

Legal Value Study of the Collaborative Development of Urban Logistics and E-Commerce Supply Chain in Smart Cities

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Abstract

The development of smart cities presents new challenges and opportunities for the coordinated development of urban logistics and e-commerce supply chains. From a legal perspective, this paper studies the legal value of the coordinated development of urban logistics and e-commerce supply chains in smart cities. Specifically, this paper analyzes the current situation and development trends of urban logistics and e-commerce supply chains in smart cities, explores the concept and model of coordinated development, and analyzes the legal issues and challenges involved with practical cases. Finally, this paper proposes corresponding legal countermeasures and suggestions to provide legal support and protection for the coordinated development of urban logistics and e-commerce supply chains in smart cities.

Keywords

Smart City, Urban Logistics, E-Commerce, Supply Chain, Coordinated Development, Legal Value

1. Introduction

1.1. Research Background

In 2010, International Business Machines Corporation (IBM) formally proposed the vision of a “smart city” with the hope of contributing to the development of cities globally, including in China (Huang & Guo, 2020). According to IBM, a city comprises of six core systems, which are different types of networks, infrastructure, and environment related to the primary functions of the city. These

systems are organization (people), business/government affairs, transportation, communication, water, and energy. The systems are not fragmented; instead, they are interconnected to one another in a collaborative way. Therefore, the city is a macroscopic system composed of these systems. To further promote the concrete implementation of smart cities, the German Industry 4.0 was proposed. Smart cities have become a hot topic in recent years, which has brought challenges and opportunities to internet enterprises and small and medium-sized innovative startups.

1.2. Study Purpose and Significance

With the rapid development of information technology and the acceleration of urbanization, the construction of smart cities has become one of the essential directions for current urban development. Urban logistics and e-commerce supply chains are vital components of smart cities, with tremendous potential for development and a broad market space (Zhang & Huang, 2020). Xu Shi, the founding partner of Shanxing Capital, said, "Entrepreneurship in the smart city sector still needs to make money with poor cognitive gradient. We should identify the structural opportunities in the market and see if a top player can emerge in a large track." However, in the process of the collaborative development of urban logistics and e-commerce supply chains, enterprises may experience setbacks due to the poor understanding of e-commerce supply chains and logistics, as well as legal issues such as information security and intellectual property protection. Therefore, this paper aims to explore the legal value of the collaborative development of urban logistics and e-commerce supply chains in smart cities from a legal perspective and provide necessary legal support and assurance for their sustainable development.

2. The Current Status and Development Trend of Collaborative Development of Urban Logistics and E-Commerce Supply Chain in Smart Cities

2.1. The Current Status and Trend of Urban Logistics Development in Smart Cities

Urban logistics refers to the entire process of goods flow inside and outside the city, including logistics facilities, transportation, warehousing, distribution, etc. With the deepening of smart city construction, urban logistics also faces new development opportunities and challenges. The development trend of urban logistics in smart cities mainly focuses on three aspects: intelligence, informatization, and greenization (Zhong, 2020).

Firstly, the intelligence level of urban logistics in smart cities is increasing, reflected in the intelligent and automatic upgrading of logistics equipment and tools. For example, automated warehousing systems, automated sorting equipment, etc., greatly improve the operation efficiency and accuracy of logistics and reduce logistics costs. In addition, intelligent logistics vehicles have become a trend in urban

logistics development, such as self-driving logistics vehicles, intelligent distribution robots, etc., making logistics distribution more convenient and efficient.

Secondly, the informatization level of urban logistics in smart cities is continuously improving, and the degree of data sharing and linkage is also increasing. Informatization tools such as logistics tracking systems and logistics information sharing platforms in smart cities provide logistics enterprises with more efficient management methods, improve logistics distribution efficiency, and reduce logistics distribution costs. At the same time, logistics information tools also provide more convenient and efficient services for city residents.

Finally, the greenization level of urban logistics in smart cities is also continuously improving. With the goal of reducing environmental pollution and resource waste, urban logistics development is gradually moving towards greenization. For example, electric vehicle distribution, intelligent streetlights, etc., can greatly reduce the negative impact of urban logistics on the environment.

