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**Research Paper**

# The Role of Green Logistics Activities in Establishing Green Hospitals: Survey Study

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***Abstract***

*The study seeks to identify the role of green logistics activities (green purchasing, green transportation, green storage, green packaging) in establishing green hospitals. The study problem is clear through the main study question, which states: Do green logistics activities contribute to establishing green hospitals? The study used the descriptive analytical approach. The study was applied to a number of private hospitals in the Kurdistan Region - Iraq. The study adopted the questionnaire as the main tool for collecting data and distributed to logistics managers and directors in the hospitals studied. The statistical program (SPSS.22) was used to test the study hypotheses. The study presented many results and suggestions, the most important of which has: There been a significant correlation and influence between green logistics activities, and green hospitals. The study suggested enhancing green logistics activities to reduce the negative impact of hospitals on the environment.*

***Keywords:***
**Green logistics, Green transportation, Green warehousing, Green hospital**

ورقة بحثية

# دور أنشطة اللوجستيك الاخضر في اقامة المستشفيات الخضراء : دراسة استطلاعية

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***المستخلص***

*سعت الدراسة إلى تحديد دور الأنشطة اللوجستية الخضراء (الشراء الأخضر، النقل الأخضر، التخزين الأخضر، التغليف الأخضر) في اقامة المستشفيات الخضراء. تتضح مشكلة الدراسة عبر تساؤل الدراسة الرئيس والتي تنص: هل تسهم الانشطة اللوجستية الخضراء من اقامة المستشفيات الخضراء؟ استخدمت الدراسة المنهج الوصفي التحليلي لدراسة الموضوع، طبقت الدراسة على عدد من المستشفيات الخاصة في إقليم كردستان- العراق، واعتمدت الدراسة استمارة الاستبيان كأداة رئيسية لجمع البيانات وزعت على مدراء ومدراء اللوجستيك في المستشفيات المبحوثة، استخدم البرنامج الإحصائي ( SPSS.22 ) لاختبار فرضيات الدراسة. قدمت الدراسة العديد من النتائج والمقترحات اهمها : ان هناك علاقة ارتباط وتاثير معنوية بين انشطة اللوجستيك الاخضر والمستشفيات الخضراء، واقترحت الدراسة تعزيز انشطة اللوجستيك الاخضر للتقليل من التاثير السلبي للمستشفيات على البيئة .*

***الكلمات الرئيسة:***

اللوجستيات الخضراء، النقل الأخضر، التخزين الأخضر، المستشفى الأخضر

**مجلة**

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***(TANRA):*** **مجلة علمية، فصلية، دولية، مفتوحة الوصول، محكمة.**

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## 1. Introduction

Nowadays, global supply chain has progressed significantly, and despite achieving economic, social and individual benefits, they have caused negative impacts on the environment through their logistical activities' practices all over the world (Pham et al., 2023). As a result of development and globalization, logistical activities continue to grow and the negative impact of these activities on the environment has become clear (Maurya et al., 2023). Logistics and supply chain services are closely related to each other, and logistics are considered the largest and most important part of supply chain (Jefimovaitė and Vienažindienė, 2022). On the other hand, (Rozelin et al., 2020) illustrated that, organizations are very interested in logistics due to the importance of their activities and the multiplicity of these activities. Logistics services are considered one of the main activities of organizations and the sustainability of organizations has become a strategic requirement. Therefore, these organizations seek to include logistics activities in environmental sustainability issues (Rad and Gulmez, 2017). Despite the importance of logistics for economic activities, it has a negative impact on the environment. With the increase in environmental awareness of customers and government legislation, pressures on logistics practitioners have increased. To address this problem and find viable solutions, many organizations have moved to adopt green practices in logistics activities, and thus GL has emerged .

