Evaluating Crowdsourcing Logistics Platforms in São Paulo and Rio de Janeiro, Brazil

Márcio José Padovan de Antônio(✉), João Gilberto Mendes dos Reis, Paula Ferreira da Cruz Correia, Acácio Pereira de Macêdo Neto, Gabriel Santos Rodrigues, and Joel Porto Alves

RESUP - Research Group in Logistics and Supply Chain Management - Postgraduate Program in Production Engineering, Universidade Paulista - UNIP, São Paulo, Brazil
marcio.jpadovan.oficial@gmail.com, joao.reis@docente.unip.br, contato@ceconport.com.br

Abstract. The advancement of digital technologies and the consolidation of the platform economy have driven new models of logistics organization, with crowdsourcing standing out as an innovative alternative for the last mile. This model mobilizes underutilized resources from the population – such as vehicles and informal labor – through digital platforms that connect service providers to users. In large urban centers in Brazil, such as São Paulo and Rio de Janeiro, these solutions have changed traditional distribution paradigms. This article aims to evaluate the performance of the Loggi, Rappi, and 99Frete platforms, considering three dimensions: operational efficiency, economic viability, and social and regulatory impacts. The methodology is based on international studies and the concept of crowd logistics, identifies advances in flexibility and inclusion, and also points out challenges such as job insecurity, urban sustainability, and legal gaps. The study contributes to the debate on innovation, social justice, and digital transformation in Brazilian urban logistics.

Keywords: Last Mile Delivery · Crowd Logistics · Logistics Applications

1 Introduction

The digitalization of the economy and the widespread access to the internet have driven profound transformations in the organization of work, particularly in sectors such as urban logistics. In this context, crowdsourcing – originally defined by Brabhan [1] as the outsourcing of tasks to a distributed network of individuals via open calls – has emerged as a flexible and decentralized solution for last-mile delivery. According to Mladenow, Bauer, and Strauss [2], the integration of social crowds into logistics systems represents a paradigm shift enabled by digital platforms, allowing the mobilization of underutilized resources and greater responsiveness to urban distribution challenges.

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This logic aligns with the concept of crowd logistics [3], which highlights the co-creation of logistics value through collective collaboration. Digital platforms take advantage of resources such as private vehicles and the population's available time to make on-demand deliveries, creating a logistics ecosystem parallel to the traditional model.

In the Brazilian context, particularly in cities such as São Paulo and Rio de Janeiro, this model has expanded rapidly, driven by the growth of e-commerce, informality in the labor market, and high technological penetration. Initiatives such as Loggi, Rappi, and 99Frete stand out in this panorama, adopting technologies such as routing algorithms and artificial intelligence to optimize deliveries and reduce operating costs [4].

Despite the gains in efficiency and capillarity, important challenges remains. Informality, while promoting economic inclusion, raises concerns about the precariousness of work particularly in the Brazilian platform economy, where most workers operate without formal contracts or social protection [5]. Moreover, the absence of adequate regulation hinders the sustainable expansion of these platforms, as it limits legal certainty, distorts competition, and prevents the effective integration of digital labor into the broader economic framework [6].

Given that logistics accounts for about 12% of Brazilian GDP [7], understanding these platforms' performance is crucial to assessing their viability in complex urban contexts. To fill this gap, the article aims to analyze how the crowdsourcing model contributes to mitigating last-mile bottlenecks, reducing delays, optimizing costs, and integrating informal workers into the logistics system.

The article is structured in five main sections. The introduction contextualizes the rise of crowdsourcing in urban logistics and presents the challenges and opportunities of applying this model in Brazilian megacities. Section 2 presents the theoretical framework and reviews the literature on crowdsourced logistics, highlighting international and national contributions. Section 3 details the methodological approach, based on qualitative analysis and case studies of Loggi, Rappi, and 99Frete platforms. Section 4 discusses the main findings, comparing the platforms across operational, economic, and social dimensions, and the last sections concludes with final considerations and recommendations for public policy and future research.

