



STUDY AND ANALYSIS OF FACTORS INFLUENCING THE SELECTION OF LOGISTIC AREAS SITES ACASE STUDY: ALEXANDRIA REGION

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ABSTRACT

Logistic zones constitute a fundamental pillar in comprehensive development due to their effective role in economic, social, and urban development. Rigorous scrutiny in selecting the appropriate location for these zones is of utmost importance to ensure maximum benefit from logistic operations. Therefore, professionals and researchers in this field must precisely understand and analyze the influencing factors in the selection process of logistic zone locations. This research aims to study and analyze the factors influencing the selection of logistic zone locations and comprehend their impact on the performance of the supply chain and the integration of logistic operations. The study is applied to the provinces comprising the Alexandria region. This helps in making accurate strategic decisions regarding the identification of logistic locations that effectively meet the needs of companies and clients, thereby enhancing the efficiency and profitability of transportation and distribution operations. The research methodology relies on the review approach to identify the key factors influencing the selection of logistic zone locations. Additionally, it incorporates previous studies conducted in this field. The relevant factors and variables related to the logistic zone locations in the Alexandria region are described. Analytical methodology is employed to illustrate the relationships between various factors and expected impacts, utilizing statistical methods to examine correlations and effects. The research has yielded several results, indicating that the Alexandria region possesses multiple attributes making it suitable for establishing logistic zones, according to the suitability ratios identified as indicators. Logistic zones can be established in the Alexandria Governorate with a percentage of 43.2%, in Matrouh Governorate with 31.8%, and in Beheira Governorate with 16.6%. The results of correlation analysis using SPSS software show a strong proportional relationship between the capability of the Alexandria region to establish logistic zones and the diversity of transportation means, the percentage of those employed in transportation and storage, as well as communication and energy networks. Additionally, the outstanding strategic location of the region enhances its effectiveness as a center for logistic activities.

KEYWORDS: Logistic Zone – Logistic Corridors – Multimodal Transportation – Logistic Sustainability.

دراسة وتحليل العوامل المؤثرة في اختيار مواقع المناطق اللوجستية حالة دراسية إقليم الإسكندرية

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المخلص

تمثل المناطق اللوجستية أحد الركائز الأساسية في التنمية الشاملة لما لها من دور فعال في التنمية الاقتصادية والاجتماعية والعمرانية، ويمثل التدقيق في اختيار الموقع المناسب لها أمراً بالغ الأهمية لضمان تحقيق أقصى استفادة من العمليات اللوجستية، لذلك يتعين على المهنيين والباحثين في هذا المجال فهم وتحليل العوامل المؤثرة في عملية اختيار مواقع المناطق اللوجستية بدقة. ويهدف البحث إلى دراسة وتحليل العوامل المؤثرة في اختيار مواقع المناطق اللوجستية، وفهم كيفية تأثيرها على أداء سلسلة التوريد وتكامل العمليات اللوجستية مع التطبيق على المحافظات المكونة لإقليم الإسكندرية، إذ يساعد ذلك في القدرة على اتخاذ قرارات استراتيجية دقيقة فيما يتعلق بتحديد المواقع اللوجستية التي تلبي احتياجات الشركات والعملاء بشكل فعال، وبالتالي تعزيز كفاءة وربحية عمليات النقل والتوزيع، وتعتمد منهجية البحث على المنهج الاستقرائي للتعرف على أهم العوامل المؤثرة في اختيار مواقع المناطق اللوجستية، وبعض الدراسات السابقة التي تمت في هذا المجال، بالإضافة إلى توصيف العوامل والمتغيرات ذات الصلة بمواقع المناطق اللوجستية في إقليم الإسكندرية، كما تم استخدام المنهج التحليلي لتوضيح العلاقات بين مختلف العوامل والتأثيرات المتوقعة مع استخدام الأساليب الإحصائية لفحص الارتباطات والتأثيرات. وتوصل البحث إلى العديد من النتائج والتي منها أن إقليم الإسكندرية يتمتع بعدة مقومات تجعله مناسباً لإقامة مناطق لوجستية وفقاً لنسب الملاءمة التي تم رصدها كؤشرات حيث يمكن إقامة مناطق لوجستية في محافظة الإسكندرية بنسبة ٤٣.٢٪، وفي محافظة مطروح بنسبة ٣١.٨٪، وفي محافظة البحيرة بنسبة ١٦.٦٪، وتشير نتائج تحليل الارتباط بين المتغيرات اللوجستية في الإقليم باستخدام برنامج SPSS أن هناك علاقة تناسب قوية بين قدرة إقليم الإسكندرية على إقامة مناطق لوجستية وتنوع وسائل النقل، ونسبة المشتغلين بالنقل والتخزين، وشبكات الاتصالات والطاقة، هذا بالإضافة إلى الموقع الإستراتيجي المتميز للإقليم مما يعزز فاعليته كمرکز للنشاطات اللوجستية.

الكلمات المفتاحية: المنطقة اللوجستية، الممرات اللوجستية، النقل متعدد الوسائط، الاستدامة اللوجستية.

1. INTRODUCTION

Logistic zones are a key factor significantly influencing the efficiency and effectiveness of the supply chain, playing a crucial role in improving transportation, storage, and product distribution processes. The strategic decision of selecting locations for establishing logistic zones requires a thorough analysis of various influencing factors.

Studying the analysis of factors affecting the choice of logistic zone locations is essential for understanding the challenges and opportunities available to companies and organizations in this context. This research aims to analyze these factors and understand their impact on the process of selecting logistic zone locations.

The research provides a comprehensive overview of a variety of factors influencing the choice of logistic zone locations, including geographic location, market accessibility, and transportation infrastructure. Environmental and sustainability factors, increasingly important in logistic site selection, are also reviewed.

Drawing on recognized sources and previous research in the field of logistics, as well as studying experiences of cities in establishing logistic zones such as Paris, France, the study identifies the factors influencing the choice of logistic zone locations. This analysis will be applied to the Alexandria region to assess its potential for establishing logistic zones.

This research contributes to enhancing the understanding of companies and logistics professionals regarding the importance of analyzing the factors influencing the selection of logistic zone locations and their impact on the performance of the supply chain and business operations in general.

In today's complex and ever-changing economic landscape, supply chain and logistics management play a crucial role in achieving competitiveness and sustainable success for companies and institutions. Choosing the location of a logistics area remains a complex strategic decision that requires careful analysis of the multiple factors that influence this choice.