On the other hand, we see that the health sector, including hospitals, which is the focus of our study, has a significant negative impact on the environment. Hospitals consume a large amount of energy and water, and generate large amounts of waste, which has a significant negative impact on the environment and constitutes a large cost (World Health Organization, 2017). According to the World Economic Forum report (2019), all environmental risks are linked to climate change and are considered a serious threat to the public health of people in all countries of the world (Sepetis, 2020). Based on the above discussions, the current study will try to find the nature of the relationship between GL activities and GH dimensions and their role in preserving the environment**.** Based on the above, the study will address the following main axes:

First axis: Theoretical Background, Second axis: methodology,Third axis: Data Analysis.The fourth axis :Discussion of the results, The fifth axis : Conclusions and recommendations

## 2. Theoretical Background

### 2.1.Green Logistics

Recently, the term "logistics" have been combined with the concept of "green", which led to the creation of a new term "green logistics". This means reconsidering the choices made regarding many logistics activities in order to preserve the environment (Maurya et al., 2023). GL means practicing traditional logistics activities while preserving the environment, and enhancing environmental awareness by obligating all participants in the logistics system to review their activities and the damage they cause to the environment (Cheng et al., 2023). The

term “green logistics” refers to practices and strategies that reduce the environmental and energy impact of logistics activities such as transportation, warehousing, and packaging (Ashfaq et al., 2019). On the other hand, the American Reverse Logistics Executive Council (RLEC) defined GL as a process of understanding the environmental impact of the logistics industry (Athanasios, 2018). GL according to (Seroka-Stolka, 2014) is the strategies and practices of supply chain management that reduce the environmental and energy footprint of freight distribution, which focuses on material handling, waste management, packaging and transportation. The researcher believes that green logistics is logistics that adhere to the green environmental concept and adheres to it in the long term, and uses green principles in all logistics activities practiced by organizations.

**2.2.The importance of Green Logistics**

According to the researchers’ opinions, more than one motivation can be identified for adopting green logistics. GL diminishes global warming by reducing the carbon footprint of transportation activity, achieving efficiency in warehousing procedures, and reducing waste resulting from packaging processes (Srisorn, 2013). The practices of GL such as purchasing, warehousing, distribution, transportation and packaging are incorporated to improve social and environmental sustainability, enhancing the organization’s competitive advantage to enhance financial performance (Khan, 2020). The results of the study that has been conducted by (Agyabeng-Mensah et al., 2020) indicate that GL practices have a significant positive impact on environmental performance. Collaboration with stakeholders to adopt GL increases economic returns and achieves environmental benefits (Zowada, 2020). On the other hand, there is a significant role for GL in environmental sustainability in developing countries (Jinru et al., 2021). The implementation of GL is often linked to circular production systems that aim to reduce greenhouse gas emissions through the use of renewable energy and the reuse of materials (Souza et al., 2022). Adopting the concept of GL may be included within the individual's rights to a clean environment and achieving environmental balance and sustainability, which is within human rights (Perkumiene et al., 2022). Recently, the attention on sustainability concept has increased significantly, and this attention has affected logistics practices. The study that has been performed by (Cheng et al., 2023) showed that GL strongly affects the circular economy of organizations' practices and preserves environmental degradation. Regarding the benefits, the study of the authors (Jefimovaitė and Vienažindienė, 2022) showed that the main motives for adopting GL in many organizations are improving the organization's image, reducing costs, and complying with government legislation. At the national level, GL services contribute to provide job opportunities, increasing per capital income, and are important for sustainable economic development (Mohsin et al., 2022).

Based on the above discussions, the researcher believes it can be noted that achieving environmental sustainability and preserving the environment is among the most important drivers for adopting green logistics. These drives came as a result of government laws and regulations to limit the impact of logistics activities of organizations. It may be caused by

customers' awareness of the environment and the emergence of green customers. The organization wants to win these customers and achieve a competitive advantage by meeting their requirements.

### 2.3.GL activities

Many authors refer to GL activities, and some named them components, practices, applications. As mentioned from (Table 1) that the activities (green transportation, green packaging, green warehousing, and green purchasing) are the most used and referred to activities by authors.

**Table (1).** Green Logistics activities

| GL Activities / Author s | Green purchase | Green transportation | Green warehousing | Green packaging | Green production | Eco-design | Reverse logistics | distribution | Green information | Consumption | Collection | Services which add value | Waste management |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mogeni, 2016 | * | | | * | | * | * | | | | | | |
| Rad and Gulmez , 2017 | * | * | | * | * | | * | | | | | | |
| Athanasios, 2018 | | * | * | | * | | * | | | | | | |
| Ashfaq et al ., 2019 | | * | * | * | | | | | | | | | |
| Khan et al ., 2020 | * | | | | * | | | * | | * | * | | * |
| Bala et al ., 2021 | * | * | | * | | | * | | | | | | |
| Vienažindiene et al ., 2021 | | * | * | * | | | | | * | | | | * |
| Souza et al ., 2022 | | * | * | * | | | | | | | | | |
| Mak at el ., 2022 | * | * | * | * | | | | | | | | | |
| Nwaulune et al . , 2023 | * | * | | * | * | | * | | | | | | |
| Maurya et al ., 2023 | | * | * | * | | | | | | | | * | |
| Cheng et al ., 2023 | | * | * | * | | | | | * | | | | * |
| Percentage % | 50 | 83 | 58 | 83 | 33 | 8.3 | 42 | 8.3 | 17 | 8,3 | 8.3 | 8.3 | 25 |