2 Literature Review

2.1 Crowdsourcing: Definition, Evolution, and Logistics Applications

The concept of crowdsourcing, initially formulated by Brabhan [1], refers to the outsourcing of tasks to a distributed group of individuals through an open call. Over time, this concept has evolved to encompass various organizational applications, especially with the advancement of digital platforms. In the logistics field, such an approach is gaining strength as an alternative to meet the growing demand for fast, flexible, and low-cost deliveries.

Several Studies such as those by Estellés-Arolas and González-Ladrón-de-Guevara [8] and Nakatsu et al. [9] highlight core elements of crowdsourcing, such as technological dependence, incentives for participation, and task scalability. Applied to logistics, this model becomes what Carbone, Rouquet, and Roussat (2017) [3] call **crowd logistics** - i.e., the use of underused logistics resources, such as private vehicles and storage spaces, to carry out activities traditionally delegated to specialized companies (Fig. 1).

The expansion of platforms such as Uber Freight, Amazon Flex, and Deliveroo demonstrates how the on-demand economy has adopted routing algorithms, real-time data, and dynamic pricing models to optimize deliveries [10,11]. Recent advances have focused on smart task allocation, provider experience, and loyalty strategies [12].

However, much of the literature is focused on developed economies, whose infrastructures are more consolidated. This generates relevant gaps in understanding of the functioning of these platforms in emerging countries, such as Brazil, where urban and social challenges are more complex [13].

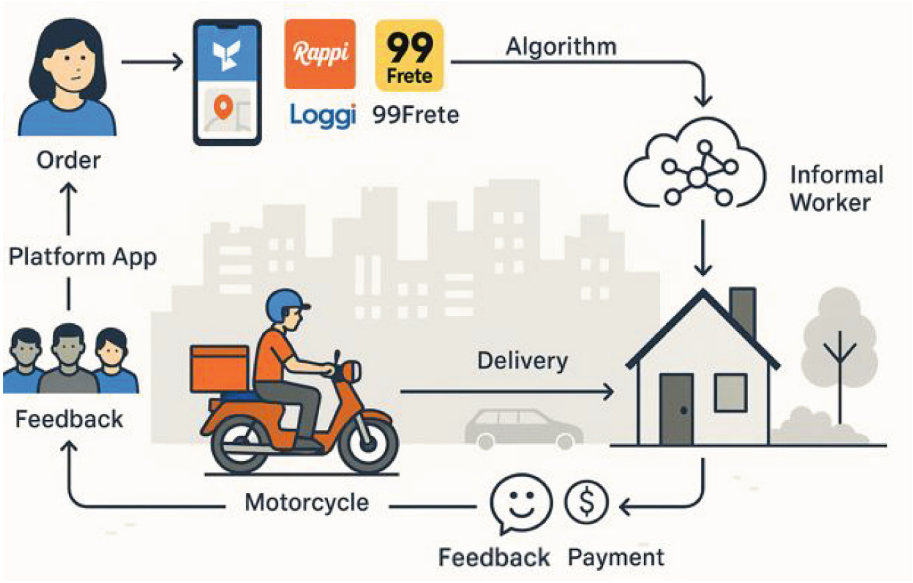


Fig. 1. Last-Mile Logistics Operations of Crowdsourcing Platforms.

This infographic illustrates the operational flow of last-mile deliveries using crowdsourcing logistics platforms such as Loggi, Rappi, and 99Frete in urban Brazilian contexts. The process begins with the customer placing an order via a platform app. Algorithms then allocate tasks to available informal workers, who use motorcycles to carry out the delivery. After the service is completed, users provide feedback through the platform, closing the cycle. The model highlights

the integration of digital infrastructure, informal labor, and urban mobility in on-demand logistics.

