



e-ISSN: 2319-8753 | p-ISSN: 2320-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 5, May 2021

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.512

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com



Indicators for Measuring Industrial Localization Strategies and Determinants of their Application: A Comparative Analytical Study

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ABSTRACT: The industry went through several stages and in each stage it had factors for its own industrial localization. Moreover, with this industrial development, several strategies for industrial localization emerged, each of which has requirements for localization.

The research conspicuously aims to develop indicators for measuring industrial localization strategies through the inductive approach, then follow the analytical, deductive and comparative approach by evaluating indicators for measuring industrial localization strategies with a number of global and regional case studies to reach the extent of their success at the urban, economic, social and environmental levels, from which the determinants of the application of industrial localization strategies are extracted.

The research finally concluded that the most appropriate strategies for application to the Egyptian regions are chosen according to the application determinants available in each region and the level of industrial development and the sustainability of the industry there. Then, the research summarizes some recommendations.

KEYWORDS: Industrial Localization Strategies - Industrial Complexes - Industrial Clusters - Green Industries

I. INTRODUCTION

The industry went through four industrial revolutions; each of them had its own characteristics. Besides, they resulted in waves of industrial innovation represented in six innovation waves. With the development in the innovative waves, the factors of industrial localization required by each wave differed. Consequently, it led to a change in the factors of industrial localization from basic to secondary factors to higher factors, which also led to the emergence of strategies for industrial localization that differed according to the different industrial revolution and the innovative waves it brought about. There are strategies that appeal to social and economic development. There are also strategies that appeal to environmental development in its broad sense, which is sustainability. All of this reflects on urban and regional development.

Additionally, the previous studies have dealt with a set of concepts related to the definition of industrial localization strategies, goals and importance, providing some of its successful experiences. However, it did not address the development of indicators for measurement or determinants of the application or the status of implementation.

Moreover, this research is concerned with developing measurement indicators for each strategy. This is in addition to extracting the determinants of its application. Thus, it is possible to determine which strategy is most appropriate for dealing with the region or country, according to the study of the availability of the determinants of application in the country, region or city, according to the level of national, regional or local dealings.

II. RELATED WORK

2- The Concept of Industrial Localization:

It means establishing an industry in a certain region so that it has a relative importance that outweighs that enjoyed by other industries in the rest of the region. It means choosing the appropriate site for the factory by specifying the location at the regional and local levels.¹



Marshall defined it as the concentration of designated branches of production in some areas that paved the way for many recent developments in the division of labor in the mechanical arts and the task of business administration.²

The localization of the industry in a certain place is measured in a very simple mathematical way to obtain what is known as the industrial localization factor.³ The localization factor for an industry = the percentage of workers in a given industry / the total workers of this industry in the country. If the result is more than the whole number (1), this means that an industry has a high concentration ratio that exceeds the percentage in the country, and if it is less than 1, it indicates that the concentration of this industry in the region is less than the general concentration.

III. FACTORS OF INDUSTRIAL LOCALIZATION

The industry passed through three phases, namely:

3-1. The industrial economics stage during the period (1900-1950), where transportation and labor costs are among the basic factors necessary for the establishment of industry. These factors represent industries that depend on basic resources. These factors consequently led to the concentration of industries in specific locations. Thus, the factors of industrial localization for this stage are:

- The basic factors for industrial localization (near raw materials, near ports and main roads, near energy sources, markets, or near labors)⁴

3-2. The stage of economies of scale and economic agglomeration during the period (1950-1990): as there are some industries that tend to agglomerate or gather, and the factors of industrial localization in the stage of agglomeration economies are:

- The Secondary Factors in terms of benefiting from the presence of customers and suppliers on short distances and the availability of services and facilities and the concentrated labor market. The importance of agglomeration economies increased in the middle of the twentieth century, especially in developed countries, not only as a result of the phenomenon of agglomeration itself, but it reflects the increasing spatial extension, the density of transportation networks and the large movement of workers that reduce the importance of transportation cost and reduce the spatial variability of labor costs. The previous "primary factors" increase the importance of secondary factors for industries.⁵

3-3. The stage of spatial spread during the period (2000: until now): New approaches and ideas have emerged trying to explain industrial localization in light of the new variables on the global arena (sustainability, globalization, competitiveness), so a shift occurred in the factors of industrial localization at this stage where the higher site factors appeared (post-secondary) which is;

-Factors of higher industrial localization: such as the availability of knowledge services, infrastructure, information technology, living conditions, entertainment and environmental aspects of the site, in addition to logistical networks, educational infrastructure, public transport, facilities and the presence of airports. However, all these factors did not negate the importance of the basic factors for the localization of the industry, but rather made there greater flexibility in settling industrial projects in areas that do not contain resources as a result of technological development.⁶ Figure No. (1) shows a diagram of the industrial localization factors for the three stages

METHODOLOGY

The research conspicuously aims to develop indicators for measuring industrial localization strategies through the inductive approach, then follow the analytical, deductive and comparative approach by evaluating indicators for measuring industrial localization strategies with a number of global and regional case studies to reach the extent of their success at the urban, economic, social and environmental levels, from which the determinants of the application of industrial localization strategies are extracted.