In the context of the evolving global market and the complexities of modern supply chains, the importance of logistics emerges as a strategic factor for the success of companies and achieving strong competitiveness. Among the success factors in this context, the selection of logistic zone locations stands out as a crucial strategic decision that affects the flow of materials and products, as well as production and distribution costs. Companies face numerous challenges in determining the ideal location for logistic zones, making this topic worthy of a detailed analysis to understand the influencing factors in this strategic decision.

This research aims to Analyze the factors influencing the selection of logistic zone locations and understand their impact on the efficiency of the supply chain and company performance. Shed light on the challenges and opportunities that companies may encounter when choosing logistic zone locations.

So the research assumes The presence of strong infrastructure and efficient communication networks, along proximity to ports and international borders, contributes to determining optimal logistic zone locations, and Government policies and guidance can influence the selection of logistic zone locations.

2. Research Methodology and context

The methodology is embodied in the following :

- First Stage: Reviewing literature and references that explain the concept of logistic zones, their importance in the global economy, as well as clarifying the general concept of sustainable logistic services. Additionally, understanding the concept of supply chains in logistic zones, aiming to deliver the final product to the consumer quickly and cost-effectively. The review also included clarifying the influencing factors in choosing logistic zone locations, such as geographic location, road networks, and infrastructure. In this step, the deductive and inductive methods were used.

- Second Stage: Studying and analyzing several global experiences, including logistic zones in Paris, Turkey, China, and Vietnam. The goal was to identify the influencing factors in choosing locations for these zones and apply them to the provinces constituting the Alexandria region. In this step, the analytical descriptive method was used.

- Third Stage: Applied study on the Alexandria region, listing logistic focal points such as road networks, ports, airports, transportation means, and human resources. Comparing them with factors derived from global experiences to assess its readiness to establish logistic zones. In this step, the descriptive and applied methods were used.

- Fourth Stage: Results and Recommendations, concluding the methodology with the analysis of research results and conclusions. Recommendations are prepared based on a comprehensive understanding of the factors influencing the selection of logistic zone locations.

3. Theoretical Concepts of Research

3-1 Concept of Logistic Zones

Logistic zones comprise a set of activities related to the distribution of goods, such as distribution centers, transportation, and support services within a specific and often planned area [1]. In 1991, the Markets Council, a trade organization founded in the United States, defined logistic zones as the process of planning, executing, and controlling the necessary and effective flow and storage of goods, services, and related information from the point of origin to the point of consumption to satisfy consumer requirements [2]. Logistic services play a vital role in managing the flow of various resources, such as energy and goods, from the production area to the consumer. Professional logistic support is essential for executing these tasks, playing a key role in enhancing and supporting economic growth within a country[3].

3-2 Importance of Logistic Services in the Global Economy

Logistic services the backbone of global economy, playing a vital role in the smooth flow of goods and services from suppliers to manufacturers, distributors, retailers, and ultimately to end consumers. They reduce lead times, improve inventory management, reduce operating costs, thus enhancing the overall efficiency of the supply chain. In addition, effective logistic services facilitate trade by connecting markets and countries through efficient logistic infrastructure, such as ports and airports, easing customs procedures, enabling global trade and economic integration. They contribute significantly to job creation worldwide, provide essential support to various industries, maintain their operations and productivity, stimulate economic growth by facilitating trade, investment, and consumption. Moreover, effective logistic services contribute to environmental sustainability by reducing carbon emissions and environmental impact[4].

3-3 Sustainable Logistics

Sustainable logistics can be described as an integrated transformation of logistics strategies, structures, processes, and systems towards the rational and efficient use of resources in supply chain activities. It encompasses the entire product lifecycle, starting from the supply of raw materials to transformation processes, storage, packaging, distribution, and end-of-life product management. Sustainable logistics has become increasingly important in transitioning from a linear economic model (relying on extraction, transformation, distribution, and consumption cycles) to a circular model aiming to extend the lifespan of products and optimize resource usage over time[5].

3-4 Concept of Supply Chains in Logistic Zones

Supply chains refer to the comprehensive system that includes all the operations and activities involving the transformation of raw materials into finished products and

their delivery to customers. It is related to how the processes of transporting and distributing materials and goods from suppliers to customers and target markets are organized and managed through logistic zones. Supply chains aim to ensure coordination and efficiency in all stages of the product or goods lifecycle throughout the supply chain. This includes inventory management, transportation and distribution management, demand management, collaboration with suppliers and customers, and performance evaluation. The supply chain sector participating in obtaining the final product from the manufacturer to the consumer is referred to as distribution channel [6].

4. Review and Analysis Logistic Zone Site Selection Factors

4-1 Geographic Location

The geographic location of a logistic zone significantly impacts its efficiency and logistic performance. It can have a substantial effect on transportation costs, delivery times, and communication with customers and suppliers. Optimal selection of logistic zone locations is a crucial factor in facilitating access to customers and target markets, reducing delivery times, improving supply chain efficiency, saving transportation costs near major transportation hubs such as ports, airports, and main road networks. This contributes to lowering infrastructure costs, streamlining logistic operations, reducing environmental impact, and achieving environmental sustainability principles. It supports future expansion strategies for the region, either by increasing storage capacity or expanding services, and minimizes exposure to security issues or disruptions. In summary, the distinctive geographic location of a logistic zone is a critical factor in its success, influencing supply chains and overall company performance [7].

4-2 Road Network as a Fundamental Pillar of Logistic Infrastructure

The road network serves as a fundamental pillar of logistic infrastructure, playing a crucial role in facilitating the movement of goods and providing effective access to key locations. This network significantly contributes to enhancing the efficiency of the supply chain and improving the performance of logistic zones. Its primary role is in connecting logistic zones to raw material sources and target goods, facilitating the efficient movement, storage, and transportation of goods, reducing transportation costs, and saving time. The road and land transport infrastructure is a key element in improving logistic facilities, playing a vital role in easing and speeding up transportation operations. This contributes to economic development, job creation, emphasizing the importance of effectively investing resources in developing infrastructure and improving transportation means to address diverse challenges in the shipping industry, enhancing competitiveness, and achieving sustainable development [8].

