

A Comparative Study of Supply Chain Configurations for Fast Fulfillment in E-commerce: Evidence from JD.com and Amazon

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Abstract

In e-commerce, delivery speed has become a core dimension of customer experience and platform competitiveness. Same-day and next-day delivery services do not rest solely on the efficiency of last-mile transportation. Their performance also depends on how warehousing, inventory positioning, order fulfillment, and delivery resources are coordinated with one another. JD.com and Amazon have developed large-scale fast fulfillment systems in China and the United States, respectively. Both firms seek to shorten the spatial distance between inventory and customer demand. Multi-node warehousing and inventory localization are the common means, yet the ways in which fulfillment networks are organized and logistics resources are allocated diverge considerably between the two firms. The study draws on a literature review and a comparative case study approach. JD.com's mainland China operations and Amazon's U.S. market are placed side by side. The comparison is organized around three analytical dimensions: fulfillment network and inventory positioning, logistics governance, and resource configuration. Order density, labor costs, and the broader logistics service environment enter the analysis not as explanatory variables in a strict sense. They function instead as contextual conditions that help interpret the observed differences. The case evidence points toward a stronger reliance on internally coordinated fulfillment operations at JD.com. Amazon, by contrast, follows a hybrid governance approach, combining in-house infrastructure with external logistics resources. There is little ground, based on the two cases examined here, for claiming that a single fast fulfillment configuration can suit all market conditions. Speed, cost efficiency, and resource flexibility have to be weighed against one another. By bringing together supply network configuration and logistics governance perspectives, the study provides an analytical framework for understanding why fast fulfillment configurations vary across markets.

Keywords

fast fulfillment, supply chain configuration, last-mile delivery, fulfillment network, logistics governance

1. Introduction

1.1 Research Background and Research Questions

Delivery speed and service reliability have become core competitive capabilities for major e-commerce platforms. Same-day and next-day delivery services cannot be reduced to last-mile transportation alone. Network design, demand distribution, and delivery strategies also shape fast fulfillment performance [1–4].

Fast fulfillment rests, in general, on moving inventory closer to demand before customer orders are placed. Regional demand has to be forecast, products must be assigned to storage locations, and decisions need to be made about which fulfillment nodes process which orders and how delivery resources are allocated. Warehousing decisions, inventory positioning, delivery commitments, and order fulfillment are thus tightly interdependent rather than separable [5–6].

JD.com and Amazon were chosen as comparative cases because both operate as large e-commerce platforms within their primary domestic markets and both have built mature fast fulfillment networks. At the same time, the boundaries of their logistics governance differ considerably. This combination offers a common operational basis for comparison while still providing clear organizational differences. JD.com depends on a two-level distribution network and inventory pre-positioning to support local fulfillment. Amazon, for its part, has pushed the regionalization of its U.S. fulfillment network, so that a larger share of orders can be fulfilled within customers' local regions [15–18]. The two companies share the same general goal of shortening the distance between inventory and demand, but their network organization and their mix of internal and external logistics resources differ in practice.

The literature has approached e-commerce logistics from several directions. Last-mile delivery, third-party logistics integration, and differences between Chinese and U.S. e-commerce firms have all received attention [1–5,8,10]. What remains less developed is a systematic comparison of fulfillment configurations, governance boundaries, and market conditions for JD.com and Amazon within a single analytical framework.

The present study therefore concentrates on fast fulfillment supply chains and compares the major configuration differences between JD.com and Amazon. Three questions are addressed:

- (1) What are the main similarities and differences in the fast fulfillment supply chain configurations of JD.com and Amazon?
- (2) How might order density, labor costs, and the logistics service environment relate to different fulfillment configurations?
- (3) Under what conditions might different configurations show advantages or face limitations?