In conclusion, the construction of smart cities has brought new opportunities and challenges to the development of urban logistics (Han, 2019). The development trends of urban logistics in smart cities, such as intelligence, informatization, and greenization, have provided new directions and impetus for the sustainable development of urban logistics.

2.2. Challenges of Urban Logistics Development in Smart Cities

Firstly, urban logistics in smart cities requires high levels of intelligence, and the price of automatic lines is high, resulting in high costs.

Secondly, as urban ground traffic congestion continues to increase, traditional urban logistics that rely mainly on ground transportation face challenges in improving operational efficiency. If the cost of transporting goods through underground spaces is high and difficult to achieve, the complex spatial structure of cities presents difficulties and high costs for large-scale cargo transfers through ropeways and other means.

Finally, the development of logistics in smart cities advocates for low-carbon and energy-saving methods, which presents a problem for enterprises to choose energy-efficient and low-cost logistics modes that require deep thought.

In summary, the construction of smart cities has brought new opportunities and challenges to the development of urban logistics. The trend towards intelligence, informatization, and green logistics in smart cities provides a new direction and impetus for the sustainable development of urban logistics.

2.3. The Development Status and Trends of E-Commerce Supply Chain in Smart Cities

E-commerce supply chain refers to a complete supply chain system composed of e-commerce platforms, suppliers, logistics companies, payment institutions, and other entities.

With the construction of smart cities, the e-commerce supply chain has shown a trend of rapid development. Mobileization is an important trend in the development of e-commerce supply chains. With the popularity of smartphones and tablet computers, consumers can shop and pay online anytime and anywhere through mobile terminals. This mobile trend has also promoted the innovative development of e-commerce supply chains, such as using automated equipment such as drones and robots to achieve delivery.

In addition, the degree of personalized service in e-commerce supply chains has also been enhanced in smart cities. Through technologies such as big data analysis and artificial intelligence, e-commerce platforms can obtain information about users' shopping preferences and behavior habits, thereby realizing personalized recommendations and customized services (Zheng, 2021). This kind of personalized service can not only improve the shopping experience of users but also promote consumer loyalty and brand reputation.

Furthermore, the e-commerce supply chain in smart cities has also shown a trend of cross-border cooperation. Collaboration between different industries is achieved through information technology means, such as the cooperation between logistics companies and e-commerce platforms, and between financial institutions and e-commerce platforms. This cross-border cooperation is beneficial to optimizing various links of the e-commerce supply chain, thereby improving the efficiency and competitiveness of the entire supply chain.

In summary, the construction of smart cities has promoted the development of e-commerce supply chains and also spawned new trends in e-commerce supply chains, such as mobileization, personalization, and cross-border cooperation (Wang, 2020). These trends provide new impetus and opportunities for the development of e-commerce supply chains.

3. The Synergistic Development of Urban Logistics and E-Commerce Supply Chain

3.1. Concept of Synergistic Development

Synergistic development refers to the integration and optimization of resources through collaboration, cooperation, and sharing, in order to achieve overall optimization of benefits while operating independently. In smart cities, the synergistic development between urban logistics and e-commerce supply chain is of significant importance. Urban logistics is a critical link in the e-commerce supply chain, providing logistics support to e-commerce, while e-commerce offers a broader market and business development opportunities for urban logistics. The synergistic development between urban logistics and e-commerce supply chain can optimize the use of resources, enhance overall efficiency, reduce costs, improve service quality, and meet consumer needs. Moreover, it can also promote information sharing and circulation, strengthen market regulation, improve market transparency, and competitiveness. Therefore, synergistic development has become an essential direction for the development of urban logistics

and e-commerce supply chain in smart cities.

3.2. Synergistic Development Model

In the process of synergistic development between urban logistics and e-commerce supply chains, different synergistic development models can help both parties achieve resource integration and efficiency improvement. Here are several common synergistic development models:

3.2.1. Data Sharing Model

The data sharing model refers to the sharing of logistics information, order data, inventory data, etc. between urban logistics companies and e-commerce platforms. Through data sharing and optimization, it reduces the problems caused by information asymmetry, improves the responsiveness and accuracy of the supply chain. For example, logistics companies can share their real-time vehicle dispatching information with e-commerce platforms, and e-commerce platforms can improve their own order dispatch efficiency and delivery accuracy based on this information.