4-3 Accessibility

Transportation costs are a key component of overall logistics expenses, and accessibility is a crucial factor determined by proximity to railway stations, ports, road networks, and customer locations. The presence of multimodal railway stations is highly significant for logistic zones aspiring to function as inland ports. Accessibility varies depending on the logistics zone's purpose, with a preference for locations along routes to major consumer markets for import-focused zones. For export-oriented zones, proximity to major transportation hubs, particularly ports, is ideal. Regardless of the focus, the zone should represent a significant market in terms of production and consumption. Given the rising importance of final distribution costs, especially the "last mile," being closer to transportation hubs becomes critical to mitigate increased costs over distance. Temporary accessibility is also essential, ensuring that the logistic zone can be accessed 24/7 for better adaptability in supply chain management[9].

5. Experiences of Some Countries in Choosing Logistic Zones Locations

5-1- Experience of Studying Logistic Zones in Paris

The study identified five influencing factors in choosing logistic zone locations, including logistic facility sites, regulatory regulations, access to employment opportunities (population density), and access to highways. Based on a preliminary quantitative analysis of the total logistic zones in the Paris region, amounting to 489 locations as illustrated in **Fig .1**. classified into (direct transfer transport stations, storage and direct transfer facilities managed by transport companies, storage facilities managed by transport companies, ...). The analysis included a diverse set of variables such as population density, employment, and access capabilities to various transport facilities, including (highways, airports, shipping stations, river container ports, multimodal transport stations, land division). The analysis resulted in five suitable indicators for the model[10]:

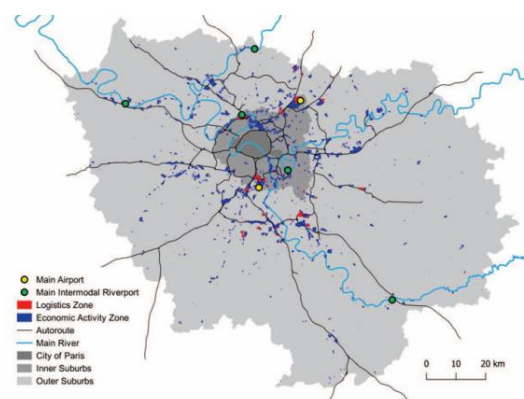


Fig. 1.Total logistic zones in the Paris region

Share of Economic Activity Zones: Represents the relative share of the location in economic activity zones.

Share of Logistic Zones: Represents the relative share of the location in logistic zones that are not part of economic activity zones.

Number of Wholesale Industry Jobs: Represents the number of jobs for the wholesale industry within a 3 km radius of the location.

Population Density: Represents the population density in the municipality to which the location belongs (per square kilometer)9.

Distance to the Nearest Entrance of the Highway (Autoroute): Represents the distance from the location to the nearest point of the dedicated entrance to the highway (in kilometers).

5-2 Experience of Studying Logistic Zones in China

The study focuses on selecting the location of national logistic zones in China using the hierarchical analysis method to analyze factors influencing logistic zone locations. The study identified three influencing factors in evaluating logistic zones, including infrastructure, business environment, and the economy. These factors are assessed through nine evaluation indicators: traffic flow, population size, energy, environmental factors, environmental protection factors, political and regulatory factors, logistics costs, storage costs, and delivery costs. Relative Weights of Factors Influencing Selection of Logistics Areas in China on Table.1.[11].

Table (1): Relative Weights of Factors Influencing the Selection of Logistics Areas in China.

	Index	Traffic Volume	City	Energy Capacity
Infrastructure			Population	
	Weight	0.0365	0.0809	0.1243
Business Environment	Index	Environment Nature	Environmental Protection	Policies and Regulations
	Weight	0.1299	0.3407	0.0432
Economy	Index	Logistics Costs	Storage Cost	Distribution Cost
	Weight	0.1017	0.0309	0.1119

The study utilized the previous findings in comparing four Chinese cities in terms of advantages in selecting and establishing logistic zones.

5-3 Experience of Studying Logistic Zones in Turkey

The study focuses on assessing the capacity of regions in Istanbul for establishing logistic zones. The increase in national and international transportation volume has led to a focus on logistics centers and their distribution. Properly determining the locations of logistics centers is considered a crucial strategic decision to enhance the transportation system. The study employed a two-step methodology for decision-making regarding logistic zones, including geographic analysis and digital modeling. **Fig. 2.** Proposed Logistic Zones in Istanbul City.

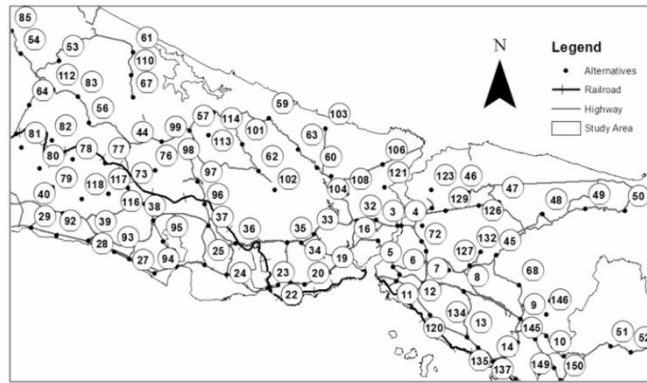


Fig.2 Proposed Logistic Zones in Istanbul City

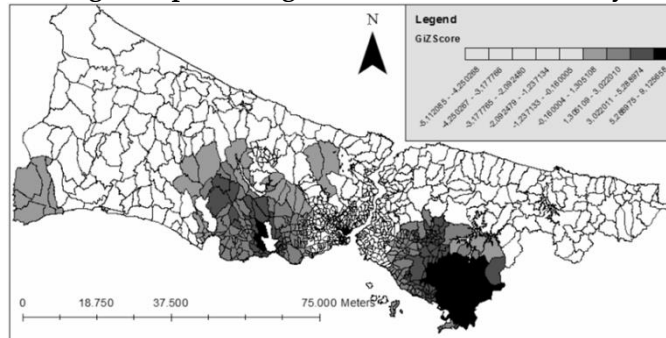


Fig.3. Results of the Analysis of Proposed Logistic Zones in Istanbul City

Geographic analysis involves spatial analysis of logistics zone density and an analysis of the road network, showing distances between logistics zones and selecting the shortest routes based on time. Digital modeling includes the use of the meta-heuristic algorithm **Fig.3.**

The study relies on Geographic Information Systems (GIS) to analyze spatial data for two key factors in evaluating logistic zones: linking logistic sites through the road network and the overall transportation cost. The study concluded by identifying the suitability level of the proposed zones as logistic areas in Istanbul, Figure (3) shown results of the analysis of proposed logistic zones in Istanbul city namely, Drake, Uskudar, Dilova, and Avcilar, where geographical advantages such as ports, airports, and proximity to logistic areas are available [2].