1.2 Research Objectives and Significance

The question behind this study is straightforward: why do two firms with similar fulfillment goals end up with different supply chain configurations? JD.com and Amazon both seek to position inventory closer to demand, yet their networks, governance choices, and resource arrangements look quite different. One way to make sense of this is to bring inventory positioning, fulfillment networks, and logistics governance into a single analytical frame. That frame draws on several bodies of work: last-mile delivery [1–4], supply network configuration [5], third-party logistics integration [8], data-driven logistics strategies [9], and transaction cost economics [12–13]. Much of this work examines these elements from separate perspectives. The comparison between JD.com and Amazon is therefore useful not because one firm is more successful, but because the two cases show how similar objectives can be pursued through different organizational paths.

1.3 Research Method and Analytical Framework

This is a comparative case analysis [14] built around three dimensions: fulfillment network and inventory positioning, logistics governance, and resource configuration. The analysis draws on peer-reviewed academic studies, corporate annual reports, and publicly available operational information. Market conditions—order density, labor costs, and the logistics service environment—are not treated as explanatory variables. They enter the analysis as contextual factors that help interpret the differences between the two configurations. The study

does not test causal effects or build a quantitative model. Its purpose is to clarify how configuration choices and market conditions are connected, and where the main trade-offs lie.

1.4 Research Scope and Definition

The comparison is limited to JD.com's mainland China market and Amazon's U.S. market. Fast fulfillment, as the term is used here, refers to short-lead-time e-commerce services such as same-day and next-day delivery, which depend on inventory pre-positioning, order fulfillment, and last-mile delivery. The focus is not on the entire e-commerce operations of either firm, but on the supply chain structures behind these short-lead-time services.

2. Literature Review

2.1 Fast Fulfillment and Last-mile Delivery

Last-mile delivery refers, in general, to the movement of goods from the final logistics node to the end customer. This stage is characterized by highly dispersed delivery locations, small order sizes, and customer expectations for both speed and convenience. It is therefore widely recognized as a complex operational challenge in e-commerce logistics [1–4].

A substantial part of the existing work approaches last-mile delivery as a network design and routing problem. Delivery node configuration, route planning, and the spatial distribution of demand have received considerable attention, and last-mile efficiency is often traced back to these three factors [1–2]. Once delivery commitments tighten, however, this framing becomes harder to sustain. Warehousing and inventory allocation decisions further upstream begin to constrain what the last-mile network can accomplish. Improving last-mile transportation alone may not be enough for reliable fast fulfillment if the inventory is simply not where it needs to be.

Order density matters here because it affects how many customers a given facility or route can serve within a fixed delivery window. Higher order density can raise utilization. Dispersed demand may have the opposite effect. This is why the present study uses order density rather than population density to characterize market demand conditions. Customer density and delivery time windows have been shown to shape the economic performance of last-mile delivery [11], but the spatial distribution of actual orders is treated in this study as a more direct constraint.

2.2 Supply Chain Configuration and Logistics Governance

Inventory positioning is one of the key decisions that shape fast fulfillment. Placing nodes closer to customers can shorten delivery distances, but it may also scatter inventory across more locations and lower the utilization of individual facilities. The problem is therefore not how many warehouses a firm operates, but how products are distributed among them and whether that distribution matches real demand patterns [5–6].

A second decision concerns who carries out logistics activities. Prior research has linked the integration of third-party logistics providers with internal supply chains to overall supply chain performance [8]. Self-operated logistics, third-party logistics, and hybrid configurations each involve different trade-offs among service control, resource investment, and operational flexibility.

Data capabilities feed into both decisions. Digital technologies and data-driven methods can support demand forecasting, inventory planning, and logistics strategies [9,15–16]. From a transaction cost perspective, activities with high asset specificity and strong coordination requirements may require greater internal control. Where external service markets are mature, cooperation can provide greater resource flexibility [8].

This study therefore avoids treating logistics governance as a binary choice between self-operated and outsourced models. The focus is on how firms combine internal logistics capabilities with external resources under different market conditions.

2.3 Literature Gap and Research Positioning

E-commerce logistics has been studied from a range of angles. Last-mile delivery, inventory management, logistics governance, and digital transformation have all received considerable attention [1–13]. More recent work has looked specifically at JD.com 's RDC-FDC inventory configuration and Amazon's regionalized fulfillment network in the U.S. market [15–17].

