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# Managing The Invisible Product: A Strategic Framework for Geospatial Infrastructure Investment in Indonesian Ride-Hailing Platform

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## Abstract

Geospatial capabilities have become critical dependencies in ride-hailing platforms, providing maps, routing, and location services. However, these foundational technologies frequently face prioritization challenges against more visible product features. This research addresses the "Invisible Product Paradox" by developing a Geospatial Product Strategy Framework for Indonesian ride-hailing platforms, using PT GoTo Gojek Tokopedia Tbk as the primary case. Employing a sequential mixed-methods design, the study integrates qualitative analysis of eight expert interviews (275 coded quotations using Atlas.ti) with quantitative validation through sentiment analysis of 4,806 user reviews. The theoretical lens combines Jobs-to-be-Done, Product-Market Fit, and Platform Strategy theories. Two complementary analyses were conducted: an independent platform-based validation (Kimola.com) identified a -1.07 star penalty across 586 geospatial reviews (12.19%), while the primary keyword-filtered analysis revealed a -1.21 star penalty across 520 reviews (10.81%, $p<0.001$). Three emergent concepts were identified: the Invisible Product Paradox, Silent Killer Effect, and Frequency-Severity Disconnect. The framework resulting from this research comprises three integrated tools: Job-to-Geo Impact Matrix, PMF Threshold Metrics Framework, and Build-vs-Buy Geospatial Sourcing Decision Framework, providing systematic approaches for geospatial investment prioritization in emerging market contexts.

**Keywords:** Geospatial Strategy; Ride-Hailing Platform; Product-Market Fit; Jobs-to-be-Done; Technology Management; Decision Making

## A. INTRODUCTION

Indonesia's digital economy reached USD 90 billion in Gross Merchandise Value during 2024, establishing it as the largest in Southeast Asia according to the SEA economy report (Google, Temasek, and Bain & Company, 2024). The ride-hailing segment specifically grew from approximately USD 2 billion to USD 3 billion within a single year, with (Mordor Intelligence, 2025) projecting growth to USD 5.34 billion by 2030. These figures provide the empirical backdrop for this research, which investigates the day-to-day operational dynamics underlying the ride-hailing platform ecosystem.

The ride-hailing business model is fundamentally a geography problem operating through a digital technology platform. (Parker et al, 2016) characterize these services as "geographic matching systems" in their Platform Revolution framework. The core algorithm connects riders with drivers across physical space; when map data contains errors, the consequences cascade through every transaction. Pickup locations become misaligned, estimated arrival times lose reliability, routes cease to make practical sense, and fare calculations produce incorrect results.

Indonesia's context presents distinct complexity factors for geospatial services. Data from (Statista, 2023) indicates that 74.18% of rides involve motorcycles rather than cars, necessitating two distinct navigation systems that reflect how these vehicle types move through cities differently. Motorcycle drivers utilize shortcuts through "gang-gang" (narrow residential alleys), traverse parking areas, and access routes that cars cannot. Indonesia's informal addressing system further compounds the challenge. Unlike Western models with alphanumeric grid systems, Indonesian navigation is predominantly landmark-based. As noted by (Sutanta et al., 2016), the lack of geocoded precision in informal settlements forces reliance on descriptive addressing using visual anchors such as "the blue house" or "behind the mosque." This phenomenon aligns with (Lynch, 1960) urban theory, where landmarks become the primary navigation references in spatially unstructured environments.

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Mordor Intelligence (2025) estimates Gojek's market share at 52% with Grab at 40%. Jakarta's traffic congestion ranks 7th globally, with drivers losing 108 hours annually (Jakarta Smart City, 2024). These local conditions shaped the research framework in ways not initially anticipated.

The qualitative findings challenged initial hypotheses regarding the prioritization of geospatial infrastructure. Interviews with eight product managers across four organizations (Table 1) revealed a consistent pattern: map-related improvements are systematically deprioritized in favor of features with greater user visibility or direct revenue generation potential.

Quantitative evidence corroborates practitioner accounts. Gojek's engineering team (Rajmohan, 2020) acknowledged that 50% of historical trips originated from "problematic pickup locations." To validate this pattern, two complementary quantitative approaches were employed. First, an independent validation using the (Kimola.com, 2025) sentiment analysis platform analyzed the full 4,806-review dataset and identified 586 geospatial-related reviews (12.19% prevalence), yielding a -1.07 star rating penalty. Second, the primary analysis applied a researcher-constructed keyword filter using 20 domain-specific terms derived from interview transcripts, identifying 520 geospatial reviews (10.81%) with a more severe -1.21 star penalty ($p<0.001$). Both figures are internally consistent: the Kimola platform provided an independent, validated baseline, while the primary analysis generated the empirically grounded thresholds used in the framework construction. The -1.21 penalty from the primary analysis serves as the framework's anchor value throughout this paper.

