

Article

Enhancing City Logistics for Sustainable Development in Jordan: A Survey-Based Study

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Abstract: *Background:* The global concern for the environment and sustainable development goals has led to a growing focus on the increasing activities of city logistics. This research study aims to evaluate the current state of city logistics within the framework of sustainable development and analyze the key factors that impact the efficient management of city logistics in Jordan. *Methods:* To achieve these research objectives, a quantitative approach utilizing a survey questionnaire was employed. The findings emphasize a significant disparity between current practices in city logistics and desired outcomes, indicating an urgent need for improvement in cost reduction, enhancement of quality of life, and promotion of sustainability. *Results:* The results reveal that the performance of urban authorities in managing city logistics is influenced by various factors, including regulatory inefficiencies, suboptimal human resource performance, deficiencies in information systems, and challenges related to coordination amongst stakeholders. *Conclusions:* Consequently, this paper puts forth actionable recommendations for improving city logistics management, which involve amending existing regulations, implementing comprehensive training programs for employees, strengthening infrastructure for information systems, and fostering robust communication channels between urban authorities and stakeholders.

Keywords: city logistics; urban authorities; urban polices; quality of life; sustainable environment; Jordan



Citation: Alnsour, J.; Arabeyyat, A.R.; Al-Hyari, K.; Al-Bazaiah, S.A.I.; Aldweik, R. Enhancing City Logistics for Sustainable Development in Jordan: A Survey-Based Study. *Logistics* **2024**, *8*, 1. <https://doi.org/10.3390/logistics8010001>

Academic Editor: Robert Handfield

Received: 8 September 2023

Revised: 21 October 2023

Accepted: 28 November 2023

Published: 28 December 2023



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1. Introduction

Cities are centers of consumption that rely on the movement of people, transportation, and goods [1]. The modern urban environment is characterized by challenges in accessing basic services due to issues such as traffic congestion and inadequate infrastructure, which hinder the effectiveness of city logistics operations [2,3]. The quality of life in cities greatly depends on how well urban authorities manage these logistics. The transportation of goods within cities has resulted in various adverse effects, including environmental pollution (such as road congestion, air pollution, and noise), negative impacts on communities (such as accidents and decreased quality of life), and economic consequences (such as increased transport costs leading to higher prices for consumers) [4–6]. These issues are further compounded by the rapid pace of urbanization worldwide, particularly in Jordan, which places additional strain on city logistics. Given this context, it is crucial for urban authorities to improve logistics performance in order to minimize the negative environmental and socio-economic outcomes. Achieving this requires adequate funding availability, technological proficiency, effective urban strategies, and a skilled workforce within urban authorities.

Currently, major cities around the world are aiming for a sustainable environment, with a particular focus on sustainable energy to reduce CO₂ emissions [7]. Transportation is seen as crucial in achieving these goals [8]. The shift towards an energy-efficient urban transportation sector requires consideration of all aspects of urban planning, including

transportation and land use management [9–13]. While most research on urban development has focused on the transportation of people, there has been less study on the transportation of goods, services, and waste [14,15]. However, this trend is starting to change as cities face challenges such as road congestion, CO₂ emissions, and infrastructure quality [14,15]. For instance, many Western cities have implemented Sustainable Urban Mobility Plans (SUMP) to enhance the efficiency of their transport sectors and integrate different modes of mobility in a sustainable manner. SUMP offer innovative ideas and cost-effective measures to achieve sustainable urban logistics.

City logistics, an important aspect of urban logistics, involves making decisions on implementing measures, while urban logistics deals with adhering to the measures set by policymakers [16]. The available literature on city logistics can be categorized into two main areas: modeling approaches for managing city transportation and the decision-making context of urban authorities [16]. Numerous studies have concentrated on modeling approaches for managing city transportation by proposing potential solutions to facilitate the implementation of sustainable transport. By utilizing models such as multi-agent systems and multi-criteria decision-making methods, city logistics modeling proves to be an effective tool in addressing the challenges associated with stakeholders' behavior in urban logistics [17–23].

