THE IMPACT OF APPLYING CIRCULAR ECONOMY POLICIES AND MECHANISMS ON THE SUSTAINABLE TRANSPORTATION SYSTEM AND PARTICIPATORY TRANSPORTATION IN EGYPT CASE STUDY

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ABSTRACT

The purpose of this study is to define and explore the relationship between circular economy policies and mechanisms in sustainable and participatory transportation systems. The study depended on a descriptive analytical approach, through questionnaire data that was collected from participatory and sustainable transportation users such as (Uber, Didi, In driver, SWVL). Statistical tools such as (Excel) have been used for data analysis to determine the scientific contribution and integration between the relationship of circular economy, sustainable and participatory transportation systems through highlighting private vehicle trips to reduce carbon emissions, resource improvement, save time and cost. The outstanding results of the study present the positive relationship between the environmental field and the participatory transportation system through raising awareness of reducing private vehicle use. Circular economy policies can be implemented in various fields such as industries, they support sustainable and participatory transportation systems. High environmental awareness can lead to participatory transportation system preferences.

Keywords: linear economy (LE), circular economy (CE), sustainable transportation, participatory transportation, Cradle to cradle (C2C), Cradle to grave, vehicles miles traveled, Egypt.

INTRODUCTION

Due to (Ellen MacArthur foundation, 2013) requested from readers to think of goods and services as resources in the economy today to widely spread sustainability in a world of finite resources. The foundation was created to inspire the next generation about how the linear economy (take, make, dispose) model was transferred to the circular economy (use, rethink, redesign) for a better future.

Linear economy (LE) was a traditional system and has been practiced through many years ago, but it didn't give any force power to the sustainable development concept (Ghisellini & Ulgiati., 2020) and only worked on guaranteeing the insurance of raw

materials, disposals, and finished products without using the value of the end product cycle. Circular economy (CE) is a sort of sustainable economy that aims to make development for the society, economy and improving the environmental challenges and it refers to the industrial economy. It's a zero waste framework for sustainability and can be described as an alternative to the traditional economy (Ellen MacArthur Foundation, 2013). It's aims to maintain the idea of sustainability of services for reducing the nonrenewable energy and keep materials and products in use through the life cycle systems such as collaborating with environment life cycle and vehicle manufacturing that considers an important electrification strategy for reducing the environment emissions and it is used as a tool for reaching sustainable development growths (SDGs).

Sustainable transportation encourages people to use an alternative rather than using their own vehicle, for reducing the cost, consumption, and environmental pollution percentages. The participatory transportation system launched in Egypt in 2014. It's known as (shared mobility) and its work with the process of people can share their ride in the same vehicles (car sharing, vehicles sharing, ride sharing). there are other apps Egypt has hosted such as (Indriver/ Didi/ Swvl / Uber bus) to spread the concept of ride-sharing or participatory transportation with citizens in the country for applying fluid relation between circular economy policies and mechanisms between sustainable participatory transportation systems (Martin *el al*., 2016)

RESEARCH PROBLEM

Since the circular economy got the attention years ago from companies and academies, they all want to find alternatives for the current economic model and the main purpose of that research is to raise awareness of sharing customer request services. About transition from linear economy to circular economy in transportation sector presents the challenges and economic opportunities such as, CE policies and mechanisms can create effectiveness and efficiency while using resources and services, reduce high cost, saving time, serve the sustainability system and reduce negative emissions impacts, but in other side there are obstacles in the investment cost for using the sustainable and participatory transportation

system. The high percentage of consumption and negative impacts on the environmental field make the country try to go on applying the circular economy systems and principles for presenting the efficiency, effectiveness and reuse of the transportation sector. The circular economy (CE) principles and mechanisms aim to reduce the environmental negative impacts, while the participatory transportation system (ride-sharing) tries to involve citizens in the sustainable transportation policies. Unfortunately, people suffering from lack of knowledge about the circular economy (CE) concept and ride-sharing concept have been established since the 1970s (Murray et al., 2017).

The reduction of COs emissions and pollution are the main purpose for achieving sustainable development growth to societies. Ride sharing ideas have become popular in many countries and there are many companies applying ride-sharing such as (Uber, Didi, Indriver, Swvl) platforms because they decided to find the best way to pick up many riders on the same trip. Successful circular economy system depends on good behavior for their culture, political system and society.

RESEARCH QUESTIONS

1- What is the impact of applying circular economy policies and mechanisms on the sustainable transportation system and participatory transportation in Egypt?
2- How different do mobility platforms follow the circular economy (CE) policies and mechanisms?
3- What is the relationship between the circular economy and the ride-sharing platforms (Uber, Didi, Indriver) ?
4- How do ride-sharing platforms (Uber, Didi, Indriver) play an important role for circular economy awareness?
5- Can a circular economy have a relationship with ride sharing to achieve SDGs?

SIGNIFICANT STUDY

This study is considered one of few contributions to analyze the relationship between circular economy policies and mechanisms on participatory transportation in Egypt for achieving a sustainable transportation system. The scientific value of the study depends on

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the participatory transportation system that falls into circular economy policies and mechanisms by reducing private vehicle use for fewer negative impacts of emissions, reducing resources and service consumption, saving save time and cost. The circular economy model can be used to reduce negative emissions impacts on the environment by spreading high awareness of services and resource effectiveness for more sustainable transportation systems.

STUDY OBJECTIVES

1- Circular economy can impact ride-sharing to achieve sustainability.
2- Ride-sharing platforms want to improve our world by reaching less emissions that impact the environment.
3- Spread awareness about the circular economy, ride-sharing terms, and sustainable transportation concepts.
4- Changing people's behaviors and keeping services such as rides and car sharing more environmentally friendly.

STUDY HYPOTHESIS

1- First hypothesis: The circular economy policies and mechanisms such as (reducing waste of resources, services efficiency lifecycle) impact positively on sustainable transportation systems.
2- Second hypothesis: Participatory transportation systems such as (shared mobility platforms and reusing vehicles) influence the environmental field by reducing negative emissions.

STUDY CONCEPTS

Circular Economy: is a sort of sustainable economy that aims to make a development for the society, economy and improving the environmental challenges and it refers to industrial economy. It’s a zero waste framework for sustainability and can be described as an alternative to the traditional economy due to the importance of sustainability that is considered a major concern in policies. It has been designed to keep services and products at high utility all the time to keep the economy as long as possible (Ellen MacArthur Foundation, 2013; Geissdoerfer et al., 2017)

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Sustainable transportation system: It's a widely spread definition, which present policies, practices and actions to be classified as (sustainable). Sustainability is all about analysis and how the circular economy and transportation system interact with their advantages and disadvantages. Also, considered as the best solution for achieving high population demands of the transportation sector, many organizations identified sustainable transportation as affordable, safe and it will depend on generated energy such as the circular economy system which has low effects on the environment (Jelti *et al*., 2023).

Participatory transportation system: This service (car-Sharing / ride-sharing) started in the late of 1998s in San Francisco and that concept has expanded after this period in big cities (Martin *el al*., 2016). Starting from 2018 the car-sharing industry has become more famous within many cities in recent years, also operating in over 30 countries around the world. It works with the process of people sharing their ride on the same vehicles and road of the trip because that makes users have access to transportation modes on an (as- needed) basis.

PREVIOUS STUDIES

1- Study: (Ellen MacArthur, E. 2013) titled: "Towards the circular economy".

This study aimed to analyze the circular economy concept as alternative model of linear economy (take, use, dispose) by reviewing the sustainability conceptual framework for ensuring the creativity and innovation of the economy and applied it on different sectors. The study used quantitative analytical method for evaluating circular economy impacts on different sectors of industry and systematic review has been used for clarifying the circular economy main concepts. Study contribution here presented circular economy development and principles such as (reuse, less use of services and resources, raise awareness of lifecycle concept). The results of study shows that it enhance the efficiency of services and resources to reduce wastes, and provide a positive solution for environmental field, also adopt the relationship between private and public sectors. The scientific gap of the study didn't address circular economy relationship between sustainable and participatory transportation systems. Therefore, current studies try to link transportation systems with circular economy policies and mechanisms for achieving sustainability to environmental field.

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2- Study of (Roorda, M.J, and Nourinejad, M., 2016): "Agent based model for dynamic ridesharing".