EXPERIMENTAL RESULTS

Factors of Industrial Localization		
Basic Factors	Secondary Factors	Higher Factors
Near to raw materials - near to ports and main roads - near to energy sources and markets, near to labor	Benefiting from the presence of customers and suppliers on short distances and the availability of services and facilities and the concentrated labor market	Availability of knowledge services, infrastructure, information technology, living and entertainment conditions, environmental aspects of the site, in addition to logistical networks, educational infrastructure, public transport, facilities and the presence of airports.

Figure No. (1): Industrial Localization Factors

Source / The researcher from collecting previous data

IV. INDUSTRIAL LOCALIZATION STRATEGIES

Industrial localization strategies began to crystallize in the 1950s, when Walter Isard gave shape to the concept of Industrial Complexes as it was the first strategy for industrialization in regions and countries in the context of the post-war flourishing. Then, in the late 1980s, Michael Porter devised a complete concept of "Industrial Clusters" to describe the geographical concentrations of industries. Besides, he observed this in a group of countries he studied where the trend toward competition began.⁷ Then, with the development of the industry's depletion of natural resources, industrial ecology appeared with the end of the third industrial revolution in the nineties. Then, the environmental industrial localization strategy appeared, which was developed into the so-called Green Industries with the advent of the fourth industrial revolution

4-1. Industrial Complex Strategy:

Walter Isard came up with the concept of industrial complex as part of a study he was conducting in Puerto Rico on the theory of growth poles, as it has been believed that the poles of growth are not explained, whether they are groups of large companies or industrial establishments, or entire industries, or even entire urban areas.

In his opinion, an industrial complex is "one or more activities that occur in a specific location and belong to a group of activities that are subject to significant production, marketing, or other interrelationships. It is a group of interdependence of activities linked to a matrix of structural relationships.⁸ it consists of one or few of the large payment companies. Therefore, industrial complexes have both functional and regional connotations, because they bear some basic similarities with the poles of growth.⁹

Whereas the Industrial Complexes Strategy aims at regional development, indicators have been drawn to measure their effectiveness, which are:

On the urban level: the extent of exploitation (the comparative advantage of the site from a distinct geographical location - development axes - ports and airports - new cities so that industry is the economic base for them)

On the economic level: the extent of exploitation of the region's resources and the region's potentials - the industrial development in a region - the export ratio of the region's industries

On the social level: the unemployment rate - the poverty rate - level of education - the rate of skilled employment

4-2. Industrial Clusters Strategy

Globalization has brought about more specialization in industry and urban agglomeration as industries look for locations that offer globally competitive advantage to the producers of goods and services. Where competitiveness depends to a large extent on production efficiency and the extent of external factors that give a competitive advantage that is created by a favourable environment. Thus, the concept of competitive advantage represents a complete and intentional departure from the comparative advantage developed by David Ricardo in the nineteenth century, because the comparative advantage lost its priority in the globalized economy.¹⁰



Michael Porter defined the competitive advantage as the value that an organization provides to its customers that exceeds its production cost and the willingness of customers to purchase it. Also, the high value results when offering lower prices than the competitors or providing unique advantages that compensate for the higher prices.¹¹ The Industrial Cluster concept was formulated as a consultative remedy to increase competitiveness.¹²

Moreover, Porter defined industrial clusters as "a geographically approximate set of interconnected firms and associated institutions in a specific domain, related to similarities and complementarities. The geographic scope of a cluster can be a city, state, country, or even a network of neighbouring countries.¹³ The strategy of the industrial clusters aims at competitiveness, so the indicators of its measurement were extracted, which are:

On the urban level: Exploiting the competitive advantage of the site - Close to universities and research institutions - the geographical concentration of companies on the site - the availability of strong infrastructure.

On the economic level: measured by competitiveness, either by the industrial localization factor greater than 2, or by analysing the transformation share, through the rapid growth of one economic activity faster than the other, i.e. the growth of an industry faster than others or analysis of inputs and outputs I/ o production and consumption flows in the region -¹⁴ and by export ratio

On the social level: skilled labor - high level of education and innovation - cooperation between institutions and companies.

