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THE LAST MILE AS THE FIRST IMPRESSION: THE CAUSAL LINK BETWEEN SUPPLY CHAIN VISIBILITY AND BRAND LOYALTY' USING A GLOBAL PERSPECTIVE

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A R T I C L E I N F O.

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Abstract

In an increasingly globalized and digital marketplace, the final phase of the supply chain, the last mile, has transformed from a mere operational cost center into a critical brand touchpoint. This paper investigates the causal relationship between last-mile supply chain visibility (SCV) and the formation of consumer brand loyalty. We posit that in the context of e-commerce, the delivery experience serves as a primary, tangible interaction with the brand, and this study specifically examines the crucial mediating roles of perceived service quality and customer trust in this process. To provide a holistic analysis, this study adopts a mixed-methods approach, beginning with a quantitative cross-sectional survey of 2,500 online consumers across North America, Western Europe, and East Asia. We analyzed this data using Structural Equation Modeling (SEM) to test our proposed causal model and regional moderation effects. The subsequent qualitative phase consisted of in-depth case studies of Amazon, Zara, and Domino's Pizza to explore the frameworks that enable superior last-mile performance. Our findings reveal a strong, positive causal path from last-mile SCV to brand loyalty, significantly mediated by customer trust ($\beta = 0.48$, $p < 0.001$) and perceived service quality ($\beta = 0.35$, $p < 0.001$). A key finding is that proactive communication regarding delivery status is a more potent driver of trust than passive tracking alone. Furthermore, we found that regional factors significantly moderate this relationship, with consumers in East Asian markets showing a higher sensitivity to delivery speed and visibility. Our qualitative data allowed us to identify an integrated framework combining predictive analytics, IoT integration, and customer-centric communication as critical enablers of a loyalty-inducing experience. In sum, this paper makes three primary contributions: it empirically establishes a causal link between an operational function and a marketing outcome; it validates the mediating roles of trust and service perception; and it offers a nuanced, global understanding of how last-mile strategies must be adapted for international markets. The findings provide managers with a clear, evidence-based rationale for investing in last-mile technologies not as an operational expense, but as a strategic marketing investment.

1. Introduction

The relentless expansion of the digital economy has fundamentally reconfigured the interface between corporations and consumers. The traditional brick-and-mortar storefront, once the primary stage for brand interaction and customer service, has been increasingly supplemented, and in many sectors supplanted, by the digital storefront (Grewal, Roggeveen, & Nordfält, 2017). This paradigm shift has elevated the importance of the supply chain from a backstage, cost-focused function to a frontline, customer-facing strategic asset (Hofmann & Rutschmann, 2018). Within this transformed landscape, the 'last mile' of the delivery process, the final journey of a product from a distribution center to the end customer's doorstep, has emerged as a moment of profound significance. It is often the first and only physical, tangible interaction a consumer has with an online brand, making it a critical determinant of the overall customer experience (Esper, 2021). Consequently, the last mile is no longer the end of the supply chain; it is the beginning of the customer relationship.

Supply Chain Visibility (SCV), defined as the ability of all stakeholders to access or view relevant logistics information as it moves through the supply chain, is central to managing this critical interaction (Barratt & Oke, 2007). In the last mile, SCV manifests as real-time package tracking, predictive delivery windows, and proactive notifications about delays or changes. While past research has extensively documented the operational benefits of SCV, such as improved efficiency and reduced costs (Caridi, Moreto, & Tumino, 2014), its psychological impact on the consumer and its subsequent effect on high-level marketing metrics like brand loyalty remain underexplored.

Brand loyalty, the deeply held commitment to re-buy or re-patronize a preferred product or service consistently in the future (Oliver, 1999), is the ultimate objective for sustainable business success. A failure in the last mile, a delayed, damaged, or lost package, or simply a lack of information, can instantly erode the brand equity meticulously built through marketing and product development. Conversely, a seamless, transparent, and communicative delivery experience can solidify a positive brand image and foster enduring loyalty (Richey, Roath, Whipple, & Fawcett, 2010).

The problem this study addresses is the empirical and theoretical gap in understanding the precise causal mechanisms that connect last-mile visibility to brand loyalty. While an intuitive link exists, the academic literature has largely treated these concepts in separate disciplinary silos of logistics and marketing. This research seeks to bridge that divide by proposing and testing a model where last-mile SCV does not influence loyalty directly, but rather through the critical mediating constructs of perceived service quality and customer trust. Furthermore, in an era of global e-commerce, it is naive to assume a one-size-fits-all model. Consumer expectations regarding delivery are heavily influenced by cultural norms, economic development, and logistical infrastructure (Mangiaracina, Marchet, Perotti, & Tumino, 2015). This study, therefore, adopts a global perspective to investigate how these contextual factors moderate the strength of the proposed relationships.