Urban authorities aim to improve the quality of life and promote sustainable urban development through various measures. These measures encompass different elements such as city logistics, regulatory preparedness, location planning for logistics, logistics operations, future prospects, financial considerations, and engagement with stakeholders [24,25].

The difficulties faced by urban authorities in managing city logistics in a sustainable way are discussed in this study. The complex relationship between stakeholders involved in city logistics, including urban authorities, freight carriers, manufacturers, shippers, and consumers [26–30], adds to the challenges. Therefore, the role of urban authorities goes beyond just establishing measures for city logistics, such as traffic control and information sharing. It also encompasses improving quality of life, promoting a sustainable environment, and enhancing socio-economic welfare [31].

The area of city logistics is intriguing in urban studies and plays a significant role in improving urban economies. However, according to researchers, it has been relatively neglected in the field of urban planning literature [32–34]. It is crucial to examine this topic, especially in Middle East countries like Jordan. Many scholars argue for the importance of an effective role in enhancing the efficiency of city logistics, which aligns with the ideas presented by [33–35]. These authors emphasize that addressing the activities related to city logistics carried out by urban authorities is essential for achieving efficient city logistics.

This paper aims to evaluate the activities of city logistics carried out by urban authorities in Jordan and investigate the factors that influence decision-making in city logistics. Analyzing city logistics within the context of Middle Eastern countries builds on previous research to provide a comprehensive analysis of how urban administrations manage city logistics problems, issues, and initiatives. This study seeks to address the following research questions: RQ1. What is the present state of city logistics in Jordan? RQ2. What factors impact the performance of urban administrations in managing city logistics? RQ3. What are potential solutions to overcome challenges in city logistics?

Improving the knowledge of Jordanian urban authorities and introducing effective policies for urban authorities in Middle Eastern countries can be achieved by addressing the difficulties they encounter in managing city logistics sustainably.

2. Literature Review and Hypotheses

Urbanization poses a significant challenge for city logistics in both developed and developing nations. The Urbanization Prospect Report 2018, published by the United Nations, predicts that 68% of the global population will reside in cities by 2050, with 90% of this urban population concentrated in developing countries [36]. However, developed countries have lower urban population densities compared to developing ones. As a

result, the management approach, strategies, solutions, and priorities for city logistics differ between these two types of countries. In developed nations, city logistics policies encompass various dimensions such as environmental protection, smart transportation, and parking systems to alleviate traffic congestion, preservation of historical heritage sites, and the utilization of advanced technology [37,38]. Conversely, policies in developing countries primarily focus on mitigating air pollution and reducing traffic congestion. Furthermore, the specific priorities and solutions for city logistics can vary across different countries due to natural factors like geography or climate conditions as well as socioeconomic considerations [39]. Therefore, comprehending the challenges faced by city logistics is crucial for devising effective solutions.

Research on city logistics in developing countries is lacking despite the fact that both developed and developing countries face similar problems, such as urbanization, traffic congestion, and environmental challenges [4,40]. The implementation of sustainable development initiatives can be viewed as an innovative approach to overcome these challenges and enhance the efficiency of managing city logistics for urban authorities. The goal of sustainable development initiatives is to mitigate the negative impacts of city logistics and improve quality of life [41]. According to Woudsma et al. [42], the spatial pattern of logistics is influenced by transportation accessibility, which in turn affects logistics costs. Therefore, the ability of urban authorities to manage transportation operations is greatly influenced by factors like spatial location, land use patterns, and trade movement [12]. Morana and Gonzalez-Feliu [43] have established a framework for assessing economic, environmental, and social aspects of sustainable city logistics using indicators. They discovered that there are variations in indicator selection between individuals, experts, and senior managers.

In Jordan, the population has now surpassed 11 million people, and the urbanization rate stands at 92% [44]. This rapid urbanization has led to a greater need for services, goods, and transportation. As a result, there has been an increase in CO₂ emissions, traffic congestion, and higher costs for city logistics [45]. Consequently, urban authorities are now facing a significant challenge in ensuring timely access to economic activities and markets.