4-3. Environmental Industrial Localization Strategy (Green Industries Strategy)

The United Nations Organization for Industry and Development (UNIDO) has defined Green Industries as the economies that strive to achieve a more sustainable path of growth. It is also defined as industrial production and development that do not come at the expense of the health of natural systems or lead to negative consequences on human health. The green industry agenda covers the greening of industries, under which all industries are constantly improving resource productivity and environmental performance; along with the process of creating new green industries.¹⁵ The following is an explanation of each of them:

A- Greening Industries:

Greening existing industries through the application of Industrial Ecology emerged as a result of the loss of biological diversity in many environments and the rapid consumption of energy and natural resources. The concepts of waste recycling and reuse emerged (Recycle, Reuse)¹⁶

B- New Green Industries:

The new green industries represent the group of industries that provide environmental goods and services. This includes resources recovery and waste management materials as well as companies that transport waste. Other examples include engineering companies specialized in wastewater treatment, air pollution control devices, and waste treatment equipment. The sector also includes consultants in the field of environment and energy in addition to solution providers. Moreover, the new green industries include companies that manufacture and install new equipment and renewable energy and companies that develop and produce clean technologies.¹⁷

Whereas the green industries strategy aims at sustainability, indicators have been developed to measure sustainability, which are:

- **Environmental Efficiency:** It means measuring the flows of materials and energy entering the production stages from the stage of extraction to the product stage.¹⁸
- **Economic Efficiency:** by measuring the costs of producing the product in comparison to the yield and added value. Besides, it can add a criterion for generating green job opportunities within the criteria.
- **Social Efficiency:** by measuring the effects of the product on the consumer environment, such as production or consumption waste, and also measuring the product's role in improving and facilitating the living or working environment of some inventors.
- **Product Sustainability:** It is the production of goods and services using non-polluting or environmentally polluting processes and systems, preserving the environment and saving energy and resource consumption.¹⁹
- **Efficiency of Governance:** it is concerned with measuring the efficiency of environmental and economic laws and policies as well as the sustainability of the flow of investments to establishments. This is in addition to the rates of technology introduction into manufacturing and facility management.

V. EFFECTIVE EXPERIMENTS TO IMPLEMENT INDUSTRIAL LOCALIZATION STRATEGIES

The effective experiments to implement the industrial localization strategy were selected according to the extent to which they achieve the desired goal of their application. This is measured through the measurement indicators for each strategy, and then the application determinants are extracted for each of them.



Figure No. (2) The Site of both Cities Jubail & Yanbu in The Kingdom of Saudi Arabia

Source/ Royal Commission for Jubail & Yanbu , Jubail Industrial city, book

5-1. Industrial Complexes Experience in Saudi Arabia

The Kingdom of Saudi Arabia possesses a huge oil wealth, which necessitated the establishment of industrial complexes based on the petrochemical industries in the cities of Jubail and Yanbu. Besides, its residents were characterized by a low standard of living and work in agriculture and grazing, so the first was established on the Arabian Gulf and the second on the Red Sea.²⁰ Figure No. (2) shows the location of the Yanbu and Jubail Industrial Complex. The industrial complexes strategy aims at regional development. Thus, it has been applied according to the measurement indicators on the following aspects.²¹

On the urban level:

- **Exploiting the comparative advantage:** sites have been chosen near fuel sources, ports, and raw materials that are available at competitive prices, which helps in many industrial investment opportunities.
- **Exploitation of the axes of development:** the two development axes on the Arabian Gulf and the Red Sea, meaning east and west Saudi Arabia, were exploited, which helped ease export and import.
- **Construction, facility and equipping:** Communication methods have been implemented, both local and international roads and infrastructure, and industrial complexes have been established and equipped by the Saudi government and assigned to an authority for management and operation.
- **Ports and airports:** The two complexes are located at the port of Jubail and Yanbu, which has created a modern civil and commercial environment along with the ease of export and import.
- **An economic base for the new cities:** The two complexes (Yanbu and Jubail) became an economic base for the cities of Yanbu and Jubail

On the social side:

- **Unemployment and the standard of living:** The unemployment rate decreased and the standard of living increased for the residents of Yanbu and Jubail, due to the employment of its residents in industry.
- **The level of education:** The level of education has increased through the establishment of universities by the Saudi government in the two industrial cities of Jubail and Yanbu.
- **Skilled workers:** the level of skilled workers has increased, through training centres suited to the needs of different industries and the Skills Development Centre, in order to keep pace with the information revolution that the world is witnessing.

On the economic level:

- **Exploitation of resources and capabilities:** Natural resources have been exploited and the added value increased by establishing industrial complexes on a natural resource "petroleum."
- **Industrial development:** Industrial development was carried out by attracting many related industries (secondary industries and cross-border companies), which led to raising product quality and price competitiveness.

- Export: Export increased through opening many markets in multiple countries.