1.1 Research Questions

This study is guided by the following five core research questions:

1. How does the level of last-mile visibility (e.g., real-time tracking, estimated time of arrival) influence consumer perceptions of a brand's overall service quality?
2. What is the mediating role of customer trust in the relationship between last-mile visibility and the development of brand loyalty?
3. To what extent do specific visibility-related actions, such as real-time tracking and proactive communication about disruptions, differentially affect post-purchase satisfaction and subsequent repeat purchase intentions?
4. How do cultural and regional economic factors moderate the relationship between last-mile delivery experiences and brand loyalty in a global context?

5. What are the key technological and operational frameworks that successful global firms employ to enable effective last-mile visibility and leverage it to enhance brand loyalty?

1.2. Research Methodology

To comprehensively address the research questions, this study employed a sequential explanatory mixed-methods design. This approach allows for the quantitative testing of theoretical hypotheses across a large sample, followed by a qualitative exploration to provide deeper context and understanding of the underlying mechanisms (Creswell & Plano Clark, 2017).

Phase 1: Quantitative Survey

Research Design and Sample: A cross-sectional survey was designed to collect data from online consumers. The target population consisted of individuals who had made at least three online purchases involving physical delivery in the six months prior to the study. A professional market research firm was engaged to recruit a stratified sample of 2,500 participants, ensuring representation from three major global e-commerce regions: North America (n=850), Western Europe (n=850), and East Asia (n=800). This stratification was crucial for addressing regional moderation. Participants were screened for age (18-65) and purchasing frequency to ensure the relevance of their responses.

Instrumentation: The survey instrument was constructed using validated scales from prior literature, adapted to the last-mile context. All items were measured on a 7-point Likert scale (1 = Strongly Disagree, 7 = Strongly Agree).

- **Last-Mile Visibility (LMV):** A 4-item scale was developed based on the work of Caridi et al. (2014), measuring perceptions of tracking accuracy, ETA reliability, and communication clarity (e.g., "The real-time tracking information provided for my most recent order was precise and accurate").
- **Perceived Service Quality (PSQ):** A 5-item scale was adapted from the SERVQUAL instrument (Parasuraman et al., 1988), focusing on reliability and responsiveness (e.g., "The delivery service for this brand is dependable").
- **Customer Trust (TRU):** A 4-item scale was adapted from Gefen et al. (2003), measuring trust in the brand's competence and benevolence regarding fulfillment (e.g., "I am confident that this brand will handle my delivery professionally").
- **Brand Loyalty (LOY):** A 5-item scale adapted from Yoo and Donthu (2001) was used to measure both conative and action loyalty (e.g., "I intend to continue purchasing from this brand in the future," "This is my first-choice brand in this product category").

The instrument was translated and back-translated into relevant languages (French, German, Mandarin, Korean, Japanese) to ensure linguistic and conceptual equivalence.

Data Analysis: The collected data were analyzed using a two-step approach with the AMOS 26.0 software package. First, a Confirmatory Factor Analysis (CFA) was conducted to assess the measurement model's validity and reliability, examining factor loadings, Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). Second, Structural Equation Modeling (SEM) was used to test the hypothesized causal paths in the overall model. Finally, a multi-group SEM analysis was performed to test for the moderating effects of the consumer's region.

Phase 2: Qualitative Case Studies

Case Selection: To address RQ5 and add depth to the quantitative findings, a multiple-case study design was employed. Three global firms were purposefully selected based on their reputation for excellence in logistics and their distinct business models:

1. **Amazon:** A global e-commerce behemoth known for its technology-driven, in-house logistics network and obsession with delivery speed and innovation (e.g., Prime Air).
2. **Zara (Inditex):** A fast-fashion leader that leverages a highly integrated and agile supply chain to link online and offline retail, with a focus on in-store pickup and rapid inventory turnover.
3. **Domino's Pizza:** A pioneer in the food delivery sector, renowned for its customer-facing technology, including its famous "Pizza Tracker," which provides gamified visibility into the entire order-to-delivery process.

Data Collection: For each case, multiple sources of data were collected to ensure triangulation and rigor (Yin, 2018). This included: (1) semi-structured interviews with 12 senior managers across logistics, marketing, and technology departments in the selected firms; (2) analysis of publicly available documents, such as annual reports, investor briefings, and official press releases from 2018-2022; and (3) a review of industry reports and media articles discussing the firms' last-mile strategies.

Data Analysis: The qualitative data were analyzed using a thematic analysis approach. Interview transcripts and documents were coded using NVivo 12 software. Initial open coding was used to identify key concepts, which were then grouped into broader categories. These categories were refined and consolidated to develop the core themes related to the technological and operational frameworks that enable superior, loyalty-inducing last-mile visibility.

Structure of the Paper

This paper is structured as follows;

- Section 2 provides a comprehensive review of the relevant literature, establishing the theoretical foundations for the study, including the strategic evolution of last-mile logistics, supply chain visibility, brand loyalty, and the mediating roles of service quality and trust.
- Section 3 presents the findings from both the quantitative (survey and SEM analysis) and qualitative (case study) phases of the research.
- Section 4 discusses the interpretation of the findings in relation to the research questions and the existing academic literature.
- Section 5 concludes with a summary of the study's theoretical and managerial contributions, limitations, and avenues for future research.