Modes of transportation in city logistics encompass air, road, railway, and maritime. Air travel is the primary contributor to CO₂ emissions and incurs high costs. The accessibility of airports is crucial for city logistics, especially in the age of e-commerce. Airports not only serve as transportation hubs but also as significant nodes in the logistics network where goods and services are efficiently moved within urban areas. Previous studies highlight the significance of airports in facilitating the movement of goods, particularly in e-commerce activities [46]. E-commerce heavily relies on airports for swift and reliable distribution to meet customer demands. The concept of an “aerotropolis”, as described by Kasarda and Lindsay [47], emphasizes the evolving relationship between airports and urban development. An aerotropolis that includes airports, planned cities, and business hubs acts as a central hub for global integration and economic growth. With the rise of Industry 4.0 technologies worldwide, airports play an even greater role in supporting efficient city logistics [46]. Innovations like Industry 4.0 enable real-time information exchange and automation that enhance coordination and efficiency among various city logistic operations.

City logistics aims to achieve two important goals: enhancing the quality of life and promoting a sustainable urban environment [6,48]. The concept of quality of life refers to the extent to which a city has obtained the necessary conditions for happiness [31]. It is strongly influenced by the effective management of city logistics [49]. On the other hand, a sustainable urban environment focuses on minimizing negative outcomes resulting from transportation, such as pollution, vibration, and noise [50]. Urban authorities play a crucial role in achieving this objective by implementing innovative projects and combining existing resources in Western countries. Ultimately, their efforts control the environmental impact of transportation movements [2].

There is a significant amount of literature that suggests that when planning cities, managing infrastructure, and creating population policies, it is important to take into account the sustainable development of city logistics [51]. It is the responsibility of both the public and private sectors to provide logistics services. However, when stakeholders like freight carriers and shippers do not participate in the city planning process, it results in limited logistics services [52,53] and ineffective decision-making [54].

The concept of sustainable city logistics is influenced by various stakeholders [31,55–57]. These stakeholders include shippers, freight carriers, administrators, and residents [4,5]. Each stakeholder has their own interests and goals, which is why it is important to work towards improving the quality of life and creating a sustainable urban environment [5]. To ensure that cities are livable and the environment is sustainable, there needs to be coordination with logistics stakeholders and practical solutions to facilitate the movement of goods and residents [4]. Additionally, when implementing city logistics activities, it is essential to consider the following areas:

- Environmental domain: This includes concerns such as congestion, air pollution, and noise [55–58].
- Economic domain: Reducing logistics costs can lead to lower product prices [58–61].
- Social domain: Safety measures, raising awareness among residents, and providing information are all important factors in this aspect [2,4,11,62,63].

The development of city logistics depends on the crucial task of enhancing the quality of life and creating sustainable urban environments, as emphasized by [16,29,33,48,49]. The concept of an aerotropolis proposed by Kasarda and Lindsay [47] further highlights the significant role played by airports in shaping urban dynamics and logistics operations. Moreover, through the use of Industry 4.0 technologies, smart cities are able to address environmental, social, and governance goals, thereby promoting greater sustainability, as pointed out by [47].

In order to accomplish environmental, economic, and social goals, it is important to consider the following measures for implementing city logistics: supply management measures (such as access, time, nodes, and distribution); demand management through coordination and cooperation to increase load aggregation; the direct impact of a city logistics information system (CLIS) on the performance of city logistics activities [64]; public-private collaboration where stakeholders with different interests, goals, and risks come together; and reverse logistics that encompass all stages from product return to recycling [48].

The decision-making process plays a crucial role in sustainable city logistics, according to the model presented. However, this process is influenced by various factors within urban authorities, such as coordination, legal considerations, human resource performance, information technology, and financial situation [65]. Evaluating these factors and their impact on decision-making is important for understanding the interaction among stakeholders. Currently, there is limited literature that assesses the role of these factors in the decision-making process [66–68]. Examining multiple factors that influence urban logistics decision-making has become a significant area of research in urban logistics [66–68].

The level of collaboration between urban authorities and stakeholders to address problems through effective communication is known as coordination [65]. Effective communication involves continuous and timely interaction, as well as a high degree of responsiveness. Communication networks that facilitate effective coordination include regular meetings, ongoing and timely communication, prompt problem-solving, and up-to-date information exchange [69]. Therefore, efficient coordination allows for informed decision-making and the identification of strengths and weaknesses in city logistics activities [26].