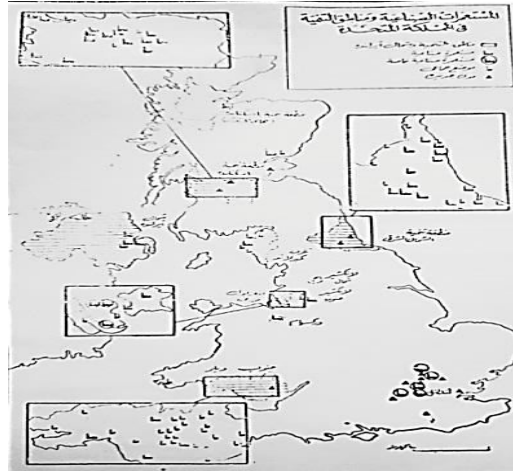


Figure No. (3) shows the locations of industrial complexes in crisis areas and new cities
Source / Muhammad Mahmoud Ibrahim Al-Deeb, 1973

5-2. England's experience of industrial complexes strategy:

The British government encourages industrial development in crisis areas. Besides, the main goal behind establishing industrial complexes was to improve the state of Depressed Areas, which were called special areas. Moreover, they are those whose economic and social conditions worsened during the depression period. Additionally, a company for industrial complexes was established in each area to determine the type of industrial complex according to the prepared study. It used to buy the land, pave it, construct factory buildings on it, provide it with facilities and services, and rent it to factories, while providing high financial concessions and reducing taxes.²² Figure No. (3) shows the location of the industrial complexes in England, so the industrial complexes strategy was applied according to the measurement indicators as follows.²³

- On the urban level:

- The comparative advantage was exploited: through the exploitation of the resources available and latent in it, or the main roads and ports overlooking them.
- Construction, facility and equipping: The government prepared and facilitated the land, built factories and rented it to industrialists for long periods of time, up to 99 years
- Exploiting the axes of development: the industrial complexes at that time were the axes of development due to what Britain went through during the period of the global recession and the emergence of crisis areas.
- An economic base for new cities: Industrial complexes have become the economic base for new cities

On the social level:

- Unemployment: The unemployment problem has been eliminated by equitable distribution of industrial complexes throughout the country
- Standard of living: The standard of living for residents of crisis regions has increased after working in industrial complexes
- The level of education: the level of education has increased due to the possibility of joining the industrial complexes at all levels
- Skilled workers: the level of skilled workers has increased due to the training centres provided by the complexes to train workers.

- On the economic level:

- Exploitation of resources and capabilities: the industrial complexes are based on the resources and opportunities inherent in each region and determine the type of industry suitable for it.
- Industrial development: Industrial development took place by attracting many industries to industrial complexes through the incentives and facilities provided by the state.



- Exporting: The industry in England was aiming first to solve the problem of unemployment and crisis regions, then exporting.

Tools and method of evaluation: Through indicators to measure the strategy of industrial complexes, each indicator is evaluated through a set of symbols equal to these values to measure the extent of success of experiments to implement the strategy of industrial complexes. The values are (0), the symbol ☼ = does not achieve, (0,25), the symbol ○ = weak, (0,5), the symbol ■ = average, (0,75) and the symbol = ■ above average, (1) and ● = strong
Then, the results are analysed in the form of statistical comparisons illustrated by graphical columns on the level of measurement elements for each experiment to extract the extent of success, and from which the application determinants are extracted. Table No. (1) shows the measurement indicators of the industrial complexes strategy for the Saudi and England experiences to measure the extent of the success of the experiments to implement the strategy. Then, the determinants of its application are extracted.

Table No. (1): shows indicators for measuring the strategy of industrial complexes and extracting the application determinants

Measuring Indicator		Saudi Experience	England Experience												
On the urban level	Exploitation of the comparative advantage of the site	●	■												
	Exploitation of development axes	●	○												
	Ports and airports	●	○												
	Economic base for new cities	●	●												
	Construction, facility and equipping	●	●												
On the economic level	The extent of exploitation of resources and capabilities	●	●												
	Industrial development	●	●												
	Export	●	■												
On the Social level	Unemployment	●	●												
	Poverty	■	●												
	Education level	■	■												
	Skilled workers	●	■												
Measurement and evaluation results	Through monitoring and analysis, the extent of the success of the study samples is evaluated to implement the strategy of industrial complexes. The Saudi experiment achieved 95.8% and England achieved 80%. Besides, this is considered a high percentage in view of the global recession that it was going through at that time.	<table border="1"> <caption>Success Percentages from Figure</caption> <thead> <tr> <th>Country</th> <th>Urban</th> <th>Economic</th> <th>Social</th> </tr> </thead> <tbody> <tr> <td>Saudi</td> <td>100%</td> <td>95.8%</td> <td>80%</td> </tr> <tr> <td>England</td> <td>100%</td> <td>80%</td> <td>80%</td> </tr> </tbody> </table>		Country	Urban	Economic	Social	Saudi	100%	95.8%	80%	England	100%	80%	80%
Country	Urban	Economic	Social												
Saudi	100%	95.8%	80%												
England	100%	80%	80%												
Extracting application determinants															
A location where the basic factors for industrial localization are available - the availability of a ratio advantage - the government's participation in the private sector in implementation, management and operation - the presence of a pioneering activity for the industrial complex, along with complementary industries															