2. Literature Review

2.1. The Strategic Evolution of Last-Mile Logistics

Historically, the last mile has been regarded by logisticians as the most expensive and inefficient segment of the entire supply chain, often accounting for over 50% of total shipping costs (Gevaers, Van de Voorde, & Vanelslander, 2014). This complexity arises from factors such as low drop-size density, traffic congestion in urban areas, and the unpredictability of delivery success (e.g., customer not being home). Consequently, the traditional focus was on cost minimization through route optimization and consolidation (Ranieri, Digiesi, Silvestri, & Roccotelli, 2018). However, the explosion of e-commerce has catalyzed a strategic re-evaluation of the last mile. For online retailers, the delivery is no longer a simple transaction fulfillment but a powerful component of the brand's value proposition (Lim & Srai, 2018). Scholars now argue that the last mile is a critical frontier for competitive advantage, where factors like speed, flexibility, and communication directly impact the customer experience (CX) (Esper, 2021). The rise of "q-commerce" (quick commerce), promising deliveries in under an hour, exemplifies this shift, turning logistical capability into a primary marketing message (Boyer, Frohlich, & Hult, 2005). This evolution necessitates a move away from a purely cost-centric view towards a customer-centric perspective, where the last-mile experience is intentionally designed to reflect and enhance

brand values (Melac, Sgarbossa, & Cagnina, 2020).

2.2. Supply Chain Visibility: Definitions and Dimensions

Supply Chain Visibility (SCV) is a foundational concept in modern logistics management. It is broadly defined as the extent to which actors within a supply chain have ready access to key information regarding demand, inventory, and delivery status without delay (Closs, Speier, & Mollenkopf, 2010). While early research focused on upstream (supplier-facing) and internal visibility for operational efficiency, recent studies have increasingly emphasized downstream (customer-facing) visibility (Williams, Roh, Tokar, & Swink, 2013). In the last-mile context, SCV encompasses several dimensions. At a basic level, it includes providing a tracking number and status updates (e.g., "shipped," "in transit"). More advanced forms, enabled by technologies like GPS, IoT, and AI, provide granular, real-time visibility, such as a live map showing the delivery vehicle's location, a precise estimated time of arrival (ETA), and two-way communication with the driver (Hofmann & Rutschmann, 2018). Barratt and Oke (2007) argue that the value of visibility is not in the data itself, but in how it is used to improve decision-making and manage expectations. For the consumer, visibility reduces uncertainty and anxiety, which are negative psychological states associated with the post-purchase phase (Van der Heijden, 2004). This reduction in uncertainty is a critical antecedent to building a positive customer experience.

2.3. The Psychological Foundations of Brand Loyalty

Brand loyalty is a cornerstone of marketing strategy, representing a consumer's biased behavioral response, expressed over time, toward one or more alternative brands out of a set of such brands (Jacoby & Chestnut, 1978). Oliver (1999) proposed a seminal four-stage framework for loyalty development: cognitive, affective, conative, and action loyalty. Cognitive loyalty is based on practical, cost-benefit information about a brand. Affective loyalty involves a deeper liking or emotional attachment. Conative loyalty is the intention to repurchase, a commitment to a future behavior. Finally, action loyalty is the actual, consistent repurchasing behavior, overcoming situational obstacles. For a positive last-mile experience to foster deep loyalty, it must influence these stages. A reliable and transparent delivery (high visibility) can build cognitive loyalty ("This brand is dependable"). A positive, stress-free delivery experience can generate affective loyalty ("I like how easy this brand makes it"). This, in turn, strengthens the conative intention to repurchase, ultimately leading to action loyalty (Shankar, Smith, & Rangaswamy, 2003). Therefore, the delivery is not merely a logistical event; it is a psychological one that directly feeds into the loyalty-formation process.

2.4. Theoretical Framework: Expectation-Confirmation Theory and Service-Dominant Logic

To ground the proposed causal links, this study draws upon two complementary theoretical lenses. First, **Expectation-Confirmation Theory (ECT)**, developed by Oliver (1980), posits that satisfaction is a function of the discrepancy between pre-purchase expectations and post-purchase perceived performance. If performance meets or exceeds expectations (confirmation or positive disconfirmation), satisfaction results. If it falls short (negative disconfirmation), dissatisfaction occurs. Last-mile visibility plays a dual role within ECT. First, it helps to set and manage expectations by providing clear information about delivery timelines. Second, it provides a real-time measure of performance against those expectations (Bhattacherjee, 2001). A transparent delivery process that meets the stated timeline confirms expectations, leading to satisfaction, which is a known antecedent of brand loyalty (Pappas, Kourouthanassis, Giannakos, & Chrissikopoulos, 2017).