Hypothesis 1 can be formulated as follows, as effective coordination plays a vital role in shaping the decision-making process within city logistics operations. This coordination involves smooth collaboration among urban authorities, manufacturers, carriers, shippers, and other pertinent entities [69]. It affects the efficient distribution of resources, timely sharing of information, and seamless movement of goods [69].

Hypothesis 1. *The level of coordination has a significant impact on managing city logistics undertaken by urban authorities.*

Holding effective coordination among stakeholders is crucial for achieving sustainable urban logistics, as highlighted by Kasarda and Lindsay [47]. Adapting laws and regulations becomes necessary to accommodate the changing urban mobility models driven by vehicle autonomy, crowdsourced logistics, and micro-consolidation centers, as mentioned by Taniguchi et al. [57]. The significance of regulatory considerations is further emphasized by Florido-Benítez's study [46], which identifies the evolving role of airports as integral logistic hubs. Laws and regulations establish a regulatory framework for city logistics activities, guiding emissions standards, land-use controls, and transport management systems. They play a vital role in ensuring sustainability and efficiency in the movement of urban freight. Therefore, hypothesis 2 can be formulated as follows.

Hypothesis 2. *Laws and regulations have a significant impact on managing city logistics undertaken by urban authorities.*

The efficiency and effectiveness of city logistics initiatives can be influenced by the performance of human resources, as discussed in Ambrosino [28]. Additionally, Fossheim et al. [29] mention that Industry 4.0 technologies have the potential to enhance workforce dynamics, streamline operations, and improve urban logistics management. The performance of human resources within urban authorities plays a significant role in the efficacy of city logistics management by impacting strategic planning, risk assessment, and the identification of common values among stakeholders. When human resources perform well, it facilitates effective coordination between stakeholders through knowledge sharing and interrelationships. Therefore, we can propose the following hypothesis:

Hypothesis 3. *Human resource performance has a significant impact on managing city logistics undertaken by urban authorities.*

According to Taniguchi [57], city logistics information systems (CLIS) are important tools for exchanging real-time information, supporting decision-making, and optimizing urban logistics processes. The digitalization of city logistics through Industry 4.0 technologies leads to integrated ESG-focused solutions, as reported by Russo and Comi [55]. CLIS plays a crucial role in enabling efficient urban freight movement by facilitating the exchange of real-time data and improving overall performance [2,4,26,27,45]. Therefore, it is possible to propose the following hypotheses.

Hypothesis 4. *CLIS has a significant impact on managing city logistics undertaken by urban authorities.*

The study by Katsela et al. in 2019 [22] highlights how the financial context greatly impacts decision-making in city logistics efforts. The emergence of Industry 4.0 technologies presents a new opportunity to optimize logistic investments, considering factors such as Gross Domestic Product, Foreign Direct Investments, and Employment Rate, as discussed in Ferrari et al.'s research in 2023 [64]. Adequate financial resources are crucial for implementing effective city logistics measures like addressing logistical challenges and investing in infrastructure while promoting sustainable practices [5,7,12,17]. Analyzing the influence of financial situations on decision-making provides valuable insights into the relationship between financial support and successful logistics management, which is essential for understanding city logistic performance [59–61]. As a result, we can propose the following hypothesis.

Hypothesis 5. *Financial resources have a significant impact on managing city logistics undertaken by urban authorities.*