The purpose of study is to clarify and analyze participatory transportation systems (ride-sharing) impact on environmental field, also how riders and drivers interaction can impact on reduce vehicle number on roads for improving sustainable transportation system. The researchers used the quantitative curriculum, where they established a virtual environment for drivers and riders to evaluate their behaviors that impact on participatory transportation system to achieve sustainable environment. The contribution of the research to clarify individuals behavior impact on participatory transportation systems. The research results showed that participatory transportation systems can reduce negative emissions percentage and vehicles number. The study gap here didn't link the relationship between participatory transportation systems and circular economy policies and mechanisms. Therefore, current studies try to find the integration between both concepts to achieve environment sustainability.

3- Study: (Becker, H. Becker and Axhauen, K.W., 2017) titled: "Assessing the welfare impacts of Shared Mobility and Mobility as a Service (MaaS)".

The goal of the study was to analyze the impact of shared mobility services such as (ride-sharing platforms) on circular economy and transportation systems. It also based on simulation process for analyzing integration between public and participatory transportation systems, in addition to estimate time and cost consumption. The researchers at this study used the quantum method for analyzing people behaviors about participatory transportation through surveys to clarify the impact on vehicles and resources consumption and putted future scenarios how ride-sharing can widely spread among citizen. Contribution of this study showed that efficiency of using resources and services can decrease transportation cost of individuals, therefore it's a benefits for circular economy systems. The results of study shows that ride-sharing concept can reduce negative impacts on environmental field and decreasing the use of private vehicles. The scientific gap didn't provide a direct relationship between circular economy mechanisms such as (reuse, decrease wastes) and participatory

transportation systems. The importance of current study to prove the relationship between circular economy with participatory and sustainable transportation systems.

4- Study of (Winans, K., Kendall, A., Deng, H., 2017): "The history and current applications of the circular economy concept".

This study aim to review circular economy history and analyze the development that happened in various industrial sectors for achieving sustainability on environmental field. Researchers here used the descriptive analytical approach by analyzing circular economy previous studies to clarify how circular economy implementation will be different from sector to another. Study contribution here showed the economic evolution from linear economy to circular economy due to Ellen MacArthur, also it provide the difference between circular economy implementation in various sectors to determine the strength and weakness. The results explained that circular economy policies and mechanisms has not been full achieved because of depending more on traditional economy. The study gap didn't link the relationship between circular economy and participatory transportation systems to achieve sustainability on environment.

5- Study: (Shaheen, S., Cohen, A., and Jaffee, M., 2018) titled: "On the potential for one-way electric vehicle car-sharing in future mobility systems".

The purpose of the study is for exploring the car-sharing platforms, future systems of transportation, economic and environmental benefits. The study here depended on comparative analytical approaches, additionally it also had a purpose to analyze the cost of ride-sharing systems. The contribution of study was in expanding awareness of participatory transportation system to achieve sustainable transportation goals through decrease the use of private to ride-sharing process for less negative impacts emissions on environmental field. The results of study clarify that electric vehicles and car-sharing systems can be highly effective for citizens. Unfortunately the study didn't address the direct relationship between circular economy and car-sharing systems, regards the reuse of services and resources. The research focusing on the linking between circular economy policies and mechanisms with car-sharing systems to achieve sustainable transportation systems.

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6- Study of (Reike, D., Vermeulen, W. J., 2018): "Circular economy indicators: What do they measure".

The purpose of the study was to analyze and clarify the difference between circular economy model and effectiveness of each one such as (3Rs, 5Rs, 6Rs, 10Rs). The study depend on a comparative analytical method of circular economy policies and mechanisms and show models impact on services and resources consumption. The scientific contribution of study focus on clarifying the difference between circular economy models (3Rs, 5Rs, 6Rs, 10Rs), because each modern model represent more advanced such as 10Rs model. The results of study showed that transfer from 3Rs model to 10Rs model required advanced policies and technologies for strong business models to face economic challenges. The gap here that didn't address circular economy models on participatory and sustainable transportation sectors, the research tries to analyze the impact of circular economy policies and mechanisms on participatory transportation systems to achieve sustainability.

7- Study of (Chris dedicoat, M., 2019) titled: "Introduction to circular economy".

The goal of the study was viewed the principles of circular economy and explained the difference between circular economy concept and linear economy. The researchers here used a descriptive analytical method to clarify how companies apply sustainable economic. The scientific contribution of this study to clarify more about circular economy pillars such as life cycle concept. The results showed that circular economy was an important for economic challenges, tool to decrease negative emissions that impacts on environment and it also need major changes in policies, business models and mechanisms. However the study didn't address circular economy implementation in participatory and sustainable transportation systems. The study here try to link the relationship between circular economy and participatory and sustainable transportation systems.

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life cycle concept. The results showed that circular economy was an important for economic challenges, tool to decrease negative emissions that impacts on environment and it also need major changes in policies, business models and mechanisms. However the study didn't address circular economy implementation in participatory and sustainable transportation systems. The study here try to link the relationship between circular economy and participatory and sustainable transportation systems.

9- Study (Moraga, G., Huysveld., 2019) titled: "Circular economy indicators: What do they measure?".

The study purpose here was to evaluate and measure the circular economy indicators and strategies to identify the preservation of product creation by lifetime extension for instance (reuse, remanufacture, durability) and for the components preservation through (recovery, parts repurpose and reuse). The researchers used a systematic methods for analyzing indicators strengths and weakness. The scientific contribution of study to clear the classification of circular economy indicators to know the difference between the indicators that impacted on environmental field and circular economy. The study gap shows that circular economy indicators related to resources consumption and there was number of indicators had no impact on environmental field, however it didn't focus widely on sustainable and participatory transportation systems. The scientific contribution here for addressing how those indicators can impact on circular economy policies and mechanisms on participatory and sustainable transportation systems.

METHODOLOGICAL PROCEDURES OF THE STUDY

Introduction:

This part includes data analysis by using some statistical methods and tests to verify the validity of the study's hypotheses stemming from the general objectives of the thesis. The study community include all users of participatory and sustainable transportation for measuring "The impact of applying circular economy policies and mechanisms on the sustainable transportation system and shared transportation in Egypt (case study)". The sample of study include participatory transportation platforms such as (Uber, Didi, In-

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Driver, SWVL). Size sample here depend on using Statistical equation for accurate analysis. The chapter will end with the study results.

The data will be analyzed in several stages as follows:

1- Coding to answer the questionnaire data between 200- 400 people.
2- Preliminary analysis of the data.
3- Exploring the characteristics of the study sample.
4- Conducting descriptive analysis of the study variables.
5- Conducting statistical analyses to test the study.

Research Methodology:

Preliminary analysis of the data

When collecting primary data from the questionnaire list of participatory and sustainable transportation users in Egypt, data processing or preliminary data analysis is a key step required before conducting subsequent statistical analyses. Preliminary analysis of the data is critical to ensure that subsequent statistical analyses will be carried out correctly.

The preliminary analysis of the data was established based on the following stages:

• Reliability and Validity tests
• Identify the statistical methods used in data analysis

Reliability test:

Reliability refers to the extent to which the statements (items) of the survey list are stable and do not contradict themselves, that is, the survey list will give approximately the same results with a probability equal to the value of the reliability coefficient if it is re-applied to another sample of the same population and the same size. To test the reliability of the statements in the survey lists, Cronbach's Alpha was used, a parameter that takes values ranging from zero to one. If there is no stability, then the value of this parameter will be equal to zero, while if there is complete stability in the data, then the value of this parameter will be equal to one. That is, an increase in the value of Cronbach's alpha coefficient and its closeness to one means an increase in the level of data credibility to reflect the results of the sample on the population under study. Note that the lowest value of the reliability coefficient is 0.7, and more than 0.7 gives a strong indicator to judge the reliability of the survey list

(Cronbach, 1951), however, according to (Griethuijsen et al., 2015; Taber, 2018) values greater than 0.6 are considered acceptable values a well.

The Cronbach's alpha coefficient is calculated using equation (1):

$$Alpha = \frac{n}{n - 1}(1 - \frac{\sum_{i=1}^{n} Vi}{Vt})$$

Whereas:

Alpha stands for Cronbach's alpha coefficient.

n stands for the number of statements in the survey list.

Vi stands for one-statement variance.

Vt stands for the variance of all statements in the poll list.

Validity test:

The validity of the survey list means that the statements in the survey lists represent the well-studied population, that is, the answers obtained from the survey lists give the information for which the statements are made (the survey list measures what they are supposed to measure) (Taber, 2018).

The validity coefficient is measured by taking the square root of the reliability coefficient as shown in equation (2

$$= \sqrt{\text{Alpha}} = Validity$$

Table (1) shows the results of applying both the reliability and validity tests at the level of the study variables.