During interviews, PM-5 characterized maps as a "silent killer": unlike server crashes or major bugs, map-related failures rarely trigger emergency responses. The degradation is subterranean; users do not perceive the infrastructure, they only experience the late driver or inaccurate ETA. The term Invisible Product Paradox emerged when the researcher recognized that multiple practitioners were describing the same phenomenon: the more effectively geospatial infrastructure functions, the less visible its value becomes, creating a fundamental advocacy problem within organizations.

## B. LITERATURE REVIEW

This section critically synthesizes the existing gaps in three literatures - Geographic Information Systems, Platform Strategy, and Product Management - before introducing the integrated theoretical framework that addresses these gaps.

### *Gaps in Geospatial Technology Literature*

Geographic Information Systems researchers, including (Goodchild, 2007), have focused primarily on technical accuracy improvements: enhancing map precision, optimizing routing algorithms, and related technical concerns. While this body of work offers valuable insight into the technical dimension, it does not address the strategic resource constraints that product development teams face in practice. There exists a fundamental disconnect between what GIS literature optimizes for and what product managers must decide upon in their development groups.

### *Gaps in Platform Strategy Literature*

Platform strategy research, as demonstrated by (Gawer and Cusumano, 2014), acknowledges that infrastructure enables network effects but tends to treat geospatial capabilities as interchangeable with other backend services, positioning them as commodity inputs rather than strategic assets. This characterization overlooks the unique invisibility problem associated with geospatial infrastructure, a distinction that the present study's qualitative data clarifies.

### *Gaps in Product Management Literature*

Product management frameworks from (Cagan and Jones, 2017) provide prioritization methodologies, but these frameworks generally assume features that generate value by producing positive outcomes rather than by preventing negative ones. Geospatial infrastructure fits poorly into frameworks designed around positive value creation. The approach to prioritize invisible product infrastructure specifically within emerging market platform contexts constitutes the gap that this study addresses.

***Theoretical Framework Integration***

The research design initially relied on the Jobs-to-be-Done theory alone. However, the qualitative data revealed that geospatial decisions are situated at the intersection of user needs, business metrics, and platform dynamics, such that no single theoretical lens adequately captures the phenomenon. The framework consequently evolved to integrate three complementary theories. Jobs-to-be-Done theory (Christensen et al., 2016) proposes that people "hire" products to accomplish specific jobs, examining what functional task requires completion, what emotional state is sought, and what social outcome is desired. In ride-hailing, geospatial capabilities serve functional jobs (accurate pickup locations, timely arrivals) and emotional jobs (users seek certainty that the application knows their location and provides reliable ETAs). The circumstantial dimension of JTBD is particularly relevant in Indonesia, where the "job" of locating a pickup point operates differently than in markets with formal addressing systems.

Product-Market Fit theory (Andreessen, 2007) describes the state wherein a product satisfies market demand. For ride-hailing platforms, PMF represents not a single achievement but an ongoing equilibrium requiring continuous maintenance with multiple constituencies simultaneously. Geospatial quality affects riders and drivers differently: pickup precision matters more to riders who stand on street corners, while routing accuracy matters more to drivers whose earnings depend on distance calculations.

Platform Strategy theory (Parker, Van Alstyne, & Choudary, 2016) examines how multi-sided markets generate value. Geospatial capabilities occupy an ambiguous position: maps can amplify network effects (more accurate matching produces more completed rides) without directly creating network effects. They enable rather than produce. In priority discussions, enabling capabilities typically lose to features that directly drive user acquisition metrics. The principal research question is: How can Indonesian ride-hailing platforms develop a systematic framework for geospatial product strategy decisions? Secondary questions address: the factors product managers weigh when choosing between geospatial improvements and competing features; the influence of Indonesian market conditions on these choices; build-versus-buy decision frameworks accounting for local context; and optimal quality thresholds for map accuracy.