3. Methods and Materials

3.1. Measurement of Variables and Reliability

We used established Likert scale measures for each variable in our study to ensure a thorough evaluation of the main concepts. This approach was chosen because of its effectiveness in capturing detailed responses and providing reliable measurements. More information about the measurement and reliability testing of variables can be found in Table 1. The dependent variable is the management process outcomes for city logistics, specifically the decision-making process. According to [31], this variable is assessed using eight items, including congestion levels throughout the day, heavy goods vehicle levels, noise levels from traffic, CO₂ emissions from traffic, road safety related to freight transport, sufficiency of parking spaces, and problems with unloading/loading vehicles carrying heavy goods. Information systems are measured based on [70,71] using ten items that evaluate aspects such as sufficient information links and databases for city logistics, reliability, accuracy, validity, clarity, timely updates, ease of use and access, credible sources, and security. Coordination is assessed based on [72] through six items that consider communication between urban authorities (extent and timeliness), information accuracy between urban authorities, and goal sharing among stakeholders' knowledge participation in problem-solving efforts. Laws and regulations are evaluated using a scale consisting of eight items derived from [73,74]. These items assess laws' flexibility compatibility across institutions, updatedness, and comprehensiveness of environmental impact mitigation solutions for reducing logistics costs and autonomy of local authorities, enhancing sustainable development. Human resource performance is evaluated based on nine items from [75]. These include work standards, timeliness, speed achievement, budgetary constraints, trust between managers and employees' incentives, training programs' contribution to a positive culture, and ease of communication between employees and managers. The financial situation is measured by seven items based on [76]: general financial condition, funds availability plans, finance credit rating loans over the past five years, ability to transfer budget surplus, and maintain current employee benefits.

Table 1. Study variables, measurement, and reliability.

Variables	Source	Items No.	Alpha Value
Decision-Making Process	[31]	10	0.854
Information Systems	[70,71]	8	0.835
Coordination	[72]	6	0.914
Laws and Regulations	[73,74]	9	0.871
Human Resource Performance	[75]	9	0.881
Financial Situation	[76]	7	0.861

3.2. Research Design and Data Collection

The research concentrated on the governmental subdivisions in Jordan, including twelve governorates. These governorates are made up of larger municipalities, smaller municipalities, and decentralization councils that have leaders chosen by the people. The Amman and Aqaba governorates have unique governance systems that differ from the rest.

The study objectives were achieved through the use of a quantitative method, which involved conducting a cross-sectional survey. Previous research has successfully used surveys to assess the role of local authorities in city logistics (references [31,77,78]). To ensure the validity of our survey instrument, experts and academics were involved in a pretesting phase. The questionnaire was then distributed to urban authorities and stakeholders who were identified. The survey consisted of five sections that measured specific variables: decision-making processes, coordination efforts, laws and regulations, human resource performance, and financial situations. Each section included carefully crafted items designed to capture nuances related to the corresponding variable. The

target population for this study included various individuals involved in city logistics activities across Jordan, such as mayors, directors, managers, experts, council members, and stakeholders directly engaged in planning and executing city logistics. A comprehensive list of urban authorities and relevant stakeholders was compiled, resulting in a total population of 359 potential respondents. The survey questionnaire was distributed electronically via email to the identified target groups who were invited to participate in the study. From April to December 2022, a total of 197 completed questionnaires were returned, with a response rate of approximately 55%. Table 2 provides more details on the response rate.

Table 2. Research Sample.

Urban Authorities	Sent Questionnaires	Received Questionnaires
Greater Municipalities	90	52
Aqaba Company for Ports Operation and Management	20	11
ASEZA	33	16
Aqaba Development Corporation (ADC)	12	09
The Ministry of Transport	25	10
Aqaba Railway Corporation	05	02
Arab bridge Maritime	05	01
Jordan-Hijaz Railway Corporation	04	02
Land Transport Regulatory Commission	10	04
Civil Aviation Regulatory Commission	08	03
The Jordanian-Syrian Land Transport Corporation	07	04
Stakeholders/fright careers and shippers	140	83
Total	359	197

4. Results and Discussion

The examination of the socio-economic traits of a group aided in comprehending the challenges related to city logistics. These characteristics play a significant role in developing policies for city logistics. Findings reveal that respondents differ greatly in terms of their experience, occupation, education, age, and gender. A summary of the sample's characteristics is provided in Table 3.

Table 3. Sample Characteristics.