5-4 Experience of Studying Logistic Zones in Vietnam

various factors in selecting and favoring logistic zones. These factors include human efficiency, service quality, accessibility, and technological advancements. The study employed regression analysis using the SPSS program to analyze the impact of a set of variables on the preference and selection of logistic regions.

The study included three main variables for evaluation: capabilities, employee service, and company reputation, subdivided into 13 sub-variables. Table (2) illustrates the key sub-variables and their relative weights [12].

Table 2. Key Sub-Variables and their Relative Weights.

Indicators	Weight
Employee Quality	0.836
Geographic Coverage	0.899
Capability to Provide Transportation Means	0.860
Ability to Facilitate Electronic Data Interchange	0.830

Analyzing previous experiences, the factors influencing the selection of logistic zone locations were identified as follows: the percentage of economic activity zones, the percentage of logistic zones, the number of wholesale industry jobs, population density, distance to the nearest autoroute, traffic volume, city population, energy volume, surrounding environmental nature, environmental protection, policies and regulations, logistics costs, storage costs, distribution costs, logistic sites through road network, transportation cost, workforce quality, geographic coverage, transportation provision capability, and electronic data exchange capability.

6. Considering these factors sectors

There are six main factors sectors include:

- **Environmental Sector:** Includes environmental protection, surrounding environmental nature, and energy volume.
- **Urban Sector:** Encompasses distance to the nearest autoroute and traffic volume.
- **Social Sector:** Involves city population.
- **Economic Sector:** Comprises the percentage of economic activity zones, workforce quality, the number of wholesale industry jobs, and the percentage of logistic zones.
- **Administrative Sector:** Involves policies and regulations.
- **Technological Sector:** Encompasses the capability to provide electronic data exchange.

7. Introduction to the Alexandria Region:

The Alexandria Region is the second of Egypt's seven planning regions, occupying the western part of the country. Its total area is approximately 178.6 thousand square kilometers, representing around 17.7% of Egypt's total area. The population is about 76.11 million people, constituting 63.12% of the total population of the country in 2017. The administrative structure of the

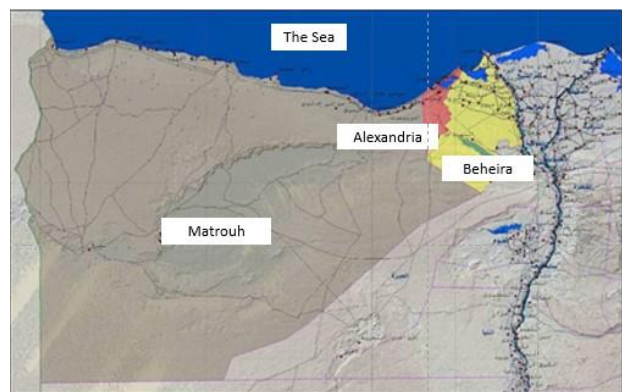


Fig. 4. Administrative Boundaries of the Alexandria Region's Governorates.

Alexandria Region includes three provinces: Alexandria, Beheira, and Matrouh. The region comprises 26 urban agglomerations, ranging from million cities to medium and small cities. The administrative boundaries of the Alexandria Region are illustrated in **Fig. 4**.

Logistics Capabilities in the Alexandria Region: The Alexandria region is characterized by the abundance and diversity of economic and human resources that can be effectively utilized for comprehensive development purposes. These resources constitute a fundamental pillar for the establishment of an integrated economic renaissance, supported by a suitable level of infrastructure and a distinctive geographical location that provides advantages for activities, services, and urban development [13].

7-1 Transportation and Communication Network

7-1-1 Road Network: The road network connects the various provinces within the region and links them with the neighboring regions. It can be classified into the following categories:

- **Coastal International Road:** It connects the provinces forming the region through a network of roads and bridges, facilitating transportation between them and the neighboring regions. It spans a length of 1021 km, representing a vital link between the provinces, contributing to regional economic development.
- **Internal Roads (Regional and Economic):** These roads connect the provinces within the region and link them with the neighboring regions. They can be categorized as follows:
 - **The Coastal Road:** represents a vital link between the provinces, spanning a length of 220 km.
 - **The Agricultural Road:** serves the agricultural areas and spans a length of 214 km.
 - **Wadi El Natrun – Alamein Road:** It connects the desert and agricultural areas, spanning a length of 125 km.
 - **Nasr Road:** It spans approximately 442 km and is connected to the agricultural and industrial areas, facilitating the movement of goods and services.
 - **Victory Road:** With a length of about 290 km, it is a dual carriageway in good condition.
 - **Oasis Highway – Siwa:** It has a length of about 66 km, providing connectivity to Siwa Oasis.
 - **Integrated Development Roads:** These roads extend the network to 300 km, linking remote areas and promoting development.
 - **Urban Ring Road:** A circular road around the urban areas, contributing to traffic flow and serving as a vital transportation link.

7-1-2 The Transport Network: The region has several local and international airports, including:

- Alexandria International Airport (El Nouzha Airport): It is located 6 km from the city center and covers an area of 650 acres, with a runway length of 7808 feet. The airport handles both domestic and international flights.
- Borg El Arab International Airport: Located 49 km southwest of Alexandria, it covers an area of 8520 acres, with a runway length of 11,482 feet. It serves as a major hub for both cargo and passenger flights.
- Marsa Matrouh Airport: Situated 2 km south of Marsa Matrouh, it features a 2005-meter runway and serves domestic flights.
- El Alamein International Airport: Located 12 km south of El Alamein, it has a runway length of 60 km and provides services to domestic and international flights.

The network also includes the Suez Canal, which serves as a vital link for shipping, facilitating the movement of goods through the region and connecting to global markets. Additionally, there are various seaports, contributing to the region's economic activities. Overall, the transportation and communication network in the Alexandria region plays a crucial role in supporting economic development and promoting connectivity within the region and beyond.

7-1-3 Maritime transport involves the movement of various types of cargo, including bulk and containerized goods, through the international shipping lanes.

