technology claims. AI-mediated traceability also warrants close scrutiny, as conversational interfaces may reduce cognitive effort while introducing new concerns about hallucinated, unverifiable, or over-personalized food information.

CONCLUSION

Digital traceability becomes meaningful in food retailing when actors convert data into credible, legible, and consequential consumer knowledge. The study shows that consumers do not scan every code, trust every digital page, or pay more for transparency by default. They respond when product risk, retail cueing, verification, interface clarity, and perceived value align. Trust requires anchors. Value requires a usable benefit. Retailers, therefore, face a translation task: they must turn supply-chain records into consumer-readable assurance and market-relevant meaning. When they do this well, traceability can support safety, authenticity, loyalty, and price justification. When they do it poorly, the same QR code becomes an ornament that exposes weak data governance. The future of digital food traceability will depend less on how much data retailers display and more on how convincingly they make that data matter at the moment of choice.

Declarations

Data availability

The anonymized interview excerpts, observation memos, and artifact inventory used in this study contain contextual retail and participant information. They are therefore not publicly deposited. De-identified analytic summaries may be made available from the corresponding author upon reasonable request and subject to confidentiality constraints.

Conflict of interest

The authors declare no conflict of interest.

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