Source / The researcher from previous data analysis

5-3. Silicon Valley Experiences in the United States of America to Implement the Industry Clusters Strategy:

The Silicon Valley cluster is the first cluster of technological industries in the world. Besides, it is located in the southern region of Ann Francisco Bay, California. It has played a key role in leading the digital revolution in the world. It is considered the first contributor to the growing strength of the American economy. It also provides about 225,000 job opportunities, and the average income of its employees is among the highest in America. Moreover, most of the profits of this grouping come through creative innovations. This is in addition to the patent revenues provided by its constituent companies, including Apple, Google, Intel, HP and IBM, Oracle, Facebook, CISCO among other leading

technology companies. ²⁴ Figure No. (4) shows the location and localization of Silicon Valley. The industrial clusters strategy aims to compete by increasing innovation, so the industrial clusters strategy has been applied according to the measurement indicators at the following levels.²⁵

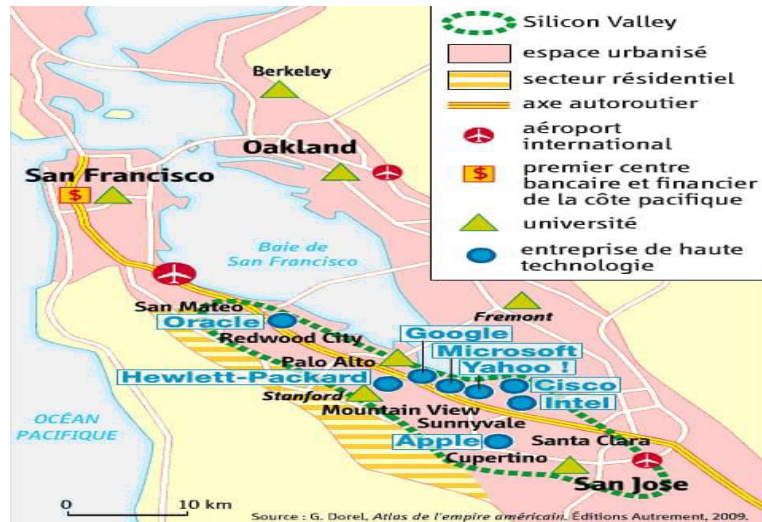


Figure No. (4) shows the location and localization of Silicon Valley
 Source: http://fr.wikipedia.org/wiki/Silicon_Valley

On the urban level:

- Exploiting the competitive advantage of the site: it overlooks San Francisco Bay, California, for ease of export and import
- Close to universities and research institutions: such as Stanford University, Berkeley and San Francisco for Biotechnology
- Geographical concentration of companies on the site: The site attracted many related companies such as Apple and Google
- The availability of a strong infrastructure: through the cooperation of the organizations with the local authorities.

- On the social level:

- Skilled Workers: Stanford University, California and Berkeley provided skilled labor and the valley attracted the talents from Asians immigrants as well as the strong leadership that Silicon Valley traces back to Frederick Terman, dean of Stanford University and dean of engineering, who encouraged graduate students to start their own companies. Terman established the Stanford Industrial Park and rent land owned by Stanford for start-ups.
- Rising levels of education and innovation: Stanford, Berkeley and San Francisco supported increased research and innovation.
- Collaboration between institutions and companies: Collaboration between companies and the rapid exchange of information led to the fact that Silicon Valley smashing the Boston Technology Corridor, which was the largest technology centre.

- On the economic level:

- Competitiveness: Silicon Valley has become the biggest competitor to technological products after it broke down the Boston Technology Corridor, which was the largest technology center, and intellectual property, patents and registered trademarks were protected.
- Export: Silicon Valley acquires technological programs such as Google, Facebook, and Apple which are exported to all countries of the world and have a monopoly on their companies.

5-4. China's experience in implementing the industrial cluster strategy:

Industrial clusters in China are concentrated in the coastal provinces, that is, about 80% of the clusters are located in the coastal regions. Coastal industrial groups accommodate a wide range of products, while the central and western regions specialize in products manufactured from the resources available in the regions.²⁶ Figure No. (5) shows the location of



Table No. 2: shows the measurement indicators for the study samples to implement the industrial clusters strategy and extracting the application determinants.