It is clear from Table (1) that the value of each of the reliability and validity coefficients exceeds 0.7, at the level of all variables, which indicates that there is stability in the statements for each variable, and the survey list measures what it was designed to measure, and therefore it represents the study population in a good way. so the data of that list can be relied upon in the work of subsequent analyses and statistical tests.

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Table (1) The results of applying the reliability and validity coefficients

Dimensions	Reliability coefficient	Validity coefficients
The variable as a whole	0.707	0.841

Source: Developed by the researchers, 2024

Determine the statistical methods used in data analysis:

The following statistical methods and tests were used :

1. Conducting descriptive statistics by calculating the frequencies, percentage age, weight percentile to measure dispersion.
2. Cronbach's alpha coefficient to Calculate reliability and validity.

Explore the characteristics of the study sample

The frequencies and percentages of demographic data expressing the study sample of 340 individuals were calculated, in order to explore the characteristics of the study sample as shown in table (2):

Table (2) Frequencies and percentage of demographic data

Variables	Category	Frequency	Percentage
Gender	Male	158	46.47%
	Female	182	53.53%
Age	16 - 25	140	41.18%
	26 - 34	56	16.47%
	35 - 44	65	19.12%
	45 - 54	65	19.12%
	55	14	4.12%
Job	Employee	115	33.82%
	Manager	43	12.65%
	Student	154	45.29%
	Volunteer	28	8.24%

Source: Developed by the researchers, 2024

From the Table (2) illustrate the number and percentage of Gender The greatest number (Male) were (158) with percentage (46.47%), while the number of (Female) with No (182) percentage (53.53%).

The number and percentage of Age The greatest number (16 - 25) were (140) with percentage (41.18%), while the number of (35 - 44) and (45 - 54) with No (65) percentage

(19.12%), (26 - 34) were (56) with percentage age (16.47%), finally, (+ 55) with No (14) percentage (4.12%).

Description answers to the questionnaire Variables:

Table (3): illustrate the number and percentage to answer the question Have you ever heard of the following terms?

(Multiple answers are allowed)

Terms	No	Percentage	Order
Circular economy	162	14.81%	4
Shared transportation	213	19.47%	3
Electric cars	314	28.7%	1
Electric Bike/Scooter Service	293	26.78%	2
Linear economy	112	10.24%	5
Sum	1094	100%	

Source: Developed by the researchers, 2024

Table (3) illustrates the number and percentage to answer the question Have you ever heard of the following terms? survey participants obtained find that the greatest number of samples answered (Electric cars) with No (314) with percentage(28.7%), after that the number of (Electric Bike/Scooter Service) were (293) with percentage(26.78%), and the number of (Shared transportation) were (213) with percentage (19.47%), after that the number of (Circular economy) were (162) with percentage (14.81%), that finally (Linear economy) with No (112) with percentage (10.24%).

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Table (4): illustrate the number and percentage to answer the question: how can circular economy policies and mechanisms affect the sustainable transportation system and shared transportation for a healthy environment in Egypt? (Multiple answers are allowed)

Variables	No	Percentage	Order
The Circular Economy System was created to help and inspire the next generation to rethink and redesign for a better future.	189	18.99%	4
Reducing carbon emissions by improving the efficiency of the transportation system and reusing resources effectively	233	23.42%	1
Some organizations believe that the circular economy provides an opportunity for creativity, innovation, and positivity for a healthy environment.	203	20.4%	2
The circular economy is designed to keep services and products in high use for as long as possible.	176	17.69%	5
Sharing ideas and encouraging cooperation between the private and public sectors.	194	19.5%	3
Sum	995	100%	

Source: Developed by the researchers, 2024

Table (4) illustrates the number and percentage to answer the question: how can circular economy policies and mechanisms affect the sustainable transportation system and shared transportation for a healthy environment in Egypt? survey participants obtained find that the greatest number of samples answered (Reducing carbon emissions by improving the efficiency of the transportation system and reusing resources effectively) with No (233) with percentage (23.42%), after that the number of (Reducing carbon emissions by improving the efficiency of the transportation system and reusing resources effectively) were (203) with percentage (20.4%), and the number of (Sharing ideas and encouraging cooperation between the private and public sectors) were (194) with percentage (19.5%), after that the number of (The Circular Economy System was created to help and inspire the next generation to rethink and redesign for a better future) were (189) with percentage (18.99%), that finally (The circular economy is designed to keep services and products in high use for as long as possible) with No (176) with percentage (17.69%).

Table (5): illustrate the number and percentage to answer the question What is the relationship between the application of circular economy policies, mechanisms, and environmental sustainability? (Multiple answers are allowed)

Variables	No	Percentage	Order
Both work to achieve reduced consumption of resources and services while reusing resources in an effective and more efficient manner.	255	26.29%	1
It aims to achieve development of society and the economic system while improving environmental challenges.	226	23.3%	2
It is a zero-waste framework for achieving environmental sustainability.	191	19.69%	3
It can be described as an alternative to the traditional economic system (Linear economy).	127	13.09%	5
Circular economy policies and mechanisms are a type of sustainable economy.	171	17.63%	4
Sum	970	100%	

Source: Developed by the researchers, 2024

Table (5) illustrates the number and percentage to answer the question What is the relationship between the application of circular economy policies, mechanisms, and environmental sustainability? Survey participants obtained find that the greatest number of samples answered (Both work to achieve reduced consumption of resources and services while reusing resources in an effective and more efficient manner) with No (255) with percentage (26.29%), after that the number of (It aims to achieve development of society and the economic system while improving environmental challenge) were (226) with percentage (23.3%), and the number of (It is a zero-waste framework for achieving environmental sustainability) were (191) with percentage (19.69%), after that the number of (Circular economy policies and mechanisms are a type of sustainable economy) were (171) with percentage (17.63%), that finally (It can be described as an alternative to the traditional economic system (Linear economy)) with No (127) with percentage (13.09%).

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Table (6): illustrate the number and percentage to answer the question How can circular economy policies and mechanisms environmentally impact the sustainable transportation and shared transportation system in Egypt? (Multiple answers are allowed)

Variables	No	Percentage	Order
Carbon emissions and negative impacts on the ecosystem will be reduced.	169	17.17%	2
The efficiency and effectiveness of (resources and services) will be improved by spreading awareness among individuals.	163	16.57%	3
Promote sustainable products and services policy and innovation in the sustainable transport system.	155	15.75%	4
The circular economy system encourages the recovery and renewal of old cars instead of their disposal.	149	15.14%	5
Spreading environmental awareness to improve environmental management among individuals, private and governmental sectors.	120	12.2%	6
All the above	228	23.17%	1
Sum	984	100%	

Source: Developed by the researchers, 2024

Table (6) illustrates the number and percentage to answer the question How can circular economy policies and mechanisms environmentally impact the sustainable transportation and shared transportation system in Egypt? survey participants obtained find that the greatest number of samples answered (All the above) with No (228) with percentage (23.17%), after that the number of (Carbon emissions and negative impacts on the ecosystem will be reduced) were (169) with percentage (17.17%), and the number of (The efficiency and effectiveness of (resources and services) will be improved by spreading awareness among individuals) were (163) with percentage (16.57%), after that the number of (Promote sustainable products and services policy and innovation in the sustainable transport system) were (155) with percentage (15.75%), after that the number of (The circular economy system encourages the recovery and renewal of old cars instead of their disposal) were (149) with percentage (15.14%),finally (Spreading environmental awareness to improve environmental management among individuals, private and governmental sectors) with No (120) with percentage (12.2%).

Table (7): illustrate the number and percentage to answer the question: What is the reason behind transforming the economic system from a linear economy to circular economy mechanisms and policies? (Multiple answers are allowed)

Variables	No	Percentage	Order
Linear economy was a traditional system in which resources were used and then disposed of and was practiced for many years.	190	20.30%	2
It did not give any strength to the concept of sustainable development where resources are used without reusing them.	164	17.52%	3
He only worked to ensure that the raw materials were secured, used and then disposed of without the value of the final product cycle.	156	16.67%	4
The traditional economy relies on models that encourage waste and the unsustainability of the economic system for individuals and sectors.	190	20.30%	2
A linear economy is against the concept of sustainable development as it is costly for companies due to the constant need to use and then dispose of resources.	236	25.21%	1
Sum	936	100%	

Source: Developed by the researchers, 2024

Table (7) illustrates the number and percentage to answer the question: What is the reason behind transforming the economic system from a linear economy to circular economy mechanisms and policies? survey participants obtained find that the greatest number of samples answered (A linear economy is against the concept of sustainable development as it is costly for companies due to the constant need to use and then dispose of resources) with No (236) with percentage (25.21%), after that the number of (The traditional economy relies on models that encourage waste and the unsustainability of the economic system for individuals and sectors)and (Linear economy was a traditional system in which resources were used and then disposed of and was practiced for many years) were (190) with percentage (20.3%), and the number of (It did not give any strength to the concept of sustainable development where resources are used without reusing them) were (164) with percentage (17.52%), that finally the number of (He only worked to ensure that the raw materials were secured, used and then disposed of without the value of the final product cycle) were (156) with percentage (16.67%).

