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EDITED BY  
Mariel Garcia-Hernandez,  
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REVIEWED BY  
Fei-Fei Cheng,  
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Lita Alita,  
University of International Business and  
Economics, China

\*CORRESPONDENCE  
Taesun Kim  
✉ taesunk@hanyang.ac.kr

†PRESENT ADDRESS  
Fan Xu  
Robotics Institute,  
Ningbo University of Technology,  
Ningbo, China

RECEIVED 24 November 2025  
REVISED 21 January 2026  
ACCEPTED 09 February 2026  
PUBLISHED 02 March 2026

CITATION  
Kim T and Xu F (2026) Relational fairness  
by design: rebalancing roles in Korea's  
public food-delivery platforms.  
*Front. Comput. Sci.* 8:1753399.  
doi: 10.3389/fcomp.2026.1753399

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# Relational fairness by design: rebalancing roles in Korea's public food-delivery platforms

Taesun Kim\* and Fan Xu†

Department of Industrial Design, College of Design, Hanyang University ERICA Campus, Ansan, Republic of Korea

**Introduction:** Digital platforms built on inherited transactional designs often fail on relational dimensions. To diagnose these structural failures, this study uses Korea's state-led public food-delivery platforms as a critical case, as they uniquely expose tensions between a public mission and a flawed, privately inherited architecture and move beyond existing research that focuses mainly on superficial, functional fixes.

**Methods:** Adopting relational fairness as an analytical lens—operationalized into three dimensions of (1) social recognition, (2) interdependent responsibility, and (3) reciprocal voice—we employ a qualitative service-design methodology, combining design ethnography and thematic analysis across three stakeholder groups (consumers, restaurant staff, and riders).

**Results:** The findings show that the current platform design systematically violates these three dimensions, producing systemic role distortions: consumers become “users without control,” restaurants are forced into “bi-directional responsibility mediators,” and riders act as “final bearers of responsibility” for breakdowns across the service chain.

**Conclusion:** Based on this diagnosis, we propose Relational Fairness by Design (RFD), a framework that translates relational fairness into three actionable principles—participatory choice and control, information transparency, and trust-based communication and reciprocal voice—and show how implementing RFD can reposition public platforms from passive intermediaries to active facilitators that mediate conflicts, redistribute responsibilities more fairly, and build sustainable public value.

## KEYWORDS

platform governance, public food-delivery platforms, relational fairness by design, service-system design, stakeholder experience

## 1 Introduction

Multi-sided food-delivery platforms have become central infrastructures, generating value through cross-group externalities (Evans, 2003; Rochet and Tirole, 2003; Belleflamme and Peitz, 2021). Their rapid expansion during COVID-19 further solidified their role as essential components of contactless societies. However, the shortcomings of private food-delivery platforms—including monopoly power, high commission fees, opaque algorithms, and uneven risk distribution—have become increasingly visible. In practice, these issues are often experienced and voiced in the market as problems of unfairness, particularly by restaurants and delivery workers. Consequently, they have intensified interest in alternative models such as platform cooperatives, public platforms, and multi-stakeholder governance as responses to these systemic challenges.

Even though they emerged as responses to the problems of dominant private platforms, these alternative models face challenges that go well beyond economic performance. Scholars caution that focusing solely on outcomes like scale and profitability risks obscuring these initiatives' broader significance (Le Lay and Lemozy, 2023). In practice, structural disadvantages—limited capital, technological constraints, and the lack of network effects—often handicap these alternatives against dominant incumbents. At the same time, examples such as CoopCycle show that, with sufficient cooperative support, active community engagement, and public funding, sustainable local ecosystems and more equitable governance structures can emerge (Papadimitropoulos and Malamidis, 2024). Scholars of social innovation argue that socially responsible solutions do not automatically scale or stabilize; they must be “industrialized” through structural and industrial embedding—that is, by building new value logics into the core structures, processes, and partnerships of the platform economy (e.g., Manzini, 2015).

Taken together, these patterns suggest that alternative platforms remain high-difficulty experiments: they are hard to sustain under current market conditions, yet they still demonstrate the possibility of more just and accountable platform arrangements. Because the structural problems of incumbent platforms are now widely acknowledged, continued experimentation with such alternatives—and a clearer understanding of the characteristics and design principles that underpin their viability—remains urgently needed. Within this global movement, Korea's public food-delivery platforms stand out as representative experiments. Driven by public concern over excessive commissions and private platform dominance, several local governments have launched state-led delivery apps—such as Baedal-teukgeup—grounded in radically lower commission policies (Ko, 2025). Yet, despite their price advantage, these public platforms consistently occupy a peripheral position in both market share and daily usage (Ko, 2025). The limited uptake, even with lower commissions, suggests that the critical determinants of platform competitiveness lie not in price alone, but in other characteristics such as its structure, design, and operational model.

To date, design and HCI research in this area has mainly focused on improving app interfaces, visibility, and usability, especially for specific user groups such as older adults (e.g., Kim and Ko, 2021; Wang and Zou, 2023; Ma and Park, 2025). While these contributions are valuable, they often address isolated touchpoints or single stakeholder groups. Holistic studies of interactions among consumers, restaurants, and riders within integrated service systems—or of how breakdowns alter stakeholder roles and responsibilities—are rare. In addition, few have systematically investigated how public food-delivery platforms, intended as alternatives, fail in practice or the resulting effects on platform governance.

In response to these gaps, this study examines the experiences of consumers, restaurants, and riders on Korea's public food-delivery platforms, comparing their journeys to identify where expectations, responsibilities, and interactions diverge or break down. From this multi-stakeholder diagnosis, we derive design guidelines that articulate the distinctive characteristics a public platform should embody and how it should operate within a market dominated by private incumbents. Accordingly, the study addresses the following research questions:

(1) Where and why do breakdowns occur across stakeholder journeys?

(2) How do these breakdowns reshape stakeholder roles and responsibilities?

(3) What actionable design principles can be developed from this analysis?

## 2 Theoretical background

### 2.1 Platform governance and power imbalances

Digital platforms are frequently viewed as infrastructures that facilitate interaction and resource exchange among diverse actors (Tilson et al., 2010). However, research indicates these platforms are not neutral. Platforms operate as mediators—or “governors”—that link user groups, reshape relationships, and influence prevailing norms and values (Gillespie, 2010; Nieborg et al., 2022; Srnicek, 2017). Notably, platform governance tends to create an uneven environment favoring the platform itself. For instance, platforms may suppress or remove negative feedback while promoting positive content, thereby exemplifying their governing role through largely invisible content-moderation processes (Gillespie, 2017). These mechanisms are central: they establish norms, define “quality,” and distribute reputation and risk. When these system-level tools become unbalanced, they create structural inequalities and stakeholder conflict, especially in gig platform settings where algorithm-driven management and information gaps heighten such issues (Veen et al., 2020; Wood et al., 2019).