- The Alexandria Seaport, one of the most significant ports in the Arab Republic of Egypt, plays a crucial role in the country's trade, accounting for approximately 60% of foreign trade. The port handles both cargo and passenger vessels, serving as a hub for commercial shipping and accommodating tourist ships and passenger ferries. Its total area is around 1729 acres [14].
- The Dekheila Port, located west of Alexandria, is connected to the Egypt-Alexandria Desert Road, and has a railway line connection [1]. With an area of approximately 1564 acres, the port is equipped to handle various types of vessels, including container ships, bulk cargo ships (clean and dirty), multi-purpose cargo ships, and roll-on/roll-off (RoRo) ships [15].
- Mersa Matruh Port: It receives ships up to 3,000 tons, and containers. There is a gas leading from the port entrance to the docks area in Tu About 3 kilometers.
- Al-Hamra Port: It is located near Al-Alamein and is a port designated for exporting Petroleum produced from well fields in the Western Sahara [16].

7-2 Regarding the energy sector

The region has 12 power generation stations with a total effective capacity of around 4652 MW. Alexandria Governorate possesses 7 stations with a capacity of approximately 3698

MW, while Beheira Governorate has 3 stations with a capacity of about 894 MW. Additionally, Matrouh Governorate has one station with a capacity of around 60 MW. The evaluation indicators suggest that the current capacity of power generation and transformation stations is sufficient to meet the electricity demand. This information provides an overview of the maritime and energy infrastructure in the Alexandria region, emphasizing the vital role these facilities play in facilitating trade and supporting the region's economic activities according to Table.3.

Table 3. Total Operational Capacity of power generation Stations in the Governorates of the Region

Governorate	Total Operational Capacity of Stations	Percentage %
Alexandria	3698	79.5%
Matrouh	60	1.3%
Beheira	894	19.2%
Sum	4652	100%

7-3 Communications in the Alexandria region

The number of central telecommunication exchanges in the region is approximately 211 automatic exchanges, representing more than 13% of the total exchanges in the Republic. Table 4 illustrates the data for the exchanges in the governorates of the region in the current situation.

Table 4. Data for Exchanges in the Governorates of the Alexandria Region

	Number of Exchanges	Exchange Capacity	Percentage	Busy Lines	Capacity Ratio
Alexandria	٦٣	١٥٠٩٩٧٣	٦٥,٩٤	٧٢٦٣٢٥	48.11%
Matrouh	٥٣	٨٥١٢٩	٣,٧٢	٢٥٥٨٦	30.05%
Beheira	١١٣	٦٩٤٧٧١	٣٠,٣٤	١٨٦٢٠٢	26.8%
Sum	٢١١	٢٢٨٩٨٧٣	١٣,٣	٩٣٨١١٣	40.99

7-4 Human Resources in the Region

By studying the population data for the region in the year 2017, the population is approximately 11.76 million people, ranking third among the republic's regions, constituting about 12.4% of the total population of the republic. Regarding the population distribution in the governorates comprising the region, the population size for the Beheira governorate is about 6,171,613 people, accounting for 52.48% of the region's population. Alexandria governorate follows with a population of approximately 5,163,750 people, representing 43.91% of the region's population. As for Matrouh governorate, it ranks last with a population of about 425,624 people, constituting 3.62% of the region's population.

7-5 Employment in the Transportation and Storage Sector in the Region

The total number of employed individuals in the transportation and storage sector in the region is approximately 123,823 workers. The distribution of employed individuals in the

transportation and storage sector across the governorates comprising the region according to Table 5. [17]

Table 5. Number of Workers in Transport and Trade across the Governorates of the Region

Governorates	Number of Workers in Transport and Trade	Percentage
Alexandria	87275	70.5%
Matrouh	2927	2.4%
Beheira	33621	27.1%
Sum	123823	100%

7-6 Logistic Zones in the Region:

7-6-1 Logistic Zones in the Region: The number of logistic zones is (2), established on an area of 573 acres. The distribution of logistic zones across the governorates comprising region according to table 6. [14]

Table 6. Logistics Zones in the Alexandria Region Logistics Zones Area

Governorates	Logistics Zones		Area	
	Numbers	Percentage	Acreage	Percentage
Alexandria	1	50	273	47.6
Matrouh	1	50	300	52.4
Beheira	0	0	·	0
Sum	2	100	573	100

7-6-2 Logistic Corridors in the Region: Egypt's strategy for transforming into an international trade and logistics hub is based on several axes and logistic corridors classified as (agricultural, industrial, service, mining, etc.). This involves establishing an extensive network of roads, arteries, and transportation to connect these corridors with ports. The plan also includes the creation and development of dry ports and logistic zones. The region has benefited from some of these projects, which are outlined in Table 7.

Table 7. Logistic Passageways in the Alexandria Region

Project	Logistic Passageway	Passageway Type
Future of Egypt's Agricultural Project, covering 1.05 million acres	Development of the Wadi El Natrun – Alamein Road, 135 km long	Agricultural [18]
Touristic sites along the Mediterranean Sea coast	Development of the Wadi El Natrun – Alamein Road, 135 km long	Service, Tourism
Jarjoub - Sallum	Extends from the maritime port of Jarjoub to the land port of Sallum, passing through the logistic area east of the Sallum port	Commercial [19]

7-7 Logistic Corridors Linking Cities and Regions in the Country

- **Sokhna-Alexandria International Logistic Axis:** comprehensive international logistic axis stretches from Ain Sokhna Port on the Red Sea, passing through dry port of Tenth of Ramadan and its associated logistic zone, the industrial area of the Tenth of Ramadan, then through Cairo, the largest urban center in the Middle East, and further to the Sixth of October Industrial City, the dry port, and linked logistic zone, finally reaching the major Alexandria Port.
- **Fourth Logistic Corridor (Cairo/Alexandria) Logistic:** Starting from the railway station of the southern region of Egypt in Bashteel, passing through the dry port of Sadat and the dry port of the Sixth of October, and extending to the Alexandria Port. [20]

7-8 Supporting Production Sources for Establishing Logistic Zones Region

The region encompasses various production sources that serve as robust pillars supporting the establishment of logistic zones. These are elucidated below:

- **Industrial Zones in the Region:** The region hosts 12 industrial zones covering an area of approximately 20,601 acres. Table 8. industrial zones in the Alexandria region. [17]

Table 8. illustrates the industrial zones in the Alexandria region

Governorates	Industrial Sector		Area		Factories		Workforce		Services	
	Number	%	Acre	%	Number	%	Number	%	Million Pounds	%
Alexandria	10	83.3	19849	96.3	1018	94.7	89526	97.6	27943	97.6
Beheira	2	16.7	752	3.7	57	5.3	2191	2.4	688	2.4
Sum	12	100	20601	100	1075	100	91717	100	28631	100