What remains relatively limited, however, is research that compares the fulfillment configurations, governance boundaries, and market conditions of JD.com and Amazon within a unified analytical framework.

The present study addresses this gap by drawing on three bodies of literature. Work on supply network configuration and inventory decisions provides the basis for analyzing fulfillment networks and inventory positioning [5–6]. Transaction cost economics and research on third-party logistics integration provide a basis for interpreting differences in logistics governance [8,12–13]. Studies on customer density and delivery efficiency connect market conditions to logistics operations [11].

On this basis, the comparison between JD.com and Amazon is structured around three analytical dimensions: fulfillment network and inventory positioning, logistics governance, and resource configuration. Order density, labor costs, and logistics service environments are further considered as contextual factors used to interpret differences in these configurations.

3. Fast Fulfillment Supply Chains of JD.com and Amazon

3.1 JD.com's Fast Fulfillment System

3.1.1 Warehousing and Inventory Allocation

JD.com operates a two-level distribution network in which selected products are pre-positioned closer to customers. The fulfillment network is built mainly around Regional Distribution Centers (RDCs) and Front Distribution Centers (FDCs). RDCs hold broader product assortments, while FDCs have relatively limited storage capacity but are located closer to end markets [16].

The central difficulty of this system lies in deciding which products should be placed at FDCs. If too much inventory is pre-positioned at FDCs, inventory fragmentation and overstocking risks rise. If too little is pre-positioned, a larger share of orders must be fulfilled from distant RDCs. Product selection, demand forecasting, and inventory allocation therefore need to be optimized together rather than in isolation.

In numerical experiments reported for JD.com, assortment planning was associated with a local order fulfillment rate 0.54 percentage points higher, from 58.29% to 58.83%. Inventory allocation was associated with an FDC demand fulfillment rate 1.05 percentage points higher [16]. These gains are not only about distance reduction. Which SKUs belong at FDCs, and how much inventory each node holds, also shape how well the RDC-FDC structure performs.

3.1.2 Fulfillment Coordination and Technology Support

Warehousing, inventory management, and order fulfillment at JD.com are kept largely within the company's own coordination structure [10]. Information and logistics systems link product planning, inventory allocation, and order fulfillment together [16].

Data analytics support demand forecasting, product selection, and inventory allocation decisions [15,16].

3.2 Amazon's Fast Fulfillment System

3.2.1 Regionalized Fulfillment Network

Amazon's U.S. fulfillment network was not always organized the way it is now. The earlier model relied on a highly interconnected national system. That design offered greater allocation flexibility, but cross-regional transportation and coordination became more complicated [17].

The company responded by dividing the U.S. network into eight interconnected but largely self-sufficient regions. The share of orders fulfilled inside the customer's region rose from roughly 62% to 76% after the change, and the average distance between fulfillment nodes and customers fell by about 15% [17].

3.2.2 Delivery and External Resources

Amazon operates large-scale fulfillment centers, sorting facilities, and delivery infrastructure of its own. Transportation and last-mile delivery, however, draw on delivery partners and commercial carriers [17–18].

Regional demand, fulfillment capacity, inventory levels, and order allocation decisions have to be coordinated [17–18].

4. Comparative Analysis of JD.com and Amazon

4.1 Comparison of Fulfillment Networks and Inventory Positioning

The clearest difference between the two firms lies in how local fulfillment capacity is created. JD.com creates it through the RDC-FDC hierarchy: selected products are moved forward to FDCs before customer orders are placed [16]. Amazon creates it by reorganizing the larger network geographically, so that a higher share of orders can be fulfilled within the customer's local region [17]. Both designs respond to the same spatial problem, but they solve it at different levels of the network.