Measuring Indicator		Silicon Valley Experience	China Experience												
On the urban level	Exploitation of the comparative advantage of the site	●	●												
	Close to universities and research institutions	●	■												
	Geographical concentration of companies in the location	●	●												
	Availability of strong infrastructure	●	●												
On the economic level	Competitiveness	●	●												
	Export	●	●												
On the Social level	Skilled workers	●	■												
	Training centres, universities and research institutions	●	●												
	Rise in the level of education and innovation	●	■												
	Cooperation between institutions and companies	●	●												
Measurement and evaluation results	Through monitoring and analysis in the previous table, the extent of the feasibility of the experiments was evaluated to apply the strategy of industrial clusters, as the Silicon Valley experiment achieved 100% and China 92.5%, which is an indicator of the success of the experiments		<table border="1"> <caption>Success Rates Comparison</caption> <thead> <tr> <th>Indicator</th> <th>Silicon Valley (%)</th> <th>China (%)</th> </tr> </thead> <tbody> <tr> <td>Urban</td> <td>100</td> <td>92.5</td> </tr> <tr> <td>Economic</td> <td>100</td> <td>92.5</td> </tr> <tr> <td>Social</td> <td>100</td> <td>92.5</td> </tr> </tbody> </table>	Indicator	Silicon Valley (%)	China (%)	Urban	100	92.5	Economic	100	92.5	Social	100	92.5
Indicator	Silicon Valley (%)	China (%)													
Urban	100	92.5													
Economic	100	92.5													
Social	100	92.5													
Application Determinants according to Success Indicators															
A location with secondary industrial localization factors - a geographical location with a competitive advantage according to the cluster orientation - Close to research and educational institutions to increase innovation and development - Close to urban centres for the possibility of attracting innovative minds and talents and providing a suitable housing environment - cooperation and transfer of knowledge, information and modern technology - protection of intellectual property, patents and registered trademarks - government participation in the private sector in implementation, management and operation.															

Source / The researcher from analysing previous data

5-5. Korea's experience of implementing green industries strategy

Korea was suffering from excessive consumption of non-renewable energy sources in industry by about 38% of the total energy consumption. This is in addition to depletion of materials, environmental pollution, and the increase in the environmental footprint over the biological capacity.²⁷ So the Korea National Centre for Cleaner Production (KNCPC), a government-funded institute to support small and medium enterprises, started the National Environmental Industrial Park (EIP) program. KNCPC revealed a 15-year master plan to develop EIP with three expansion phases. Then, the government changed the implementation agency to KICOX to make more effective use of its experience and ability in managing industrial parks.²⁸ Figure No. (6) shows the three stages of implementing the green industries strategy in Korea.

According to the measurement indicators, the green industries strategy has been implemented as follows:

Environmental Efficiency: Percentage of materials and energy involved in the production stages: the percentage of materials involved in the production stages has been reduced. The program saved 1.35 million toes in energy use, reusing 5.21 million tons of by-products and waste, and saving 74.13 million tons of water in total.

- The output ratio of emissions and waste: the percentage of emissions of sulfur dioxide and carbon dioxide has been reduced by 17% and 13%, respectively, and reducing water consumption by 40%.²⁹

Economic Efficiency: production costs were reduced by reducing waste of materials and energy. It consequently led to the project's contribution to building state regulation facilities, with total private investment amounting to 623.7 billionKRW³⁰

Social Efficiency: It is measured in two parts, the extent of generating green employment opportunities and the role of the producer in improving and facilitating living. Then, it provides green job opportunities through the establishment of new green industries represented in the industries of new energy units and renewable energy, the volume of employment increased from 826 workers in 2004 to 13,380 workers in 2010.³¹ Besides, cleaner production reduced the environmental footprint of industry on society, as well as the introduction of new and renewable energy industries to reduce the global warming that Korea suffers from.

Product Sustainability: The government has encouraged research projects to develop solidarity systems, develop various innovations and technological development in resource recycling and secondary-product use. Moreover, new technologies and commercial ideas for capturing resources and reusing them in production as sources of energy or as raw materials appeared and were registered as patents. Besides, Korea has turned towards a gradual transformation towards green industries, with the intensity of research and development, and the introduction of modern technology in the industry. It has also turned to modern green industries such as new and renewable energy industries.³²

Efficiency of Governance: It is measured by the efficiency of environmental and economic laws and policies and the rates of technology introduction into manufacturing. In the 1990s, the Korean government began implementing laws to strengthen the environmentally friendly industrial structure (APEFIS), where it focused on promoting cleaner production (CP) and a certification program for environmental management system (EMS) on the basis of ISO14001. Indeed, a long-term plan was developed that succeeded in converting industrial complexes to EIP and introducing new and renewable industries energy to reduce energy consumption in Korea and reduce greenhouse emissions to 30%.