Characteristics	Average/Percentages		
Experience	Average: 11 years		
Education	Diploma 11%	Undergraduate 81%	Postgraduate 8%
Age	Average: 46 Years		
Sex	Male 67%	Female 33%	

4.1. Current Status of City Logistics

Table 4 indicates that there are difficulties concerning traffic congestion, noise levels, environmental pollution, road safety, adequacy of parking spaces, and issues with loading and unloading heavy goods vehicles within the city. These challenges have adverse effects on the overall quality of life. Nevertheless, the impact of these challenges can differ from one governorate to another as it is primarily concentrated in the four main Jordanian governorates: Amman, Aqaba, Irbid, and Zarqa. This concentration is largely due to the high presence of transportation services and industries in these areas. However, it should be noted that these four governorates only account for 78.6% of Jordan's total population [35].

The presence of traffic congestion in urban areas has been confirmed by research findings. This issue is closely linked to the expansion of city logistics operations. Consequently, there has been a noticeable increase in the number of vehicles owned by individuals working in the logistics industry.

Table 4. Current Status of City Logistics.

Items	Very Low	Low	Moderate	High	Very High
The level of congestion during peak periods in the city	0.0	0.0	15%	64%	21%
The level of congestion in most of the day in the city	0.0	0.0	81%	19%	0.0
The level of heavy goods vehicles in the city	0.0	0.0	22%	61%	16%
The level of noise in the city resulting from traffic	0.0	0.0	68%	32%	0.0%
The level of CO ₂ emissions due to traffic in the city	0.0	0.0	78%	22%	0.0
The level of road safety due to freight transport	0.0	24%	76%	0.0	0.0
The level of sufficiency of parking spaces in the city	61%	39%	0.0	0.0	0.0
The level of problems with unloading/loading vehicles carrying heavy goods in the city	0.0	0.0	17%	65%	18%

A significant proportion of large trucks contribute to traffic congestion in cities, based on research findings. This congestion is characterized by slower speeds and longer travel times, resulting in increased energy consumption, CO₂ emissions, and noise levels. Despite evidence indicating that CO₂ levels in Jordanian cities are relatively low, there are currently no measures implemented by urban authorities to address city logistics and reduce future CO₂ emissions. The results also indicate that freight transportation plays a major role in ensuring satisfactory road safety standards, suggesting that urban authorities have not established sufficient regulations for safe city logistics activities. In addition, the lack of adequate parking spaces within cities is identified as a crucial issue in managing city logistics, which has been overlooked by urban authorities. Furthermore, unloading and loading heavy trucks within cities pose a problem that has not been considered in existing city logistics measures.

The current methods of managing city logistics are not beneficial because they do not decrease costs or enhance quality of life and sustainability. Consequently, the goods distribution systems employed by urban authorities are inadequate.

4.2. Factors Affecting the Decision-Making Process of City Logistics

Table 5 presents important data regarding the multiple regression model. It displays the value of R, which represents the multiple correlation coefficient between the independent variables and the dependent variable. The R² value for this model is 0.665, indicating that the five included variables account for 44.2% of the variation in the dependent variable. The adjusted R² value (0.434) is similar to R². Additionally, Table 5 shows that the model causes a change in R from zero to 0.665, resulting in a significant F-ratio of 69.745 ($p < 0.05$).

Table 5. Regression Model.

Independent Variables	Non-Standardized Coefficients		Standardized Coefficients	T-Value	Sig.	Tolerance	VIF
	B	Std. Error	Beta				
Constant	0.561	0.184	-	3.050	0.002	-	-
Coordination	0.193	0.043	0.150	4.450	0.000	0.629	1.590
Law and Regulations	0.002	0.000	0.225	7.880	0.000	0.882	1.134
Human Resource Performance	0.114	0.039	0.102	2.940	0.003	0.597	1.674
Information Technology	0.190	0.049	0.175	3.854	0.000	0.348	2.876
Financial Situation	0.032	0.037	0.038	0.877	0.381	0.473	2.627
R = 0.665							
R ² = 0.442							
Adjusted R ² = 0.434							
F = 69.745	Sig.	0.000					

No evidence of multicollinearity was found in Table 5, as there were no strong correlations, VIFs below the accepted threshold of 10, or tolerance values below 0.2. Therefore, the presence of multicollinearity cannot be supported.