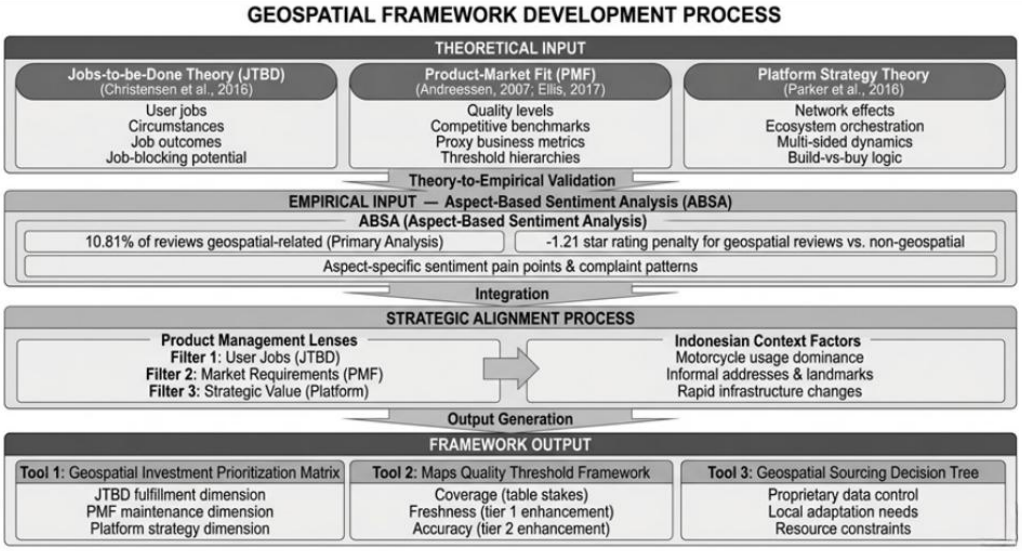


**Figure 1. Theoretical Integration and Framework Development**
Source: Research data, 2026

## C. METHODS

This study employed a sequential exploratory mixed-methods design following (Creswell, 2014), as the research questions required both depth and breadth. The qualitative component explored how practitioners reason about geospatial decisions, the logic they employ, political considerations they navigate, and the constraints they face. The quantitative component tested whether patterns identified through eight interviews held at scale across nearly five thousand user reviews. The sequencing was deliberate: qualitative analysis first to construct the framework, followed by quantitative validation. The research adopts a Pragmatist epistemological stance (Kumar, 2020), wherein framework validity is

assessed by practical utility rather than theoretical elegance. For framework construction, the study followed (Jabareen, 2009) Conceptual Framework Analysis approach combined with (Eisenhardt, 1989) methodology for building theory from cases. Interview participants were recruited through purposive sampling (Patton, 2015), selecting practitioners with direct experience in geospatial infrastructure decisions. Eight participants were recruited from four organizations: five from GoTo, including Maps Operations leadership, two from competitor platforms, and one from a geospatial startup serving ride-hailing companies. Table 1 presents participant details.

**Table 1. Interview Participant Characteristics**

| Code | Role | Organization | Experience |
|---|---|---|---|
| PM-1 | Maps PM (Former) | GoTo | Historical Perspective on Maps |
| PM-2 | Maps PM (Current) | GoTo | Current operational view in the maps product development |
| PM-3 | Product Analyst (Current) | Ex GoTo | Comparative market perspective and product metrics |
| PM-4 | Head of Product (Former) | Ex GoTo | Foundational strategic view of Maps Product |
| PM-5 | PM, Non-Ride Hailing | Geospatial Startup | Geospatial Product Technical depth + non-ride-hailing |
| PM-6 | Driver Experience Senior PM | GoTo | Supply-side platform perspective |
| PM-7 | Routing Senior PM | GoTo | Cross-industry specialization |
| PM-8 | Head of Product Maps (Current) | GoTo | Comprehensive organizational journey in ride-hailing |

Source: Research data, 2026

All sessions were recorded with consent, transcribed verbatim, and analyzed in Atlas.ti Version 23. The coding process combined deductive codes derived from the theoretical framework (e.g., Vendor_Dependency, Strategic_Control) with inductive codes that emerged during analysis (e.g., Cross_Vertical_Friction, Talent_Gap). The final codebook contained 275 quotations across eight coding families. For quantitative validation, 4,806 user reviews were collected from Google Play Store spanning October 2013 through December 2025. Two complementary analytical approaches were applied. First, the Kimola.com (2025) platform served as an independent validation tool, applying its own NLP-based classification to identify geospatial-related reviews. Second, the primary analysis employed a researcher-constructed keyword filter using 20 domain-specific terms in both Indonesian and English (peta, gps, lokasi, titik, pin, akurasi, rute, nyasar, alamat, jemput, jarak, eta, waktu, waktu tempuh), selected because they appeared in interview transcripts, representing the actual vocabulary practitioners and users employ. Sentiment classification used star ratings directly: 1-2 stars as Negative, 3 stars as Neutral, 4-5 stars as Positive. The Kimola platform was not used for the primary sentiment classification; rather, it provided an independent cross-validation of the geospatial review prevalence rate and penalty magnitude.