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Table (8): illustrate the number and percentage of answering the question Is there any environmental relationship between the circular economy and the linear economy**?**

Variables	No	Percentage	Weight Percentile
No	77	22.65%	73.2%
Yes	144	42.35%	
I don't knew	119	35%	
Total	340	100%	

Source: Developed by the researchers, 2024

Table (8) illustrates the number and percentage of answering the question Is there any environmental relationship between the circular economy and the linear economy? Survey participants obtained find that the greatest number of samples answered (Yes) with No (144) with percentage (42.35%) which reflect difference options about economic systems, and the number of (I don't knew) were (119) with percentage (35.0%), that finally (No) with (77) with percentage (22.65%) and the weight percentile (73.2%). The results support circular economy concept than linear economy.

Table (9): illustrate the umber and percentage to answer the question Share your opinion on what the environmental benefits of shifting from a linear economic system to the concept of a circular economy are:(Multiple answers are allowed)

Variables	No	Percentage	Order
The ability to maintain services and resources for the longest possible period due to reuse	288	25.78%	1
Encouraging sustainability, which enhances the economic sector and reduces the waste of resources to preserve the rights of future generations.	226	20.23%	2
The circular economy achieves the principle of flexibility by using resources and services more than once.	212	18.98%	4
Enhance corporate reputation with responsive services and products that help maintain a high ecosystem and economic balance.	178	15.94%	5
The circular economy embraces different business models such as shared transportation, which encourages innovation and sustainability.	213	19.07%	3
Sum	1117	100%	

Source: Developed by the researchers, 2024

Table (9) illustrates the number and percentage to answer the question Share your opinion on what the environmental benefits of shifting from a linear economic system to the concept of a circular economy are: survey participants obtained find that the greatest number of samples answered (The ability to maintain services and resources for the longest possible period due to reuse) with No (288) with percentage (25.78%), after that the number of (Encouraging sustainability, which enhances the economic sector and reduces the waste of resources to preserve the rights of future generations) were (226) with percentage (20.23%), after that the number of (The circular economy embraces different business models such as shared transportation, which encourages innovation and sustainability) were (213) with percentage (19.07%), and the number of (The circular economy achieves the principle of flexibility by using resources and services more than once) were (212) with percentage (18.98%), that finally (Enhance corporate reputation with responsive services and products that help maintain a high ecosystem and economic balance) with No (178) with percentage (15.94%).

Table (10): illustrate the number and percentage to answer the question In your personal opinion, Is there any environmental problems caused by the linear economic model (traditional economy)?

Variables	No	Percentage	Weight Percentile
Yes	235	69.1%	80.1
No	98	28.8%	
I don’t know	7	2.1%	
Sum	340	100%	

Source: Developed by the researchers, 2024

Table (10) illustrates the number and percentage to answer the question In your personal opinion, Is there any environmental problems caused by the linear economic model (traditional economy)? survey participants obtained find that the greatest number of samples answered (Yes) with No (235) with percentage (69.1%), and the number of (No) were (98) with percentage (28.8%), the number of (I don’t know) were (7) with percentage (2.1%) and the weight percentile (80.1%).

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Table (11): illustrate the number and percentage to answer the question Have the private and public sectors already started moving towards the transition to a circular economy system in order to implement environmental sustainability?

Variables	No	Percentage	Weight Percentile
Disagree	56	16.47%	91.8
Agree	284	83.53%	
Total	340	100%	

Source: Developed by the researchers, 2024

Table (11) illustrates the number and percentage to answer the question: Have the private and public sectors already started moving towards the transition to a circular economy system in order to implement environmental sustainability? survey participants found that the greatest number of samples answered (Agree) with No (284) with percentage (83.53%), after that the number of (Disagree) were (56) with percentage (16.47%) and the weight percentile (91.8%).

Table (12): illustrate the number and percentage to answer the question Have many governmental and private organizations been encouraged to think about changing their work strategies, such as thinking about reducing the negative impacts on the ecosystem?

Variables	No	Percentage	Weight Percentile
Disagree	48	14.12%	92.90%
Agree	292	85.88%	
Total	340	100%	

Source: Developed by the researchers, 2024

Table (12) illustrates the number and percentage to answer the question Have many governmental and private organizations been encouraged to think about changing their work strategies, such as thinking about reducing the negative impacts on the ecosystem? Survey participants obtained find that the greatest number of samples answered (Agree) with No (292) with percentage (85.88%), after that the number of (Disagree) were (48) with percentage (14.12%) and the weight percentile (92.9%).

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Table (13): illustrate the number and percentage to answer the question Do you think that the shared transportation system is part of the circular economy that aims to achieve sustainable environmental development?

Variables	No	Percentage	Weight Percentile
Disagree	55	16.18%	91.9
Agree	285	83.82%	
Total	340	100%	

Source: Developed by the researchers, 2024

Table (13) illustrates the number and percentage to answer the question: Do you think that the shared transportation system is part of the circular economy that aims to achieve sustainable environmental development? survey participants found that the greatest number of samples answered (Agree) with No (285) with percentage (83.82%), after that the number of (Disagree) were (55) with percentage (16.18%) and the weight percentile (91.9%).

Table (14): illustrate the number and percentage to answer the question Do new generations need to seize the opportunity to be more cultured and aware of the topic of the circular economy system and its importance to the environment?

Variables	No	Percentage	Weight Percentile
Disagree	27	7.94%	96.03%
Agree	313	92.06%	
Total	340	100%	

Source: Developed by the researchers, 2024

Table (14) illustrates the number and percentage to answer the question: Do new generations need to seize the opportunity to be more cultured and aware of the topic of the circular economy system and its importance to the environment? survey participants found that the greatest number of samples answered (Agree) with No (313) with percentage (92.06%), after that the number of (Disagree) were (27) with percentage (7.94%) and the weight percentile (96.03%).

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Table (15): illustrate the number and percentage of the times use your car

Variables	No	Percentage	Order
Daily (1 to 5 times)	86	25.29%	3
Weekly (from 1 to 12 times)	93	27.35%	2
Monthly or less	161	47.35%	1
Total	340	100%	

Source: Developed by the researchers, 2024

Table (15) illustrates the number and percentage of the number and percentage of the times use your car the greatest number of samples answered (Monthly or less) with No (161) with percentage (47.35%), and the number of (Weekly (from 1 to 12 times)) were (93) with percentage (27.35%), that finally (Daily (1 to 5 times)) were (86) with percentage (25.29%).

Table (16): illustrate the number and percentage of answering the question Have you ever used ride-sharing services such as the following transportation applications? (Uber, Didi, Indriver, or Swvl)?

Variables	No	Percentage
Never, I've never heard of it before	2	0.59%
No, but I've heard about it before	61	17.94%
Yes, I did	277	24.8%
Total	340	100%

Source: Developed by the researchers, 2024

Table (16) illustrates the number and percentage of answering the question Have you ever used ride-sharing services such as the following transportation applications? (Uber, Didi, Indriver, or Swvl)? survey participants obtained find that the greatest number of samples answered (Yes, I did) with No (277) with percentage (24.8%), after that the number of (No, but I've heard about it before) were (61) with percentage (17.94%), that finally (Never, I've never heard of it before) with No (2) with percentage (0.59%).

Table (17): illustrate the number and percentage of answering the question Did you know that sustainable transportation is one of the mechanisms of the circular economy, as it aims to achieve its goals and face environmental challenges?

Variables	No	Percentage	Weight Percentile
No, didn't know	150	44.12%	77.90%
Yes, I knew	190	55.88%	
Total	340	100%	

Source: Developed by the researchers, 2024

Table (17) illustrates the number and percentage of answering the question Did you know that sustainable transportation is one of the mechanisms of the circular economy, as it aims to achieve its goals and face environmental challenges? survey participants obtained find that the greatest number of samples answered (Yes, I knew) with No (190) with percentage (55.88%), and the number of (No, didn't know) were (150) with percentage (44.12%) and the weight percentile (77.9%).

Table (18): illustrate the number and percentage of answering the question Have you ever used one of the following means of transportation to preserve the environment? (Multiple answers are allowed)?