The two approaches also differ in what they require from upstream decision-making. JD.com 's model depends on product-level decisions: which SKUs should be placed at FDCs, and in what quantities. Amazon's model depends more on regional-level decisions: how demand and fulfillment capacity should be matched within each region. Reliable fast fulfillment therefore depends not only on transportation speed, but also on demand forecasting, product selection, and inventory positioning.

4.2 Comparison of Logistics Governance

The governance boundary is drawn differently in the two systems. JD.com keeps warehousing, inventory management, and order fulfillment under internal coordination. Product planning and inventory allocation are linked through the company's own information and logistics systems. Amazon places the boundary further toward external cooperation: large-scale fulfillment centers remain in-house, but transportation and last-mile delivery draw on delivery partners and commercial carriers [16–18].

Each arrangement carries different operational consequences. Internal coordination supports cross-stage alignment and service control, but it requires sustained investment in infrastructure, technology, and organizational capabilities. A hybrid arrangement can add flexibility in transportation capacity, yet it also increases the need for information coordination and service management across participants [8]. The relevant question for large e-commerce firms is therefore not whether to choose self-operated logistics or outsourcing. It is where to draw the line between internal control and external cooperation, given the operational requirements and market conditions a firm actually faces [12–13].

4.3 Resource Configuration Trade-offs

Both firms operate logistics infrastructure at considerable scale. What separates them is not whether they invest heavily, but how fixed and flexible resources are put together. JD.com 's integrated system can support higher facility utilization when order volumes are high enough, but that comes with continued investment in warehousing, technology, and delivery capabilities. Amazon also maintains substantial investment in fulfillment infrastructure. At the same time, it uses external resources to add flexibility in certain transportation activities [17–18].

The two firms also direct their technology efforts toward different areas, and these areas are related to the network structures the two firms rely on. JD.com 's RDC-FDC model requires ongoing choices about which SKUs belong at FDCs and how much stock each node should carry. SKU-level assortment planning and FDC inventory allocation matter as a result [15–16]. Amazon's regionalized network places greater weight on matching regional demand with fulfillment capacity, so its operational focus falls on regional demand-capacity matching and transportation network optimization [17].

Table 1: Comparison of Fast Fulfillment Supply Chain Configurations between JD.com and Amazon

Dimension	JD.com	Amazon
Fulfillment network	RDC-FDC two-level network	Regionalized multi-node network
Inventory configuration	Pre-positioning selected products at FDCs	Improving regional inventory-demand matching
Governance characteristics	Internal coordination across fulfillment operations	Combination of internal infrastructure and external logistics resources
Resource characteristics	Stronger emphasis on service control and sustained internal investment	Greater reliance on external resources for flexibility
Technology focus	SKU-level assortment planning and FDC inventory allocation	Regional capacity-demand matching and transportation network optimization

The two cases do not differ much in whether trade-offs exist. They differ in where the weight falls. JD.com's configuration leans toward service control and internal coordination. Amazon's leaves more room for combining resources flexibly. These different emphases can be understood in relation to the market conditions each firm operates in, including order density, labor costs, and the surrounding logistics service environment.

4.4 Market Conditions and Configuration Logic

4.4.1 Order Density

The economics of inventory pre-positioning are not the same everywhere. Holding inventory at more locations adds cost, and whether those costs are justified depends on how many orders flow through a given node. Order density helps capture this condition. Where density is high, facilities and delivery resources can be used more efficiently. Where demand is thin, the same positioning may push up fulfillment costs per order [7,11].

Population density alone may be a less direct proxy for the demand a specific facility actually faces. A city can be densely populated while a specific facility inside it handles too few orders to justify the inventory placed there. What matters is the flow of actual orders through the node, not the number of people living nearby. This is why the study treats order density, rather than population density, as the more relevant condition for pre-positioning decisions. Customer density and delivery time windows have been linked to the economic performance of last-mile delivery [11], but the choice of order density as the focal market condition is an analytical decision made in this study.