In an attempt to address these challenges, network governance has been introduced as a strategy to decentralize authority by involving stakeholders in joint rulemaking. Despite this aim, network governance often falls short in practice. Platforms tend to retain centralized and opaque control, marginalizing both workers and consumers (Caplan, 2023). The resulting lack of transparency and information symmetry erodes trust and can invite opportunism (Rahman et al., 2024). Additionally, complex decision-making structures and inadequate coordination slow responses to emerging issues. These difficulties are compounded by tensions between profit motives and calls for accountability, as platforms prioritize profitability while other actors advocate for social responsibility (Caplan, 2023). Taken together, these persistent drawbacks underscore the need to seek alternative governance models.

To bridge the gap between theoretical approaches and real-world outcomes, scholars and policymakers have tried to offer normative principles for multistakeholder governance. These principles urge a shift away from platform-centric, multi-sided markets towards collaborative and democratic governance models. Instead of viewing stakeholders as passive participants, this approach promotes meaningful engagement by platforms, governments, civil society, and workers in policymaking (Gillespie, 2017; UNESCO, 2023). Alongside this, technological solutions such as blockchain and smart contracts are seen as tactical tools to improve transparency and limit unilateral platform power, serving as complements to institutional reform (Xu et al., 2023). For example, Taiwan's experience demonstrates this approach: by advancing the draft Digital Intermediary Services Act (DISA) and leveraging civic-tech initiatives such as vTaiwan and g0v, Taiwan is institutionalizing multistakeholder governance through a blend of co-regulation, civic involvement, and digital platforms

designed to harness ongoing public input in platform policy (Tseng, 2023).

## 2.2 The dual research gap: a fragmented approach and an understudied context

Platform studies research is fragmented and functionalist, with restaurant perspectives underrepresented, especially in food delivery contexts. A review of six leading international journals and conferences (2020–2025) shows that most work focuses on platform–consumer or platform–rider relationships. Although “food delivery” is a growing research topic, among 288 CHI studies mentioning “stakeholders,” only 12% (34/288) consider restaurants as core stakeholders. This highlights a significant gap: few studies analyze the three-way interaction among platform, consumer, and restaurant in a holistic or systemic way.

To address this gap, we examined a critical case: South Korea’s state-led public platform. This context is new and reveals systemic issues clearly, as public platforms combine public missions with private transactional structures, exposing relationship failures. A scoping review of KCI (2020–2025) shows this area is rarely studied: only 6 of 110 studies tackle public delivery platforms, and just 2 adopt a design perspective. Most research is conducted in public administration or business, not in design.

Our analysis reveals that the design field’s approach to this area is largely limited to surface-level, functional improvements, such as UI/UX or visual issues, with an overwhelming focus on consumer usability. Studies addressing accessibility for older adults or people with disabilities still frame these concerns as matters of interface efficiency, rather than systemic inclusion. Crucially, the reviewed literature neglects broader systemic gaps: design is rarely treated as a multi-stakeholder practice, and almost never accounts for restaurants and riders as integral users within the ecosystem. Thus, a major blind spot remains in addressing design as a tool for integrated, systemic inclusion. These omissions reflect and reinforce the fragmented, dyadic tendencies found in the wider international literature.

These findings reveal two research gaps. Internationally, studies of food delivery platforms remain fragmented, rarely analyzing the triadic system in which restaurants are key stakeholders. Domestically, the context of state-led public platforms is understudied. Even design-focused research on delivery apps typically restricts design to interface or usability, seldom viewing it as a holistic, multi-stakeholder approach. This study addresses both gaps by adopting a design-oriented, service-system lens that treats consumers, restaurants, and riders alike as core users of public food-delivery platforms. (See [Supplementary Appendices A, B](#) for the full literature analysis that underpins this gap identification).

## 2.3 Theoretical lens: relational fairness

Debates on fairness and justice have traditionally focused on how benefits and burdens are distributed in society. In the Rawlsian tradition, for example, justice is understood primarily as the fair distribution of basic goods and opportunities among individuals (Rawls, 2020). This distributive perspective is also implicit in many evaluations of platform governance, which tend to ask whether income, visibility, and work opportunities are allocated equitably among users, merchants, and workers. At a superficial level, automated matching and assignment systems in food-delivery platforms can even appear

to approximate a Rawlsian ideal of impartial allocation: tasks and orders are assigned according to general rules, without regard to individual identity.

However, subsequent strands of justice theory have argued that fairness cannot be reduced to distribution alone. Recognition theorists and care ethicists emphasize that justice is also a matter of the quality of social relationships—of how people are seen and respected, how responsibilities are shared, and whose voices are heard in shaping the rules under which they live (Honneth, 1995; Tronto, 2020; Fraser, 2000; Young, 2006). From this relational perspective, automated distribution of work or orders does not by itself guarantee fairness, because it leaves unexamined the conditions under which actors participate in these allocations—whether they are recognized as partners, how risks and burdens are assigned, and whether they have any meaningful say in how the system operates. In other words, unfairness can arise even when allocations appear “neutral” if the underlying relationships are structured in ways that misrecognize, overburden, or silence certain groups.

This relational view is particularly relevant for platform-mediated food delivery. As discussed in Sections 2.1 and 2.2, existing debates and empirical studies largely frame platform problems in institutional or functional terms—focusing on rules, procedures, interface quality, or efficiency—while paying comparatively less attention to how platforms configure relationships among consumers, restaurants, riders, and the platform itself. Yet complaints about opaque fees, unstable work, and one-sided rating systems concern not only “how much” is allocated to whom, but also how stakeholders are treated, who is expected to absorb risk, and who can effectively contest decisions or raise concerns. In other words, these issues are experienced as problems of relational unfairness, not merely as technical or distributive shortcomings.

Against this backdrop, we adopt relational fairness as our primary theoretical lens. Building on recognition theory, care ethics, and relational accounts of responsibility and representation, we conceptualize relational fairness in platform-mediated food delivery along three interrelated dimensions: recognition, responsibility, and voice.

- Recognition concerns whether stakeholders are acknowledged and treated as legitimate, respected partners, rather than as interchangeable “nodes” in an automated system. In our context, this involves examining the extent to which the platform acknowledges the situated constraints, labor, and dignity of consumers, restaurant staff, and riders—for example, how it represents their needs, makes their contributions visible, and avoids reducing them to abstract performance metrics.
- Responsibility concerns how accountability, risk, and emotional labor are distributed across interconnected actors. Drawing on relational responsibility and social connection models (Tronto, 2020; Young, 2006), we ask whether the platform assumes a substantive share of responsibility for mediating conflicts and handling failures, or whether it constructs asymmetric accountability structures that shift burdens—such as financial loss, time pressure, reputational damage, and customer anger—onto individual restaurants and riders.
- Voice concerns whether communication and feedback channels provide genuinely two-way opportunities for all stakeholders to express grievances, contest decisions, and influence rules, or whether they primarily amplify the perspectives of some groups while silencing others (Fraser, 2000). In platform food delivery, this includes examining who can rate whom, how reviews and complaints are processed, and whether restaurants and riders have

effective channels to challenge unfair evaluations or platform decisions.