Variables	No	%	Order
Electric car	98	20.08	3
Electric scooter/bike	99	20.29	2
Shared transportation such as Uber, Didi, Swvl, and Indriver	291	59.63	1
Sum	488	100	

Source: Developed by the researchers, 2024

Table (18) illustrates the number and percentage of answering the question Have you ever used one of the following means of transportation to preserve the environment? survey participants obtained find that the greatest number of samples answered (Shared transportation such as Uber, Didi, Swvl, and Indriver) with No (291) with percentage (59.63%), after that the number of (Electric scooter/bike) were (99) with percentage (20.29%), that finally (Electric car) with No (98) with percentage (20.08%).

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Table (19): illustrate the number and percentage of answering the question What are your reasons for using shared transportation, such as (Uber, Didi, Indriver, Swvl)? (Multiple answers are allowed)

Variables	No	%	Order
For daily commuting, such as going to (work, university, school, major cities)	177	30.46	3
Travel and transportation within airports	77	13.25	4
Ease of use of shared transportation and comfort	193	33.22	1
Moving to new places, returning home	134	23.06	2
Sum	581	100	

Source: Developed by the researchers, 2024

Table (19) illustrates the number and percentage of answering the question: What are your reasons for using shared transportation, such as (Uber, Didi, Indriver, Swvl)? survey participants obtained find that the greatest number of samples answered (Ease of use of shared transportation and comfort) with No (193) with percentage (33.22%), after that the number of (For daily commuting, such as going to (work, university, school, major cities)) were (177) with percentage (30.46%), after that the number of (Moving to new places, returning home) were (134) with percentage (23.06%), that finally (Travel and transportation within airports) with No (77) with percentage (13.25%).

Table (20): illustrate the number and percentage of answering the question Do you think that ride-sharing services such as (Uber/Didi/Swvl/Indriver): Want to use electric cars and share them between individuals on trips with the aim of reducing harmful emissions on the ecosystem?

Variables	No	%	Order
No, I think ride-sharing services want to implement and share the electric car system between individuals to reduce emissions.	98	28.82	2
Yes, I think ride-sharing services want to implement and share the electric car system between individuals to reduce emissions.	242	71.18	1
Total	340	100	

Source: Developed by the researchers, 2024

Table (20) illustrates the number and percentage of answering the question: Do you think that ride-sharing services such as (Uber/Didi/Swvl/Indriver):Want to use electric cars and share them between individuals on trips with the aim of reducing harmful emissions on

the ecosystem? survey participants found that the greatest number of samples answered (Yes, I think ride-sharing services want to implement and share the electric car system between individuals to reduce emissions.) with No (242) with percentage (71.18%), and the number of (No, I think ride-sharing services want to implement and share the electric car system between individuals to reduce emissions) were (98) with percentage (28.82%).

Table (21): illustrate the number and percentage of answering the question Do you prefer to use ride-sharing services (sharing cars with individuals) or (your own car)?

Variables	No	%	Order
Car sharing with individuals	199	58.53	1
My own car	101	29.71	2
None of the above	40	11.76	3
Total	340	100	

Source: Developed by the researchers, 2024

Table (21) illustrates the number and percentage of answering the question Do you prefer to use ride-sharing services (sharing cars with individuals) or (your own car)? survey participants obtained find that the greatest number of samples answered (Car sharing with individuals) with No (199) with percentage (58.53%), after that the number of (My own car) were (101) with percentage (29.71%), that finally (None of the above) with No (40) with percentage (11.76%).

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Table (22): illustrate the number and answer the question Can you share your opinion: Why do you not prefer to use shared transportation services, and what difficulties did you face while using them?

VARIABLES	NO	%
High cost: In some cases, ride-sharing prices may be expensive than public transportation or even when compared to	7	23.33
Because of the mobilization	3	10
Pollution reduction	2	6.67
Crowded	2	6.67
Reduce gasoline expenses for the private car	2	6.67
The difficulties are that people are disorganized and random	1	3.33
Money and environmental conservation	1	3.33
Bad behavior in organizing	1	3.33
The of security sense due to the recent accidents and high costs of trips	1	3.33
No privacy	1	3.33
Lack of privacy, delay in service, or lack of comfort	1	3.33
Not available and unsafe sometime	1	3.33
Multiple options and convenient and suitable appointments	1	3.33
Because it's unsafe sometimes	1	3.33
Because it use electric vehicles and maintain the environment	1	3.33
Saving money and maintain the environment	1	3.33
Preserve the world	1	3.33
Safety issues: Some people may feel unsafe when using ride-sharing services	1	3.33
Use it only when needed and necessary	1	3.33
Sum	30	100

Source: Developed by the researchers

Table (22) illustrates the number and percentage of survey participants obtained find answering the question Can you share your opinion: Why do you not prefer to use shared transportation services, and what difficulties did you face while using them? the greatest number of samples answered (High cost: In some cases, ride-sharing prices may be expensive than public transportation or even when compared to) with No (7) with percentage (6.67%), after that the number of (Because of the mobilization) were (3) with percentage (10.0%), and the number both (Pollution reduction) (Crowded) & (Reduce gasoline expenses for the private car) were (2) with percentage (6.67%), that finally other reasons with No (1) with percentage (3.33%).

Table (23): illustrate the number and percentage to answer the question How often do you use ride-sharing services such as? (Uber/ Didi / Swvl/ Indriver)

Variables	No	%	Order
Daily	99	29.12	2
Weekly	79	23.24	3
Monthly or less	116	34.12	1
Not available	46	13.53	4
Total	340	100	

Source: Developed by the researchers, 2024

Table (23) illustrates the number and percentage to answer the question How often do you use ride-sharing services such as? survey participants obtained find that the greatest number of samples answered(Monthly or less) with No (116) with percentage (34.12%), after that the number of (Daily) were (99) with percentage (29.12%), and the number of (Weekly) were (79) with percentage (23.24%), finally (Not available) with No (46) with percentage (13.53%).

Table (24): illustrate the number and percentage to answer the question Do you believe in applying circular economy policies and mechanisms to the sustainable transportation and shared transportation system in Egypt?

Variables	No	%	Weight Percentile
Disagree	37	10.88	94.60%
Agree	303	89.12	
Total	340	100	

Source: Developed by the researchers, 2024

Table (24) illustrates the number and percentage to answer the question Do you believe in applying circular economy policies and mechanisms to the sustainable transportation and shared transportation system in Egypt? survey participants found that the greatest number of samples answered (Agree) with No (303) with percentage (89.12%), after that the number of (Disagree) were (37) with percentage (10.88%) and the weight percentile (94.6%).

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Table (25): illustrate the number and percentage to answer the question Why does the circular economy need immediate action to solve many different problems? (Multiple answers are allowed)

Variables	No	%	Order
The circular economy provides economic solutions through the reuse of resources and services, which leads to reduced costs and time.	234	23.98	1
Circular economy policies rely on reducing carbon emissions and sustaining resources and services.	227	23.26	2
The circular economy requires immediate action because it provides comprehensive solutions for the ecosystem and economy.	184	18.85	3
The circular economy is linked to the sustainable development system, where facing challenges is an obstacle to achieving economic growth goals.	169	17.32	4
To promote innovation, achieve environmental and economic sustainability, while protecting the rights of future generations.	162	16.6	5
Sum	976	100	

Source: Developed by the researchers, 2024

Table (25) illustrates the number and percentage to answer the question Why does the circular economy need immediate action to solve many different problems? survey participants obtained find that the greatest number of samples answered (The circular economy provides economic solutions through the reuse of resources and services, which leads to reduced costs and time) with No (234) with percentage (23.98%), after that the number of (Circular economy policies rely on reducing carbon emissions and sustaining resources and services) were (227) with percentage (23.26%), and the number of (The circular economy requires immediate action because it provides comprehensive solutions for the ecosystem and economy) were (184) with percentage (18.85%), after that the number of (The circular economy is linked to the sustainable development system, where facing challenges is an obstacle to achieving economic growth goals) were (169) with percentage (17.3%), that finally (16.6%) with No (162) with percentage (16.6%).

Table (26): illustrate the number and percentage to answer the question Do individuals need more awareness about the concept of the circular economy and shared transportation?

Variables	No	%	Weight Percentile
Disagree	43	12.65	93.70%
Agree	297	87.35	
Total	340	100	

Source: Developed by the researchers, 2024

Table (26) illustrates the number and percentage to answer the question Do individuals need more awareness about the concept of the circular economy and shared transportation? survey participants found that the greatest number of samples answered (Agree) with No (297) with percentage (87.35%), after that the number of (Disagree) were (43) with percentage (12.65%) and the weight percentile (93.7%).