4.4.2 Labor Costs

Labor costs do not operate in isolation. Warehousing, transportation, and last-mile delivery remain labor-intensive, so higher labor costs may increase firms' incentive to automate [19]. Whether firms respond by seeking external providers depends on the maturity of available logistics services and on the governance trade-offs discussed earlier [8,12–13]. The response is not uniform. It depends on demand characteristics, technological capabilities, and the availability of external logistics resources.

Labor costs are therefore better understood as a contextual constraint rather than a direct explanation for the differences between JD.com and Amazon. They may shape resource configuration decisions, but they do not by themselves determine governance choices. What matters is how labor cost pressures interact with other conditions a firm faces.

4.4.3 Logistics Service Environment

External cooperation becomes more feasible when the surrounding logistics service market can support it. Activities with high asset specificity and strong coordination requirements may require greater internal control [12–13]. Where external services are mature, cooperation becomes a practical option and can increase resource flexibility [8]. The logistics service environment therefore helps shape the feasible range of governance choices, rather than dictating which choice a firm should make.

A market with well-developed third-party logistics providers can make external resources easier to use in transportation and delivery. Where external services are less developed, firms may face a narrower set of workable options for external capacity. The logistics service environment matters for cross-market comparison because it affects which options are realistically available, without directly determining governance choices.

4.5 Comparative Discussion

The two cases do not point to a single superior configuration. JD.com places greater emphasis on internal coordination, but that approach requires a larger internal resource commitment. Amazon retains substantial infrastructure of its own while keeping more room to draw on outside transportation capacity. These strategic differences are accompanied by differences in the conditions each firm faces.

Order density, labor costs, and the surrounding logistics service environment do not determine these choices. They affect which options are realistically available. Where order volumes are sufficiently high, facilities and delivery resources may be used more efficiently [7,11]. Where labor costs are high, automation may become more attractive [19]. Whether automation is feasible in practice may also depend on technology and scale. Where third-party logistics markets are mature, external resources may take on a larger share of transportation and delivery work [8]. Governance boundaries, in turn, are related to the transaction cost considerations discussed earlier [12–13]. In neither case is the configuration a pure reflection of market forces. Strategic choices still matter, and the two firms have made different choices about how much control to retain and how much flexibility to obtain through external resources.

The broader lesson is not that one model is superior. Fast fulfillment configurations involve trade-offs among delivery speed, cost efficiency, and resource flexibility. The balance among them depends on conditions that differ across markets.

5. Conclusions and Future Research

5.1 Conclusions

This study has compared the fast fulfillment supply chain configurations of JD.com in mainland China and Amazon in the United States.

Both companies have pursued demand forecasting and inventory localization as ways to strengthen fulfillment efficiency. The RDC-FDC hierarchy gives JD.com a way to move selected products closer to customers before orders arrive. Amazon reaches a similar outcome by regionalizing its U.S. network, so that a larger share of orders can be fulfilled within customers' local regions. The two firms differ less in what they are trying to do than in the network level at which they do it.

JD.com keeps its core fulfillment activities under internal coordination. Amazon pairs internal infrastructure with external transportation and delivery resources. These choices are not independent of market conditions. Order density, labor costs, and the surrounding logistics service environment affect how suitable a given configuration is likely to be, but they do not determine it. The two cases do not point to a single configuration that suits all markets. The balance among delivery speed, cost efficiency, and resource flexibility shifts with the conditions a firm faces.

5.2 Managerial Implications

A logistics model that works in one market will not necessarily work in another. How much inventory to pre-position, and where to draw the line between internal and external capabilities, should reflect the demand, cost, and logistics resource conditions of the target market.

5.3 Limitations and Future Research

This study draws on publicly available secondary data. The two companies report operational indicators differently, so cost and performance comparisons remain limited. The comparison also involves only two firms, and market-level conditions are entangled with firm-level choices. These limits constrain generalization. Further work could add more firms and city-level data on order density, delivery distance, labor costs, and fulfillment costs. The effects of artificial intelligence, warehouse robotics, and autonomous delivery technologies also deserve closer study.

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Conflicts of Interest

The authors declare no conflict of interest.

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