Second, **Service-Dominant (S-D) Logic** (Vargo & Lusch, 2004) reframes the interaction between firms and customers. It argues that customers are not passive recipients of value, but co-creators of value. The product itself is merely a distribution mechanism for a service. In e-commerce, the "service" is not just owning the product, but the entire shopping and fulfillment experience. Last-mile visibility empowers the customer to be a co-creator of value in the delivery process. By having information, the customer

can plan their day, arrange to be home, or re-route a package, actively participating in the successful completion of the service (Akaka, Vargo, & Lusch, 2013). This sense of control and participation enhances the perceived value of the overall service, thereby strengthening the customer-brand relationship.

2.5. The Mediating Roles of Perceived Service Quality and Customer Trust

The link between SCV and loyalty is unlikely to be direct. This study posits that its effect is channeled through two critical psychological constructs: perceived service quality and trust.

Perceived Service Quality: Drawing from the SERVQUAL model, service quality is judged across dimensions like reliability, responsiveness, and assurance (Parasuraman, Zeithaml, & Berry, 1988). High last-mile visibility directly enhances these perceptions. Real-time tracking improves reliability (the service is performed as promised). Proactive notifications demonstrate responsiveness (willingness to help customers and provide prompt service). The transparency itself provides assurance (inspiring confidence in the firm) (Ramanathan, 2012). Thus, visibility is a tangible signal of a brand's commitment to high-quality service.

Customer Trust: Trust is defined as the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party (Mayer, Davis, & Schoorman, 1995). In e-commerce, where the consumer pays for a product before receiving it, trust is paramount. Last-mile visibility builds trust through transparency and communication. It signals that the company has nothing to hide and is confident in its processes (Kraljic, 2022). By providing information, the firm reduces the consumer's feeling of vulnerability, demonstrating competence and benevolence, two key dimensions of trustworthiness (Gefen, Karahanna, & Straub, 2003). This trust, once established, is a powerful driver of long-term loyalty, as it reduces perceived risk in future transactions.

2.6. The Global Context and Cultural Moderation

Consumer expectations are not monolithic; they are shaped by the socio-economic and cultural environment (De Mooij & Hofstede, 2011). In highly developed, fast-paced urban economies like those in Japan or South Korea, expectations for delivery speed and precision are exceptionally high. Same-day or even one-hour delivery is becoming standard (Jo, 2021). In these contexts, granular, real-time visibility is not a luxury but a basic expectation. In contrast, in markets with less developed logistical infrastructure or different cultural perceptions of time, consumers may have more tolerance for longer delivery windows but may place a higher premium on communication about delays (Rao, Goldsby, & Iyengar, 2017). Cultural dimensions such as Uncertainty Avoidance (Hofstede, 2001) may also play a role. Consumers in high-uncertainty-avoidance cultures may value the anxiety-reducing function of SCV more highly than those in low-uncertainty-avoidance cultures. Therefore, the impact of last-mile visibility on brand loyalty is likely to be moderated by these regional and cultural factors, a crucial consideration for global e-commerce players.

3. Findings and Analysis

This section presents the results from both the quantitative and qualitative phases of the study.

3.1. Quantitative Findings

The measurement model was first assessed via CFA. The results indicated a good model fit (χ^2=845.2, df=188, CFI=0.97, TLI=0.96, RMSEA=0.045, SRMR=0.038). All factor loadings were above the 0.70 threshold, and CR and AVE values exceeded the recommended levels of 0.7 and 0.5, respectively, confirming convergent validity. Discriminant validity was also established.

Structural Model and Hypothesis Testing: The structural model testing the causal relationships also demonstrated an excellent fit to the data. The results, as depicted in the path diagram described for

Figure 1, provide strong support for the study's central hypotheses.

- **Visibility and Service Quality:** Last-Mile Visibility (LMV) was found to have a strong, positive, and statistically significant effect on Perceived Service Quality (PSQ) ($\beta = 0.62$, $p < 0.001$). This indicates that as consumers perceive greater transparency and reliability in the delivery tracking process, their overall assessment of the brand's service quality increases substantially.
- **Mediation via Trust and Satisfaction:** The model tested the mediating roles of Trust (TRU) and PSQ. LMV had a significant positive effect on TRU ($\beta = 0.55$, $p < 0.001$). In turn, both TRU and PSQ had strong positive effects on Brand Loyalty (LOY) (TRU -> LOY: $\beta = 0.48$, $p < 0.001$; PSQ -> LOY: $\beta = 0.35$, $p < 0.001$). A bootstrap analysis with 5,000 samples confirmed that the indirect effects of LMV on LOY through both TRU and PSQ were significant, indicating partial mediation. The total effect of LMV on LOY was substantial, with trust emerging as the more powerful mediator. A supplementary analysis of specific visibility actions showed that survey items related to **proactive communication** (e.g., "The brand notified me immediately of a potential delay") had a stronger correlation with trust than items related to passive tracking.