## 3 Materials and methods

### 3.1 Data collection

We treat Korea's public food-delivery platforms as a critical case for examining how alternative platforms can still reproduce structural failures in platform governance (Flyvbjerg, 2006). In alignment with a service design approach that examines systemic relationships through lived experience, this study employed a qualitative methodology. Fieldwork was conducted from August to October 2024 in participants' everyday environments—such as consumers' preferred cafés near their homes, restaurant staff's workplaces, and riders' rest areas—to capture authentic contexts of use.

In total, we conducted semi-structured interviews and contextual observations with 7 consumers, 7 restaurant staff, and 3 delivery riders, yielding approximately 25.5 h of documented fieldwork (interview and observation notes). Individual interviews averaged around 40 min and followed a predefined protocol with follow-up questions adapted to the field context. The dataset included interview transcripts, detailed observation notes, field photographs, and relevant service artifacts. All data were anonymized and handled in accordance with the ethical protocols detailed in Section 3.3. Participant characteristics by stakeholder group and observation context are summarized in [Supplementary Appendix C](#), and the semi-structured interview and observation guide is provided in [Supplementary Appendix F](#).

Recruiting active delivery riders for *in situ* fieldwork involved practical constraints, resulting in a smaller rider sample than the other stakeholder groups. The study is therefore positioned as a qualitative, critical-case investigation aimed at identifying recurrent breakdown patterns and relational interdependencies, rather than estimating population-level prevalence.

### 3.2 Data analysis

As a first step in organizing the data, we mapped service journeys for each stakeholder group using observational and interview data. This process codified the consumer's journey into nine primary stages (eight in-app steps plus a post-use stage capturing feedback and issue reporting), the restaurant staff's journey into eight stages, and the delivery riders' journey into five stages. These journeys served as the structural foundation for our analysis by enabling systematic comparison of breakdowns and relational patterns across stakeholder touchpoints. The detailed step-by-step journey analysis and processed step labels are provided in [Supplementary Appendix C](#).

Importantly, the journey maps were used not only as descriptive visualizations but as an analytic scaffold to structure coding and comparison. We aligned utterances and observation episodes to the processed journey-stage framework and treated each stage as a unit of comparison across the three stakeholder groups. This stage-based alignment enabled us to identify where breakdowns clustered, how they propagated across stages, and how responsibilities and expectations shifted between actors.

After establishing this structural foundation, we analyzed the qualitative data using [Braun and Clarke \(2006\)](#) thematic analysis.

First, we segmented interview transcripts, behavioral observation notes, and related materials into discrete meaning units and episodic segments. Second, we generated codes by labeling recurring statements, observed behaviors, and breakdown episodes. Third, we reviewed these codes for patterns and contextual linkages and reorganized them into stakeholder-level themes.

Coding was conducted at the level of (i) meaning units embedded in stakeholder utterances and (ii) behavioral or episodic units derived from observation notes. Depending on the segment, a code captured the meaning of an expressed difficulty (e.g., perceived uncertainty or loss of control), an observed interactional struggle (e.g., delayed recognition of alerts in a multi-platform environment), or a breakdown episode with a recognizable trigger and consequence. Because a single segment could contain multiple mechanisms, multi-coding was permitted when analytically justified.

The analysis proceeded through an iterative, non-linear refinement process rather than a single linear pass. When a specific issue required extended discussion, the team revisited earlier segments to re-check prior contexts, while temporarily bracketing sections that did not raise interpretive uncertainty. After coding was completed across the dataset, we conducted a full end-to-end review to confirm internal coherence within themes and distinctiveness between themes and to ensure that no unresolved disagreements remained.

To enhance credibility and consistency, three researchers conducted investigator triangulation and consensus coding. Each researcher initially organized and coded the materials independently, after which the team convened to compare outputs, refine code labels, and select clearer expressions and thematic groupings through discussion. Disagreements were resolved through consensus, and decisions were incorporated into an iteratively refined codebook.

Theme development proceeded by clustering conceptually similar codes into candidate themes and refining theme boundaries through repeated discussion. To reduce the risk of over-interpreting idiosyncratic incidents in a small-N qualitative dataset, only recurring code clusters ( $\geq 2$  instances) were elevated to stakeholder-level thematic categories. The step-aligned coding tables, consolidated codebook, and theme development summaries are provided in [Supplementary Appendices D, E](#) to enable traceability from coded excerpts to final themes.

### 3.3 Ethical considerations

All research procedures were designed in accordance with established ethical principles for human-subject research and in line with commonly accepted criteria for exemption from formal Institutional Review Board (IRB) review. No sensitive or directly identifiable personal data were collected, participants belonged to non-vulnerable populations, and all interviews and observations took place in participants' everyday environments (e.g., consumers' preferred cafés near their homes, restaurant staff's workplaces, and riders' rest areas) without introducing any risks beyond those of daily life.

To ensure participant protection, the following measures were implemented:

#### 3.3.1 Verbal informed consent

To avoid linking individual identities to the study, verbal informed consent was obtained rather than written consent or a recorded agreement. Before each interview or observational session, the researcher verbally explained the study's purpose, procedures, the voluntary

nature of participation, the anonymity of the data, and the right to withdraw at any time. Only after participants indicated that they understood this information and agreed to take part did data collection proceed. The researcher briefly documented this consent in field notes rather than through signatures or audio recordings.

### 3.3.2 Anonymity and confidentiality

No directly identifying information (such as names, phone numbers, or specific addresses) was collected. Interview notes and observation notes were anonymized at the point of collection, and all data were stored on password-protected devices accessible only to the research team. In this paper, pseudonymous participant codes (e.g., C1, R1, D1) are used to preserve confidentiality.

### 3.3.3 Right to withdraw

Participants were informed that they could discontinue their participation at any time without penalty and that any data associated with them would not be included in the analysis if they chose to withdraw.

## 4 Results

Our thematic analysis of stakeholder experiences revealed deep-seated systemic failures related to trust, control, and responsibility—dimensions that cut across consumers, restaurant staff, and delivery riders. The core stakeholder themes are detailed below. For transparency, an audit trail is provided in [Supplementary Appendix D](#) (41 coded instances; 37 distinct initial code labels; 25 consolidated code labels), while theme development is summarized in [Supplementary Appendix D](#) and further detailed in [Supplementary Appendix E](#).

### 4.1 Themes of consumer experience

The themes of consumer experience derived from the thematic analysis consist of three main themes, detailed as follows.

#### 4.1.1 Theme 1. Failure of trust due to informational ambiguity

When first exploring food-delivery apps, consumers primarily rely on visual icons and text information to select food categories and menu items. However, ambiguity and inconsistency in these icons hinder decision-making and cause confusion.

“This screen looks similar to Baemin, so it’s familiar and easy to choose quickly.” (C4)

“The café icon looks like ice cream, so I thought it was a dessert shop.” (C7)

#### 4.1.2 Theme 2. Perceived lack of control stemming from information asymmetry

Excessive or unclear information—particularly inconsistencies between category filters and actual restaurant listings, as well as inaccurate or missing images—induces cognitive fatigue and confusion.