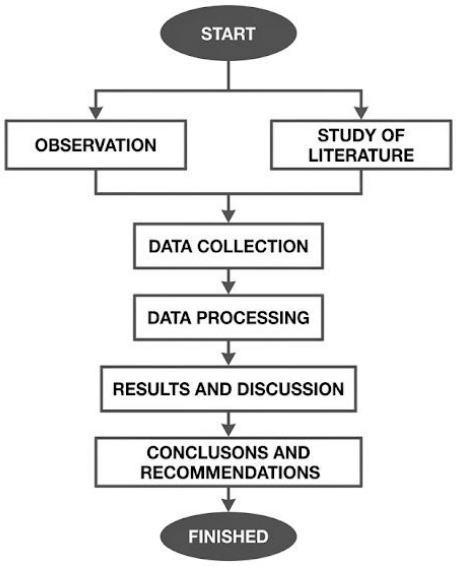


**Figure 2. Research Flow Diagram**
Source: Research data, 2026

## D. RESULTS AND DISCUSSION

Three emergent concepts surfaced across all eight interviews, with patterns emerging first and labels crystallizing around the fourth interview: the Invisible Product Paradox, the Silent Killer Effect, and the Frequency-Severity Disconnect. Each challenges conventional approaches to product prioritization.

### *Jobs-to-be-Done Analysis*

PM-1 described the user job as follows: "From the customer side, the goal is simple: select pickup location and book a trip." While this functional objective appears straightforward, the interview data revealed significant underlying complexity. The functional job hierarchy proceeds through stages: accurate location selection, then price and ETA evaluation, then journey monitoring. Failure at any stage causes the entire job to fail. The emotional dimension proved unexpectedly significant. PM-6 articulated: "After the basic need of transportation, users seek certainty. Ride-hailing customers want price certainty, arrival time estimates, and a more predictable experience than traditional ojek. Drivers also want income certainty rather than roaming around hunting for passengers." Geospatial accuracy underpins this sense of certainty, yet users do not consciously attribute their experience to the underlying infrastructure.

The Invisible Product Paradox emerged most clearly from PM-5: "Maps are a silent killer. It does not become a blocker; no release gets stopped because maps are bad. However, if routes are consistently wrong, pricing becomes inaccurate, driver earnings suffer, and the whole system degrades slowly." PM-4 added a temporal dimension: "Quality improvements take time to change user perception. Even highly accurate maps take time to be recognized by customers and drivers." Good geospatial work remains invisible; only failures become visible, and even then, only after a significant lag.

### *Product-Market Fit Analysis*

PM-3 corrected the researcher's initial expectation that practitioners would discuss technical accuracy metrics: "The first layer is not GPS Accuracy. The first layer is the conversion rate. We look at conversion, then drill down to find what is causing problems." Practitioners work backwards from business metrics to technical causes, an insight that directly shaped Tool 2 of the framework. A threshold hierarchy emerged from multiple interviews. PM-3 stated: "Coverage is the basic minimum. You need good coverage and frequent updates. Accuracy comes second." Practitioners provided concrete benchmarks (Table 2): average ETA error of approximately 1 minute for motorcycles and 90 to 120 seconds for cars, POI accuracy at the 90th percentile within 100 meters.

**Table 2. Practitioner-Derived Quality Thresholds**

| Metric | Threshold | Source |
|---|---|---|
| ETA Error (Two-wheeler) | ~1 minute average | PM-3 |
| ETA Error (Four-wheeler) | 90-120 seconds | PM-3 |
| POI Accuracy | P90 at 100 meters | PM-3 |
| Discoverability | 95%+ of orders | PM-4 |

Source: Research data, 2026

A particularly striking finding was the ETA Accuracy Paradox. PM-3 described: "Our ETA has actually been inaccurate all along, but always low. We show 6, 7, 8 minutes when the real time is 10 minutes. Customers wait because the number seems close. Then we improved the model. The new system showed 10 minutes, accurate now, but because it was longer, customers started canceling." Technical improvement produced measurable business harm, as users had adapted to historical inaccuracy.