2.2 Crowdsourcing in Brazil: Local Applications, Challenges and Complexities

In urban centers such as São Paulo and Rio de Janeiro, the last mile faces structural obstacles such as heavy traffic, disorderly urban sprawl, and high labour informality. National studies [14,15] point out that such factors have put pressure on conventional logistics models, making room for alternative solutions based on crowdsourcing.

Platforms such as Loggi and Rappi have been able to operate with greater agility precisely because they take advantage of motorcyclists and informal workers, which represents a competitive advantage over centralized models [16]. Moreover, the social and regulatory aspects of these operations remain underexplored, especially concerning economic sustainability and workers' rights.

With more than 40% of the workforce in informal conditions [17], Brazil represents a complex environment for the implementation of models that mix innovation and precariousness. While some scholars acknowledge that digital platforms may offer a pathway to the formalization of labour relations through technological integration, critical perspectives emphasize that this formalization often occurs without adequate protection. Woodcock and Graham [18] affirm that in the regulatory domain, Brazilian municipal and national policies have not kept pace with the rapid expansion of digital platforms, resulting in regulatory gaps that limit legal certainty, distort competition, and weaken the protection of workers and consumers. According to [6], the absence of updated legal instruments and regulatory enforcement undermines the sustainable growth of the platform economy and hampers fair market dynamics. This scenario contrasts with the European Union, where comprehensive digital regulation has been enacted. The Digital Services Act (DSA) and the Digital Markets Act (DMA), for example, represent a robust institutional effort to balance technological innovation with social protection, ensuring accountability, fairness, and user rights in the platform economy [19].

Therefore, understanding the feasibility of logistics crowdsourcing in Brazil requires a multidimensional approach, one that goes beyond operational efficiency and considers the social, environmental and institutional effects of the model.

3 Methodology

This study adopts a qualitative and exploratory approach, based on document analysis and case studies, to evaluate the performance of logistics crowdsourcing platforms in Brazil. Secondary data from institutional reports, academic publications, and sectoral sources updated up to March 2025 are used.

The platforms analyzed Loggi, Rappi, and 99Frete were selected for their rerfdee Janeiro. Each platform was evaluated based on three key dimensions: operational efficiency, economic viability, and social and regulatory impact.

This analytical framework was inspired by international models that examine crowd logistics platforms from multiple perspectives [3,13], allowing a critical comparison between the Brazilian scenario and global benchmarks.

In addition, the study considers elements such as smart task allocation, delivery driver satisfaction [12], pricing models, and regulatory compliance, offering a broad view of the challenges and opportunities associated with the adoption of logistics crowdsourcing in Brazilian megacities. Fig. 2 presents the methodological structure of the research.

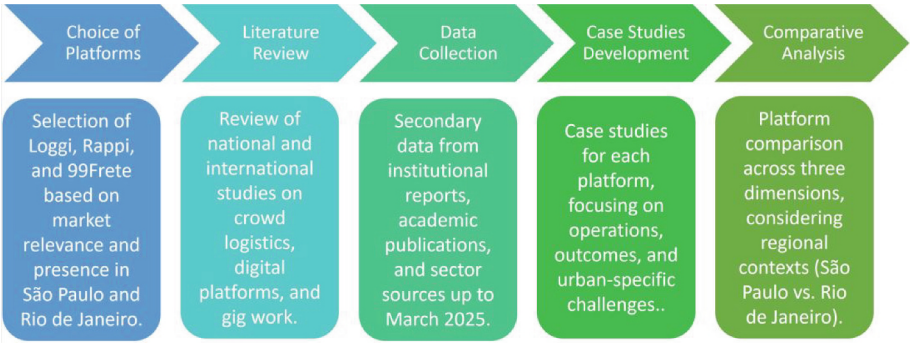


Fig. 2. Methodological framework for the evaluation of crowdsourcing logistics platforms