- **Economic Zone in Gergoub:** Gergoub Seaport is situated in the city of Al-Nagila, 70 kilometers west of Marsa Matrouh. Covering an area of 2,169 acres, this port provides around 30,000 job opportunities. The project involves constructing grain silos, establishing a factory for reassembling used cars imported from Korea and Japan, creating a petroleum pipeline from Libyan territories to the Gergoub Port for re-export to European countries. The project also encompasses the construction of a container station to serve goods arriving from East Asia destined for both North and South America [19].
- **Alexandria Public Free Zone:** Located on the Cairo-Alexandria Desert Road, covering an area of approximately 1,357.14 acres, and situated 20 km away from the Alexandria Port and the international Nazha Airport, in proximity to the Borg El Arab International Airport. This zone offers various shipping, unloading, navigation, and

transportation services. It stands the largest free zones in Egypt, including projects in petroleum and gas production, oil refining, petrochemicals, fertilizers, chemical industries, electricity and energy production, iron and steel production, cement production, ceramic and porcelain manufacturing, food production and industry, plastics, pharmaceuticals, beverage manufacturing, paper industry, automobile trade, edible oils, and vegetable derivatives, ready-made garments, spinning, and textiles [21].

7-9 National Agricultural Projects in the Alexandria Region:

The agricultural sector and land reclamation have witnessed significant development in the Alexandria region due to the availability of extensive cultivable areas. The area suitable for agricultural development is estimated at approximately 14 million acres. Unprecedented developments and achievements have reached their peak in recent times, as outlined below:

- The Million and a Half Acres Project: Initiated in 2015, this project covers 13 agricultural reclamation zones in 8 governorates, including the Mughra region and the East Siwa region in the Alexandria region. The project aims to establish integrated urban communities with services and attractions for the population. Additionally, it involves creating industrial centers for agriculture-related industries such as food production, packaging, and oil production.
- New Delta Project: A Future Project for Egypt: Situated along the New Rod El Farag - El Dabaa Axis, the New Delta Project is part of the national road project with a length of 120 km and a depth of 60 to 70 km. The targeted reclaimed area is one million and fifty thousand acres out of a total of 2.2 million acres. The project aims to provide various high-quality agricultural products to bridge the gap between production and import, achieve food security, and attain self-sufficiency in strategic goods.

Additionally, it aims to export surplus produce to export ports via land and air routes. The project is expected to generate around 10,000 direct job opportunities and over 360,000 indirect employment opportunities, with anticipated increases in labor opportunities in the coming seasons [22].

- Establishment of 100,000 Greenhouses Project: Located in the Hamam area (Mohamed Naguib Base) on an area of 20,000 acres as part of the National Agricultural Greenhouses Project, this project aims to provide approximately 40,500 job opportunities for youth. The site's proximity to the Alexandria and El Dekheila ports, Borg El Arab Airport, and major roads facilitates the transportation and distribution of the products. The following diagram illustrates the available potential and resources in the Alexandria region for establishing logistical zones. The available resources in the Alexandria region for establishing logistic zones according to **Fig.5**.

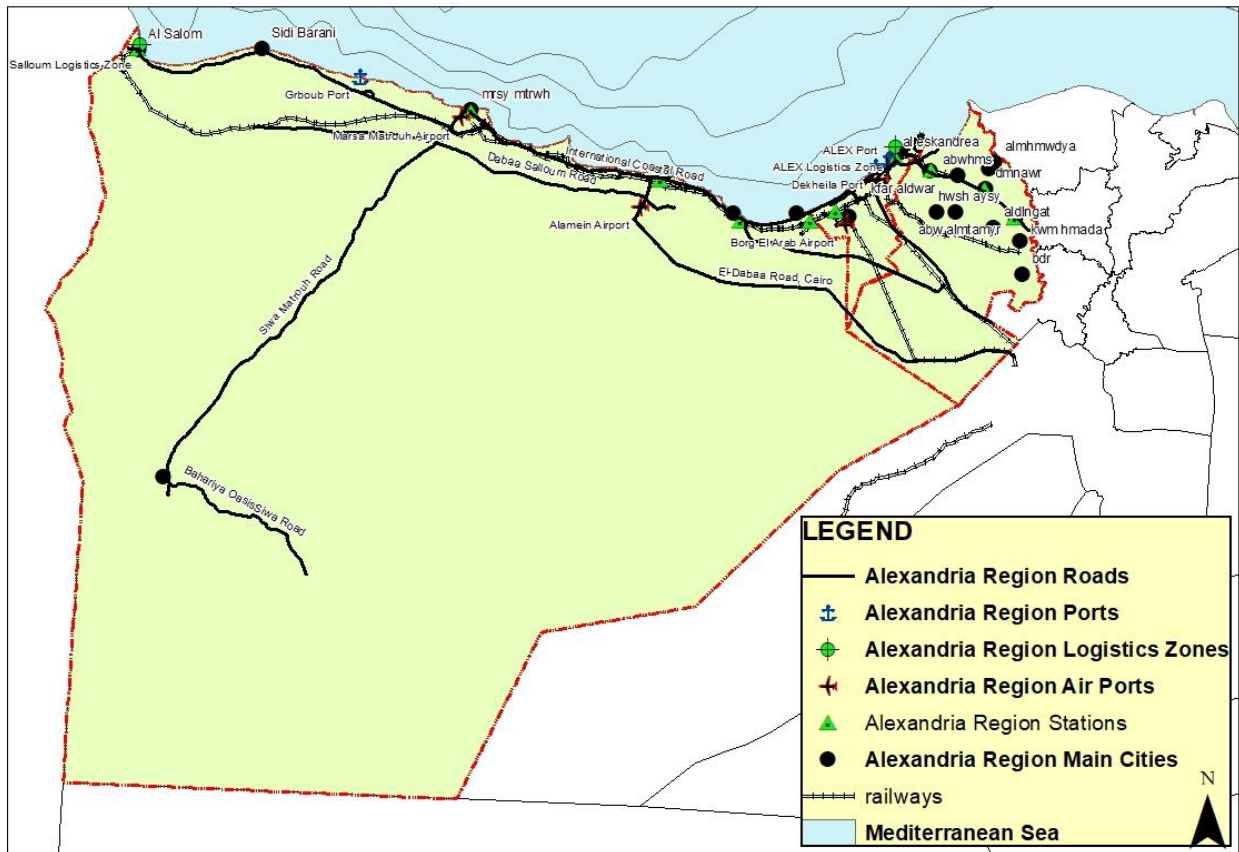


Fig.5. Available resources in the Alexandria region for establishing logistic zones.