Table (27): illustrate the number and percentage to answer the question Why do you think people need more awareness about the concept of a circular economy and shared transportation? (In your opinion)

Answers	No	%
The environment maintenance	28	14.43
Economic sustainability	16	8.25
Community challenges	7	3.61
Sustainable development achievement	24	12.37
Reducing the private cars usage	7	3.61
Because of waste materials and environment pollution that people make	7	3.61
Most of the people in society have no awareness	7	3.61
This concept is not widely spread among people and is applied in specific areas only	17	8.76
Most of individuals have no idea about the circular economy concept	25	12.89
It's a modern term and lack awareness of those concepts should be widely spread among people	7	3.61
To spread and consolidate the sustainable environment awareness	6	3.09
Lack of awareness of how to use ride-sharing and not accepting changes	5	2.58
To reduce the congestion and negative emissions	10	5.15
The importance of awareness to promote sustainable behaviors and reduce environmental wastes	8	4.12
Yes, because it saves time, effort, resources and reduces negative emissions	13	6.7
I mean all companies are looking for the consumer, not the person who wants to recycle."	7	3.61
Total	194	100
Environmental conservation.	28	14.43

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Because there are many individuals who do not have an idea about the circular economy	25	12.89
Achieving sustainable growth.	24	12.37
Because this concept is not widely spread and is applied in specific areas only, and for this reason we demand that	17	8.76
Economic sustainability.	16	8.25
Yes, because it saves time, effort, resources and reduces pollution	13	6.7
To reduce congestion and carbon emissions	10	5.15
The importance of awareness to promote sustainable behaviors and reduce environmental waste.	8	4.12
Because it is a modern term and the lack of awareness of these concepts should be widely disseminated through the means of	7	3.61
Societal challenges.	7	3.61
Because some people do not have knowledge and awareness of these things	7	3.61
Because most people waste materials and pollute the environment	7	3.61
To reduce the use of private cars	7	3.61
I mean all companies are looking for the consumer, not the person who wants to recycle	7	3.61
To establish and consolidate sustainable environmental awareness.	6	3.09
For lack of knowledge of use and non-acceptance of change	5	2.58
Sum	146	100
No answer	194	57.1%

Source: Developed by the researchers, 2024

Table (27) illustrates the number and percentage to answer the question Why do you think people need more awareness about the concept of a circular economy and shared transportation? survey participants obtained find that the greatest number of samples answered (Environmental conservation) with No (28) with percentage (14.43%), after that the number of (Because there are many individuals who do not have an idea about the circular economy) were (25) with percentage (12.89%), and the number of (Achieving sustainable growth) were (24) with percentage (12.37%), after that the number of (Because this concept is not widely spread and is applied in specific areas only, and for this reason we demand that) were (17) with percentage (8.76%), that finally (Economic sustainability) with No (16) with percentage (8.25%).

Table (28): illustrate the number and percentage to answer the question: what are the obstacles that the state may face in implementing the circular economy? (Multiple answers are allowed)

Variables	No	%	Order
Laws in both the private and public sectors often support a linear economy with little awareness among individuals.	199	20.2	3
The high cost of investment, especially in developing countries suffering from economic pressures.	227	23.05	1
Consumer acceptance of the use of reclaimed materials instead of raw materials	155	15.74	5
Environmental awareness is still limited among individuals, which causes delays in implementing sustainable systems.	220	22.34	2
The need for financial support and cooperation between the private and public sectors, as they are essential elements in addressing economic and environmental challenges.	184	18.68	4
Sum	985	100	

Source: Developed by the researchers, 2024

Table (28) illustrates the number and percentage to answer the question: what are the obstacles that the state may face in implementing the circular economy? survey participants obtained find that the greatest number of samples answered (The high cost of investment, especially in developing countries suffering from economic pressures) with No (227) with percentage (23.05%), after that the number of (Environmental awareness is still limited among individuals, which causes delays in implementing sustainable systems) were (220) with percentage (22.34%), and the number of (Environmental awareness is still limited among individuals) were (199) with percentage (20.2%), that finally (The need for financial support and cooperation between the private and public sectors, as they are essential elements in addressing economic and environmental challenges) with No (184) with percentage (18.68%).

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Table (29): illustrate the number and percentage to answer the question Do you think that one of the most important policies in Egypt is implementing circular economy policies and mechanisms to apply shared transportation and sustainable transportation?

Variables	No	%	Weight Percentile
Agree	205	60.29	82.60%
Disagree	42	12.35	
Potentially	93	27.35	
Total	340	100	

Source: Developed by the researchers, 2024

Table (29) illustrates the number and percentage to answer the question Do you think that one of the most important policies in Egypt is implementing circular economy policies and mechanisms to apply shared transportation and sustainable transportation? Survey participants obtained find that the greatest number of samples answered (Agree) with No (205) with percentage (60.29%), after that the number of (Potentially) were (93) with percentage (27.35%), that finally (Disagree) with No (42) with percentage (12.35%) and the weight percentile (69.1%).

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Table (30): illustrate the number and percentage to answer the question How can circular economy policies and mechanisms help solve some of the complex problems around the ecosystem and the sustainable and shared transportation system in Egypt? (In your opinion)

Variables	No	%
Raising awareness to promote sustainable behaviors and reduce environmental wastes	14	6.9
Reduce negative emissions	9	4.43
Firstly is to solve the traffic issue	5	2.46
Reduce wastes percentages and improve resources management	10	4.93
Achieve the efficiency of resources	5	2.46
Promoting ride-sharing and sustainable transportation system	8	3.94
Make job vacancies and boost the local economy	4	1.97
Achieving the integration between sectors	3	1.48
The circular economy is a positive model for solving long-term environmental problems, which saves material costs, conserves environmental resources, does not waste them, and provides them for future generations, which provides a better life and sustainable development for all, for example when using electric vehicles or solar energy instead of fuel.	2	0.99
Define the topic	6	2.96
Maintain the climate and environment	11	5.42
Environmental maintain	16	7.88
Advancing knowledges	2	0.99
Reducing the cost of transportation or even making it free will allow many people to use it instead of their own cars, thus greatly reducing negative emissions and the traffic issue will reduced	8	3.94
Reduce emissions percentage	7	3.45
Reduce transportation cost	6	2.96
Reusing the used vehicles	7	3.45
Make citizens more organized	2	0.99
Will reduce the percentage of negative emissions	21	10.34
Reduce pollution and conserve the energy	7	3.45
Fuel saving as a result of ride-sharing and saving raw material as a result of recycling	7	3.45
Encourage people on beneficial ride-sharing	7	3.45
Maintain the cleanliness and system	2	0.99
Save money cost and efforts to the people	7	3.45
I don't know	13	6.4
Aware the people	7	3.45
Not waste the resources	7	3.45
Sum	203	100

Source: Developed by the researchers, 2024

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Table (30) illustrates the number and percentage to answer the question How can circular economy policies and mechanisms help solve some of the complex problems around the ecosystem and the sustainable and shared transportation system in Egypt? survey participants obtained find that the greatest number of samples answered (Will reduce the percentage of negative emissions) with No (21) with percentage (10.34%), after that the number of (Environmental maintain) were (16) with percentage (7.8%), and the number of (Raising awareness to promote sustainable behaviors and reduce environmental wastes) were (14) with percentage (6.9%), after that the number of (I don't know) were (13) with percentage (6.4%), and the number of (Maintain the climate and environment) were (11) with percentage (5.42%), after that the number of (Reduce wastes percentages and improve resources management) were (10) with percentage (4.93%), and the number of both (Promoting ride-sharing and sustainable transportation system) and (Reducing the cost of transportation or even making it free will allow many people to use it instead of their own cars, thus greatly reducing negative emissions and the traffic issue will reduced) were (8) with percentage (3.94%), after that the number of (Reduce emissions percentage, Reusing the used vehicles, Save money cost and efforts to the people, Reduce pollution and conserve the energy, Fuel saving as a result of ride-sharing and saving raw material as a result of recycling, Encourage people on beneficial ride-sharing, Aware the people and Not waste the resources) were (7) with percentage (3.45%), both (Define the topic) and (Reduce transportation cost) were (6) with percentage (2.96%), and the number of (Firstly is to solve the traffic issue) and (Achieve the efficiency of resources) were (5) with percentage (2.46%), after that the number of (Make job vacancies and boost the local economy) were (4) with percentage (1.97%), the number of (Achieving the integration between sectors) were (3) with percentage (1.48%), that finally (The circular economy is a positive model for solving long-term environmental problems, which saves material costs, conserves environmental resources, does not waste them, and provides them for future generations, which provides a better life and sustainable development for all, for example when using electric vehicles or solar energy instead of fuel, Maintain the cleanliness and system, Make citizens more organized, Advancing knowledges) with No (2) with percentage (0.99%).