Source: Prepared by Author

The study will depend on a number of activities that were adopted by most authors which got the highest agreement rate, table 1. and these activities also match the field of the subject of the current study, and the activities are:

#### 2.3.1. Green transportation (GT)

Transportation activity effecting environmentally significant through its carbon emissions and noise pollution, so officials are looking for more sustainable solutions and alternatives (Palsson and Hellstrom, 2016). Logistics professionals realize that to gain a competitive advantage in this field, it is necessary to reduce energy use and reduce pollution by looking for other alternatives, and electricity is now the most trending alternative for green environment (Osman et al., 2022). GT is the materials movement management in the value chain from the beginning, the end without causing any destruction to the environment (Tiwari and Khan,

2019). The study that has been conducted by (Lu et al., 2019) concluded that countries with a good Logistics Performance Index (LPI) also have a high level of green transportation, which is evidence of commitment to government regulations and policies towards the environment.

### 2.3.2. Green packaging (GP)

GP is often known as environmentally friendly packaging and the aim of using this method of packaging is to enable the use of lightweight and recyclable materials, because most packaging materials are used once, and then they turn into waste after use. It is known that the product life cycle has become shorter, so there is a large consumption of these materials and then they leave a negative impact on the environment (Zhang and Zhao, 2012). GP is a packaging method that protects the environment, animal and human health (Tiwari and Khan, 2019). The study that has been conducted by (Islam et al., 2023) concluded that implementing GP can promote environmentally friendly economic growth and achieve competitiveness.

### 2.3.3. Green warehousing (GW)

Warehouses use a large amount of energy worldwide, estimated at (32%) according to the International Panel on Climate Change (IPCC, 2014), and harmful gas emissions that affect the environment from buildings exceed those from transportation activities (Athanasios, 2018). The report of (ECE, 2016) indicates that green storage includes a set of practices such as green design, using energy-friendly facilities, consuming alternative energy sources, using water systems that reduce waste and the optimal use of spaces. While (Mak et al., 2022) perceives that the GW practices and technologies that organizations can use to reduce their impact on the environment are: relying on automation through digital technology, artificial intelligence and the Internet of Things, and the use of storage facilities such as forklifts that consume less energy, and updating these facilities continuously.

### 2.3.4. Green procurement

Purchasing products and services that care about the environment and reduce destruction until it is described as green purchasing (Nwaulune et al., 2023). Green purchasing is the organization's adoption of procedures that are not harmful to the environment and cooperates with suppliers to achieve them. This requires training and information exchange to make purchasing operations more environmentally sustainable (Lee et al., 2011). Green purchasing refers to many purchasing policies that care about the environment, including: obtaining materials and selecting suppliers, distribution, packaging, recycling, and reuse (Assumpcao, 2019). Organizations that deal with green purchasing give priority and attention to environmental considerations more than the costs of purchased materials (Fang et al., 2020).

### 2.4.Green Hospital

Many authors agree that hospitals have a negative role on the environment through their high usage of energy and water, and the amount of waste and pollution generated from them

(Kumari & Kumari, 2020; Sahamir & Zakaria, 2014). Hospitals consume large amounts of water and energy and consume energy, twice as much as traditional buildings (Azer et al., 2015). Because there is a continuous and necessary need for hospital services, they provide services throughout the day (Shawn et al., 2021). The ratios show that (4.4%) of the world's carbon emissions are healthcare systems including hospitals, and India consumes about (6.7%) of total energy consumption in hospitals (Octavianus et al., 2021). In the United States, about (9-10%) of greenhouse gas emissions are emitted from hospitals, and they also produce large amounts of waste that include highly toxic materials that directly contribute to environmental pollution (Vogus, 2021).