8. Evaluation of the Alexandria Region for Establishing Logistic Zones:

This assessment is based on a review of successful global experiences in this field, including those in Paris, China, Turkey, and Vietnam. The focus of this evaluation was on key factors influencing the selection of logistic zone locations, such as the presence of an integrated road network, transportation capabilities, the availability of human resources, existing infrastructure, and the presence of logistic zone. Based on this analysis, a set of indicators were identified to assess the strength of the region as a potential location for establishing logistic zones. These indicators include:

- Percentage of regional road lengths in the Governorates.
- Percentage of the number of railway stations.
- Percentage of transportation means diversity (airports, ports).
- Percentage of logistic zones in the Governorates.
- Percentage of workers in trade, transportation, and storage in Governorates.
- Percentage of the local output of major projects in the Governorates.
- Percentage of electricity generator capacity in the Governorates.
- Percentage of central unit loads in the Governorates. The arithmetic mean was used for the indicators' variables to arrive the results shown in Table 9.

Table (9) of Logistic Capabilities Indicators in the Alexandria Governorate

	Alexandria	Matrouh	Beheira
percentage of the lengths of regional roads in the Governorates	13.94	69.53	16.53
percentage of the number of railway stations	8.3	58.4	33.3
Percentage of diversity in transportation means (airports - seaports)	57.1	42.9	0
percentage of existing logistic zones in the Governorates	50	50	0
Percentage of workers in trade, transport, and storage in the Governorates	70.5	2.4	27.1
percentage of the Gross Domestic Product (GDP) attributable to major projects in the Governorates	97.6	0	2.4
percentage of electricity generators' capacity in the Governorates	79.5	1.3	19.2
percentage of occupied lines from the capacity of the central stations	48.11	30.06	26.8
Arithmetic Mean	43.2	31.8	16.6

Based on the previous table and the indicators used in the study of global experiences in establishing logistic zones, it appears that the Alexandria region has several factors that make it suitable for establishing logistic zones. Following the analysis, the three governorates of the region (Alexandria, Beheira, Matrouh) evaluated according to the suitability ratios identified as shown in **fig. 6**.

8-1 Alexandria Governorate

The numbers show a high ratio of 43.2% suitable for establishing logistic zones in Alexandria. This could be due to strategic location of the province on the Mediterranean coast, facilitating the transportation of goods by sea, in addition to advanced infrastructure and sophisticated logistic services.

8-2 Matrouh Governorate

The figures indicate that Matrouh Province holds a ratio of up to 31.8%, making it also a good site for establishing logistic zones. This due to its border location with Libya, opening opportunities for international trade and commodity exchange.

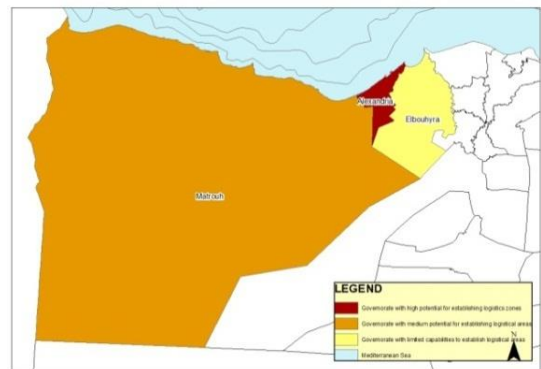


Fig. 6. the capability of the Region Governorates establish logistical zones.

8-3 Beheira Governorate

The numbers show that Beheira holds a ratio of 16.6% for establishing logistic zones. This could be attributed to its strategic location in the northeastern part of the region, allowing easy access to Alexandria and other logistic areas.

With this classification, the Alexandria region can leverage its various strengths to enhance the logistics sector, contributing to the promotion of domestic and international trade and boosting the local economy.

Evaluation of Factors Influencing the Selection of Logistic Zone Sites in the Constituent Provinces of the Alexandria Region.

To assess these factors, the use of the SPSS program was proposed to conduct a correlation analysis between the logistic variables in Alexandria region, Table 10.

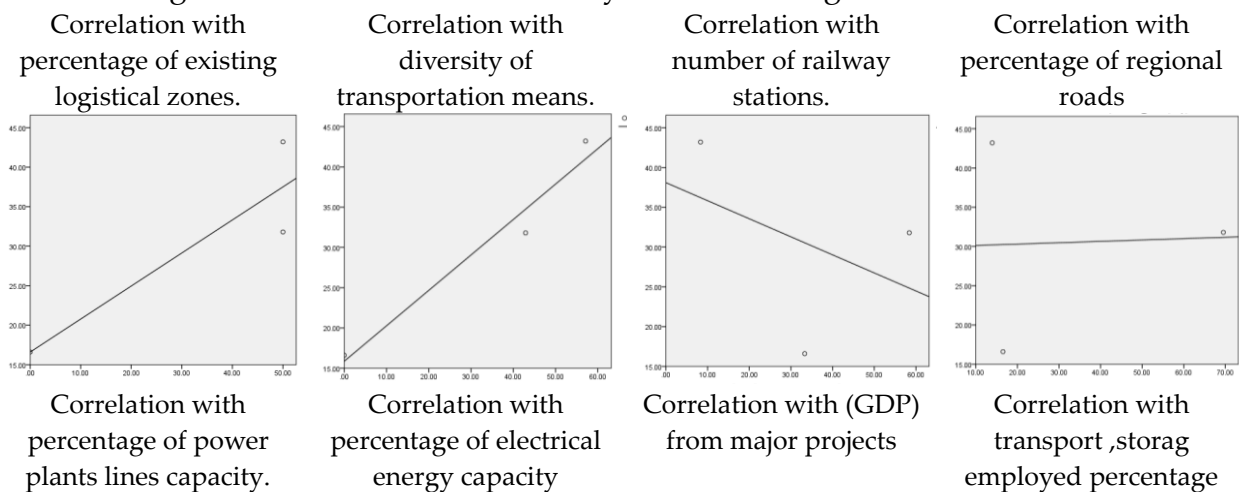
Table 10. Correlation Analysis between the logistic variables in the Alexandria region