Table (31): illustrate the number and percentage to answer the question Are you interested in getting more information about the circular economy and shared transportation?

Variables	No	%	Weight Percentile
Agree	218	64.12	79.40%
Disagree	88	25.88	
Potentially	34	10	
Total	340	100	

Source: Developed by the researchers, 2024

Table (31) illustrates the number and percentage to answer the question Are you interested in getting more information about the circular economy and shared transportation? survey participants obtained find that the greatest number of samples answered(Agree) with No (218) with percentage (64.12%), after that the number of (Disagree) were (88) with percentage (25.88%), that finally (Potentially) with No (34) with percentage (10.0%) and the weight percentile (70.4%).

Table (32): illustrate the number and percentage to answer the question What are the benefits and future developments of the circular economy? (Multiple answers are allowed)

Variables	No	%	Order
Reducing business risks, products, services, and resource consumption, as well as creating new job opportunities.	235	21.11	1
Increase environmental and social awareness, reduce costs, and save time.	234	21.02	2
Enhancing resource and service efficiency while protecting the ecosystem and economy.	219	19.68	4
Reducing the percentage of risks of resource scarcity and climate change impacts, which has a positive impact on the health of individuals.	220	19.77	3
Respecting the nature and privacy of the environment through the optimal use of resources and the efficiency of their circulation.	205	18.42	5
Sum	1113	100	

Source: Developed by the researchers, 2024

Table (32) illustrates the number and percentage to answer the question What are the benefits and future developments of the circular economy? survey participants obtained find that the greatest number of samples answered (Reducing business risks, products, services,

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and resource consumption, as well as creating new job opportunities) with No (235) with percentage (21.11%), after that the number of (Increase environmental and social awareness, reduce costs, and save time) were (234) with percentage (21.02%), and the number of (Reducing the percentage of risks of resource scarcity and climate change impacts, which has a positive impact on the health of individuals) were (220) with percentage (19.77%), after that the number of (Enhancing resource and service efficiency while protecting the ecosystem and economy) were (219) with percentage (19.68%), that finally (Respecting the nature and privacy of the environment through the optimal use of resources and the efficiency of their circulation) with No (205) with percentage (18.42%).

Table (33): illustrate the number and answer the question What are the environmental impacts resulting from the implementation of the car-sharing/ride-sharing system with the benefits? (Multiple answers are allowed)

Variables	No	%	Order
Reducing local emissions that pollute the ecosystem and saving energy consumption	214	22.15	2
Conserving energy, resource consumption, services, and enhancing environmental and economic efficiency	191	19.77	3
Providing (subscription/membership) services for a short-term car-sharing system for individuals	184	19.05	4
The ride-sharing system replaces four to eight vehicles, which means an improved carbon footprint.	157	16.25	5
Reducing private car consumption and reducing the burden on the ecosystem	220	22.77	1
Sum	966	100	

Source: Developed by the researchers, 2024

Table (33) illustrates the number and percentage to answer the question: What are the environmental impacts resulting from the implementation of the car-sharing/ride-sharing system with the benefits? survey participants obtained find that the greatest number of samples answered (Reducing private car consumption and reducing the burden on the ecosystem) with No (220) with percentage (22.77%), after that the number of (Reducing local emissions that pollute the ecosystem and saving energy consumption) were (214) with percentage (22.15%), and the number of (Conserving energy, resource consumption, services, and enhancing environmental and economic efficiency) were (191) with percentage

(19.77%), after that the number of (Providing (subscription/membership) services for a short-term car-sharing system for individuals) were (184) with percentage (19.05%), that finally (The ride-sharing system replaces four to eight vehicles, which means an improved carbon footprint) with No (157) with percentage (16.25%).

Table (34): illustrate the number and percentage to answer the question: What are the challenges in applying circular economy policies and mechanisms to the sustainable transportation and shared transportation system in Egypt? (Multiple answers are allowed)

Variables	No	%	Order
Low awareness among individuals and high cost of investment in the circular economy.	234	23.4	1
Lack of quality, transparency, and inappropriate infrastructure with circular economy policies and mechanisms	191	19.1	4
The current transportation systems depend on private cars and unsustainable traditional means of transportation.	205	20.5	3
The absence of a comprehensive legal framework and the habit of using traditional, outdated transportation systems	206	20.6	2
Lack of policy coordination between sectors in Egypt, causing it delays in implementation	164	16.4	5
Sum	1000	100	

Source: Developed by the researchers, 2024

Table (34) illustrates the number and percentage to answer the question What are the challenges in applying circular economy policies and mechanisms to the sustainable transportation and shared transportation system in Egypt? survey participants obtained find that the greatest number of samples answered (Low awareness among individuals and high cost of investment in the circular economy) with No (234) with percentage (23.4%), after that the number of (Low awareness among individuals and high cost of investment in the circular economy) were (206) with percentage (20.6%), and the number of (The current transportation systems depend on private cars and unsustainable traditional means of transportation) were (205) with percentage (20.5%), after that the number of (Lack of quality, transparency, and inappropriate infrastructure with circular economy policies and mechanisms) were (191) with percentage (19.1%), that finally (Lack of policy coordination

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between sectors in Egypt, causing it delays in implementation) with No (164) with percentage (16.4%).

Table (35): illustrate the number and percentage of answering the question Choose from the following answers the benefits of applying sustainable transportation and shared transportation, such as: (Uber/ Swvl/ Didi/ Indriver)? (Multiple answers are allowed)

Variables	No	%	Order
Reducing economic costs as individuals share transportation costs, making it a cause of cost and energy savings.	234	23.24	1
Reducing carbon emissions from transportation and supporting environmental sustainability	200	19.86	3
Promoting ride-sharing and sustainable transportation	198	19.66	4
Encourage sustainable behavior and increase individual awareness.	169	16.78	5
A sustainable and shared transportation system offers multiple benefits that combine improving the environment and providing innovative solutions to transportation problems.	206	20.46	2
Sum	1007	100	

Source: Developed by the researchers, 2024

Table (35) illustrates the number and percentage of answering the question Choose from the following answers the benefits of applying sustainable transportation and shared transportation, such as: (Uber/ Swvl/ Didi/ Indriver)? survey participants obtained find that the greatest number of samples answered (Reducing economic costs as individuals share transportation costs, making it a cause of cost and energy savings) with No (234) with percentage (23.24%), after that the number of (A sustainable and shared transportation system offers multiple benefits that combine improving the environment and providing innovative solutions to transportation problems) were (206) with percentage (20.46%), and the number of (Reducing carbon emissions from transportation and supporting environmental sustainability) were (200) with percentage (19.66%), after that the number of (Promoting ride-sharing and sustainable transportation) were (198) with percentage (19.66%), that finally (Encourage sustainable behavior and increase individual awareness) with No (169) with percentage (16.78%).

Table (36): illustrate the number and answer the question Why is a sustainable transportation system the best solution for the transportation sector? (Multiple answers are allowed)

Variables	No	%	Order
Sustainable transportation relies on low-emission technologies such as electric vehicles.	205	20.38	2
Reducing the consumption of resources and services while promoting circular economy mechanisms and policies.	229	22.76	1
Lower cost of sustainable transportation, such as electric scooters and shared bikes	191	18.99	4
The compatibility of shared transportation and sustainable transportation systems with sustainable development	198	19.68	3
Sustainable transportation can improve access to remote areas.	183	18.19	5
Sum	1006	100	

Source: Developed by the researchers, 2024

Table (36) illustrates the number and percentage to answer the question Why is a sustainable transportation system the best solution for the transportation sector? survey participants obtained find that the greatest number of samples answered(Reducing the consumption of resources and services while promoting circular economy mechanisms and policies) with No (229) with percentage (22.76%), after that the number of (Sustainable transportation relies on low-emission technologies such as electric vehicles) were (205) with percentage (20.38%), and the number of () were (198) with percentage (19.68%), after that the number of (The compatibility of shared transportation and sustainable transportation systems with sustainable development) were (191) with percentage (18.99%), that finally (Sustainable transportation can improve access to remote areas) with No (183) with percentage (18.19%).