The statistics relating to hypothesis 1 in this study show that the extent of coordination between stakeholders and urban authorities has a direct impact on the decision-making process in city logistics, with a beta of 0.150 (t -value = 4.450). The result is supported at the 0.05 significance level. It seems that the extent of coordination between stakeholders does not achieve the expected results since current coordination channels do not provide opportunities to increase financial returns through logistics. The findings suggest that Jordanian urban authorities are unable to create effective coordination channels between stakeholders. A number of studies, such as those done by [34,62], discussed the importance of coordination between stakeholders in improving the decision-making process in city logistics management. Empirical results imply that urban authorities are unable to increase the economic benefits of city logistics. Cost and benefit allocation in city logistics is a real challenge [79], but effective coordination among various stakeholders reduces costs and increases benefits [55]. Reasons for a lack of coordination may relate to a lack of stakeholders' participation themselves [74], which makes the decision-making process ineffective. Another reason is that the management of city logistics deals with multi-sectoral actions and policies that could appear separately, requiring an advanced level of coordination. Urban policies do not provide a holistic framework for urban authorities to efficiently manage city logistics at multi-sectoral levels. In addition, there is an unreality of roles and responsibilities since most urban authorities have dissimilar policies with similar roles. Therefore, it is not possible to effectively manage city logistics without using unified, collaborative channels of policies and programs. The results suggest that the interaction between stakeholders is lacking, which increases the challenges of city logistics. As a result, it can be concluded that the urban authorities do not have sufficient knowledge concerning the challenges of the realization of logistics activities in the city, while the logistics service providers did not adequately improve awareness of the priority to achieve sustainable development supported by the urban authorities.

The findings in Table 5, relating to Hypothesis 2, illustrate that laws and regulations undertaken by urban authorities have a direct impact on the decision-making process in city logistics, with a beta of 0.225 (t -value = 7.880). The empirical result is supported at the 0.05 significance level. It seems that laws and regulations are relatively irrelevant when it comes to increasing the performance of city logistics since current laws and regulations provide opportunities for non-diversification of services and a lack of financial returns. Several studies found a significant association between laws and regulations and the current status of city logistics, such as [19,20]. In fact, urban authorities do not have a holistic policy for city logistics. Laws governing city logistics and regulations pertaining to urban freight transport are typically outdated. Restrictive standards regarding the load capacities of vehicles and times for accessing a specific urban zone have been in place for more than 20 years and have not changed in spite of global developments in city logistics systems. Furthermore, the regulations are mostly non-unified and might be contradictory among institutions. For instance, Jordanian Aqaba City, which is one of the most important logistical cities in the Middle East, has various authorities responsible for managing logistics, such as the Aqaba Company for Port Operations and Management, the Aqaba Development Corporation, the Aqaba Special Economic Zone Authority, the Aqaba Corporation for Transportation, and Customs. In addition, outdated laws and regulations have continuously created contradictions between strategies and policies developed by urban authorities to manage city logistics. Therefore, current laws and regulations do not create an effective decision-making process and do not define the priorities of city logistics efficiently.

Empirical findings relating to hypothesis 3 in Table 5 illustrate that human resource performance in urban authorities has a direct impact on the decision-making process in city logistics, with a beta of 0.102 (t -value = 2.940). The regression result is supported

at the 0.05 significance level. The results imply that urban authorities, along with the current performance of human resources, are unable to manage city logistics effectively. These findings agree with the study of [63,75,80,81], who argued that performance in managing city logistics is related to the performance of human resources. Urban authorities do not have sufficient funds to improve the performance of human resources in terms of incentives and the quality of training programs, either technically or administratively. The lack of incentives and high-quality training hinders innovation and best practices. Furthermore, strategies, regulations, practices, and systems of human resource management vary from one urban authority to another, leading to variations in performance among related authorities. Thus, empirical findings show that current human resources are unable to provide a more effective intervening role when encountering city logistics problems.