Many hospitals are trying to implement green concept in hospitals to show their concern and interest in environmental problems and to improve the hospital environment (Inraruangsri, 2018). By implementing green productivity tools and techniques in hospitals, they reduce their impact on the environment (Norouzi et al., 2019). Hospitals can achieve sustainability by adopting environmental management programs, green concept, expanding their investments in environmental protection initiatives, and sustainability practices (Lee and Lee, 2020). The GH as an approach is to address environmental challenges and community needs (Azer et al., 2015). As indicated by (Octavianus et al., 2021), the GH model emerged as an initiative for the optimal use of resources. Green hospitals are one of the most important initiatives to address environmental issues, and their goal is to maximize resource savings, protect the environment, reduce pollution, and provide healthy, applicable, and effective spaces for patients and medical staff (Zhan et al., 2022). The World Health Organization defines a GH as a hospital that responds to environmental impacts through the use of improved resources and energy (WHO, 2009). A green (environment) hospital is a hospital that has been designed, built, renovated, operated, and maintained by taking into account the principles of sustainable health and the environment (Octavianus et al., 2021). A green (environmentally friendly) hospital is one that prioritizes health and sustainability by conserving energy, water, and materials and reducing health and environmental impacts, which enhances overall health and saves lives (Khairunnisa et al., 2022). Implementing green concept in hospitals has many advantages; it enhances health care, achieves financial savings, increases productivity, and reduces environmental damage (WHO, 2017; Khairunnisa et al., 2022). On the other hand, it reduces negative impacts on the environment and eliminates diseases by identifying the relationship between human health and the environment (Lee and Lee, 2020). Also, it contributes to reducing building operating costs and increasing the value of the building and return on investment (Kumari &Kumari, 2020).

The researcher believes that the green hospital refers to hospitals that care about environmental conservation standards when practicing their activities, such as reducing energy, materials and water consumption, disposing of waste properly, and applying environmental standards when storing and transporting materials.

**2.5.Literature review**

Numerous studies have been conducted by other authors in different areas and related to the variables of the current study. And we will present at some of them. The researchers associated with the GL can be classified into two sections: Researches that deliberate GL with sustainability, such as: The research that has been conducted by (Ren et al., 2020) attempted to discover the

literary gaps of studies presented in the field of GL and sustainability during the years (1999-2019) and they were classified into 50 branches, and the study presented the view of aAuthorson the current and future reality of the GL and sustainability. Another study that has been done by (Agyabeng-Mensah et al., 2020) presented a model to determine the impact of GL practices on sustainable performance through its variables (environmental, financial and social).

They concluded that there is a clear impact of GL on financial performance through organizations' focus on environmental performance and no impact on social performance. Vienažindiene et al., (2021) also presented a model on how GL practices achieve sustainability, and the results showed that GL activities contribute significantly to achieving sustainability. The study (Souza et al., 2022) attempted to evaluate GL performance to help improve environmental performance. The study concluded that some GL activities are ignored when achieving environmental sustainability, and this may negatively affect the organization's environmental performance. Jefimovaitė and Vienažindienė (2022) presented a theoretical model for adopting GL practices, they concluded that adopting these practices can enhance GL activities and will ultimately contribute to achieving the many benefits for organizations, including environmental and sustainability. Another study that has been conducted by (Perkumiene et al., 2022) discussed the right to a clean environment through GL and sustainable tourism and indicated that GL can contribute to achieving a clean environment. Finally, Cheng et al., (2023) identified the role that GL and green intellectual capital can contribute to improve the circular economy, the results showed that there is a positive correlation between the variables of their research.

The second group of researchers focused on the obstacles of applying GL concept, such as: The study that has been done by (Zowada, 2020) indicated that most researchers studied the concept of GL in large companies, and a small number of them focused on small and medium-sized companies despite the importance of these firms, so there are obstacles that small companies face when adopting the concept Because they do not have sufficient information and knowledge to adopt green logistics. (Mak et al., 2022) confirmed that there are many environmental challenges facing logistics service providers at the present time, and these challenges can be addressed by adopting green concepts in logistics activities such as green procurement, green packaging, green transportation, and GW. The research of (Jefimovaitė and Vienažindienė, 2022) pursued to identify the factors that contribute to the implementation of GL and what are the obstacles to its implementation, they concluded that

the lack of experience, long-term investment, and participation of workers are among the main challenges.