To elaborate on the methodological steps illustrated in Fig. 2 **(i)** the research began with the *selection of platforms*, focusing on Loggi, Rappi, and 99Frete, chosen for their significant presence and operational relevance in the metropolitan areas of São Paulo and Rio de Janeiro; **(ii)** This was followed by a *comprehensive literature review*, encompassing national and international academic sources, technical reports, and theoretical contributions on crowd logistics, the gig economy, and platform-based delivery systems; **(iii)** The *data collection phase* relied on secondary sources, including institutional reports, academic publications, regulatory documents, and sectoral analyses, all updated to March 2025; **(iv)** In the *case study development* stage, each platform was analyzed in terms of its operational model, performance indicators, socio-environmental impacts, and urban challenges, through a triangulated approach combining platform data, public records, and scholarly literature; **(v)** Finally, the *comparative analysis* evaluated the platforms across three analytical dimensions—operational efficiency, economic viability, and social/regulatory impact—while accounting for contextual specificities of the two cities.

This layered methodological design enabled a comprehensive and context-sensitive evaluation of crowdsourced logistics in the Brazilian urban landscape.

Although this study is grounded in the Brazilian urban context, the proposed methodological framework was designed with a degree of flexibility that enables its application to other regions and platform ecosystems. The analytical dimensions adopted–operational efficiency, economic viability, and social/regulatory impact–are broad enough to accommodate regional specificities, while maintaining conceptual consistency across cases. Moreover, the reliance on secondary data, document analysis, and triangulated case study construction makes the method particularly suitable for replication in environments where direct access to primary data is limited. This opens the possibility for comparative studies in cities of both the Global South and Global North, where platform logistics may face similar challenges, such as labor informality, urban congestion, or fragmented regulation. By adjusting context-sensitive indicators within the same analytical structure, the framework supports broader evaluations of crowdsourced logistics and fosters international dialogue on sustainable and inclusive urban delivery models.

4 Results and Discussions

4.1 Case Companies

In this study, we evaluate three case companies to evaluate crowdsourcing applications in Brazil as above mentioned.

- **Case 1: Loggi:** Established in 2013, Loggi has established itself as one of the main players in digital logistics in Brazil. The platform uses artificial intelligence to optimize routes, which led to a reduction in delivery times by about 20% in São Paulo [20]. This strategy is aligned with the use of optimization algorithms based on variable neighborhood search [12], evidencing a continuous effort to maximize operational efficiency in the last mile. Economically, Loggi benefits from reduced indirect costs by employing autonomous couriers, aligning with the economic viability observed in crowdsourced logistics models under conditions of high demand elasticity. Oyama and Akamatsu (2024) [21] developed a market-based matching mechanism for crowdsourced delivery systems, demonstrating how leveraging underutilized driver capacity can enhance efficiency in such elastic demand scenarios. However, the scalability of this model has been critiqued for contributing to precarious labor conditions. Oliveira (2017) [22] discusses how the expansion of informal labor in Brazil, exacerbated by economic and political crises, has led to increased job insecurity and the erosion of workers' rights, highlighting the social implications of such employment models.
- **Case 2: Rappi:** Rappi stands out as a multi-service platform, operating in various segments (food, parcels, market), with wide penetration in the peripheral regions of Rio de Janeiro. This performance gives the platform an advantage in social inclusion by incorporating workers from vulnerable communities–a differential compared to competitors. However, its premium pricing policy and high turnover of delivery workers suggest operational

imbalances and challenges in workforce loyalty, which are related to the intention of permanence of delivery workers. Belanche et al. (2021) [23] highlight the importance of fair remuneration and the quality of interaction with customers as crucial factors for retention, noting that customers' perceptions of delivery workers' conditions can significantly influence their usage and recommendation of food delivery services.