Correlations	percentage of the lengths of regional roads in the Governorates	percentage of the number of railway stations	Percentage of diversity in transportation means (airports - seaports)	percentage of existing logistic zones in the Governorates	Percentage of workers in trade, transport, and storage in Governorates	percentage of Gross Domestic Product (GDP) attributable to major projects in Governorates	percentage of electricity generators' capacity in Governorates	percentage of occupied lines from the capacity of the central stations
PEARSON CORRELATION	0.041	-0.426	0.980	0.904	0.563	0.810	0.678	0.895
R2	0.002	0.182	0.960	0.818	0.317	0.655	0.459	0.800
SIG	0.974	0.720	0.127	0.281	0.619	0.399	0.526	0.295
Coefficient	0.017	-0.227	0.440	0.418	0.218	0.194	0.221	0.140
Constant	29.952	38.1	15.868	16.600	23.263	24.065	23.175	-5.568

Analysis of previous table interpret the results based on the strength and direction of the relationships between the variables leads to the following conclusions:

- There is a slight positive correlation between the ability of Alexandria region to establish logistic zones and proportion of regional roads. Governorates of Matrouh and El Beheira are leading of the proportion of regional roads, while potential to establish logistic zones is limited.
- An inverse variation is observed between the ability of the Alexandria region to establish logistic zones and the number of railway stations. Governorates of Matrouh and El Beheira lead in the number of railway stations, while their potential to establish logistic zones is limited.
- There is a positive correlation relationship between the ability of the Alexandria region to establish logistic zones and the diversity of transportation means. The diversity in transportation means, such as airports and ports, in Alexandria Governorate increases its ability to establish logistic zones, making the relationship between the diversity of transportation means and the ability to establish logistic zones the strongest among the eight factors studied.

- There is a positive correlation relationship between the ability of the Alexandria region to establish logistic zones and the percentage of existing logistic zones in the region. The existence of logistic zones in Alexandria Governorate increases its ability to establish new logistic zones, making the relationship between existing logistic zones and the ability to establish new logistic zones the second strongest among the eight factors studied.
- A positive correlation is observed between the ability of the Alexandria region to establish logistic zones and the percentage of workers in transportation and storage. An increase in the percentage of workers in transportation and storage in Alexandria Governorate supports its ability to establish logistic zones.
- A positive correlation is observed between the ability of the Alexandria region to establish logistic zones and the percentage of the GDP of major projects in the governorate. An increase in the percentage of outputs of major projects in Alexandria Governorate supports its ability to establish logistic zones, making the relationship between the GDP of major projects and the ability to establish logistic zones the fourth strongest among the eight factors studied.
- A positive correlation is observed between the ability of the Alexandria region to establish logistic zones and the percentage of electrical power capacity in the governorate. An increase in the percentage of electrical power capacity in Alexandria Governorate supports its ability to establish logistic zones.
- A positive correlation is observed between the ability of the Alexandria region to establish logistic zones and the percentage of the number of lines occupied by the load of power stations in the governorate. An increase in the percentage of the number of lines occupied by the load of power stations in Alexandria Governorate supports its ability to establish logistic zones, making the relationship between the percentage of the number of lines occupied by the load of power stations and the ability to establish logistic zones the third strongest among the eight factors studied. The relationships mentioned above can be illustrated through the following **Fig. 7**. The correlations between logistical zones factors and ability to establish logistical zones.



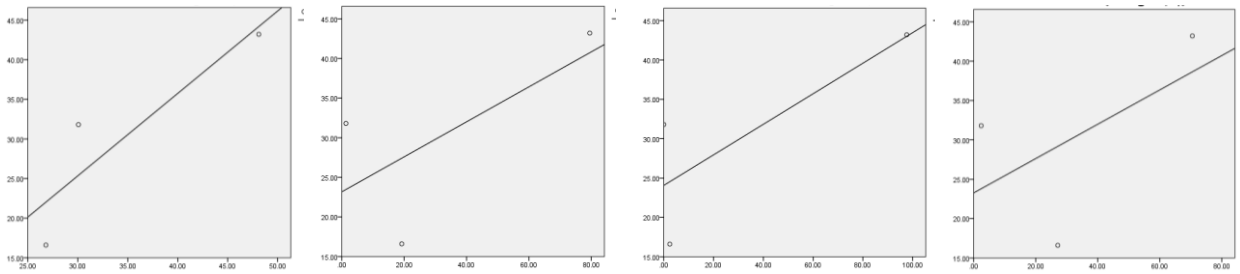


Fig. 7. The correlations between logistical zones factors in the province and ability to establish logistical zones.

9. Research Results

After reviewing the available literature and previous research related to the analysis of factors affecting the selection of logistic zone locations, it is revealed that the Alexandria region relies on several logistic components that contribute to enhancing its role as a center for logistic activities. These components include:

- **Distinguished Geographical Location:** The region has a strategic location that enhances its effectiveness as a center for logistic activities.
- **Advanced Road Network:** It includes various roads at different levels, with a focus on the international coastal road, facilitating the movement of goods and logistic communication.
- **Diverse Transportation Means:** Transportation diversity is represented by the presence of several airports, including Alexandria International Airport and Borg El Arab Airport, along with important ports such as Alexandria Seaport and Borg El Arab Seaport.
- **Logistic Zones and Corridors:** There are several logistic zones and logistic corridors, with emphasis on the Future of Egypt Agricultural Project and the logistic corridor it serves.
- **Diversity in Production Sources:** Diversity in production sources is available, forming a strong foundation for establishing logistic zones.
- **Strong Infrastructure:** The region is characterized by an advanced infrastructure network, including electricity and communication, enhancing its effectiveness as a center for logistic activities.
- **These factors support the possibility of establishing logistic zones in the region, as a major hub for logistic activities and reflecting its strength in this context.**

10. Research Recommendations

These recommendation include:

- **Enhance Investment in Infrastructure:** This includes improving the road network, maritime and air transport, and other logistic services in the Alexandria region.

- Encourage Interaction and Collaboration: Between local government and logistic companies, providing facilities for companies to enhance their activities in the region.
- Coordinate with the Private Sector: To ensure its participation in developing and improving logistic zone locations.
- Promote Sustainability: In logistic sites in the region, including the use of environmentally friendly transport technologies and adopting reduction initiatives.
- Provide Government Facilities: For logistic companies, such as investment incentives and simplified bureaucratic procedures to encourage more companies to invest in the region.
- Utilize Modern Technology: Such as Geographic Information Systems (GIS) and artificial intelligence to improve the management and operation of logistic zone locations.
- Offer Training Programs: For the human workforce in the logistics sector to enhance their efficiency and understanding of modern challenges.

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