

Ghost Kitchens And The Digitalization Of Indonesia's Urban Informal Economy

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Abstract

Ghost kitchens have emerged as a disruptive force in Indonesia's urban food economy, driven by digitalization, platform-based business models, and changing consumer behavior. Small entrepreneurs can reduce operational costs and access a broader market through food delivery platforms like GoFood, GrabFood, and ShopeeFood by eliminating the need for physical storefronts. However, their reliance on these platforms creates new economic dependencies, as algorithm-driven visibility and commission fees significantly impact profitability. Additionally, the rise of ghost kitchens intensifies market competition, particularly between independent operators and corporate-backed cloud kitchens that dominate rankings and resources. This study employs a qualitative multiple-case study approach to examine ghost kitchens' economic and regulatory implications, including their impact on traditional food vendors, gig workers, and urban policies. Findings reveal that while ghost kitchens increase business accessibility, they also contribute to labor precarity within the gig economy, as food delivery workers face unstable incomes and high operational costs. The study underscores the need for adaptive regulatory frameworks, including fair taxation, food safety measures, and platform accountability to ensure equitable market participation. As ghost kitchens evolve, proactive policies are required to balance innovation with sustainability, ensuring long-term benefits for entrepreneurs, workers, and consumers in Indonesia's digital food ecosystem.

Keywords: Ghost Kitchens; Urban Informal Economy; Platform Dependency; Gig Economy; Digital Food Entrepreneurship

A. INTRODUCTION

The interplay between formal and informal sectors is fundamental to the development of Indonesia's urban economy, with informal occupations—such as street vending, home-based businesses, and small-scale food enterprises—playing a crucial role in employment generation and the provision of affordable services amid rapid urbanization (Telaumbanua et al., 2024). The informal sector not only functions as a vital safety net for low-income communities but also complements formal markets by filling gaps in affordability and accessibility (Charina et al., 2024). However, the increasing digitalization of urban economies has introduced novel business models that blur the distinctions between formality and informality. One of the most prominent manifestations of this transformation is the rise of ghost kitchens—food establishments that operate without physical storefronts, relying exclusively on online delivery platforms such as GoFood, GrabFood, and ShopeeFood to reach consumers (Pitoyo et al., 2020).

Ghost kitchens have emerged as a strategic innovation within Indonesia's food service industry, particularly in high-density urban centers like Jakarta, Bandung, and Surabaya, where digital literacy and consumer demand for convenience rapidly increase (Mardiansjah et al., 2021). By leveraging digital platforms, these kitchens reduce operational costs while maximizing market reach, making food entrepreneurship more accessible to small-scale vendors who may lack the capital to establish traditional restaurants (Arsil et al., 2018; Purwanto et al., 2023; Widodo, 2023). This model reflects the broader platformization of informal labor, wherein digital technologies facilitate market participation while introducing new dependencies on third-party platforms that control pricing, visibility, and profit margins (Kuswardana et al., 2021; Pratiyo et al., 2020). Furthermore, the COVID-19 pandemic accelerated the expansion of ghost kitchens as both consumers and businesses shifted toward app-based food services, reinforcing their role in Indonesia's evolving socio-economic framework (Nigro et al., 2022).

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Despite their economic advantages, ghost kitchens present significant challenges, particularly regarding regulatory ambiguities and market disruption. These kitchens frequently operate in a legal grey area, where compliance with zoning laws, labor protections, and food safety regulations remains inconsistent (Naeni & Nouhi, 2024; Shapiro, 2022). Their reliance on third-party delivery platforms also introduces concerns about platform dependency, as high commission fees and algorithm-driven visibility create barriers to profitability for small operators (Giousmpasoglou et al., 2023; Zhao et al., 2023). Additionally, the rapid proliferation of ghost kitchens intensifies competition, posing a direct challenge to traditional eateries and street vendors, many of whom struggle to adapt to the digitalized food economy (Harini et al., 2025; Razak et al., 2022). The lack of a clear taxation framework further complicates governance, as these digital-first food enterprises often operate informally, potentially leading to municipal revenue losses and unfair market competition (Saad et al., 2024).

Given their disruptive potential, ghost kitchens must reassess urban economic policies to ensure a balance between innovation, fair competition, and regulatory oversight. While their flexible business model enhances accessibility for micro-entrepreneurs, policymakers must address critical concerns about labor rights, food safety, and taxation to foster an equitable and sustainable food service industry (Sh. Ahmad et al., 2022). This paper examines ghost kitchens as a guerrilla force within Indonesia's urban informal economy, analyzing their economic significance, impact on traditional food businesses, and regulatory implications. By exploring the intersection of digitalization, informality, and urban food economies, this study aims to provide insights for scholars, policymakers, and entrepreneurs navigating the shifting landscape of Indonesia's digital and informal economy.