Figure No. (6) shows the three stages of implementing Korea's green industries strategy
 Source: Green Industry Conference, 2013 "Eco Industrial Park Initiative in Korea"

5-6. Japan's Green Industries Experience:

Despite the remarkable progress that Japan achieved in the industrial field, it suffered from many problems due to the negative impact of economic activities on the environment, which prompted Japan to recognize an environmental industrial approach to sustainable development. One of the most important problems that it has suffered from is the problem of waste. Japan produces 450 million tons of waste annually, mostly industrial waste, limited natural resources, so Japan consumes 1950 million tons of its natural resources annually. Air pollution and carbon dioxide emissions are the largest source of carbon dioxide emissions 40.1%. The energy problem, Japan lacks energy resources such as petroleum, natural gas and coal, so it imports them. The green industries strategy has been implemented according to the measurement indicators as follows:



Environmental Efficiency:

- The percentage of materials and energy involved in the production stages: the percentage of materials and energy has been reduced, as Japan issued compulsory laws for the recycling and use of waste such as paper recycling, packaging and plastic containers. As for energy, the energy used was reduced in order to use modern technology and the transformation towards the sixth wave industries, which is the most sustainable.
- Output ratio of emissions and wastes: the Zero Emission Research Initiative of the United Nations University aimed at zero emissions, as Japan reached zero emissions and wastes.³³

Economic Efficiency: production costs are reduced due to the reuse, recycling and exchange of materials between industries and reaching zero waste, as well as the transformation to the production of high-tech industries, "The Sixth Wave".

Social Efficiency: It is measured in two parts, the extent of generating green job opportunities and the role of the producer in improving and facilitating living. Given the transformation of Japan to the industries of the fourth and fifth waves, and its access to the sixth wave, i.e. the entire industry was restructured and the path of its industry became sustainable. So job opportunities became green as the industry in Japan became the sixth wave products are more sustainable and luxurious for their society, as they are the first countries in the production of robots, computer and automobile industries, and high-end technological industries.³⁴

Product Sustainability: Industrial cities in Japan turned into ecological cities, where the industrial solidarity system was activated, as well as the use of modern technology in the production of the fourth, fifth and sixth wave industries, which are the most sustainable industries.

Efficiency of Governance: it is measured by the efficiency of environmental and economic laws and policies and the rates of technology introduction into manufacturing. Japan has put strict laws for waste disposal as well as emissions, in a 15-year plan. It has led to the transformation of industrial cities into eco-industrial cities, as well as zero waste through waste management legislation and also on the **Zero Emission Initiative**, in cooperation with the United Nations, reached zero emissions. Moreover, Japan tended to fully restructure industries, becoming a pioneer for sustainable industries, reaching the sixth wave, by using advanced technology in industry with increased research and development.³⁵

Table No. (3) shows the measurement indicators for the study samples for implementing the green industries strategy to measure the extent of the success of the experiments to implement the green industries strategy, and through which the application determinants are extracted.

Table No. (3): shows the measurement indicators for green industries experiences and extracts the application determinants

Measuring Indicator,	Measuring standard	Korea	Japan
Environmental Efficiency	The percentage of materials and energy involved in the production stages	●	●
	Output percentage of emissions and wastes	■	●
Economic Efficiency	The costs of producing the product compared to the revenue generated	●	●
Social Efficiency	The extent of generating green job opportunities	●	●
	The role of the product in improving and facilitating living is measured	●	●
Product Sustainability	Production of goods and services using non-polluting processes and systems	■	●
Governance Efficiency	Measuring the efficiency of environmental and economic	●	●



	laws and policies		
	Technology introduction ratios in manufacturing	■	●
Measurement and evaluation results	Through monitoring and analysis, the extent to which the experiments are feasible to implement the green industries strategy were evaluated, as the experience of Korea scored 90.6% and Japan 100%, which is an indicator of the success of the experiments		
Application Determinants			
A site in which the factors of higher industrial localization are available - the intensity of research and development - the shift towards modern technology - the use of a cleaner production method or industrial solidarity IS - the government's participation in the private sector in implementation, management and operation - protection of intellectual property, patents and registered trademarks			

Source / The researcher from analysing previous data

VI. MEASUREMENT INDICATORS AND DETERMINANTS OF THE APPLICATION OF INDUSTRIAL LOCALIZATION STRATEGIES

Through studies of previous experiences for the application of industrial localization strategies, as well as the results of measurement and evaluation of these experiments that clarified the success rates in the application, through which the determinants of the application of industrial localization strategies were deduced. **Table No. (4)** illustrates a comparative analytical study to extract the objectives, indicators of measurement and determinants of the application of industrial localization strategies.