These inadequacies undermine consumers’ sense of control and their ability to make sound decisions.

“The menu descriptions only display names and text; photos would really help.” (C3)

“I searched for coffee but got pizza and snack shops, which was confusing.” (C7)

#### 4.1.3 Theme 3. Lack of recognition through one-way feedback

Continuity in service use is compromised when payment errors force users to restart the process or when unclear delivery status updates create uncertainty. In addition, the absence of incentives or meaningful interaction with the platform discourages consumers from writing reviews, resulting in an underutilized feedback system and a sense that their voices do not matter.

“If there’s a payment error, I have to go back to the beginning, which is inconvenient.” (C1)

“I’d need a reward to write a review; otherwise, I wouldn’t bother.” (C6)

### 4.2 Themes of restaurant staff experience

The themes of restaurant staff experience derived from the thematic analysis consist of three main themes, detailed as follows.

#### 4.2.1 Theme 1. Cognitive load and usability challenges

Staff must simultaneously manage multiple platform interfaces while responding to non-intuitive visual and auditory cues. This constant demand produces sustained cognitive fatigue, reduces concentration, increases the likelihood of errors, and ultimately undermines operational efficiency.

“It’s hard to distinguish the POS beep from my phone ringtone, and in the kitchen, notifications are difficult to hear.” (R5)

“Processing an order takes several clicks, so it’s more complicated than other platforms—it’s quite cumbersome overall.” (R2)

#### 4.2.2 Theme 2. Reliance on manual practices due to insufficient system support

Cooking times and delivery request timing are not systematically synchronized. Staff often rely on personal experience and subjective judgment to adjust preparation schedules and manually account for external factors such as weather and traffic. This lack of integration makes precise coordination difficult, reducing service predictability and stability.

“I always enter 40 minutes regardless of distance or conditions—it’s just based on experience.” (R3)

“When it’s raining, I usually add 10 minutes.” (R1)

### 4.2.3 Theme 3. Structural shifting of delivery-related responsibility onto restaurants

In the absence of active platform mediation, restaurants shoulder both the final responsibility and the emotional burden for service problems or customer complaints. This directly generates business risks, including reputational damage and declines in sales.

“The delivery rider spilled the meal, but we had to take responsibility and make it again for the customer. Otherwise, we could get a negative review.” (R3)

“I received a call from a customer urging me to deliver a dish promptly. I looked up the delivery rider’s phone number and pleaded with him to speed up the process.” (R6)

## 4.3 Themes of rider experience

The themes of delivery riders’ experience derived from the thematic analysis consist of three main themes, detailed as follow.

### 4.3.1 Theme 1. Instability of delivery routes due to environmental and system variables

Riders are continually exposed to route uncertainty and safety risks caused by external factors such as weather conditions, traffic congestion, map inaccuracies, and physical obstacles (e.g., stairs). System-level limitations in real-time route optimization exacerbate inefficiency, increase physical fatigue, compromise safety, and heighten stress.

“Complex neighborhood layouts and address errors cause many difficulties... I even had to run red lights to save time.” (D2)

“I had to turn down a request since the delivery location was at the top of a flight of stairs.” (D2)

### 4.3.2 Theme 2. Mismatches in service flow and operational timing

A lack of integration between food-preparation status, order-assignment timing, and delivery instructions frequently results in misaligned operational flow. Riders compensate by adjusting their own schedules or waiting at restaurants, which increases idle time and heightens the risk of delayed delivery. This mismatch not only disrupts task efficiency but also leads to customer dissatisfaction.

“When I pick up multiple orders at once, route planning is important.” (D3)

“If the food isn’t ready when I arrive, I get anxious... and it creates unnecessary waiting time.” (D1)

### 4.3.3 Theme 3. Burden of emotional labor and disproportionate responsibility

In cases of delays, location errors, or customer complaints during delivery, riders receive little to no tangible support or protection from the platform. They must personally resolve issues and bear full

responsibility, intensifying emotional exhaustion and producing an unbalanced distribution of accountability.

“Even if the food is delivered to the wrong address, we have to go back, pick it up, and still get yelled at.” (D2)

“Waiting outside when the customer doesn’t answer the phone is really stressful.” (D1)

## 5 Discussion

### 5.1 Synthesis: interconnected patterns in stakeholder experiences

The thematic analysis in Section 4 identified distinct challenges for consumers, restaurant staff, and riders. However, when these experiences are considered together, they form a tightly interconnected pattern rather than a set of isolated problems. As summarized in [Supplementary Appendix G](#), the patterns cluster around five dimensions: information flow, service-flow alignment, workload and stress, responsibility and accountability, and emotional impact. Across all three groups, breakdowns along these dimensions interact and accumulate, shaping a service ecosystem in which everyday work and use are experienced as fragmented, unpredictable, and burdensome.

First, failures in information flow create a common foundation of confusion and inefficiency. Consumers confront opaque pricing structures and unclear fee breakdowns, leaving them uncertain about what they are paying for. Restaurant staff lack transparency in how orders are linked to delivery assignments, forcing them to infer riders’ progress and status from incomplete cues. Riders must cope with inaccurate or imprecise route and location data, which undermines both their efficiency and safety. These informational gaps do not operate independently: when consumers cannot interpret pricing or status updates, they initiate additional inquiries or complaints; when restaurants cannot see where an order sits in the process, they resort to guesswork and manual coordination; when riders are sent to ambiguous addresses, they must improvise routes or seek clarification from restaurants and customers. In effect, information that should synchronize the system instead becomes a source of friction at every touchpoint.

Second, these informational problems feed directly into misalignments in service flow. Disruptions in the linkage between ordering, food preparation, and delivery timing generate cascading inefficiencies. Consumers experience this as unclear, unreliable, or stale delivery-status updates. Restaurants lack systematic synchronization between cooking time and rider arrival, leading them to adjust preparation schedules manually and repeatedly. Riders encounter mismatched waiting times and rushed assignments, oscillating between idle periods at restaurants and time pressure on the road. Because each group compensates locally—consumers by repeatedly checking or calling, restaurants by improvising their own timing rules, riders by re-sequencing routes on the fly—the system functions through a patchwork of *ad hoc* corrections rather than through a coherent, platform-managed flow.

These misalignments translate into additional workload and emotional strain that extend beyond each group’s core role. Consumers must exert extra effort to resolve service issues independently,

navigating fragmented help channels and unclear responsibilities when something goes wrong. Restaurants are pushed into a dual role as mediators between consumers and riders, absorbing operational disruptions and interpersonal conflicts without adequate tools or formal authority. Riders bear physical strain, time pressure, and frequent exposure to customer frustration or anger as they reconcile algorithmically assigned tasks with variable real-world conditions such as traffic, weather, and building access. Responsibility and accountability are consequently shifted away from the platform and concentrated on frontline actors: consumers have limited control and ineffective feedback channels, restaurants “bear the brunt” of conflict resolution, and riders become the default locus of responsibility when problems occur. Emotionally, these interconnected challenges manifest as consumer frustration with unmet expectations, chronic stress among restaurant staff from ongoing conflict management, and anxiety among riders about safety risks and tense customer interactions.