B. LITERATURE REVIEW

Theoretical Foundations of the Informal Urban Economy

The informal economy, conceptualized by (Hart, 1973) and later expanded by the International Labour Organization (ILO), encompasses economic activities outside formal regulatory, taxation, and legal frameworks. In developing economies such as Indonesia, the informal sector constitutes over 60% of the workforce, with a significant presence in urban food services, including street vending and home-based enterprises (Shakeyev et al., 2021). The emergence of ghost kitchens—digital-only food businesses that operate without traditional storefronts—exemplifies how informal economic activities are being reshaped by digitalization. By leveraging third-party delivery platforms such as GrabFood, GoFood, and ShopeeFood, ghost kitchens lower entry barriers and enable entrepreneurs to bypass the high startup costs typically associated with traditional restaurant models (Butorina & Starodumova, 2021; Vovchenko et al., 2017). Many of these businesses function without formal registration, mirroring traditional street vendors' ability to launch quickly and operate flexibly (Ilchenko, 2021; Song, 2024). Their capacity to adapt to shifting market trends by modifying menus, utilizing temporary spaces, and minimizing overhead reinforces their alignment with broader informal economic principles (Mottaeva et al., 2023).

Despite their economic potential, the expansion of ghost kitchens raises regulatory and governance challenges. The lack of formal oversight in taxation, food safety, and labor protections presents concerns for policymakers seeking to ensure fair competition between traditional food establishments and these digital-first enterprises (Naeni & Nouhi, 2024; Shapiro, 2022). As ghost kitchens continue to proliferate, balancing their contributions to economic inclusivity with the need for regulatory accountability remains a critical issue. This necessitates a policy framework that accommodates the unique operational characteristics of ghost kitchens while ensuring compliance with public health and labor standards (Ahmad et al., 2022).

Ghost Kitchens as a Disruptive Force in the Food Industry

Ghost kitchens represent a paradigm shift in the food service sector, allowing businesses to operate without physical storefronts and instead rely exclusively on digital ordering and delivery infrastructure

(Harini et al., 2025; Jones et al., 2024). Their cost efficiency is a primary advantage, as eliminating the need for premium retail locations significantly reduces rental expenses and allows entrepreneurs to allocate resources toward food production and marketing (Fridayani et al., 2021; Harini et al., 2025). Additionally, the scalability of ghost kitchens enables operators to manage multiple virtual brands under a single kitchen infrastructure, optimizing operational efficiency and expanding market reach (Ashton et al., 2022; Shapiro, 2022). This model democratizes food entrepreneurship by allowing small-scale vendors to enter the industry without the financial and regulatory constraints faced by traditional restaurant owners, thereby fostering greater culinary diversity (Fridayani et al., 2021; Nigro et al., 2022).

However, this business model also presents structural vulnerabilities. Ghost kitchens depend highly on third-party delivery platforms, which impose substantial commission fees and dictate platform policies, limiting business autonomy and reducing profit margins (Giousmpasoglou et al., 2023; Shapiro, 2022). Furthermore, the lack of direct consumer engagement hinders brand loyalty, making it difficult for ghost kitchen operators to establish a strong customer base compared to traditional restaurants that benefit from in-person dining experiences (Jones et al., 2024; Nigro et al., 2022). Additionally, regulatory ambiguities in food safety, sanitation, and business licensing create uncertainties for operators and policymakers, necessitating clearer guidelines to ensure public health protections and fair competition (Ashton et al., 2022; Na et al., 2024). As ghost kitchens evolve, striking a balance between fostering innovation and maintaining regulatory oversight will be essential for sustaining their long-term viability within the food service ecosystem.

Digitalization and the Blurring of Informal and Formal Sectors

The digitalization of urban economies has significantly altered the structure of informal labor, enabling small-scale entrepreneurs to access broader markets while simultaneously creating new dependencies on digital platforms. Ghost kitchens exemplify this phenomenon by integrating informal labor practices with digital infrastructure, further blurring the distinction between formal and informal economic activities. Their reliance on platform-mediated transactions allows small food vendors to circumvent traditional retail barriers while subjecting them to platform-based constraints, such as commission fees and algorithm-driven market visibility (Dai & Wu, 2023). Additionally, many ghost kitchens operate outside conventional regulatory frameworks, lacking formal business registration and food safety compliance, which raises concerns about consumer protection and public health risks (Vovchenko et al., 2017). Their ability to function within residential and non-commercial spaces further complicates urban planning and zoning regulations, challenging conventional governance mechanisms (Jiang et al., 2023).

While ghost kitchens offer new economic opportunities, they also necessitate a reassessment of regulatory approaches. The accessibility of digital platforms has enabled informal workers to scale their operations, yet concerns persist regarding income sustainability, tax compliance, and market fairness (DesRivières, 2019). Given their disruptive nature, policymakers must develop adaptive regulatory frameworks that accommodate the flexibility of ghost kitchens while safeguarding consumer interests and ensuring equitable market competition (Ahmad et al., 2022). As digitalization redefines urban informal economies, understanding the evolving role of ghost kitchens will be critical in shaping sustainable economic policies that balance innovation with responsible governance.

C. RESEARCH METHODS

This study employs a qualitative research approach with a multiple case study design to explore the role of ghost kitchens in Indonesia's urban informal economy. The research focuses on their economic significance, regulatory challenges, and impact on traditional food service businesses. Given ghost kitchens' rapid growth and complex relationship with digital platforms, informal labor, and regulatory frameworks,

a multi-method approach is used to ensure a comprehensive analysis. The study is conducted in major urban centers in West Java, which represent diverse market dynamics, urban regulatory responses, and digital food ecosystem developments. The multiple case study design allows for comparative analysis across different urban contexts, highlighting common patterns and unique local adaptations of ghost kitchens.