Table No. (4): Indicators and determinants of the application of localization strategies and the economic stage of the appropriate region or country for implementation

Strategy	Industrial Complexes	Industrial Clusters	Green Industries
Objectives	Regional Development	Competitive	Sustainability
Measurement Indicators	<p>Urban: Exploitation of the comparative advantage of the site - Exploitation of development axes - ports and airports - an economic base for new cities - construction, facilities and equipment</p> <p>Economical: - The extent of exploitation of resources and capabilities - industrial development - export</p> <p>Social: Unemployment – Poverty - Level of Education - Skilled Worker</p>	<p>Urban: Exploitation of the competitive advantage of the site - Close to universities and research institutions - the geographical concentration of companies in the site - the availability of a strong infrastructure</p> <p>Economical: Competitive - Export</p> <p>Social: Skilled workers - training centres, universities and research institutions - high level of education and innovation - cooperation between institutions and companies</p>	<p>Environmental Efficiency: - The percentage of materials and energy involved in the production stages - Percentage of outputs of emissions and wastes</p> <p>Product Sustainability: - Production of goods and services using non-polluting processes and systems</p> <p>Economic Efficiency: Product production costs compared to the revenue generated.</p> <p>Social Efficiency: - The extent of generating green jobs - The role of the product in improving and facilitating living is measured</p> <p>Governance Efficiency: - Measuring the efficiency of environmental and economic laws and policies</p>



			- Percentages of technology introduction into manufacturing
Application Determinants	<ul style="list-style-type: none"> - A site where the basic factors for industrial localization are available - Availability of a ratio advantage - Government participation in the private sector in implementation, management and operation. - The presence of a pioneering activity for the industrial complex, along with complementary industries 	<ul style="list-style-type: none"> - A location where secondary industrial localization factors are available - A geographic location with a competitive advantage depending on the cluster orientation - Close to research and educational institutions to increase innovation and development - Close to urban centres to attract innovative minds and talents and to provide a suitable housing environment - Cooperation and transfer of knowledge, information and modern technology - Protection of intellectual property, patents and registered trademarks - The government's participation in the private sector in implementation, management and operation 	<ul style="list-style-type: none"> - A location where the factors of higher industrial localization are available. - Intensive research and development - A shift towards modern technology - Use of the cleaner production method or IS industrial solidarity - Government participation in the private sector in implementation, management and operation - Protection of intellectual property, patents and registered trademarks

Source / The researcher from analysing previous data

VII. CONCLUSION

7- Results:

- The strategy of industrial complexes is considered the most appropriate strategy to be applied in a developing country with economic resources, as it acts as poles of growth for urban, economic and social development. Besides, it is suitable to be applied in the Egyptian regions due to its richness in mineral and quarantine resources, as well as the fact that some regions have agricultural activity, which saves many agricultural crops that involved in manufacturing operations, which achieves the added value or the distinctive location. Moreover, there are regions in Egypt characterized by a distinct geographical location, such as being close to ports, airports and major markets, which helps to establish some industrial complexes on export industries that can be settled near ports and on the coasts for ease of export and import as well as attracting foreign investments to it.
- The green industries strategy is considered a partner strategy for implementation with industrial localization strategies, at the approach to greening industries on the one hand, and on the other hand, the shift towards new green industries for the sustainability of the industry is appropriate to also apply to the Egyptian regions along with the strategy of industrial complexes to convert them into environmental industrial complexes.
- The strategy of industrial clusters is a suitable strategy for regions that have a competitive advantage, that is, with competitive industries and skilled labor as it can fit few of the Egyptian regions in which competitive companies reside.



VIII. RECOMMENDATIONS

- Exploiting and cultivating the strategic location of the Egyptian state on global trade lines in the localization of industries that depend on imported raw materials in industrial / commercial areas near the Egyptian ports on the Red and Mediterranean Sea, and their manufacture and re-export, which reduces transportation costs.
- Reshaping the social and economic characteristics of the spatial units in the region through the localization of high-tech industries in the region, which leads to the restoration of the lost demographic balance.
- The use of industrial technologies compatible with the natural environment, which reduces pollution and preserves the environment and natural resources
- The need for the Egyptian state to pay attention to the intensity of research and development for the industry, as well as to establish innovation centres and technological parks in order to increase competition and visibility on the global stage of the industry
- The need to attract cross-border companies and foreign investments to the Egyptian regions through the coastal regions in order to get acquainted with advanced technology and work to develop it through research and development so that Egypt becomes a partner in the industrialization process and can compete in global markets.
- The necessity to make a tripartite linkage to the economy (industry), the Egyptian government and universities, where universities conduct basic research, the industry produces innovative goods, and the government regulates the market in order to increase innovation. In the knowledge-based economy we are going through now, innovation plays a major role in increasing industry competitiveness
- The necessity to implement all laws and legislations related to the environment and the transition to cleaner production (CP) in order to obtain environmental certificates such as ISO that help in the export process and increase competitiveness.

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SJIF Scientific Journal Impact Factor

**Impact Factor:
7.512**

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