### *Platform Strategy Analysis*

PM-6 noted: "There are different nuances. Passengers want cheap and fast. Drivers want fair compensation." Geospatial accuracy mediates this tension: distance calculations determine fares, and inaccurate routes carry distributional consequences for both sides of the platform. Regarding build-versus-buy decisions, PM-4 was emphatic: "Having more control gives you power to build the right experience." Control over quality consistently outweighed cost savings from vendor solutions. A hybrid evolution pattern emerged: platforms begin by purchasing vendor solutions, then gradually build hybrid capabilities, eventually developing in-house solutions for core functions. This Buy-to-Hybrid-to-Build progression became Tool 3 of the framework. The Frequency-Severity Disconnect emerged when practitioners

described how prioritization functions: most teams prioritize according to complaint frequency, but severity often points in a different direction. Routing issues occur less frequently than location issues, but when routing fails, users become significantly more upset (Table 3).

**Table 3. Geospatial Issue Category Analysis**

| Category | Count (n) | % | Avg. Rating | Severity Impact |
|---|---|---|---|---|
| Location Accuracy | 95 | 26.7 | 1.87 | High Freq / Mod. Severity |
| ETA Accuracy | 89 | 25.0 | 1.91 | High Freq / Mod. Severity |
| Maps Quality | 59 | 16.6 | 1.95 | Med Freq / Mod. Severity |
| Pickup Points | 57 | 16.0 | 1.81 | Med Freq / High Severity |
| Routing | 42 | 11.8 | 1.55 | Low Freq / Critical Severity |
| Address/Search | 41 | 11.5 | 1.80 | Low Freq / High Severity |
| Total/Average | 356 | 100 | 1.82 | -1.21 penalty (primary) |

Source: Research data, 2026

### *Quantitative Findings*

The primary keyword-filtered analysis identified 520 geospatial-related reviews (10.81% of 4,806 total), averaging 1.90 stars compared to 3.11 stars for non-geospatial complaints. The resulting -1.21 star penalty is statistically significant (t-test, $p<0.001$, Cohen's $d = 0.89$), indicating a large practical effect. The independent Kimola.com validation yielded a directionally consistent -1.07 penalty across a broader filter of 586 reviews (12.19%). The convergence of both methods confirms the robustness of the geospatial-satisfaction relationship; the primary analysis penalty (-1.21) anchors all framework thresholds.

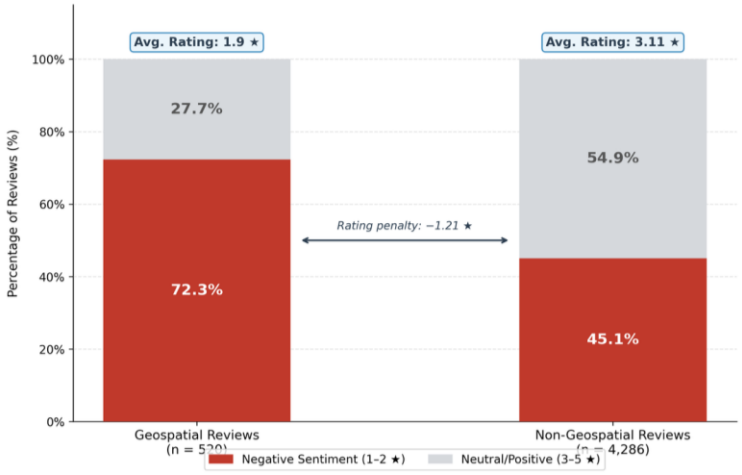


**Figure 3. Sentiment Distribution Comparison Chart**

Source: Research data, 2026

Category analysis confirmed the Frequency-Severity Disconnect: location and ETA complaints together constitute over half of all geospatial reviews, yet routing complaints, representing only 11.8% of volume, carry the worst average rating at 1.55 stars. A prioritization approach based solely on complaint frequency would systematically misallocate resources toward more frequent but less severe issues.

### *The Geospatial Product Strategy Framework*

The framework contains three tools, each addressing a specific challenge identified through this research. Tool 1: Job-to-Geo Impact Matrix. This tool maps geospatial capabilities to user jobs across both rider and driver sides of the platform. For priority scoring, a formula was developed that weights severity higher than frequency: Priority Score = Frequency Weight x (5 - Average Severity Rating). This formulation draws conceptual parallels with established prioritization methodologies. The Risk Priority Number (RPN) in Failure Mode and Effects Analysis (FMEA) similarly combines frequency and severity dimensions to generate composite priority scores, though FMEA additionally incorporates a detectability factor. The RICE scoring framework (Reach, Impact, Confidence, Effort) used in product management likewise combines multiple dimensions rather than relying on any single metric. The present formula privileges severity over frequency based on the empirical finding of the Frequency-Severity Disconnect,

where volume-based prioritization demonstrably misallocates resources. Table 4 presents the priority calculations.