The study integrates semi-structured interviews, document analysis, and digital ethnography to ensure a comprehensive understanding. Semi-structured interviews are conducted with key stakeholders to capture diverse perspectives on business operations, challenges, and regulatory concerns. Using purposive sampling, interviews are carried out with 15 ghost kitchen operators to explore their business strategies, cost structures, and market challenges. At the same time, 10 traditional restaurant and street food vendors provide perspectives on ghost kitchens' economic and social impact on their businesses. Each interview is analyzed thematically, focusing on key themes such as business strategies, regulatory ambiguities, platform dependency, and market competition.

In addition to interviews, document analysis is conducted to examine ghost kitchens' governance and regulatory challenges. This includes an in-depth review of government policies on food business licensing and taxation, municipal zoning laws, and industry white papers on the digital food economy. The policy analysis helps assess the extent to which ghost kitchens comply with formal regulations and highlights policy gaps that require government intervention. The collected data is analyzed using thematic analysis, following a structured process. To enhance the validity and reliability of findings, this study employs triangulation, cross-referencing interview data, policy documents, and digital platform observations. Additionally, member checking is conducted, where selected participants review key findings to ensure accuracy and credibility. A reflexive approach is maintained throughout the research process to minimize researcher bias and acknowledge the subjective interpretations inherent in qualitative analysis.

D. RESULTS AND ANALYSIS

The Early Growth of Ghost Kitchens

The emergence of ghost kitchens in Indonesia can be attributed to the convergence of digitalization, consumer behavior shifts, and economic necessity. Interviews with ghost kitchen operators revealed that many entered the business due to lower startup costs, the flexibility of online sales, and the increasing reliance on food delivery platforms. The findings indicate that the ghost kitchen model evolved through three primary phases: early adoption by digital entrepreneurs, pandemic-driven acceleration, and integration of traditional food businesses into the virtual marketplace.

Initially, ghost kitchens in Indonesia were dominated by small-scale food entrepreneurs who saw online delivery as a low-risk opportunity to enter the food service industry. Unlike traditional restaurants, ghost kitchens do not require prime retail locations, extensive staff, or large capital investment, making them an attractive option for first-time business owners. One ghost kitchen owner in Bandung, who previously ran a home-based catering business, explained:

"I started this business from home with a small investment. I did not need to rent a shop or hire many employees. I cook and sell directly through GoFood and GrabFood. This is much easier than opening a traditional restaurant."

Another respondent, a 28-year-old entrepreneur, highlighted how ghost kitchens allowed him to test multiple food concepts without the risks associated with running a physical restaurant:

"I can run multiple food brands from one kitchen. If one brand does not sell well, I can quickly change the menu without a major financial loss."

These accounts demonstrate that flexibility and scalability are major factors driving the adoption of ghost kitchens among small business owners. Unlike traditional food vendors who must commit to fixed locations and high overhead costs, ghost kitchen operators can experiment with new food concepts, target different market segments, and quickly pivot based on consumer demand.

The COVID-19 pandemic played a crucial role in accelerating the growth of ghost kitchens in Indonesia. During periods of lockdown and movement restrictions, many brick-and-mortar restaurants struggled to maintain sales, leading some to transition into ghost kitchen models. Restaurants that previously relied on dine-in customers were forced to adapt to an entirely digital marketplace, often by launching delivery-only brands alongside their existing business. A restaurant owner who converted part of his kitchen into a ghost kitchen during the pandemic explained:

"During the pandemic, we lost many dine-in customers. We had to find another way to sell food. Eventually, we created a virtual brand and focused on online orders."

This shift was particularly pronounced in urban centers like Jakarta, where food delivery apps became the primary channel for accessing meals. Data from GoFood and GrabFood indicated a significant increase in food delivery orders during the pandemic, further incentivizing businesses to adopt the ghost kitchen model. A former café owner in Bandung, who permanently transitioned to a ghost kitchen model, noted:

"After the pandemic, I realized that selling food online was more profitable than maintaining a physical café. Operational costs are lower, and I can reach more customers."

These experiences illustrate how external economic shocks, such as the pandemic, can accelerate digital transformation in the food industry, pushing businesses to abandon traditional models in favor of more flexible, online-based solutions.

As ghost kitchens became more mainstream, traditional food businesses began adopting virtual brands to maximize their kitchen capacity and increase revenue streams. Several restaurant owners indicated that they now run multiple virtual brands under a single kitchen operation, allowing them to tap into different customer segments without additional infrastructure costs. One restaurateur who manages both a physical eatery and a ghost kitchen stated:

"I have a physical restaurant but also run two ghost kitchen brands. This helps me generate extra income without significant additional costs."

This hybrid model is increasingly common among mid-sized restaurants, particularly those seeking to expand their market reach beyond walk-in customers. By leveraging existing kitchen infrastructure, these businesses can experiment with different cuisines, price points, and marketing strategies. However, some traditional restaurant owners expressed concerns that the rise of ghost kitchens creates unfair competition, particularly when digital-only brands benefit from lower operating costs while competing directly with brick-and-mortar establishments. A small restaurant owner remarked:

"We have to pay rent and restaurant taxes, while ghost kitchens only pay for a small kitchen and have fewer regulations. This makes competition unfair."