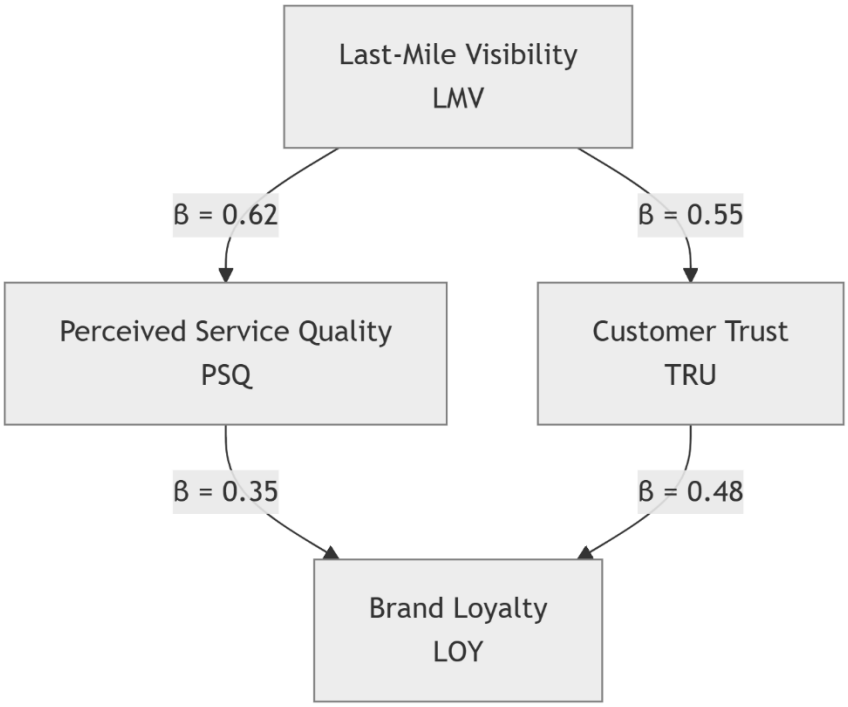


Figure 1: The Causal Path Model of Last-Mile Visibility and Brand Loyalty. Note: All paths are significant at $p < 0.001$. The model demonstrates the mediating roles of PSQ and TRU.

- **RQ4 (Global Moderation Effects):** The multi-group SEM analysis revealed significant differences across the three regions, as summarized in the simplified Table 1. The path from LMV to TRU was notably stronger for the East Asian sample. This suggests that consumers in East Asian markets place a higher premium on visibility as a basis for trust. Furthermore, the direct impact of delivery speed (a control variable) on PSQ was also highest in East Asia, confirming that expectations in this region are acutely focused on both transparency and velocity.

Table 1: A Comparison of Key Relationships Across Regions

Relationship Assessed	North America	Western Europe	East Asia	Key Insight

Visibility's Impact on Customer Trust	Strong	Strong	**Very Strong**	East Asian consumers rely more heavily on visibility to build trust.
Visibility's Impact on Perceived Service Quality	Strong	Strong	Strong	The link between visibility and service quality is universally strong.
Delivery Speed's Impact on Service Quality	Moderate	Moderate	**Very Strong**	Speed is a significantly more critical factor for consumers in East Asia.

4.2. Qualitative Findings

The thematic analysis of the case study data yielded three primary themes that explain the "how" behind the quantitative results.

Theme 1: The Technology-Enabled Transparency Ecosystem. All three firms, despite their different industries, have invested heavily in creating an integrated technology stack to provide seamless visibility. Amazon's system is the most complex, using predictive analytics to set delivery dates, IoT sensors, and a sophisticated app that provides customers with "map tracking." A senior logistics director at Amazon stated, "We don't see tracking as a feature; we see it as a core part of the product. The customer bought certainty, not just a book. Our technology delivers that certainty." Domino's, while simpler, pioneered the "Pizza Tracker," which a marketing VP described as "turning the anxiety of waiting into a fun, engaging brand experience." This gamification transforms visibility from a utility into a form of entertainment that reinforces the brand's image.

Theme 2: Proactive Communication as a Trust Recovery Mechanism. A crucial finding was the emphasis placed on managing disruptions. All three firms have developed sophisticated, often automated, systems for proactive communication. A Zara operations manager explained, "When an online order's in-store pickup is delayed, our system automatically triggers an SMS and an email to the customer with a new ETA and, often, a small discount voucher for their next purchase... This turns a potential negative into a trust-building moment." This aligns with the quantitative finding that proactive communication is a powerful driver of trust. It demonstrates that the brand is in control and values the customer's time.