**Table 4. Priority Score Calculation**

| Category | Count | Freq. Weight (a) | Avg Rating (b) | Severity Factor (5-b) | Priority Score (a x (5-b) |
|---|---|---|---|---|---|
| ETA | 89 | 0.250 | 1.72 | 3.28 | 0.820 |
| Location | 95 | 0.267 | 2.00 | 3.00 | 0.801 |
| Routing | 69 | 0.194 | 1.55 | 3.45 | 0.669 |
| GPS | 55 | 0.154 | 1.84 | 3.16 | 0.487 |
| Map General | 48 | 0.135 | 2.21 | 2.79 | 0.377 |

Source: Research data, 2026

Note: Frequency Weight = proportion of geo-related reviews per category (decimal). Severity Factor = (5 - Average Rating), inverting the scale so lower ratings produce higher priority values. The formula balances both dimensions, counteracting the volume-based bias documented in the Frequency-Severity Disconnect.

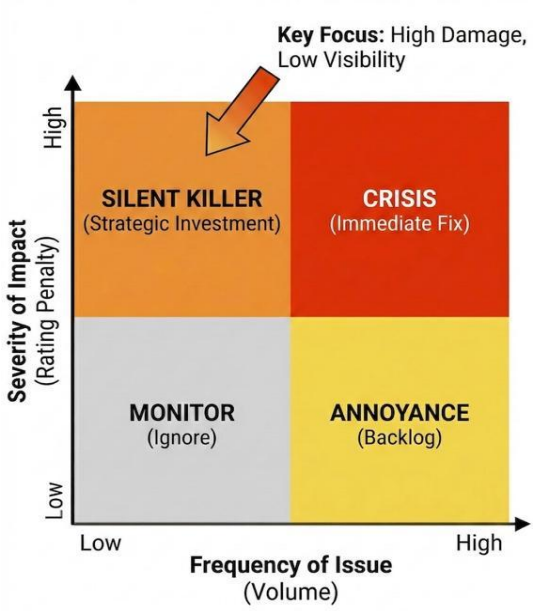


**Figure 4 Tool 1: Geospatial Investment Matrix**

Source: Research data, 2026

Tool 2: PMF Threshold Metrics Framework. This tool establishes quality thresholds anchored on the -1.21 star penalty from the primary analysis, structured around three tiers: Blocking (quality prevents core job completion, average rating below 1.90), Warning (quality shows degradation trend, rating 1.90-2.61), and Healthy (quality supports market fit, rating above 2.61). Table 5 presents the tier definitions.

**Table 5. PMF Threshold Metrics Framework**

| Tier | Condition | Rating Threshold | Accuracy Threshold | Required Action |
|---|---|---|---|---|
| TIER 1: BLOCKING (Red) | Quality prevents core job completion | Impact > -1.21 (Avg < 1.90) | Accuracy < 85% OR Error > threshold | STOP new development. Fix immediately. |
| TIER 2: WARNING (Yellow) | Quality shows a degradation trend | Impact -0.5 to -1.21 (Avg 1.90-2.61) | Accuracy 85-90% | PRIORITIZE in next sprint. Monitor daily. |
| TIER 3: HEALTHY (Green) | Quality supports market fit | Impact < -0.5 (Avg > 2.61) | Accuracy > 90% | MAINTAIN. Monitor weekly. Optimize. |

Source: Research data, 2026




**Figure 5. Tool 2: PMF Threshold Dashboard**
Source: Research data, 2026

Tool 3: Build-vs-Buy Geospatial Sourcing Decision Framework. This tool addresses the sourcing question through a four-question decision tree, with criteria weights derived from interview analysis. The decision tree produces five possible outcomes based on sequential assessment of strategic differentiation, vendor maturity, resource availability, and time-to-market urgency. Table 6 presents the decision framework outcomes.

**Table 6. Build-vs-Buy Geospatial Sourcing Decision Framework Outcomes**

| Outcome | Decision Path | When Appropriate |
|---|---|---|
| BUILD | Q1(Strategic?)=YES, Q3(Resources?)=YES, Q4(Time-critical?)=NO | Strategically differentiating, resources available; no time pressure |
| BUY | Q1=NO, Q2(Mature vendor?)=YES | Not differentiating; mature vendor solution available |
| HYBRID (Partner + Customize) | Q1=NO, Q2=NO | Not differentiating; no mature vendor; need customization |
| HYBRID (Build Core + Buy Support) | Q1=YES, Q3=NO | Strategically differentiating: resource constraints |
| HYBRID (Quick Buy + Gradual Build) | Q1=YES, Q3=YES, Q4=YES | Strategically differentiating; time-to-market critical |