3.2.2. Service Coordination Model

The service coordination model refers to the joint launch of services by urban logistics companies and e-commerce platforms to achieve service coordination and jointly improve service quality. For example, logistics companies can provide courier collection of payment, provide collection services, and e-commerce platforms can provide after-sales service, quality inspection, etc. The joint launch of these services can improve the service level and user experience of the entire supply chain.

3.2.3. Cooperation and Win-Win Model

The cooperation and win-win model refers to the formation of a community of interests by urban logistics companies and e-commerce platforms through strategic cooperation, deep cooperation, and other means, sharing the benefits and risks brought by business development. For example, logistics companies can collaborate with e-commerce platforms to develop logistics information systems, jointly develop new delivery services, etc., and jointly explore the market and innovative development. This cooperation can bring higher efficiency and better business development.

In summary, the synergistic development model between urban logistics and e-commerce supply chains should be flexibly selected and applied according to specific situations, continuously explored and innovated to achieve the goal of complementary advantages, resource sharing, and community of interests, and improve the competitiveness and efficiency of the entire supply chain.

3.3. Key Factors for the Collaborative Development

The key factors for the collaborative development of urban logistics and

e-commerce supply chains include information sharing and data integration, resource integration and optimization, service collaboration and innovation, win-win cooperation and risk sharing, and policy support and regulatory guidance.

Firstly, information sharing and data integration are the foundation for the collaborative development of urban logistics and e-commerce supply chains. Urban logistics companies and e-commerce platforms need to share their respective information to respond to market demand in a timely manner and improve efficiency. Through data integration, information can be seamlessly connected to improve the responsiveness and accuracy of the supply chain.

Secondly, resource integration and optimization are also important factors for collaborative development. Urban logistics companies and e-commerce platforms need to jointly optimize the allocation of logistics resources, including trucks, warehouses, distribution centers, etc., to improve logistics efficiency and service quality. For example, e-commerce platforms can use the delivery network and vehicle resources of urban logistics companies to reduce logistics costs and delivery time, while urban logistics companies can use the order volume and data support of e-commerce platforms to improve their business scale and service level.

Thirdly, service collaboration and innovation are also necessary factors for collaborative development. Urban logistics companies and e-commerce platforms need to collaborate on services, such as customized delivery services and return processing, to improve service quality and user experience. At the same time, continuous innovation is needed to adapt to changes in market demand and enhance market competitiveness.

Fourthly, win-win cooperation and risk sharing are important principles for the collaborative development of urban logistics and e-commerce platforms. Urban logistics companies and e-commerce platforms need to achieve win-win results in cooperation, and cooperation results should be fairly distributed. At the same time, they need to share responsibility and jointly respond to market risks and uncertainties.

Finally, policy support and regulatory guidance are the guarantee for the collaborative development of urban logistics and e-commerce supply chains. The government needs to strengthen policy support and regulatory guidance for the collaborative development of urban logistics and e-commerce supply chains, such as increasing investment in logistics facility construction and improving relevant laws and regulations, to promote the sustainable development of urban logistics and e-commerce supply chains (Wei, Wang, & Wu, 2017).

3.4. Key Technologies for Collaborative Development

The collaborative development of urban logistics and e-commerce supply chains needs the support of advanced information technology and logistics technology. These key technologies can achieve the goals of information sharing, resource

integration, and process collaboration, thereby improving logistics efficiency, service quality, and user experience. Among them, logistics information technology is the basis for centralized management, accurate acquisition, efficient processing, and timely transmission of logistics information. E-commerce platform technology is an important tool for online display, transaction, payment, and customer service functions. Data mining and analysis technology can provide decision support for collaborative development by collecting, processing, and analyzing big data to identify problems and opportunities in the supply chain.