### 5.2 Diagnosis: relationship distortions and structural failures through a relational fairness lens

While the public platform establishes technical connectivity among stakeholders, it neglects cultivating fair, respectful, and shared relationships, reproducing relational inequities similar to those observed on private platforms. Viewed through the relational fairness lens introduced in Section 2.3 (Honneth, 1995; Tronto, 2020; Fraser, 2000; Young, 2006), the interconnected experiences synthesized in Section 5.1 can be understood as patterned violations of

three core relational dimensions: recognition, responsibility, and voice. Figure 1 (“The Current Service Model: Platform as a Peripheral Connector”) illustrates this existing configuration, in which the platform remains technically central but relationally withdrawn, leaving coordination and conflict resolution to be absorbed at the edges by consumers, restaurants, and riders. These relational failures distort stakeholder roles and embed structural weaknesses in the platform’s governance.

#### 5.2.1 Recognition

Failures of recognition are evident in how the platform positions and treats each stakeholder group. Consumers receive insufficient, fragmented information and have limited decision-making power over ordering options, timing, and redress, reducing their role to that of passive recipients rather than active partners. At the same time, restaurant staff and riders experience systemic under-recognition of their labor, risks, and the situational complexity of their work. Restaurants’ operational expertise and service recovery efforts are largely invisible in the interface and in the platform’s rule-making, even though they shoulder much of the practical and emotional work of resolving problems. Riders’ navigation skills, time management, and risk exposure are similarly abstracted into performance metrics and ratings, treating them as interchangeable “nodes” rather than situated workers negotiating variable and sometimes hazardous conditions. Across all three groups, stakeholders are not fully acknowledged as legitimate partners whose perspectives and constraints matter to how the service is designed and governed.

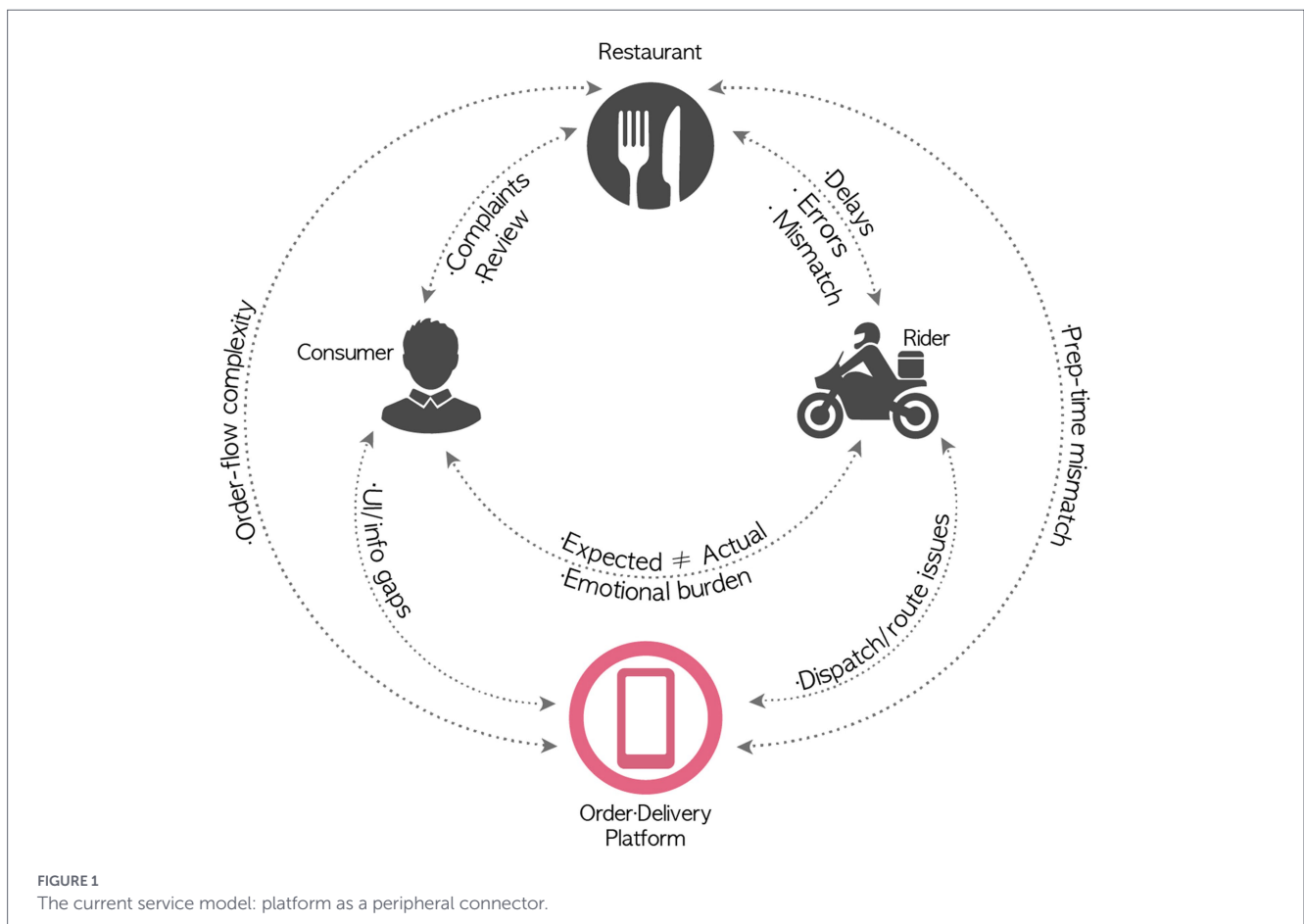


FIGURE 1 The current service model: platform as a peripheral connector.

## 5.2.2 Responsibility

Responsibility is unevenly and asymmetrically distributed. The platform refrains from assuming a substantive share of responsibility for orchestrating service flow or mediating conflicts, instead shifting the burdens of breakdowns onto restaurants and riders. When delays, address errors, or spills occur, it is typically restaurant staff who compensate by remaking food at their own cost, and riders who invest additional time and effort to complete or correct deliveries. Consumers, for their part, are often required to resolve issues independently, yet their primary mechanism of “responsibility” is limited to rating or complaining—actions that frequently intensify pressure on restaurants and riders rather than prompting structural changes by the platform. In Young’s (2006) terms, the platform evades social connection responsibility by individualizing accountability: systemic risks and failures are borne by those with the least control over the system’s design.