Source: Research data, 2026

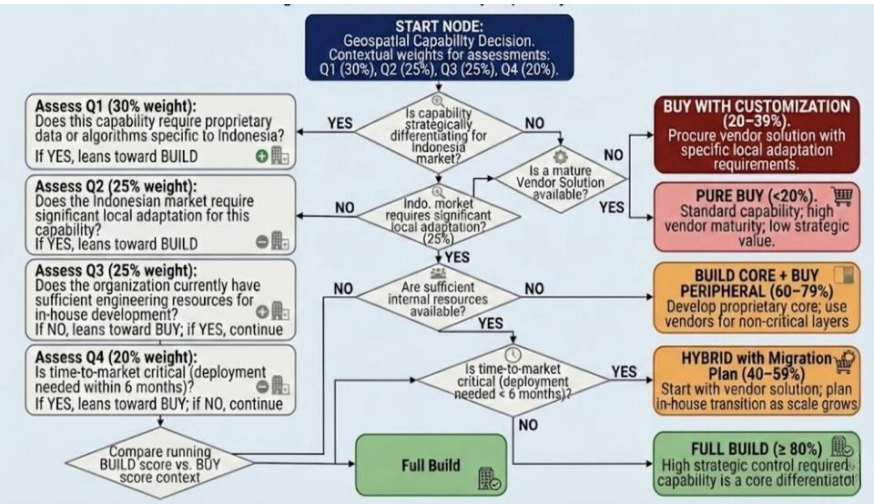


**Figure 6. Tool 3 Geospatial Sourcing Decision Framework**
Source: Research data, 2026

The four decision questions are weighted based on practitioner priorities identified in the qualitative analysis. Table 7 presents the criteria weights and their empirical basis.

**Table 7. Build-vs-Buy Decision Criteria Weights**

| Criterion | Weight | Key Indicators | Empirical Basis |
|---|---|---|---|
| Strategic Control | 30% | Competitive differentiation, data ownership, and rapid iteration capability | PM-4 emphasis on control over cost; consistent across all interviews |
| Local Adaptation Needs | 25% | Indonesia-specific requirements; informal addressing; motorcycle routing | PA-1 complexity assessment; Indonesia context discussions |
| Resource Availability | 25% | Engineering capacity; domain expertise; maintenance capability | Talent gap discussions; crowdsourcing failure evidence |
| Time-to-Market | 20% | Competitive pressure; market opportunity window; urgency | Hybrid evolution pattern; MVP approach discussions |

Source: Research data, 2026

Strategic Control receives the highest weight (30%) because practitioners consistently emphasized control over cost. Local Adaptation Needs receives 25%, given Indonesian market requirements for significant customization. Resource Availability also receives 25% as talent constraints surfaced repeatedly. Time-to-Market receives 20%, lower than expected given the startup culture, but practitioners indicated control matters more once scale is reached. The decision tree also captures the Buy-to-Hybrid-to-Build evolution pattern, framing it as a normal strategic progression rather than failure. Finally, the Indonesia Context Adaptation Guidelines operate as a cross-cutting moderator adjusting the parameters of all three tools. Five context factors were identified: informal addressing systems, motorcycle dominance (74.18%), rapid infrastructure change, archipelago complexity, and variable OpenStreetMap data quality. Table 7 summarizes these guidelines.

**Table 8. Indonesia Context Adaptation Guidelines**

| Context Factor | Market Characteristic | Strategic Implication | Framework Adjustment |
|---|---|---|---|
| Informal Addressing | ~30% addresses use landmarks | Fuzzy logic required for pickup accuracy | Pickup priority score x1.5 in Tool 1 |
| Motorcycle Dominance | 74.18% two-wheelers | Car-based routing engines fail for motorcycles | ETA error margin <1 min (vs 2 min cars) |
| Rapid Infrastructure Change | Frequent road changes, construction | Map freshness > absolute precision | "Map Updates" prioritized over "HD Precision." |
| Archipelago Complexity | 17,000+ islands, varying connectivity | Offline capability required | "Offline Caching" = Blocking Tier in Tool 2 |
| Variable OSM Quality | Data varies: Java (high) vs Outer Islands | Hybrid sourcing needed | Build in Tier 1 cities, Buy in Tier 2/3 |

Source: Research data, 2026

### *Discussion*

The findings of this study provide empirical validation for the systemic under-investment in foundational platform infrastructure, conceptualized here as the "Invisible Product Paradox". Unlike user-facing features that directly stimulate acquisition or engagement, geospatial capabilities operate as enablers within the platform ecosystem. The quantitative revelation of a -1.21 star rating penalty for geospatial failures underscores the "Silent Killer Effect": infrastructure degradation does not trigger immediate operational alarms but severely erodes user trust over time.