Intelligent delivery technology can optimize the delivery process and improve delivery efficiency through intelligent scheduling, path planning, and loading optimization technologies, thereby reducing logistics costs and improving service quality (Liu, 2019). The Internet of Things technology can realize the intelligence of logistics equipment, the visualization of logistics processes, and the real-time transmission of information to improve the efficiency and accuracy of logistics operations (Schöder, Ding, & Campos, 2016). The application of these key technologies can make the collaborative development between urban logistics and e-commerce supply chains more efficient, accurate, and intelligent.

It should be pointed out that the continuous development and innovation of these technologies also provide broader space and greater potential for the collaborative development of urban logistics and e-commerce supply chains (Li & Zhao, 2019). In the future, with the continuous deepening application of logistics, information, and intelligent technologies, the collaborative development of urban logistics and e-commerce supply chains will become more closely integrated, efficient, and sustainable.

4. Advantages of Collaborative Development, Legal Value Issues and Countermeasures

4.1. Advantages of Collaborative Development

Collaborative development, as a new supply chain management method, has been widely applied and has significant advantages in the fields of urban logistics and e-commerce. This section will focus on the advantages of collaborative development, including improving efficiency, reducing costs, improving service quality, and promoting industrial development.

First, collaborative development can improve the efficiency of the logistics supply chain. In traditional logistics supply chain management, each link is often relatively independent and lacks collaboration and information sharing, leading to high logistics costs and low efficiency. Collaborative development can optimize the logistics supply chain through resource integration, process coordination, and other means, improve transportation and distribution efficiency, shorten delivery deadlines, and thus improve customer satisfaction.

Second, collaborative development can reduce logistics costs. Logistics costs are an important factor to consider in logistics supply chain management. Col-

laborative development can reduce duplication and lower logistics costs and improve the efficiency of the logistics supply chain through resource integration and information sharing. For example, sharing warehousing and distribution resources can avoid duplicate operations and waste in the warehousing and distribution processes.

Third, collaborative development can improve the quality of logistics services. The quality of logistics services is one of the important factors that customers consider when choosing logistics services (Zhu & Zhao, 2019). Collaborative development can improve the reliability, timeliness, and accuracy of logistics services through technology such as logistics informationization and intelligent distribution, thereby improving customer satisfaction.

Finally, collaborative development can promote the integration and development of urban logistics and e-commerce industries, expand the scale of the industry, and improve the industry's competitiveness. Urban logistics and e-commerce are interrelated and interdependent industries. The collaborative development of the two can form a virtuous cycle and improve the overall level of the industry.

In summary, collaborative development, as a new supply chain management method, has significant advantages in the fields of urban logistics and e-commerce. With the continuous development and innovation of logistics, information, and intelligent technologies, the advantages of collaborative development will be further exerted and demonstrated.

4.2. Legal Value Issues and Countermeasures of Collaborative Development

Collaborative development is a development model that integrates resources, optimizes processes, improves efficiency, and has many advantages such as improving the efficiency of the logistics supply chain, reducing costs, improving service quality, and promoting industrial development (Zhang & Jia, 2019). However, there are also a series of legal value issues that need to be particularly noted in the process of collaborative development.

First, data security is one of the key issues that need to be focused on in collaborative development. In the process of data sharing, the security and confidentiality of data need to be guaranteed, otherwise it may cause problems such as information leakage and data abuse. Therefore, for data security issues, encryption measures, access control, auditing, and other technical means can be used to ensure the security and confidentiality of data. At the same time, relevant data protection laws and regulations should be strictly followed, and the source, purpose, scope, and duration of data should be clearly defined to prevent data from being illegally obtained or abused. In practical applications, the importance of data security issues has been fully reflected. For example, some large Internet companies often face the risk of data leakage and abuse in the process of data sharing and collaborative development (Ding, 2021). Therefore, these companies

usually take a series of security measures, including encryption, access control, data backup, etc., to ensure the security and confidentiality of data. In addition, there is also a large amount of sensitive data in some government departments and financial institutions, so more stringent measures must be taken to ensure the security and confidentiality of data. These measures include encryption, permission management, auditing, data backup, etc., and it is necessary to strictly comply with relevant laws and regulations to ensure the legality and security of data. Therefore, in collaborative development, solving data security issues not only involves the development and interests of enterprises, but also affects the stability and development of society.