– **Case 3: 99Frete:** 99Frete, a subsidiary of 99 (Didi Chuxing), leverages the extensive driver network of the mobility app to expand its logistics coverage. With prices up to 15% lower than traditional services, the platform achieves high economic viability in short-haul operations. This model aligns with pricing strategies based on demand elasticity, where price adjustments are made according to customer sensitivity to maximize competitiveness and profitability [21]. The use of real-time tracking technologies provides a significant operational advantage, allowing for greater transparency and efficiency in deliveries. However, the platform's limited reach outside major capitals and its difficulty in handling peak demand highlight structural constraints that must be addressed to ensure the scalability and long-term sustainability of the service [24].

4.2 Crowdsourcing Platform Analysis: Comparison and Implications

Several characteristics are essential to crowdsourcing platforms, Table 1.

Table 1. Crowdsourcing platforms analyzed in the study

Platform	Efficiency	Economic Feasibility	Social Inclusion	Scalability and Challenges
Loggi	High (AI, optimized routes)	High (self-employed couriers)	Medium	High (400+ cities); precarious labor; regulatory pressure
Rappi	Moderate	Low (peripheral areas)	High (informal settlements)	High scalability; high turnover; pollution; elevated costs
99Frete	Moderate	High	Medium	Low scalability; limited capacity; regulatory uncertainty

Comparing the platforms reveals distinct strengths and trade-offs:

– Loggi excels in operational efficiency with its AI-driven system and strong scalability, although it faces problems of precariousness and labor congestion. [25]
– Rappi offers moderate efficiency through its multi-service approach and promotes social inclusion, but its higher costs and worker turnover pose challenges. [26].

– 99Freight offers moderate efficiency and high economic viability through economic integration, but its limited scale and service gaps constrain its impact. Across all platforms, the gig model drives flexibility and cost savings but introduces labour instability and urban sustainability concerns. [18]

While each of the four dimensions analyzed–operational efficiency, economic viability, social inclusion, and scalability/challenges–offers important insights into platform performance, the dimension related to scalability and systemic challenges emerges as the most critical for the long-term viability of crowdsourced logistics in Brazil. Despite advances in routing technologies and economic models, persistent issues such as labor precariousness, regulatory uncertainty, and structural informality limit the capacity of these platforms to scale sustainably. These challenges appear recurrently across all case studies and directly affect the legitimacy, governance, and fairness of the business model. As such, we argue that addressing social and institutional constraints is a necessary condition for consolidating crowdsourcing as a viable and inclusive urban logistics strategy.

Several positive trends emerge from the operations of these platforms in São Paulo and Rio de Janeiro. The utilization of motorcycle couriers and bicycles effectively addresses urban obstacles, such as São Paulo's traffic congestion and the complex topography of Rio de Janeiro's informal settlements. This approach supports Brazil's burgeoning e-commerce sector, which is projected to experience a compound annual growth rate (CAGR) of 19% from 2024 to 2027 [27,28].

Economically, these companies create jobs by integrating thousands of temporary workers into formal logistics ecosystems, mainly from informal sectors. Technologically, real-time tracking and route optimization reduce delivery delays by 15 - 30% (industry average, 2024), improving last mile performance in these capitals.

Despite the advances and benefits observed with the use of crowdsourcing platforms in urban logistics – such as reduced delays, greater flexibility, and inclusion of informal workers – significant challenges persist, especially in Brazilian capitals.

The precariousness of working conditions represents one of the main barriers to the sustainability of the on-demand logistics model. Recent data indicate that approximately 60% of delivery workers in São Paulo experience income instability, exacerbated by the absence of employment contracts and labour benefits under temporary work arrangements. This scenario reflects a broader structural trend identified by Roubaud et al. [29], who argue that occupational integration through digital platforms while offering income opportunities, is predominantly characterized by low-quality jobs, lacking legal protections and offering limited mobility toward formal employment. Such evidence reinforces concerns about the social sustainability of this model and the potential for deepening informality in Brazil's major metropolitan areas [30] .