Furthermore, the "Frequency-Severity Disconnect" identified in the dataset highlights a critical flaw in traditional, volume-based product management. While location-related issues occur more frequently, routing failures generate disproportionately severe user dissatisfaction. A prioritization approach based solely on complaint frequency systematically misallocates resources toward less damaging issues. The proposed framework mitigates this by applying a severity-weighted scoring system, drawing conceptual parallels with established risk management tools like the Risk Priority Number (RPN) in FMEA.

### *Theoretical Implications*

This research contributes to three distinct streams of literature. First, it extends Jobs-to-be-Done (JTBD) theory by demonstrating that in multi-sided platforms, functional jobs are highly interdependent.

A rider's job of booking a ride is technically and functionally bound to a driver's job of navigating unstructured environments. Second, it reframes Product-Market Fit (PMF) for backend infrastructure. Rather than treating PMF as a static, user-facing achievement, this study posits the need for an internal, subterranean PMF—a continuous equilibrium monitored through leading technical indicators before it impacts lagging metrics like conversion rates. Finally, it advances Platform Strategy by illuminating the precarious position of "enabling capabilities". The findings challenge the assumption that such capabilities are merely commodity inputs, arguing instead that strategic control over geospatial data is a core differentiator in emerging markets.

***Managerial Implications***

For ride-hailing operators like GoTo and other regional platforms, this study offers actionable mechanisms to overcome the advocacy problem associated with infrastructure funding. Product managers can utilize the empirically derived -1.21 star penalty to quantify the ROI of geospatial investments to stakeholders. The integration of the Job-to-Geo Impact Matrix and the PMF Threshold Framework allows organizations to shift from reactive ticket-counting to proactive quality management based on defined tolerance tiers (Blocking, Warning, Healthy). Furthermore, the Build-vs-Buy Geospatial Sourcing Decision Framework provides a systematic approach to navigating the "Buy-to-Hybrid-to-Build" evolution, emphasizing that control over quality-determining activities should be strategically preserved even under resource constraints.

***Limitations***

While the mixed-methods approach provides robust triangulation, several limitations must be acknowledged. First, the qualitative insights are heavily anchored in the context of GoTo, an established market leader. The resource constraints and strategic priorities of "challenger" platforms may yield different prioritization dynamics. Second, the reliance on retrospective interview data carries inherent recall biases. Third, the geospatial technology landscape is evolving rapidly; the future integration of advanced Machine Learning models or IoT technologies may alter the cost-benefit calculus of the Build-vs-Buy framework. Finally, while conceptually sound, the framework's efficacy in tangibly shifting budget allocations within an actual multi-year planning cycle remains untested.

***Future Research Directions***

Future research should adopt an action research paradigm to implement and evaluate this framework within live quarterly planning cycles. Longitudinal studies are also necessary to track whether the -1.21 star rating penalty fluctuates as overall market expectations for geospatial accuracy mature over time. Additionally, testing the transferability of the "Invisible Product Paradox" and the Context Adaptation Guidelines in other emerging markets with informal road networks—such as Latin America or Sub-Saharan Africa—would strengthen the framework's global applicability.

## E. CONCLUSIONS

This research triangulated eight practitioner interviews with an analysis of 4,806 user reviews to identify three specific pressures that distort geospatial investment decisions in ride-hailing platforms.

The Invisible Product Paradox describes how effective geospatial infrastructure becomes less visible, rendering budget advocacy nearly impossible compared to user-facing features. The Silent Killer Effect captures how quality degrades slowly and compounds invisibly until problems manifest in business metrics, by which point trust erosion has already occurred. The Frequency-Severity Disconnect reveals that counting complaints differs fundamentally from measuring damage: routing problems generate fewer tickets than location problems, but provoke significantly stronger negative reactions. The -1.21 star rating penalty from the primary analysis confirmed the magnitude of geospatial impact on user satisfaction.

For GoTo and similar regional platforms, three strategic shifts are indicated. First, the framework should be integrated into quarterly planning cycles, providing objective criteria to counteract the advocacy problem. Second, conversion rates are insufficient as primary signals for map health; product teams must track leading indicators such as GPS accuracy and snap-to-road performance. Third, the hybrid sourcing model should preserve control over quality-determining activities even when outsourcing other geospatial functions.

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