Regarding the green hospital, there are few recent studies on it compared to green logistics. We mention a number of related studies. The study (Norouzi et al., 2019) identified the factors that influence hospitals to adopt GH standards, and the study concluded that the commitment of senior management is one of the most influential factors for adopting the green concept in hospitals. On the other hand, Kumari (2020) tried to identify the basic principles of the GH and what are the factors that contribute to achieving quality in the design of future green hospitals. The study concluded that financial savings can be achieved and health care can be enhanced when adopting the GH principles.

Sepetis (2020) attempted to search for sustainable financing methods by focusing on the health sector, including hospitals, to help health sector officials make appropriate decisions. Another study that has been conducted by (Lee, 2022) focused on green healthcare activities through adopting the concept of total quality management in hospitals, the study concluded that senior management has an important role in achieving green activities in hospitals. The study by (Octavianus et al., 2021) aimed to compare several hospitals to show the extent of their commitment to applying GH dimensions, they concluded that although all hospitals are ready to adopt all dimensions of the green hospital, there is a disparity between hospitals in adopting these dimensions. The study by (Khairunnisa et al., 2022) collected data on GH studies from a number of scientific databases. 58 studies were collected on the subject, focusing on green design and health aspects in hospitals, they concluded that implementing green design can contribute to supporting the quality of health care. Finally, Orsini et al., (2024) tried to identify green organizational practices on hospital performance, and the study concluded that the collection of practices affects hospital performance to a greater extent, while individual organizational practices have a lesser impact on hospital performance.

## 3. Methodology

### 3.1. Study problem

Many studies indicate that hospitals have a very negative impact on the environment. As a result, hospitals face challenges, some of which are legal and others related to their reputation towards society and their customers. Therefore, they are looking for ways to confront this challenge. The problem of the study can be expressed by asking the following question: Do green logistics activities contribute to establishing green hospitals?

### 3.2. Importance and objectives of the study

The importance of the study appears through two axes: the first is to present a theoretical aspect related to the concepts of the current study and the latest writings by writers and researchers, the second: by identifying the nature of the relationship and influence between the variables of current knowledge. The main goal of the research is to answer the question of the study,

through which the hospitals studied benefit from the idea of the study and the shift towards green hospitals.

### 3.3. Theoretical conceptual model

The review of the literature allowed the author of the article to develop a theoretical model revealing GL activities seeking to achieve GH dimensions, Figure 1.

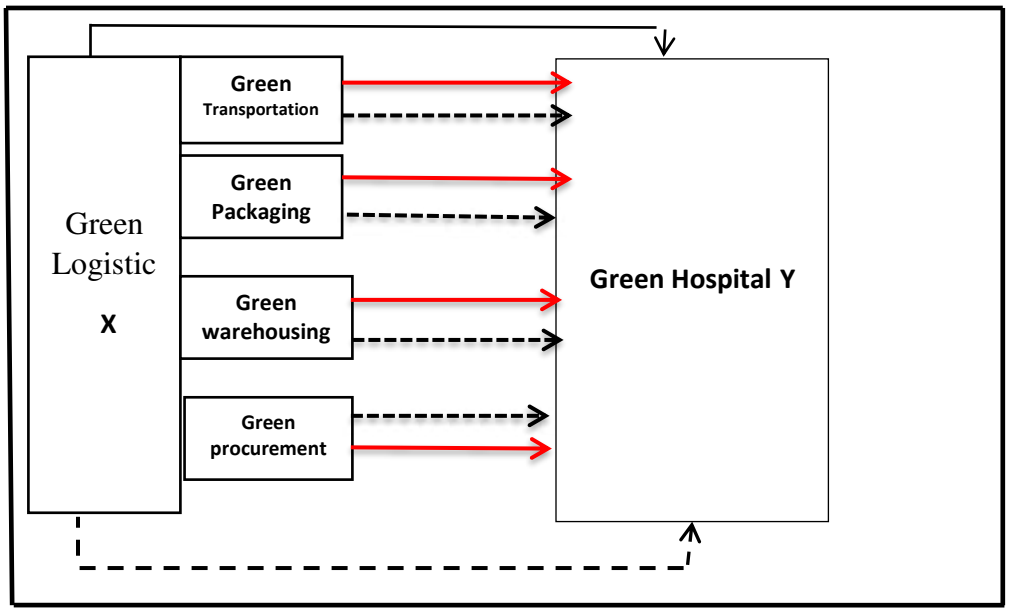


**Figure (1).** Theoretical conceptual model of GL activities seeking to achieve GH dimensions.

### 3.4 Research Hypotheses and Research Framework:

The study relied on two basic hypotheses to achieve the study objectives, which are:
H1: There is a significant correlation between GL activities and dimensions of GH.
H2: There is a significant effect of GL activities on the dimensions of GH.