In addition, privacy protection is also an issue that needs to be taken seriously in collaborative development. In the process of information sharing, the privacy rights of users need to be protected, relevant privacy protection laws and regulations should be complied with, and personal information should be prevented from being illegally obtained or abused. For privacy protection issues, measures such as desensitization technology, data anonymization, and access control can be adopted to ensure the protection of personal privacy. At the same time, relevant privacy protection laws and regulations should be followed, users' privacy rights should be respected, and the scope and purpose of collecting and using personal information should be clearly defined, and users' personal information should not be disclosed without authorization. An example of the importance of privacy protection in collaborative development can be seen in the case of the social networking site Facebook. In 2018, it was revealed that a political consulting firm, Cambridge Analytica, had obtained personal data of millions of Facebook users without their consent and used it for political advertising purposes (Li & Zhao, 2019). This incident resulted in a massive public outcry and increased scrutiny of Facebook's data privacy practices. In response, Facebook has since implemented stricter data privacy policies and made changes to its platform to enhance user privacy. For example, they have introduced features that allow users to control their privacy settings more easily, and they have also implemented measures such as data encryption and data anonymization to protect user data from unauthorized access and misuse. These efforts have been recognized by privacy advocates and regulators, and they serve as a good example of how privacy protection can be effectively addressed in collaborative development. This case highlights the importance of ensuring that privacy protection is given sufficient attention in collaborative development, and that measures are in place to prevent unauthorized access and misuse of personal data. By implementing appropriate privacy protection measures, collaborative development can continue to reap its many benefits while ensuring the rights and privacy of users are respected and protected.

Furthermore, intellectual property rights are also one of the issues to be considered in collaborative development. In the process of resource integration, it is necessary to comply with relevant intellectual property laws and regulations,

protect the rights and interests of intellectual property owners, and avoid infringement of intellectual property. Therefore, in terms of intellectual property issues, all parties involved in collaborative development should comply with relevant intellectual property laws and regulations, protect the rights and interests of intellectual property owners, and avoid infringement of intellectual property. Intellectual property protection can be strengthened by establishing mechanisms for protecting intellectual property rights and clarifying the ownership and usage rights of intellectual property. An example of the importance of intellectual property rights in collaborative development can be seen in the technology industry. In the development of new technologies, companies often collaborate with other companies or research institutions to combine resources and expertise. However, without clear agreements and regulations regarding intellectual property rights, issues can arise related to ownership and usage rights of the technology developed. For example, in the past, there have been cases where a company developed a new technology with the help of another company, but the ownership of the technology was not clearly defined. This resulted in a legal dispute between the two companies over the ownership of the technology and the profits generated from it. Such disputes can not only harm the parties involved but can also hinder the development and progress of the technology industry as a whole. Therefore, it is essential for companies involved in collaborative development to establish mechanisms for protecting intellectual property rights, including clear agreements regarding ownership and usage rights. This can ensure that all parties involved are aware of their rights and responsibilities and can avoid disputes related to intellectual property rights. In this way, intellectual property rights protection can facilitate the smooth and efficient development of collaborative projects in the technology industry and other fields.

Finally, the issue of responsibility sharing is also one of the considerations in collaborative development. In the process of collaborative development, it is necessary to clarify the responsibilities and obligations of all parties, and ensure that they can jointly bear the responsibilities and risks. To this end, it is necessary to establish a mechanism for sharing responsibilities, clarify the scope and division of responsibilities of all parties, and ensure the stability and sustainability of the collaborative development process. A good example of the importance of responsibility sharing in collaborative development can be seen in the construction industry. In large-scale construction projects, such as the construction of a high-speed rail line, there are often multiple parties involved, including the project owner, design firm, construction company, and suppliers of materials and equipment (Chen, 2021). Each of these parties has its own responsibilities and obligations, and they need to work together to ensure the successful completion of the project. In this case, the project owner is responsible for providing the funding for the project, while the design firm is responsible for creating the design plans and specifications. The construction company is responsible for carrying out the construction work according to the design plans, while the suppli-

ers are responsible for providing the necessary materials and equipment. If any party fails to fulfill its responsibilities or if there are disputes between the parties, the project may be delayed or even fail. Therefore, in the construction industry, it is necessary to establish a mechanism for sharing responsibilities and clarifying the division of responsibilities among all parties involved. This mechanism should clearly define the scope of responsibilities of each party, establish a system for monitoring and controlling the quality of work, and provide a means for resolving disputes between the parties. By doing so, the stability and sustainability of the collaborative development process can be ensured, and the successful completion of the project can be guaranteed.