## 5.2.3 Voice

Failures of voice are embedded in the platform’s one-way communication and evaluation channels. The current review system amplifies consumer evaluations while offering restaurants and riders few meaningful mechanisms to contest unfair ratings, challenge platform decisions, or influence the rules that govern their work. Feedback from restaurants and riders is fragmented, often routed through informal or low-impact channels, and rarely translated into visible governance changes. As a result, systemic conflicts are privatized as matters of personal performance, rather than acknowledged as issues requiring collective deliberation and platform-level intervention (Fraser, 2000). Stakeholders who are most exposed to risk and operational complexity have the least effective means to shape the system that governs them.

In this light, Korea’s public food-delivery platforms can be seen as meaningful social innovation experiments that pursue the common good (Tromp and Vial, 2023) while responding to the problems of dominant private platforms. Yet, consistent with critiques that many social innovations remain fragile when they are not structurally and industrially embedded (Manzini, 2015), our analysis suggests that these platforms have not yet succeeded in embedding relational fairness in their core structures and everyday operations. As a result, relational inequities continue to be reproduced beneath a nominally “public” and low-commission model.

## 5.3 Prescription: relational fairness by design (RFD)

Improving the current public platform model requires moving beyond low commissions—which our findings show is insufficient—and adopting Relational Fairness by Design (RFD). RFD is proposed as a design-and-governance framework that translates the diagnosis in Section 5.2 into implementable interventions. In what follows, we explain how each relational fairness component is translated into RFD principles and their corresponding platform-level mechanisms, and we outline implementable feature directions for each principle (see [Supplementary Appendix G](#)). Following fairness-by-design and value-sensitive design traditions (e.g., Friedman et al., 2013), RFD makes

relational fairness concerns actionable in platform design for public-interest food-delivery services.

### 5.3.1 Information transparency

It addresses failures of Interdependent Responsibility by making cost structures and process dependencies legible, thereby reducing responsibility shifting to frontline actors. This principle includes explicit disclosure of commission rates and delivery-fee composition, clear breakdowns of charges, and timely notices at decision points. It also requires process transparency—visibility into order–dispatch linkage and readiness/status integrity—supported by key timestamps across order–dispatch–pickup–delivery. Together, these measures reduce *ad hoc* coordination and establish shared reference points for accountability.

Given these process-transparency requirements, a readiness estimation support service can be proposed for restaurants. This service should be built on order–dispatch linkage visibility and readiness/status integrity, using verified process signals (e.g., timestamps and queue status) and lightweight operational inputs (e.g., typical prep time per order, current queue size, staffing level) to generate dynamically updated preparation-time forecasts under workload uncertainty. Making expected pickup timing legible to riders can reduce avoidable waiting, downstream delay cascades, and subsequent blame shifting among stakeholders.

### 5.3.2 Participatory choice and control

This principle operationalizes Social Recognition by restoring stakeholder agency in setting service terms and shaping delivery-fee options according to real constraints. For consumers, delivery option selection is not only a faster/slower toggle but a fee-tier choice that reflects the service conditions a customer is willing to accept (e.g., a lower-fee slower option). For riders, difficulty-based compensation requests refer to condition-aware pricing that accounts for delivery constraints such as environmental access barriers, weather, traffic, and load/volume. These fee tiers and adjustments should draw on the transparent pricing logic described under Information Transparency, keeping the basis of pricing intelligible and contestable rather than *ad hoc*.

For restaurants, participatory choice can be implemented through capacity- and workload-based acceptance controls, such as pausing orders and setting workload thresholds (e.g., concurrent-order limits), so that capacity management is handled through platform-supported controls rather than *ad hoc* shut-downs. Importantly, these controls differ from readiness estimation support: capacity/workload controls govern whether and how many orders a restaurant accepts, whereas readiness estimation governs how accurately expected completion times for accepted orders are communicated and aligned with dispatch. Together, they reduce overload-driven workarounds and improve coordination without shifting burdens onto informal phone calls or individual pleading.

### 5.3.3 Trust-based communication

It enables Reciprocal Voice by institutionalizing reciprocal feedback, contestation, and case closure rather than one-way evaluation.

This principle replaces broken feedback loops with reciprocal, multi-party communication and dispute handling that make feedback actionable rather than punitive. In practical terms, this requires reciprocal channels that allow stakeholders to provide case-specific input beyond one-way ratings, together with structured dispute/appeal processes that record reasons, evidence, and outcomes to support resolution and closure.

Operationally, reciprocal voice can be implemented through two-way reviews, private feedback channels, and a dispute/appeal workflow that includes triage and case-closure notification. Verification can be strengthened by using process signals enabled under Information Transparency (e.g., timestamps and status integrity), so that contested claims are reviewed with reference to shared evidence rather than immediately converted into punitive reputation signals. A review-fairness dashboard can support governance as a monitoring layer by surfacing fairness-relevant indicators such as rating asymmetries, dispute rates, resolution times, and repeated patterns, while auditability and privacy safeguards ensure accountable operation.

These principles constitute Relational Fairness by Design (RFD). Implementing RFD shifts the platform from a passive technical connector to an active relational coordinator (a “relational architect”) that mediates conflicts and deliberately redistributes responsibilities to build sustainable public value (see Figure 2). Beyond Korea’s public food-delivery platforms, RFD offers a transferable approach to “industrializing” relational fairness by specifying how recognition, responsibility, and voice can be embedded in platform architectures and

governance arrangements, supporting structural embedding beyond one-off experiments (Manzini, 2015, 2019).

## 6 Conclusion

This study analyzed the structural failures of relational governance in platforms, using Korea’s public delivery platforms as a critical case. Public platforms provide an ideal analytical lens because they reveal the tension between the “transactional-first design” inherited from private platforms and the platform’s “public mission.” Our findings suggest that such platforms may remain marginal despite lower commissions because core challenges lie not in pricing alone, but in how stakeholder relationships are structured and governed.

Using the Relational Fairness lens, we diagnosed that this inherited design structurally violates: (1) Social Recognition, (2) Interdependent Responsibility, and (3) Reciprocal Voice. We found that these violations manifest as systemic role distortions and asymmetric accountability. Accordingly, this study proposes the Relational Fairness by Design (RFD) framework, which translates these diagnostic lenses into three actionable principles: (1) Information Transparency, (2) Participatory Pricing and Choice, and (3) Trust-based Communication and Reciprocal Voice.