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Table (37): illustrate the number and percentage to answer the question Why does the sustainable transportation system face many challenges?(Multiple answers are allowed)

Variables	No	%	Order
Institutions/sectors need to change their system and activities.	197	19.84	3
The automotive industry will face a problem due to changing policies to keep up with the sustainable transportation system and thus negatively impact employment.	205	20.64	1
Difficulty in changing the behavior of individuals as they prefer the privacy and comfort of using private cars.	205	20.64	1
Low awareness of individuals regarding sustainable transport and its economic and environmental benefits	199	20.04	2
The length of time it takes to charge electric cars, as they are one of the sustainable means of transportation	187	18.83	4
Sum	993	100	

Source: Developed by the researchers, 2024

Table (37) illustrates the number and percentage to answer the question Why does the sustainable transportation system face many challenges? survey participants obtained find that the greatest number of samples answered (The automotive industry will face a problem due to changing policies to keep up with the sustainable transportation system and thus negatively impact employment) and (Difficulty in changing the behavior of individuals as they prefer the privacy and comfort of using private cars) with No (205) with percentage (20.64%), after that the number of (Low awareness of individuals regarding sustainable transport and its economic and environmental benefits) were (199) with percentage (20.04%), and the number of (Institutions/sectors need to change their system and activities) were (197) with percentage (19.84%), that finally (The length of time it takes to charge electric cars, as they are one of the sustainable means of transportation) with No (187) with percentage (18.83%).

Table (38): illustrate the number and percentage to answer the question: can you choose from multiple options about the advantages of environmentally friendly means of transportation that can be used in Egypt? (Multiple answers are allowed)

Variables	No	%	Order
Reducing harmful carbon emissions to the ecosystem and improving efficiency and quality of life	183	20.84	2
Reducing the number of single-use cars and encouraging shared transportation such as Uber, Swvl, Didi, and Indriver	171	19.48	3
Electric cars have low long-term operating costs due to low fuel costs.	156	17.77	4
Encouraging individuals to engage in physical activity, such as using bicycles, as they are an environmentally friendly means of transportation	155	17.65	5
all the above	213	24.26	1
Sum	878	100	

Source: Developed by the researchers, 2024

Table (38) illustrates the number and percentage to answer the question: can you choose from multiple options about the advantages of environmentally friendly means of transportation that can be used in Egypt? survey participants obtained find that the greatest number of samples answered (all the above) with No (213) with percentage (24.26%), after that the number of (Reducing harmful carbon emissions to the ecosystem and improving efficiency and quality of life) were (183) with percentage (20.84%), and the number of (Reducing the number of single-use cars and encouraging shared transportation such as Uber, Swvl, Didi, and Indriver) were (171) with percentage (19.48%), after that the number of (Electric cars have low long-term operating costs due to low fuel costs) were (154) with percentage (17.77%), that finally (Encouraging individuals to engage in physical activity, such as using bicycles, as they are an environmentally friendly means of transportation) with No (155) with percentage (17.65%).

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Table (39): illustrate the number and percentage to answer the question Please choose from the following answers as examples of sustainable transportation systems related to the circular economy system and the ecosystem. (Multiple answers are allowed)

Variables	No	%	Order
Electric cars, electric scooters, and electric bikes	157	16.61	3
electric train	141	14.92	5
Ride-sharing: Uber, Didi, Swvl, Indriver	172	18.2	2
monorail train	113	11.96	6
Metro electric means of transportation	150	15.87	4
All the above	212	22.43	1
Sum	945	100	

Source: Developed by the researchers, 2024

Table (39) illustrates the number and percentage to answer the question Please choose from the following answers as examples of sustainable transportation systems related to the circular economy system and the ecosystem. survey participants obtained find that the greatest number of samples answered (All the above) with No (212) with percentage (22.43%), after that the number of (Ride-sharing: Uber, Didi, Swvl, Indriver) were (172) with percentage (18.2%), and the number of (Electric cars, electric scooters, and electric bikes) were (157) with percentage (16.61%), after that the number of (Metro electric means of transportation) were (150) with percentage (15.87%), and the number of (electric train) were (141) with percentage (14.92%), that finally (monorail train) with No (113) with percentage (11.96%).

Table (40): illustrate the number and percentage to answer the question choose the appropriate answer with your point of view that expresses the disadvantages of the environmentally friendly transportation system that can be used in Egypt (Multiple answers are allowed)

Variables	No	%	Order
High cost, inadequate infrastructure to support them, large investment required to provide electric cars	219	21.62	2
Low awareness among citizens about the benefits of shared transportation and environmentally friendly means of transportation, which makes them turn to their own cars or unsustainable means of transportation.	228	22.51	1
Electric cars require dedicated, expensive, advanced, and unavailable maintenance centers.	184	18.16	4
The shift to sustainable and environmentally friendly means of transportation could lead to the loss of some traditional jobs associated with the automotive sector and traditional fuels.	183	18.07	5
Advanced transportation and electric cars suffer from limited capabilities to travel long distances.	199	19.64	3
Sum	1013	100	

Source: Developed by the researchers, 2024

Table (40) illustrates the number and percentage to answer the question choose the appropriate answer with your point of view that expresses the disadvantages of the environmentally friendly transportation system that can be used in Egypt survey participants obtained find that the greatest number of samples answered (Low awareness among citizens about the benefits of shared transportation and environmentally friendly means of transportation, which makes them turn to their own cars or unsustainable means of transportation) with No (228) with percentage (22.51%), after that the number of (High cost, inadequate infrastructure to support them, large investment required to provide electric cars) were (219) with percentage (21.62%), and the number of (Advanced transportation and electric cars suffer from limited capabilities to travel long distances) were (199) with percentage (19.64%), after that the number of (Electric cars require dedicated, expensive, advanced, and unavailable maintenance centers) were (184) with percentage (18.16%), that finally (The shift to sustainable and environmentally friendly means of transportation could lead to the loss of some traditional jobs associated with the automotive sector and traditional fuels) with No (183) with percentage (18.07%).

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CONCLUSION AND RECOMMENDATIONS

This study aim to define and explore the relationship between circular economy policies and mechanisms on sustainable and participatory transportation systems such as ride-sharing services (Uber, Didi, Indriver and Swvl) platforms for achieving sustainability in environmental field, decreasing negative emissions impacts, saving time and cost. Therefore the study search for understanding the impacts of participatory transportation and circular economy on each other. The questionnaires and descriptive analytical study method was used to represent the participatory transportation users from various sectors. The study here consider as a new vision and addition to circular economy concept, especially it is focusing on participatory transportation systems integration and impacts on circular economy policies and mechanisms to achieve sustainability in environmental field and benefits for society. Study result here showed that circular economy awareness in society still low because they still using traditional economy (linear economy), participatory transportation systems has a positive impacts on environment, where negative emissions decreased in addition to saving time and cost through reusing resources. The scientific contribution highlighted in literature review. Research recommend directive solution for environmental development.

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أثر تطبيق سياسات وآليات الاقتصاد الدائري على منظومة النقل المستدام ووسائل النقل التشاركي في مصر دراسة حالة

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المستخلص

الغرض من هذه الدراسة هو تحديد واتكشاف العلاقة بين سياسات وآليات الاقتصاد الدائري في أنظمة النقل المستدامة والتشاركية. اعتمدت الدراسة على المنهج الوصفي التحليلي، من خلال الاعتماد علي بيانات الاستبيان التي تم جمعها من مستخدمي وسائل النقل التشاركية والمستدامة مثل (أوبر، ديدي، إن درايفر، سويڤل). وقد تم تحليل البيانات باستخدام الأدوات الإحصائية مثل برنامج (الإكسيل) لتحليل البيانات مع تحديد المساهمة العلمية والتكامل بين العلاقة بين الاقتصاد الدائري وأنظمة النقل المستدامة والتشاركية من خلال تسليط الضوء على رحلات المركبات الخاصة للحد من انبعاثات الكربون وتحسين الموارد وتوفير الوقت والتكلفة. وتظهر النتائج البارزة للدراسة وجود علاقة إيجابية بين مجال النظام البيئي ونظام النقل التشاركي من خلال رفع مستوى الوعي بأهمية الحد من استخدام المركبات الخاصة. يمكن تنفيذ سياسات الاقتصاد الدائري في عدة مجالات مختلفة مثل الصناعات والنقل فهي تدعم أنظمة النقل المستدامة والتشاركية. ولمست الدراسة إلي إن زيادة الوعي البيئي بين الأفراد يمكن أن يؤدي إلى تفضيلات في استخدام نظام النقل التشاركي كبديل آمن وغير مضر للنظام البيئي.

الكلمات المفتاحية: الاقتصاد الخطي، الاقتصاد الدائري، النقل المستدام، النقل التشاركي، من المهد إلى المهد، من المهد إلى اللحد، الأميال التي قطعتها المركبات، مصر.

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