From an environmental and urban point of view, the proliferation of small vehicles, such as motorcycles and motorized bicycles, aggravates road congestion

and increases the risk of accidents, especially in cities such as São Paulo, which recorded a 10% increase in motorcycle density [31,32]

In addition, the fragmentation of deliveries contributes to the increase in carbon emissions, neutralizing part of the operational gains obtained by the platforms. These consequences are consistent with the warnings of Carbone et al. [3], which highlight the risk of negative externalities for the environment and urban space.

Another critical challenge concerns regulatory gaps. In São Paulo and Rio de Janeiro, inconsistent municipal policies make it difficult both to scale business models and to effectively protect the workers involved. This context contrasts with European experiences, where more robust regulatory frameworks shape the functioning of platforms and promote a more balanced environment between innovation and legal certainty [33].

In this context, it becomes imperative to develop public policies that are attuned to the specificities of the Brazilian reality, fostering an articulation between the promotion of technological innovation and the safeguarding of socio-environmental rights. The absence of such a balance may undermine the transformative potential of the crowdsourcing model applied to urban logistics, as its side effects such as social inequalities and environmental impacts tend to intensify in fragile regulatory contexts. Therefore, technological innovation in Brazil must be supported by a normative framework that ensures social justice and environmental responsibility in order to guarantee the long-term sustainability and legitimacy of its benefits [34].

4.3 Complexities of Crowdsourcing Implementations in São Paulo e Rio de Janeiro, Brazil

The cities of São Paulo and Rio de Janeiro represent two of the main logistics hubs in Brazil and provide distinct but complementary contexts for assessing the feasibility of crowdsourcing in last-mile delivery, Fig. 3.

São Paulo is located in the Southeast of Brazil ($23°33'01''S, 46°38'02''E$). The city is the largest metropolis in Latin America with 12 million inhabitants and has many complexities in logistical distribution due to the variety of types of neighbourhoods that involve a lack of infrastructure, security, and areas of low access, Fig. 4.

The first image shows the North-South Corridor, one of the main road axes in São Paulo, which connects the city from end to end, highlighting the heavy traffic and overload of the road system. The second image depicts a street in Vila Brasilândia, in the northern zone of the city, where urban infrastructure is limited, reflecting spatial and social inequality. The third image shows app-based delivery workers waiting for residents to pick up their orders at the entrance of a residential building, illustrating the growing reliance on digital delivery services and the daily challenges faced by these workers in the urban environment.

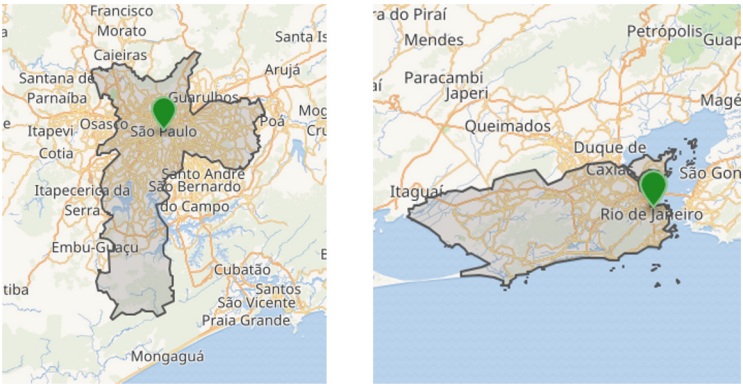


Fig. 3. Reference maps of the cities of São Paulo and Rio de Janeiro



Fig. 4. Challenges and dynamics of urban mobility in the city of São Paulo

São Paulo has greater technological maturity, with wide adoption of digital platforms and a more robust structure to support e-commerce. The high penetration of platforms such as Loggi and 99Frete allows it to efficiently meet the growing demand for fast deliveries.

However, the city suffers from high operating costs, aggravated by structural problems such as heavy traffic, road saturation, and shortage of qualified labour, requiring urgent interventions in urban planning, mobility infrastructure, and public policies that support workers in this ecosystem.