The core contribution of this study is the theoretical and practical provision of the RFD framework for platform governance, offering a

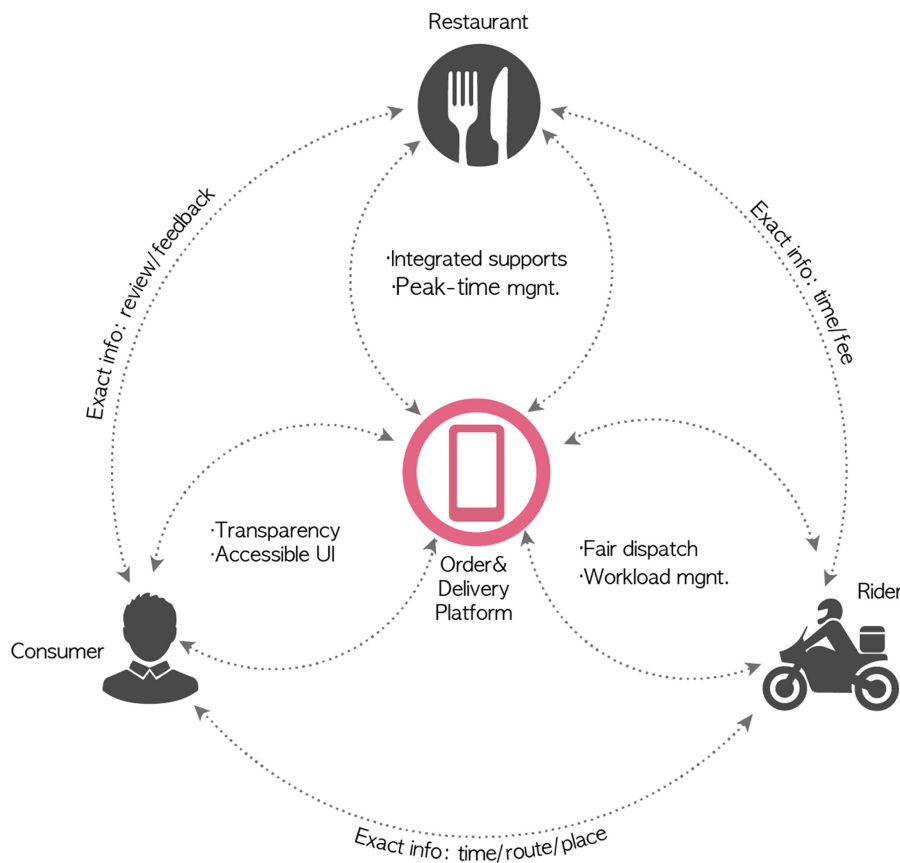


FIGURE 2  
The proposed service model: platform as an active facilitator.

pathway for (public) platforms to be redesigned from “passive intermediaries” to “active coordinators.”

## 6.1 Limitations and future research

As a diagnostic, framework-building study, this work develops RFD as a design-and-governance framework grounded in multi-stakeholder qualitative evidence, rather than evaluating an implemented intervention. A key limitation is that the study does not assess RFD through design intervention and post-implementation outcome evaluation, and the findings remain context-dependent to a critical case of Korea’s public delivery platforms based primarily on stakeholder experience data. In light of these limitations, future research should operationalize RFD into deployable features, evaluate effects in field settings, and strengthen inference by combining comparative cases with behavioral traces (e.g., platform logs or complaint/dispute records). Future work should also translate RFD into evaluative criteria and test it comparatively across public, cooperative, and commercial platforms to refine boundary conditions and assess its scalability.

## Data availability statement

The original contributions presented in this study are included in the article and/or [Supplementary material](#). Further inquiries can be directed to the corresponding author.

## Ethics statement

Ethical approval was not required for the studies involving humans because verbal informed consent was obtained and documented in field notes prior to each interview or observation, with no written consent required due to minimal daily-life risk; participation was voluntary and data anonymized throughout. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required from the participants or the participants’ legal guardians/next of kin in accordance with the national legislation and institutional requirements because all research procedures were designed in accordance with established ethical principles for human-subject research and in line with commonly accepted criteria for exemption from formal Institutional Review Board (IRB) review. No sensitive or directly identifiable personal data were collected, participants belonged to non-vulnerable populations, and all interviews and observations took place in participants’ everyday environments (e.g., consumers’ preferred cafés near their homes, restaurant staff’s workplaces, and riders’ rest areas) without introducing any risks beyond those of daily life. To ensure participant protection, the following measures were implemented: Verbal informed consent. To avoid linking individual identities to the study, verbal informed consent was obtained rather than written consent or a recorded agreement. Before each interview or observational session, the researcher verbally explained the study’s purpose, procedures, the voluntary nature of participation, the anonymity of

the data, and the right to withdraw at any time. Only after participants indicated that they understood this information and agreed to take part did data collection proceed. The researcher briefly documented this consent in field notes rather than through signatures or audio recordings. Anonymity and confidentiality. No directly identifying information (such as names, phone numbers, or specific addresses) was collected. Interview notes and observation notes were anonymized at the point of collection, and all data were stored on password-protected devices accessible only to the research team. In this paper, pseudonymous participant codes (e.g., C1, R1, D1) are used to preserve confidentiality. Right to withdraw. Participants were informed that they could discontinue their participation at any time without penalty and that any data associated with them would not be included in the analysis if they chose to withdraw.

## Author contributions

TK: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Visualization, Writing – original draft, Writing – review & editing, Supervision, Project administration, Funding acquisition. FX: Formal analysis, Validation, Methodology, Data curation, Writing – review & editing, Investigation.

## Funding

The author(s) declared that financial support was received for this work and/or its publication. This work was supported by the research fund of Hanyang University (HY-2025-1820), which was responsible for funding a major portion of this research.

## Conflict of interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Generative AI statement

The author(s) declared that Generative AI was used in the creation of this manuscript. The authors acknowledge the use of OpenAI’s ChatGPT (GPT-5.1 Thinking model, OpenAI, San Francisco, CA, USA) to assist in refining the wording and clarity of this manuscript and to broaden the authors’ thinking through iterative discussion of alternative framings and formulations. All literature searching, fact checking, data analysis, and scholarly interpretation were conducted by the authors without AI assistance, in accordance with the journal’s AI policy.

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## Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fcomp.2026.1753399/full#supplementary-material>