This sentiment highlights one of the main tensions between ghost kitchens and traditional food businesses—the unequal regulatory burden, where physical restaurants face higher compliance costs than unregulated virtual brands.

Ghost Kitchens as a Response to the High Cost of Informality

While ghost kitchens are often perceived as a cost-effective alternative to traditional restaurants, findings from this study reveal that their emergence is also a strategic response to the hidden costs of informality in Indonesia's urban food economy. Many small food vendors and restaurant owners face significant barriers to operating in physical locations, including unofficial levies, extortion threats, weak legal protections, and unrestricted market competition. Interviews with ghost kitchen operators and former street food vendors highlight that many entrepreneurs transitioned to online-only models to escape these challenges and establish greater financial and operational security.

One of the most persistent challenges small food vendors and street hawkers face in Indonesia's urban centers is the prevalence of unofficial levies imposed by local enforcers, rogue elements, or corrupt officials. Vendors operating in public spaces, markets, or near transportation hubs must often pay daily or weekly

fees to avoid being evicted, harassed, or fined arbitrarily. A former street food vendor, who now operates a ghost kitchen from home, explained:

"When I used to sell on the streets, someone would come asking for money almost daily. Sometimes, it was from mass organizations, from rogue officials. If we did not pay, we could be evicted or have our cart confiscated."

Another interviewee, a ghost kitchen owner in Bandung, shared how transitioning to an online-based business freed her from these financial burdens:

"Now, I do not have to worry about illegal levies or extortion. I cook at home, register my business on an app, and sell online. It is safer and more profitable."

These findings indicate that ghost kitchens escape the financial vulnerabilities associated with street vending and informal restaurant operations. By moving to hidden kitchens in residential areas, these businesses can avoid direct exposure to illegal fee collectors, allowing them to retain more earnings.

In addition to unofficial fees, many small food vendors and independent restaurant owners experience organized extortion or gang influence, particularly in high-traffic commercial areas. Local gangs or informal power brokers often control who can operate in a given area, how much they must pay, and what level of "protection" they receive. A small restaurant owner who later converted his business into a ghost kitchen described his experiences with extortion:

"Every month, I had to pay 'security money' to a certain group. If not, they could create problems—chasing away my customers or even getting my kitchen suddenly raided."

For many small business owners, such uncertainty makes long-term sustainability difficult, as they must allocate a portion of their revenue to protection fees rather than reinvest in business growth. Ghost kitchens, in contrast, allow entrepreneurs to operate outside the visibility of these power structures, reducing their exposure to extortion. A ghost kitchen owner noted:

"With a ghost kitchen, I do not have to deal with gangsters. I focus on cooking and selling online, and no one can interfere."

These statements highlight how digital food entrepreneurship is perceived as a safer and more autonomous alternative to operating in physical urban spaces where informal control mechanisms exist. One of the fundamental weaknesses of Indonesia's informal economy is the lack of legal protections for micro and small business owners. Many vendors operate without proper permits, making them vulnerable to sudden evictions or regulatory crackdowns. A former small food stall owner in Bandung, who transitioned to a ghost kitchen model, shared:

"I used to run a warteg, but it was often shut down because they said it violated zoning rules. Even though I paid rent and electricity, I had to close it down and started selling from home via GrabFood."

This case reflects a broader pattern where local regulations are inconsistently applied, often disproportionately affecting small businesses. Many ghost kitchens operate within private homes or hidden commercial kitchens, reducing their visibility to regulatory enforcement officers and allowing them to avoid sudden policy changes that may impact street vendors.

Traditional restaurants and street food vendors often struggle to compete in an increasingly digitalized food economy, where ghost kitchens operate with fewer regulatory constraints. While physical restaurants must comply with taxation, zoning laws, and health inspections, many ghost kitchens operate without the same level of regulatory scrutiny. A traditional restaurant owner expressed frustration with the competitive disadvantage faced by physical eateries:

"We must pay restaurant taxes, business permits, and high operational costs, while ghost kitchens only need a small kitchen and have fewer regulations. This makes competition unfair."

Conversely, ghost kitchen owners defend their model as a survival strategy, arguing that the formal regulatory environment favors larger businesses with greater financial resources. A ghost kitchen entrepreneur in Surabaya explained:

"If we had to pay all the licenses and taxes like big restaurants, small businesses like mine would not be able to survive. Ghost kitchens give us a chance to compete."

These findings indicate that ghost kitchens have redefined competition in the food service industry, shifting the playing field from physical location-based to digital and platform-driven competition.

The Rise of the Gig Economy and Food Delivery Services

One of the most significant factors fueling the growth of ghost kitchens in Indonesia is the expansion of the gig economy, particularly in food delivery services. The increasing reliance on app-based food ordering platforms like GoFood, GrabFood, and ShopeeFood has fundamentally reshaped how food businesses operate, creating opportunities and challenges for entrepreneurs and delivery workers. This section explores 1) the expansion of on-demand delivery labor, 2) the challenges faced by food delivery workers, and 3) the economic interdependence between ghost kitchens and gig workers.