On the other side Rio de Janeiro ($22°54'10''S, 43°12'28''W$) it stands out for its role in the social inclusion of workers from vulnerable communities, especially in the informal settlements, contributing to the increase of social equity in access to income opportunities, Fig. 5.

The first image shows Estrada da Gávea, the main road running through the Rocinha community, highlighting the heavy flow of vehicles and motorcycles. The second image captures rush hour traffic within the community, with a strong presence of motorcycle taxis and local residents. The third image features app-based delivery workers, a service that has become increasingly common and essential in Rio de Janeiro's favelas. Image credits: "Rocinha em Foco" Facebook page.

However, the city faces severe limitations in logistical efficiency, resulting from its rugged topography, restricted access, and fragile institutional structure,



Fig. 5. Urban mobility and deliveries in Rio de Janeiro's communities

with public policies still insufficient to deal with the expansion of platforms. These factors point to the need for geolocalized solutions, adapted to the reality of the territory, as well as clearer and more effective regulation.

In both capitals, the sustainability of the logistics crowdsourcing model depends on the implementation of balanced policies that reconcile technological innovation with social protection and mitigation of environmental impacts. Such policies are essential to ensure the long-term viability of these platforms, not only as efficiency solutions but as vectors of positive transformation of Brazilian urban logistics.

5 Final Considerations

This study evaluated the performance of the main logistics crowdsourcing platforms operating in Brazil, focusing on the cities of São Paulo and Rio de Janeiro, where the challenges of last-mile logistics are especially intense due to population density, urban complexity, and the expansion of e-commerce.

The comparative analysis between Loggi, Rappi, and 99Frete revealed that each platform has distinct characteristics that respond, in a complementary way, to urban logistics demands: operational efficiency in the case of Loggi, flexibility and social capillarity in Rappi, and cost-benefit in 99Frete. Collectively, these solutions have contributed to improving delivery times, expanding access to services, and integrating thousands of informal workers into the digital logistics chain.

However, the success of these platforms is limited by persistent structural and social problems, such as labour precariousness, regulatory gaps, and increasing environmental impacts. In São Paulo and Rio de Janeiro, these challenges manifest themselves in different ways but converge in the need for public actions that combine technological innovation with social justice and environmental sustainability.

Given this, the long-term sustainability of logistics crowdsourcing will depend on the construction of a regulatory framework that offers legal certainty, worker protection, and incentives for environmentally responsible practices.

To enhance the practical implications of this study, it is important to note that some platforms have begun to implement partial responses to the challenges identified. Loggi, for example, has launched initiatives focused on data transparency and route optimization to improve delivery efficiency and working conditions, including pilot programs offering insurance coverage for delivery drivers. Rappi has experimented with social features and incentive models aimed at increasing worker retention and customer engagement in peripheral urban zones. However, these actions remain fragmented and insufficient in the face of broader structural issues. Therefore, we propose that regulatory agencies and municipal governments establish minimum labor protection standards for platform workers, including fair remuneration, access to social security mechanisms, and participation in decision-making processes. Furthermore, public-private partnerships could be fostered to promote technological innovation aligned with inclusive urban mobility goals. Embedding these principles into local governance frameworks would not only mitigate existing risks but also reinforce the long-term viability and legitimacy of crowdsourced logistics in Brazil.

Public policies must keep up with the pace of digital transformation, promoting the growth of platforms in an ethical, safe, and inclusive way.

It is recommended that future research advance in the quantification of environmental impacts, analyze social protection mechanisms applicable to on-demand work, and propose regulatory models adapted to the Brazilian reality, especially with regard to local governance of cities.

Thus, crowdsourcing in Brazilian urban logistics can be consolidated not only as a tool for efficiency gains but also as a vector of social equity, sustainable economic development, and inclusive innovation.

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