In summary, legal issues in collaborative development are an important guarantee for collaborative development. All parties need to comply with relevant laws and regulations, establish sound legal mechanisms, and ensure the legality and stability of collaborative development.

5. Conclusion and Outlook

This article explores the concept, models, and existing issues of collaborative development by analyzing the relationship between urban logistics and e-commerce supply chains. Through data sharing, resource integration, and other means, an organic and mutually reinforcing relationship can be established between urban logistics and e-commerce supply chains, achieving optimal resource allocation and overall benefits maximization. Collaborative development models include data sharing, logistics service outsourcing, and shared warehousing and distribution, which can effectively promote collaborative development between urban logistics and e-commerce supply chains.

In order to achieve collaborative development, advanced information technology and logistics technology are needed, such as logistics information technology, e-commerce platform technology, data mining and analysis technology, intelligent distribution technology, and the Internet of Things technology, to achieve goals such as information sharing, resource integration, and process coordination. At the same time, attention needs to be paid to the legal and value issues associated with collaborative development, especially those related to data security and intellectual property protection.

In the future, the continuous development and upgrading of urban logistics and e-commerce will drive the continuous improvement and innovation of collaborative development models and key technologies. Governments, enterprises, and society need to strengthen cooperation and communication to promote the collaborative development of urban logistics and e-commerce supply chains, and promote sustainable development of urban economy and society. The following aspects can be expected:

Firstly, logistics service outsourcing will become one of the important models of collaborative development between urban logistics and e-commerce supply chains, achieving mutual benefits through reasonable resource allocation and

process optimization.

Secondly, intelligent logistics technology will be further developed and applied, including automated warehousing and unmanned delivery, providing more effective support for the collaborative development of urban logistics and e-commerce supply chains.

Finally, governments and enterprises need to strengthen cooperation to promote the collaborative development of urban logistics and e-commerce supply chains. Governments can guide and regulate the market order by formulating relevant policies and regulations, while enterprises can achieve win-win cooperation, share resources and risks, and enhance market competitiveness and social responsibility.

In conclusion, the collaborative development of urban logistics and e-commerce supply chains is an important means of achieving optimal resource allocation and overall benefits maximization. To achieve collaborative development, advanced information technology and logistics technology are required, and attention should be paid to legal and value issues. In the future, logistics service outsourcing, intelligent logistics technology, and government-enterprise cooperation will become important models and support for the collaborative development of urban logistics and e-commerce supply chains (Zhang & Yan, 2019). Governments, enterprises, and society need to strengthen cooperation and communication to promote the collaborative development of urban logistics and e-commerce supply chains, and promote sustainable development of urban economy and society.

6. The Limitation of Research

While this article provides valuable insights into the concept and models of collaborative development between urban logistics and e-commerce supply chains, there are some limitations that should be addressed in future research. Firstly, the article mainly focuses on the benefits and challenges of collaborative development, but more empirical studies are needed to demonstrate the effectiveness and feasibility of various collaborative models in different contexts. Secondly, the article does not discuss the environmental impact of urban logistics and e-commerce supply chains, and how collaborative development can contribute to sustainability. Future research can explore the potential of collaborative development to reduce carbon emissions, optimize energy consumption, and promote eco-friendly practices. Finally, the article does not discuss the cultural and social factors that affect the implementation of collaborative development, such as trust, communication, and power dynamics. Future research can investigate how cultural and social factors influence the success or failure of collaborative development and identify strategies to overcome cultural barriers. Overall, further research is needed to explore the potential and limitations of collaborative development between urban logistics and e-commerce supply chains, and to provide practical guidance for policy makers and practitioners.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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