The growth of ghost kitchens is closely linked to the proliferation of gig-based delivery work, which has transformed Indonesia's urban labor market. Findings from this study indicate that many ghost kitchen operators view food delivery services as an extension of their business operations, allowing them to access a wide customer base without investing in physical storefronts or direct delivery logistics. A ghost kitchen owner highlighted the crucial role of delivery platforms in their business success:

"In the past, if you wanted to sell food, you needed a strategic location so customers could visit. Now, I can sell from anywhere because drivers deliver the orders."

This shift has increased demand for gig workers, particularly those who rely on motorcycles to facilitate rapid food deliveries. Many low-skilled and unemployed individuals have turned to food delivery work as an accessible source of income, particularly in cities where formal job opportunities are scarce. A GrabFood driver in Bandung described why he joined the gig economy:

"I used to work in a shop but got laid off during the pandemic. Being a GrabFood driver is more flexible—I can work anytime. However, my earnings fluctuate depending on orders."

This account reflects a broader pattern where economic uncertainty and job losses have pushed many workers into gig-based employment, reinforcing the role of delivery platforms as essential economic safety nets.

Despite its flexibility, gig work in food delivery is marked by economic instability and platform dependency. Findings from this study highlight several challenges delivery workers face, including fluctuating income, high commission fees, and limited labor protections. Many delivery workers reported that their income depends heavily on the algorithms used by food delivery platforms, which determine order allocations, delivery routes, and incentive structures. Since ghost kitchens operate in hidden or residential areas, orders are often spread out, requiring longer travel times and higher fuel costs for drivers. A GoFood driver in Surabaya described this challenge:

"Sometimes we get orders that are very far from our location. If we only get one or two long-distance orders daily, our earnings do not match the fuel costs."

Additionally, algorithmic ranking systems determine which drivers receive the most orders. Some drivers mentioned that newer or less active accounts are deprioritized, making it difficult for them to earn consistently. A GrabFood driver explained:

"If a driver rarely takes orders or has a lower rating, the system gives fewer orders. We have to keep working to maintain good order flow."

These findings indicate that while gig work provides income opportunities, it also creates vulnerabilities, as workers have limited control over their earnings and must constantly adapt to platform changes.

While ghost kitchens benefit from the gig economy's flexible labor pool, findings suggest that this relationship is not always balanced, as ghost kitchens and platforms retain more bargaining power than delivery workers. A ghost kitchen operator explained how food delivery platforms dictate business operations:

"We have to follow platform rules. We are affected if they increase commission fees or change the search algorithm. We also cannot choose which driver delivers our orders—the app controls it."

Similarly, food delivery workers depend on ghost kitchens for consistent orders but lack negotiation power regarding order pricing, delivery distances, and platform fees. This dynamic reinforces a platform-driven economy, where both ghost kitchens and gig workers are locked into a system where digital platforms set the terms of engagement. A GrabFood driver noted:

"Both restaurants and drivers depend on the app. If Grab or GoFood wants to change the rules, they can do so anytime. We have to follow."

These findings highlight that ghost kitchens and food delivery drivers benefit from digital platforms but are also subject to the power of platform companies, which control pricing, visibility, and commission structures.

Platform Dependency and Market Competition

One of the most striking findings of this study is the heavy dependence of ghost kitchens on third-party food delivery platforms, particularly GoFood, GrabFood, and ShopeeFood. While these platforms provide visibility, logistical support, and access to a large customer base, they also impose significant financial and operational constraints on ghost kitchen owners. Additionally, the rapid expansion of ghost kitchens has led to intensifying market competition, where businesses must navigate algorithm-driven rankings, platform commission fees, and aggressive promotional strategies. This section discusses 1) how ghost kitchens rely on digital platforms for survival, 2) the impact of platform fees and commission structures, and 3) the intensification of competition within the online food service market.

Unlike traditional restaurants that rely on walk-in customers, foot traffic, and physical signage, ghost kitchens exist exclusively in the digital marketplace. This makes them entirely dependent on third-party platforms for order fulfillment, marketing, and customer acquisition. Interviews with ghost kitchen operators reveal that food delivery apps function as both an opportunity and a constraint, as businesses must adhere to platform policies to remain competitive. A ghost kitchen owner described how platform algorithms control her business:

"If I do not actively join promotions on GrabFood or GoFood, my restaurant rarely appears in customer searches. So, like it or not, I have to follow platform rules."

Another ghost kitchen operator in Surabaya explained how platform dependency creates unpredictability in business performance:

"We are completely dependent on the app. If the algorithm changes or a competitor suddenly launches a big promotion, our sales can drop drastically in a single day."

These findings highlight that while ghost kitchens eliminate traditional real estate costs, they exchange these expenses for digital platform costs, making them vulnerable to fluctuations in platform algorithms, search rankings, and promotional cycles.

A significant concern among ghost kitchen operators is the commission fees imposed by food delivery platforms, which typically range between 15%-20% per order. This means that for every Rp 100,000 in sales, ghost kitchens may only take home Rp 80,000, significantly reducing profitability. A ghost kitchen entrepreneur in Bandung explained how commission fees limit their ability to set competitive prices:

"If I join all platform promotions and pay commission fees, my profit margins are thin. However, if I raise prices, customers leave. This is a big dilemma for small businesses."