The results of the study regarding hypothesis 4 in Table 5 indicate that when urban authorities engage in CLIS, it directly affects the decision-making process in city logistics. The beta value is 0.175 (t-value = 3.854), and this finding is statistically significant at the 0.05 level. The findings suggest that urban authorities do not possess a comprehensive CLIS, which means they have limited effectiveness in managing large-scale city logistics and lack sufficient information technology for this purpose. These findings align with previous research [82–84], which has shown a relationship between city logistics and the level of information technology used by institutions. The empirical findings imply that there is a relative dearth of updated and relevant information on city logistics, urban growth dynamics, and information technology systems. The techniques employed to diagnose logistics issues, regulate solutions, plan for future expansions, and conduct follow-up assessments are not efficient due to a lack of detailed data availability. Furthermore, the current situation of city logistics is exacerbated by a lack of shared information among urban authorities.

The data in Table 5 regarding hypothesis 5 reveals that the financial status of urban authorities does not have a direct influence on the decision-making process in city logistics. The beta coefficient is 0.037 (t-value = 0.38). However, this regression outcome does not receive support at the significance level of 0.05. This empirical discovery suggests that the financial situation of urban authorities has no impact on their ability to manage city logistics efficiently and at reduced expenses.

5. Conclusions

The study's discoveries have significance for both theory and practice. From a theoretical perspective, this research is unique in that it was conducted in a non-western setting within the city logistics industry. In the Middle Eastern region, particularly in Jordan, there is a scarcity of research on city logistics.

Our findings offer valuable insights for policymakers regarding the importance of city logistics management. The city logistics sector in Jordan can benefit from our findings, particularly in terms of coordination channels, laws and regulations, human resource performance, and CLIS (City Logistics Information Systems). Policymakers should address the challenges faced by these components to improve the performance of urban authorities. Therefore, practitioners need to thoroughly assess the socio-economic attributes of the local workforce and stakeholders before developing targeted policies and strategies. It is also necessary to recalibrate existing regulations based on insights gained from our empirical findings in order to maximize financial returns through diversified services. Workforce development should be prioritized by investing in training programs that equip personnel with the necessary skills for efficient city logistics management while embracing technological integration through a robust CLIS infrastructure. Furthermore, practitioners are encouraged to adopt information technology to enhance diagnostics, solution regulations, expansion planning, and assessment. Advanced information technology systems can facilitate a more cohesive and efficient logistics landscape orchestrated by urban authorities. Successful city logistics management relies on collaborative efforts across departments and sectors. Practitioners can leverage the insights provided by our study to foster improved

coordination beyond traditional silos, unifying policies, programs, and priorities. Ultimately, this study has significant potential to reshape the city logistics landscape towards enhanced operational efficiency, regulatory finesse, technological integration, and collaborative prowess. By adopting these actionable insights within organizational settings, a more sustainable and efficient urban logistic paradigm can be achieved. This transformative journey will revolutionize the city logistics domain towards a prosperous future through championing collaborative endeavors that promote shared information exchange alongside synchronized policy formulation efforts for seamless implementation purposes.

The assessment of city logistics in Jordan offers valuable information for policymakers. It highlights the difficulties faced, such as traffic congestion, noise pollution, and inadequate parking spaces. Additionally, there are issues with unloading heavy goods from vehicles in urban areas. These challenges pose obstacles to achieving sustainable development goals. Therefore, it is crucial to address sustainability concerns by implementing effective interventions.

The study has several limitations. It primarily focuses on managing city logistics in Jordan, which limits its scope. The study relies on quantitative methods, which hinders understanding. Therefore, future research should utilize qualitative methods for better interpretation of city logistics. The methodology used in this study prevents the researchers from establishing cause-effect relationships between tested variables. Therefore, future studies should consider longitudinal research. Additionally, this study only examines a specific set of variables, including coordination, laws and regulations, human resource performance, CLIS, and financial situation. It is important for future studies to consider other variables, such as smart logistics, innovation, and organizational culture.

Author Contributions: Conceptualization, J.A.; methodology, K.A.-H.; validation, A.R.A.; formal analysis S.A.I.A.-B. and R.A.; writing—original draft preparation, J.A. and A.R.A.; writing—review and editing S.A.I.A.-B. and R.A.; supervision, J.A. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: The data presented in this paper are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflict of interest.

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