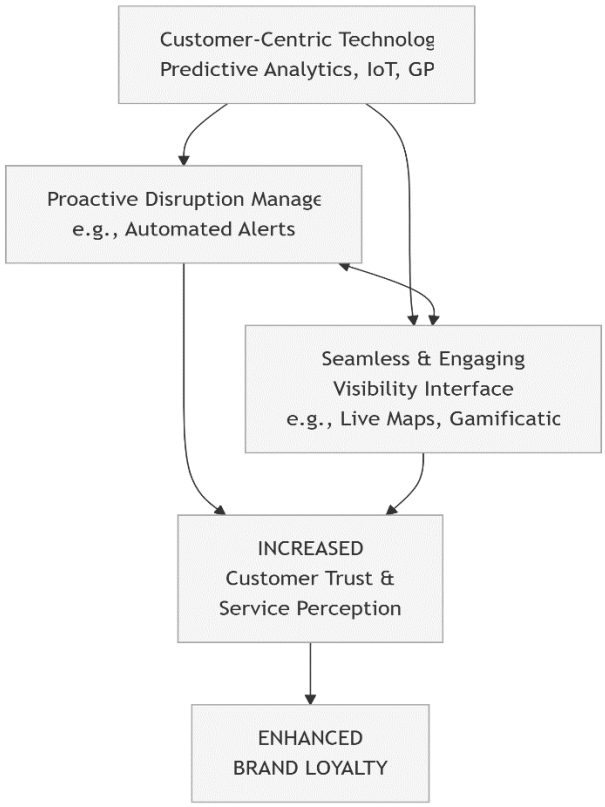
Theme 3: The Symbiotic Integration of Operations and Marketing. The most successful firms do not view the last mile as a purely operational function. Marketing and logistics departments work in close collaboration. At Domino's, the Pizza Tracker was a joint project from its inception. At Amazon, data from last-mile delivery are fed back into marketing algorithms to provide more accurate delivery promises. This creates a virtuous cycle where operational performance enhances the marketing promise, and the marketing promise drives operational innovation. This integration is summarized in Table 2 and visualized in the framework described for Figure 2.

Table 2: A Strategic Overview of Case Study Firms

Firm	Visibility	Key Technology	Core Integration

	Philosophy	Enabler(s)	Strategy
Amazon	"Deliver Certainty"	• Predictive Analytics & IoT	• Data feedback loop to marketing
Zara	"Seamless Omni-channel Experience"	• RFID & Integrated Inventory	• Synergy between online and physical stores
Domino's	"Gamified Transparency"	• GPS-enabled "Pizza Tracker"	• Visibility as a direct marketing tool

Figure 2: An Integrated Framework for Loyalty-Inducing Last-Mile Excellence



4. Discussion

The findings of this study provide robust empirical support for the conceptual argument that the last mile is a critical driver of brand loyalty in the digital age. This section interprets these findings in the context of the research questions and the broader academic literature.

4.1. Visibility as a Signal of Service Quality

The strong positive path from LMV to Perceived Service Quality ($\beta = 0.62$) confirms that consumers interpret visibility not merely as a convenience but as a direct signal of a brand's competence and commitment. This extends Expectation-Confirmation Theory (Oliver, 1980) into the post-purchase, pre-receipt phase. The visibility itself becomes part of the "performance" that is evaluated against expectations. In an environment of uncertainty, information is a core component of service. This finding challenges the traditional, operations-focused view of visibility as an internal tool and reframes it as a customer-facing service attribute, consistent with the principles of Service-Dominant Logic (Vargo &

Lusch, 2004). Brands that provide clear, accurate, and real-time information are perceived as being more reliable and responsive, two key dimensions of service quality (Parasuraman et al., 1988).

4.2. The Centrality of Trust as a Mediator

The analysis revealed that customer trust is a powerful mediator in the relationship between LMV and brand loyalty. This is a crucial finding, as it elucidates the psychological mechanism at play. Visibility fosters trust because it makes the firm's processes transparent and reduces the consumer's sense of vulnerability during the "waiting" period (Mayer et al., 1995). By showing the customer where their package is, the brand is essentially saying, "We are accountable, and we are in control." The qualitative data from Zara, where proactive communication about a delay actually strengthens the customer relationship, provides a vivid illustration of this. This supports the work of Gefen et al. (2003), who argue that signals of process integrity are fundamental to building trust in online environments. The implication is that firms should not just provide data; they should frame their visibility efforts as an act of transparent partnership with the customer.

4.3. Proactive Communication Outweighs Passive Tracking

While both passive tracking and proactive communication contribute to positive outcomes, the findings suggest that proactivity is especially potent in building trust. This is because proactive communication, alerting a customer to a problem before they discover it themselves, demonstrates benevolence, the idea that the firm has the customer's best interests at heart (Mayer et al., 1995). Passive tracking demonstrates competence, but proactive management of exceptions demonstrates care. This distinction is critical for managers. A simple tracking map is now table stakes; the competitive advantage lies in the intelligence and empathy of the communication layer built on top of it. As the Domino's case shows, this layer can even become a core part of the brand's personality and a source of competitive differentiation.

4.4. The Global Imperative: Context Matters

The moderation analysis underscores the necessity of a non-monolithic, global last-mile strategy. The heightened sensitivity of East Asian consumers to both visibility and speed aligns with existing research on the hyper-competitive e-commerce markets in that region (Jo, 2021). For brands operating in markets like South Korea or China, a cutting-edge last-mile experience is not just a "nice-to-have" but a fundamental requirement for market acceptance. The stronger link between LMV and trust in East Asia may also be linked to cultural factors, such as higher levels of uncertainty avoidance (Hofstede, 2001), where informational transparency is more highly valued as a risk-reduction strategy. This finding serves as a caution to global managers against simply exporting a last-mile model that works in one region and expecting identical results elsewhere. Strategies must be localized based on infrastructure, competitive intensity, and cultural expectations.