These accounts suggest that ghost kitchens operate in a highly controlled financial ecosystem, where pricing structures are influenced more by platform policies than by business owners themselves. The consequence is that only larger ghost kitchens or those with significant external funding can sustain long-term operations, while smaller businesses struggle to maintain profitability under platform-imposed costs.

As ghost kitchens have proliferated rapidly, market competition has become increasingly aggressive, forcing businesses to adopt strategic digital marketing tactics to remain visible. Unlike traditional food vendors that compete for prime physical locations, ghost kitchens must compete for digital visibility within

food delivery app rankings, search results, and customer recommendations. A ghost kitchen entrepreneur explained:

"Competing on the app is not just about food quality, but also digital strategy. Restaurants that pay for ads or offer big discounts appear more frequently in search results."

This competition has led to three major trends in ghost kitchen survival strategies; first, many ghost kitchens invest in paid advertising on food delivery platforms to increase visibility in customer searches. This includes sponsored listings, discount-driven promotions, and algorithmic ranking optimization. A ghost kitchen operator shared their experience with platform advertising:

"I once tried not using promotions for a week, and my orders dropped by almost 50%. Now I have to use ads regularly to stay visible."

Secondly, to maximize market reach, some businesses have started operating multiple virtual brands from the same kitchen, each targeting different price points, cuisines, or customer demographics. A ghost kitchen owner in Bandung explained:

"I have three brands in one kitchen—one sells ayam geprek, one sells ramen, and one sells drinks. This way, I can reach more customers without additional costs."

This trend shows how ghost kitchen operators adapt to digital competition by diversifying their brand offerings within the same operational space.

Thirdly, independent ghost kitchens face increasing competition from corporate-owned cloud kitchen networks like GrabKitchen and Everplate, which provide dedicated cooking spaces, marketing support, and better visibility within food delivery apps. A small ghost kitchen entrepreneur expressed frustration with corporate-backed competition:

"When big restaurant chains enter the ghost kitchen market, they get prioritized on the app. Small businesses like us find it harder to compete."

These findings indicate that the ghost kitchen industry is shifting from an accessible market for small entrepreneurs to a highly competitive and capital-intensive digital battleground, where larger players have more pricing, advertising, and visibility leverage.

The findings suggest that while digital platforms have enabled ghost kitchens to thrive, they have also created a highly competitive and algorithm-driven marketplace. Three key trends emerge: 1) Ghost kitchens are entirely dependent on food delivery platforms for survival, making them vulnerable to algorithm changes and commission fees; 2) Profitability is constrained by high platform commissions, forcing businesses to either absorb costs or pass them on to consumers; 3) Market competition is intensifying, with ghost kitchens employing paid promotions, multi-brand strategies, and aggressive digital marketing to stay relevant. While ghost kitchens initially emerged as an affordable food business model, scalability and survival increasingly depend on financial resources, marketing strategies, and platform relationships.

Discussion

The findings of this study reveal that ghost kitchens have fundamentally reshaped Indonesia's urban food economy, offering new opportunities for entrepreneurs while also creating economic dependencies, intensifying competition, and exposing regulatory gaps. This section discusses 1) the role of ghost kitchens in Indonesia's informal economy, 2) regulatory challenges and policy gaps, 3) labor vulnerabilities in the gig economy, and 4) recommendations for a more balanced digital food ecosystem.

Ghost Kitchens as a Double-Edged Sword in the Informal Economy

Ghost kitchens have allowed small-scale entrepreneurs to enter the food service industry with minimal capital, offering an alternative to high-cost traditional restaurant models. These businesses bypass rent, licensing, and operational costs by leveraging digital platforms, making food entrepreneurship more accessible. However, this shift also raises concerns about market saturation, algorithm-driven competition, and the sustainability of independent food businesses. The findings suggest that ghost kitchens escape urban

informality challenges (extortion, informal fees, and zoning constraints) and introduce new forms of economic vulnerability. Unlike traditional street vendors who operate in public spaces, ghost kitchens exist within digital marketplaces controlled by private companies, making them dependent on platform algorithms, commission structures, and promotional strategies. This reshapes informal labor dynamics, moving from spatial struggles (street vendor evictions, competition for physical space) to digital struggles (ranking algorithms, platform fees, and promotional dependence). A critical question arises: Does the shift from physical informality to digital informality create a fairer system for small entrepreneurs, or does it further entrench power imbalances in the food industry? The findings indicate that while ghost kitchens reduce barriers to entry, long-term sustainability is uncertain due to growing market competition and platform dominance.

Regulatory Challenges and Policy Gaps

Despite their rapid growth, ghost kitchens operate in a legal grey area, with unclear policies on taxation, licensing, food safety, and labor protections. The study identifies several key regulatory challenges: First, Taxation and Market Fairness: Traditional restaurants are subject to commercial taxes, food business permits, and municipal zoning laws, while many ghost kitchens operate without the same level of regulatory oversight. This creates an uneven playing field, where digital-only businesses benefit from lower costs and fewer bureaucratic hurdles. Policymakers must reassess digital taxation frameworks to ensure that ghost kitchens contribute fairly to public revenue without stifling innovation. This could include progressive taxation models, where larger-scale ghost kitchens (multi-brand operations or corporate-owned cloud kitchens) are taxed at higher rates than independent operators.