## References

- Braun, V., and Clarke, V. (2006). Using thematic analysis in psychology. *Qual. Res. Psychol.* 3, 77–101. doi: 10.1191/1478088706qp0630a
- Belleflamme, P., and Peitz, M. (2021). *The economics of platforms: Concepts and strategy*. Cambridge, UK: Cambridge University Press.
- Caplan, R. (2023). Networked platform governance: the construction of the democratic platform. *Int. J. Commun.* 17, 3451–3472. Available online at: <https://ijoc.org/index.php/ijoc/article/view/20035>
- Choi, E. (2021). Recommendations for the current conditions and policies for the O2O delivery platform industry. *J. Channel Retailing* 26, 171–197. doi: 10.17657/jcr.2021.01.31.8
- Evans, D. S. (2003). The antitrust economics of multi-sided platform markets. *Yale J. Regul.* 20, 325–381. Available online at: <http://digitalcommons.law.yale.edu/yjreg/vol20/iss2/4>
- Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *qualitative inquiry*, 2, 219–245. doi: 10.1177/1077800405284363
- Fraser, N. (2000). Rethinking recognition. *New Left Rev* 3, 107–120.
- Friedman, B., Kahn, P. H. Jr., Borning, A., and Hultgren, A. (2013). “Value sensitive design and information systems” in *Early engagement and new technologies: Opening up the laboratory* (Dordrecht: Springer Netherlands), 55–95.
- Gillespie, T. (2010). The politics of platforms. *New Media Soc.* 12, 347–364. doi: 10.1177/1461444809342738
- Gillespie, T. (2017). Governance of and by platforms. In: Burgess, J., Poell, T., and Marwick, A. (eds.) *The SAGE handbook of social media*. Los Angeles, CA, United States: SAGE, 254–278.
- Han, J., Mok, Y., and Jo, M. (2023). 모바일 배달앱 UI 디자인이 사용성에 미치는 영향-연령의 조절효과를 중심으로 [Effect of UI design on usability of Mobile food ordering apps-focusing on moderating effects of age]. *한국외식산업학회지 [Food Service Industry Journal]* 19, 9–26. doi: 10.22509/kfsa.2023.19.6.001
- Hao, Y., and Kim, J. (2025). A study on UI design and user satisfaction of delivery apps based on gestalt psychology. *J. Basic Des. Art* 26, 453–469. doi: 10.47294/KSBDA.26.1.31
- Honneth, A. (1995) in *The struggle for recognition: The moral grammar of social conflicts*. ed. J. Anderson (Cambridge, UK: Polity Press).
- Jeong, J. S., and Lee, Y. M. (2022). 공공배달앱 UX/UI 디자인 개선 방안 연구 [a study on UX/UI design improvement for public delivery apps]. *디지털콘텐츠학회논문지 [The Journal of the Digital Contents Society]* 23, 1833–1842. doi: 10.9728/dcs.2022.23.10.1833
- Kim, M. H. (2022). 배달앱의 독과점과 정부의 대응: 공공가치론 관점에서 [Monopoly of delivery apps and government response: from the perspective of public value theory]. *한국정책과학학회보 [Korean Policy Sciences Review]* 26, 121–147. doi: 10.33426/kpsr.2022.26.3.121
- Kim, T., and Ko, Y. (2021). Comparison of information perception between younger adults and older adults with an on-demand food delivery app. *J. Prod. Res.* 39, 137–146. doi: 10.36345/kacst.2021.39.6.016
- Ko, K. (2025). Diagnosis and recommendations for the public food delivery app Ttaenggyeoyo (TGYO). *Issue Freedom* 14, 1–8. Available online at: [https://www.cfe.org/20250728\\_27927](https://www.cfe.org/20250728_27927)
- Le Lay, S., and Lemozy, F. (2023). Does platform cooperativism represent a future for work? The case of a French cooperative of bike couriers. *Organization* 30, 830–850. doi: 10.1177/13505084221145564
- Lee, S. Y., Han, S. H., and Nam, J. H. (2022). 수정된 IPA를 활용한 공공 배달앱 연구 [A study on public delivery apps using revised IPA]. *관광진흥연구 [Journal of Tourism Promotion Research]* 10, 1–19. doi: 10.35498/kotes.2022.se3.77
- Ma, X., and Park, J. (2025). The effects of food delivery application UI design on consumer satisfaction and continuous use intention. *A Treatise Plastic Media* 28, 146–157. doi: 10.35280/KOTPM.2025.28.1.15
- Manzini, E. (2015). *Design, when everybody designs: An introduction to design for social innovation*. Cambridge, MA, United States: MIT press.
- Nieborg, D., Poell, T., and van Dijck, J. (2022). Platforms and platformization. In: Flew, T., Holt, J., and Thomas, J. (eds.) *The SAGE Handbook of the Digital Media Economy*. London, UK: SAGE, 29–49.
- Papadimitropoulos, V., and Malamidis, H. (2024). The transformative potential of platform cooperativism: the case of CoopCycle. *TripleC* 22, 75–89. doi: 10.31269/triplec.v22i1.1418
- Rahman, H. A., Karunakaran, A., and Cameron, L. D. (2024). Taming platform power: taking accountability into account in the management of platforms. *Acad. Manage. Ann.* 18, 251–294. doi: 10.5465/annals.2022.0090
- Rawls, J. (2020). *A theory of justice*. Revised Edn. Cambridge, MA: Harvard University Press.
- Rho, J. (2022). A study on delivery app 3D hierarchy and visual perception -focused on the GUI preference of middle-aged users. *The Treatise on The Plastic Media* 25, 162–170. doi: 10.35280/KOTPM.2022.25.3.18
- Rochet, J.-C., and Tirole, J. (2003). Platform competition in two-sided markets. *J. Eur. Econ. Assoc.* 1, 990–1029. doi: 10.1162/15424760322493212
- Son, J., and Kim, K. (2021). The convergence study on the improvement direction of mobile commerce app interface. *Korea Sci. Art Forum* 9, 211–224. doi: 10.17548/ksaf.2021.01.30.211
- Srnicek, N. (2017). *Platform Capitalism*. Cambridge Malden, MA: Polity Press.
- Tilson, D., Lyytinen, K., and Sørensen, C. (2010). Research commentary—digital infrastructures: the missing IS research agenda. *Inf. Syst. Res.* 21, 748–759. doi: 10.1287/isre.1100.0318
- Tromp, N., and Vial, S. (2023). Five components of social design: a unified framework to support research and practice. *Des. J.* 26, 210–228. doi: 10.1080/14606925.2022.2088098
- Tronto, J. C. (2020). *Moral boundaries: A political argument for an ethic of care*. New York, NY: Routledge.
- Tseng, Y.-S. (2023). Rethinking gamified democracy as frictional: a comparative examination of the decide Madrid and vTaiwan platforms. *Soc. Cult. Geogr.* 24, 1324–1341. doi: 10.1080/14649365.2022.2055779
- UNESCO (2023) in *Guidelines for the governance of digital platforms: Safeguarding freedom of expression and access to information through a multi-stakeholder approach*. ed. UNESCO (Paris).
- Veen, A., Barratt, T., and Goods, C. (2020). Platform-capital's 'app-etite' for control: a labour process analysis of food-delivery work in Australia. *Work Employ. Soc.* 34, 388–406. doi: 10.1177/0950017019836911
- Wang, D., and Zou, K. (2023). 사용자 경험을 통한 배달 앱의 UI 디자인 요소가 사용자 만족도에 미치는 영향 [The effect of UI design elements of takeout apps on user satisfaction through user experience]. *Design Research*, 9, 587–597. doi: 10.46248/kidrs.2024.4.587
- Wood, A. J., Graham, M., Lehdonvirta, V., and Hjorth, I. (2019). Good gig, bad gig: autonomy and algorithmic control in the global gig economy. *Work Employ. Soc.* 33, 56–75. doi: 10.1177/0950017018785616
- Xu, X., He, P., Zhou, L., and Cheng, T. C. E. (2023). Coordination of a platform-based supply chain in the marketplace or reselling mode considering cross-channel effect and blockchain technology. *Eur. J. Oper. Res.* 309, 170–187. doi: 10.1016/j.ejor.2023.01.057
- Young, I. M. (2006). Responsibility and global justice: a social connection model. *Soc. Philos. Policy* 23, 102–130. doi: 10.1017/S0265052506060043