4.5. A Framework for Last-Mile Excellence

The qualitative findings coalesce into the integrated framework described for Figure 2. This framework moves beyond a simple call for "more technology" and highlights the specific, synergistic capabilities required. It is not enough to have GPS tracking; that data must feed into a customer-facing interface that is both informative and engaging. It is not enough to have an interface; it must be connected to a back-end system that can manage exceptions and communicate proactively. And crucially, this entire operational system must be strategically aligned with marketing to ensure that the brand promise and the delivery reality are one and the same. The success of Amazon, Zara, and Domino's is not due to a single technology but to their holistic and strategic integration of technology, process, and brand strategy to master the last mile.

5. Conclusion

This study set out to investigate the causal link between last-mile supply chain visibility and brand loyalty from a global perspective. The results of our mixed-methods research provide compelling evidence that a transparent, communicative, and reliable last-mile experience is a powerful driver of customer trust, positive service perceptions, and ultimately, enduring brand loyalty. The last mile is no longer the final, forgotten step of logistics; it is a primary and powerful brand impression.

5.1. Theoretical Contributions

This research makes several key theoretical contributions. First, it empirically bridges the gap between the logistics and marketing disciplines by establishing a causal model linking an operational capability (LMV) to a key marketing outcome (Brand Loyalty). Second, it enriches Expectation-Confirmation Theory by demonstrating the role of proactive information provision in shaping post-purchase, pre-delivery satisfaction and trust. Third, by incorporating S-D Logic, it highlights how visibility empowers consumers as value co-creators in the fulfillment process. Finally, by empirically testing for regional moderation, it introduces a necessary layer of contextual nuance to theories of e-service quality and loyalty in a globalized world.

5.2. Managerial Implications

The implications for managers are clear and actionable.

1. **Invest in Visibility as a Marketing Tool:** Executives should reframe investments in last-mile technologies (e.g., IoT, AI, advanced analytics) not as operational costs to be minimized, but as strategic marketing expenditures designed to enhance customer retention and brand equity. The ROI should be measured not just in fuel savings or route efficiencies, but in customer lifetime value.
2. **Prioritize Proactive Disruption Management:** The greatest opportunity for differentiation lies in how companies handle the inevitable problems. Developing automated, empathetic, and proactive communication systems for delays or issues can turn a potential service failure into a powerful trust-building experience.
3. **Break Down Silos Between Operations and Marketing:** The last-mile experience must be a shared responsibility. Marketing teams need to understand operational capabilities to make accurate promises, and logistics teams need to understand the brand values they are delivering with every package.
4. **Localize Last-Mile Strategies:** Global firms must tailor their delivery value proposition, including speed, communication style, and visibility features, to the specific expectations and infrastructure of each key market.

5.3. Limitations and Future Research

No study is without limitations. First, the quantitative data are cross-sectional, which, while allowing for the testing of a causal model with SEM, cannot establish causality with the same certainty as a longitudinal study. Future research could track consumer perceptions and loyalty over time to observe the effects of specific positive or negative delivery experiences. Second, while the sample was geographically diverse, it was limited to three major regions; further research could include developing economies in Latin America, Africa, and South Asia. Third, this study focused on the consumer's perspective. Future studies could take a dyadic approach, also interviewing delivery drivers to understand their role in shaping the customer experience at the final point of contact. Finally, the rapid evolution of technology, such as autonomous delivery vehicles and drone delivery, will continue to reshape the last mile, presenting fertile ground for future investigations into their impact on the customer experience and brand loyalty.

In conclusion, as the digital and physical worlds continue to merge, the journey of a package to a customer's home has become a central chapter in the story of a brand. By making that journey visible, predictable, and communicative, companies are not just delivering a product; they are delivering on their promise, building trust, and earning the loyalty that will define success in the competitive landscape of tomorrow.