Secondly, Food Safety and Consumer Protection: Many ghost kitchens operate from home kitchens or unregulated spaces, raising concerns about food hygiene, storage practices, and regulatory oversight. Unlike traditional restaurants that undergo routine health inspections, ghost kitchens often function without formal health and safety monitoring. To address this, clearer health certification processes for ghost kitchens are needed. Regulatory agencies could implement a tiered licensing system, where businesses undergo simplified but mandatory inspections to ensure basic compliance.

Labor Vulnerabilities in the Gig Economy

The findings indicate that ghost kitchens are deeply intertwined with the gig economy, particularly in reliance on food delivery workers. However, the study highlights several vulnerabilities within this labor model, including 1) Unstable income and algorithmic uncertainty: Delivery workers' earnings fluctuate due to platform ranking systems, demand surges, and commission structures; 2) Lack of legal protections: As self-employed gig workers, drivers do not receive health benefits, job security, or workplace protections; 3) Long-distance order assignments: Many ghost kitchens operate in residential areas, requiring drivers to travel further for pick-ups, increasing fuel costs and delivery times. To ensure fairer labor conditions, policymakers must consider platform labor protections, such as 1) Minimum guaranteed earnings per delivery; 2) Fair commission structures that balance the needs of platforms, restaurants, and drivers; and 3) Distance-based fee adjustments to compensate for longer travel times. These regulations could be modeled after policies in countries like Spain and the UK, where gig workers are granted minimum wage protections and platform accountability measures.

Policy Recommendations for a Balanced Digital Food Ecosystem

To balance innovation with fair competition, the government should introduce a simplified business registration system for ghost kitchens. This could involve: 1) A "micro business" licensing tier for independent operators, ensuring accessibility while promoting accountability; and 2) Tax incentives for

small-scale ghost kitchens, while larger-scale operations contribute more to tax revenues. This would ensure that ghost kitchens remain inclusive for small entrepreneurs while preventing regulatory loopholes for larger corporations.

Health regulations should be adapted to accommodate digital food businesses, ensuring that basic food safety standards are met without excessive bureaucratic burdens. This could include 1) Mandatory digital health inspections for ghost kitchens and 2) Training programs for home-based food entrepreneurs on hygiene best practices. By incorporating technology-driven monitoring solutions, such as QR-coded health certificates displayed on food delivery apps, consumers can make informed choices about food safety.

To protect delivery workers, the government should work with platforms to establish 1) A fair commission model that ensures both drivers and businesses remain profitable; 2) Transparent platform algorithms that prevent bias against low-ranking drivers; and 3) Basic employment protections, including accident insurance and pension schemes for full-time gig workers. By addressing these structural inequalities, policymakers can create a sustainable digital food economy that benefits all stakeholders—from entrepreneurs and workers to consumers and regulators.

Conceptual Framework

The Input-Process-Output (IPO) framework in Figure 1 illustrates how ghost kitchens operate within Indonesia's digital informal economy, emphasizing the driving factors, operational mechanisms, and resulting economic and regulatory challenges. It also incorporates a feedback loop, demonstrating how the outcomes of ghost kitchen expansion influence future policies and platform adjustments.

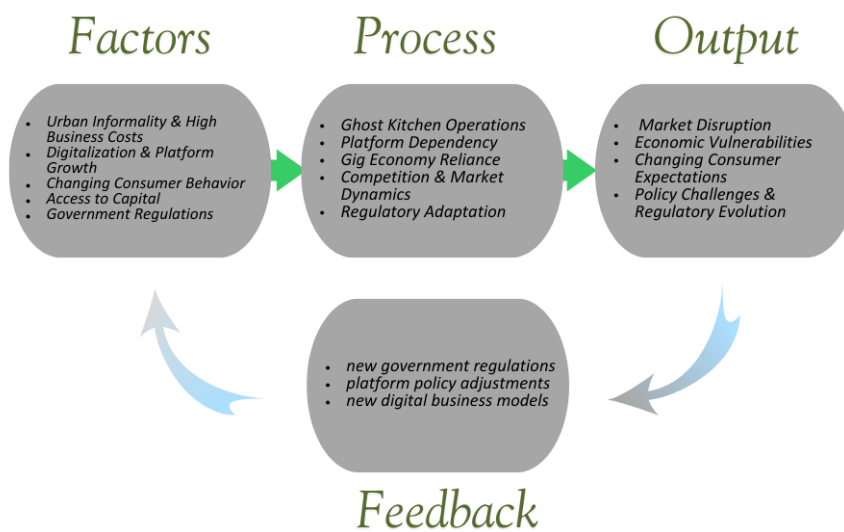


Figure 1. Conceptual Framework

Source: Research data, 2025

The input stage highlights key factors driving the emergence of ghost kitchens. Urban informality and high business costs, such as expensive rent, extortion, and weak legal protections, make physical restaurants financially unsustainable for small entrepreneurs. Digitalization and platform growth, particularly through the rise of food delivery apps like GoFood, GrabFood, and ShopeeFood, have enabled a shift toward virtual restaurant models, reducing dependence on physical storefronts. Changing consumer behavior, especially after the pandemic, has increased demand for convenient, app-based food delivery, further fueling the expansion of ghost kitchens. Access to capital varies, as some ghost kitchens are self-funded by independent entrepreneurs, while others operate as corporate-backed cloud kitchens, creating inequalities in market

competition. Meanwhile, government regulations remain unclear, with gaps in taxation, licensing, and labor protections allowing ghost kitchens to thrive in an unregulated digital economy. These factors shape ghost kitchens' business strategies and operational structures, which are further detailed in the process stage.