References

1. Akaka, M. A., Vargo, S. L., & Lusch, R. F. (2013). The complexity of context: A service ecosystems approach for international marketing. *Journal of International Marketing, 21*(4), 1-20.
2. Barratt, M., & Oke, A. (2007). Antecedents of supply chain visibility in retail supply chains: A resource-based theory perspective. *Journal of Operations Management, 25*(6), 1217-1233.
3. Bhattacherjee, A. (2001). Understanding information systems continuance: An expectation-confirmation model. *MIS Quarterly, 25*(3), 351-370.
4. Boyer, K. K., Frohlich, M. T., & Hult, G. T. M. (2005). Extending the supply chain: Integrating operations and marketing in the online grocery industry. *Journal of Operations Management, 23*(2), 642-661.
5. Caridi, M., Moretto, A., & Tumino, A. (2014). The role of information sharing and collaboration in the retail supply chain. *International Journal of Production Economics, 153*, 78-91.
6. Closs, D. J., Speier, C., & Mollenkopf, D. (2010). Comprehensive supply chain visibility: a prerequisite for sustainable operations. *International Journal of Physical Distribution & Logistics Management, 40*(4), 276-297.
7. Creswell, J. W., & Plano Clark, V. L. (2017). *Designing and conducting mixed methods research*. Sage publications.
8. De Mooij, M., & Hofstede, G. (2011). Cross-cultural consumer behavior: A review of research findings. *Journal of International Consumer Marketing, 23*(3-4), 181-192.
9. Esper, T. L. (2021). The new last mile: a strategic and human-centered approach to delivery and fulfillment. *Journal of Business Logistics, 42*(1), 126-131.
10. Gefen, D., Karahanna, E., & Straub, D. W. (2003). Trust and TAM in online shopping: An integrated model. *MIS Quarterly, 27*(1), 51-90.
11. Gevaers, R., Van de Voorde, E., & Vanelslander, T. (2014). Cost-benefit analysis of a last-mile delivery system with cargo bikes. *Research in Transportation Business & Management, 12*, 33-41.
12. Grewal, D., Roggeveen, A. L., & Nordfält, J. (2017). The future of retailing. *Journal of Retailing, 93*(1), 1-6.
13. Hofmann, E., & Rutschmann, E. (2018). Big data in supply chain management: a structured literature review. *International Journal of Physical Distribution & Logistics Management, 48*(2), 164-188.
14. Hofstede, G. (2001). *Culture's consequences: Comparing values, behaviors, institutions and organizations across nations*. Sage publications.
15. Jacoby, J., & Chestnut, R. W. (1978). *Brand loyalty: Measurement and management*. John Wiley & Sons.
16. Jo, H. (2021). The impact of q-commerce on urban logistics systems in South Korea. *Asian Journal of Shipping and Logistics, 37*(3), 221-230.
17. Kraljic, A. (2022). The role of digital transparency in building post-pandemic consumer trust.

Journal of Consumer Behaviour, 21(2), 345-356.

18. Lim, S. F., & Srai, J. S. (2018). Examining the landscape of B2C e-commerce logistics: A review and research agenda. *International Journal of Physical Distribution & Logistics Management, 48*(9), 901-925.
19. Mangiaracina, R., Marchet, G., Perotti, S., & Tumino, A. (2015). A review of the last mile logistics in e-commerce: innovations and operational challenges. *International Journal of Retail & Distribution Management, 43*(10/11), 915-933.
20. Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *Academy of Management Review, 20*(3), 709-734.
21. Melac, H., Sgarbossa, F., & Cagnina, M. R. (2020). A framework to design the last-mile delivery in B2C e-commerce. *International Journal of Logistics Research and Applications, 23*(4), 362-384.
22. Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research, 17*(4), 460-469.
23. Oliver, R. L. (1999). Whence consumer loyalty?. *Journal of Marketing, 63*(4_suppl1), 33-44.
24. Pappas, I. O., Kourouthanassis, P. E., Giannakos, M. N., & Chrissikopoulos, V. (2017). Sense and sensibility in personalized e-commerce: How emotions rebalance the purchase intentions of persuaded customers. *Psychology & Marketing, 34*(10), 972-986.
25. Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing, 64*(1), 12-40.
26. Ramanathan, U. (2012). The role of partnership and information sharing on retailers' performance: a case of UK food and drink retailers. *International Journal of Production Economics, 140*(1), 225-234.
27. Ranieri, L., Digiesi, S., Silvestri, B., & Roccotelli, M. (2018). A review of last mile logistics innovations in an externalities cost reduction vision. *Sustainability, 10*(3), 782.
28. Rao, S., Goldsby, T. J., & Iyengar, D. (2017). The marketing and logistics efficacy of online retail platforms: A developing country perspective. *Journal of Business Logistics, 38*(1), 4-20.
29. Richey, R. G., Roath, A. S., Whipple, J. M., & Fawcett, S. E. (2010). Exploring a governance theory of supply chain management: Barriers and facilitators to integration. *Journal of Business Logistics, 31*(1), 237-256.
30. Shankar, V., Smith, A. K., & Rangaswamy, A. (2003). Customer satisfaction and loyalty in online and offline environments. *International Journal of Research in Marketing, 20*(2), 153-175.
31. Van der Heijden, H. (2004). User acceptance of hedonic information systems. *MIS Quarterly, 28*(4), 695-704.
32. Vargo, S. L., & Lusch, R. F. (2004). Evolving to a new dominant logic for marketing. *Journal of Marketing, 68*(1), 1-17.
33. Williams, B. D., Roh, J., Tokar, T., & Swink, M. (2013). The influence of supply chain visibility on collaborative performance. *Journal of Operations Management, 31*(3), 113-128.
34. Yin, R. K. (2018). *Case study research and applications: Design and methods*. Sage publications.
35. Yoo, B., & Donthu, N. (2001). Developing and validating a multidimensional consumer-based brand equity scale. *Journal of Business Research, 52*(1), 1-14.