The process stage represents the core operational mechanisms of ghost kitchens. These businesses function without physical storefronts, relying entirely on online orders and delivery services. However, they depend highly on food delivery platforms, requiring them to compete for visibility within app-based ranking algorithms, often leading to price wars, promotions, and paid advertising. Gig economy reliance plays a critical role, as food delivery services depend on freelance workers who face unstable income, high commission fees, and algorithmic job allocation. Market competition is increasingly fierce, with independent ghost kitchens struggling against corporate-backed cloud kitchens, which benefit from preferential ranking and stronger financial backing. Regulatory adaptation is another defining feature, as many ghost kitchens operate in legal grey areas, using strategies to bypass formal licensing and taxation requirements. These operational realities result in several economic and regulatory consequences, outlined in the output stage.

The output stage highlights the broader impact of ghost kitchens on Indonesia's digital economy. Market disruption is evident as ghost kitchens increase competition with traditional restaurants and street food vendors, challenging long-established food businesses. Economic vulnerabilities arise as small ghost kitchens struggle with high platform commission fees and shrinking profit margins while gig workers experience precarious employment conditions. Consumer expectations are also shifting, with digital food services influencing pricing models, food quality perceptions, and the decline of dine-in culture. Additionally, policy challenges and regulatory uncertainty persist as the rapid growth of ghost kitchens raises concerns about digital taxation, food safety, and fair labor practices, requiring new governance frameworks.

The feedback loop demonstrates that ghost kitchens do not operate in a static environment but actively shape future policies, platform regulations, and digital business strategies. Market disruptions may lead to stricter government policies, including business registration requirements, taxation frameworks, and food safety regulations. In response to shifting market dynamics, food delivery platforms may adjust their commission structures, algorithmic rankings, and labor policies to balance business sustainability with regulatory compliance. The evolution of ghost kitchens may also lead to the development new digital business models, integrating hybrid cloud kitchens, AI-driven restaurant management, and further food production and delivery automation.

This framework provides a structured understanding of ghost kitchens as a crucial part of Indonesia's digital informal economy. While they present new opportunities for food entrepreneurs and small businesses, their heavy reliance on platform economies and gig labor introduces significant regulatory and economic challenges. Including a feedback loop emphasizes the need for adaptive policies that ensure ghost kitchens remain a sustainable and equitable business model, balancing innovation with fair competition, labor protections, and consumer rights.

E. CONCLUSION

The rise of ghost kitchens in Indonesia represents a significant transformation in the country's urban food economy, driven by digitalization, changing consumer behavior, and the expansion of platform-based business models. By eliminating the need for physical storefronts, ghost kitchens lower barriers to entry for small entrepreneurs, allowing them to operate with reduced costs while reaching a broader market through food delivery applications. However, their reliance on digital platforms introduces new economic dependencies, as business visibility, pricing strategies, and customer access are increasingly dictated by algorithm-driven ranking systems and commission-based revenue structures.

While ghost kitchens solve challenges in Indonesia's informal food sector—such as high rental costs, extortion, and regulatory uncertainty—they also present new complexities. Market competition has intensified, with independent ghost kitchens struggling to survive against corporate-backed cloud kitchens that benefit from superior financial resources and preferential platform treatment. Additionally, ghost kitchens have become deeply intertwined with the gig economy, where food delivery workers face unstable earnings, high operational costs, and algorithmic job allocation that limits their autonomy. These factors create a fragile economic ecosystem in which small food entrepreneurs and gig workers remain vulnerable to platform control and regulatory gaps.

The rapid expansion of ghost kitchens raises critical policy concerns regarding taxation, labor protections, and fair competition. Current regulatory frameworks remain insufficient in addressing the unique challenges posed by digital-only food businesses. Stricter yet adaptable policies are needed to ensure that ghost kitchens contribute fairly to the economy without stifling innovation. This includes implementing a structured digital business registration system, establishing clear food safety standards for online vendors, and enforcing platform accountability to prevent exploitative commission fees and unfair ranking algorithms. Furthermore, labor protections for gig workers must be improved to ensure fair wages, job security, and social benefits.

As ghost kitchens evolve, their long-term sustainability depends on how well regulations, business models, and labor policies adapt to the shifting digital economy. Without intervention, the sector risks becoming dominated by corporate interests, further marginalizing small-scale food entrepreneurs and increasing economic precarity for delivery workers. However, if properly managed, ghost kitchens have the potential to serve as a bridge between the informal and formal economy, fostering inclusive growth and digital innovation in Indonesia's food industry. Moving forward, research should explore the long-term viability of independent ghost kitchens, the role of AI and automation in food service, and the impact of evolving platform policies on market dynamics. By addressing these challenges proactively, Indonesia can create a more balanced and sustainable digital food ecosystem that benefits entrepreneurs, workers, and consumers.

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