### 3.5 Data Collection Method and Study Sample.

The current study followed the quantitative method, surveying the respondents' opinions through questionnaire. The questionnaire form was prepared by benefiting from previous studies, and the questionnaire was given to a number of university professors who hold the title of assistant

professor and professor before distributing it to the research sample, and some modifications were made to the questionnaire. The questionnaire form was divided into three parts: The first part was related to the questions specific to the respondent, the second part was related to the questions or paragraphs of the GL variable (independent variable) and the number of its items was 20 for each of its dimensions, the third part was related to the questions or paragraphs of the GH variable (dependent variable). The study used the five-point Likert scale, which graded and arranged the scale scores from the phrase (strongly agree, agree, neutral, disagree, strongly disagree) with weights (5, 4, 3, 2, 1), and with a hypothetical mean of (3). The study used SPSS version 21 to analyze the primary data, and used the descriptive and diagnostic method, Bivariate correlation and linear regression. Private hospitals in the Kurdistan Region, Duhok Governorate, were selected as a study community, numbering (25) hospitals, and (270) questionnaires were distributed to managers who have a relationship with logistical activities in hospitals as a study sample, and they are managers of (transportation, warehouses, purchasing, packaging, management director, general managers). The period for distributing and retrieving the questionnaires took two months, starting in September 2024.

## 3. Data Analysis

To ensure the validity of the data obtained from the questionnaires for statistical analysis, the following tests were verified:

### 4.1. Validity and Reliability

Reliability refers to the ability of instruments to measure what is intended to measure (Campbell & Stanley, 1963). The best method to verify the reliability of the scale is to be accepted by a number of relevant experts (shaban et al., 2021). The opinion of a group of university professors within the same specialization was taken to confirm the validity of the questionnaire.

The reliability of the scale data was verified by finding the value of Cronbach's alpha as shown in (Table 2). The results show that all values were acceptable, because in anthropological studies ($\alpha \geq 0.70$) is required, a Cronbach's alpha value equal to or greater than 0.7 is considered reliable (Pukėnas, 2009). Table (2).

**Table (2).** The Value of Cronbach's Alpha.

| Scale and factors | items | Cronbach's alpha |
|---|---|---|
| | | |
| Geen Logistic combined | 20 | 0.70 |
| Green procurement | 5 | 0.712 |
| Green transportation | 5 | 0.806 |
| Green packaging | 5 | 0.858 |
| Green warehousing | 5 | 0.729 |

| | | |
|---|---|---|
| Green Hospital | 10 | 0.796 |
| Over all | 30 | 0.944 |
| | | |

Source: Prepared By Authors Using SPSS Program

**4.2. Description and diagnosis of the research variables:**

The results of the description and diagnosis can be used to verify the data used and to ensure that there are no errors in the collection or coding. The arithmetic mean, standard deviation and many other indicators are used to verify this (Rao & Fisher, 1992). We note from the results of (Table 3) that all the arithmetic means are much greater than the acceptable arithmetic mean on the five-point Likert scale, which is (3). The values of the deviation coefficients are acceptable and less than the permissible limit, which is 1, and the results of the coefficient of variation fall within the permissible limits.

**Table (3).** Descriptive Statistics

| Variables | Mean | Std. Deviation | Variance |
|---|---|---|---|
| Geen Logistic combined | 4.1286 | .48994 | **.210** |
| Green procurement | 4.0000 | .57483 | **.264** |
| Green transportation | 4.1886 | .51402 | **.330** |
| Green packaging | 4.1029 | .63770 | **.407** |
| Green warehousing | 4.1050 | .45859 | **.210** |
| Green Hospital | 4.8543 | .42484 | **.180** |
| Valid N (listwise) 70 | | | |

Source: Prepared By Authors Using SPSS software

**4.3. Testing the research hypotheses**

1. Testing the correlation hypothesis

The first main hypothesis indicates that there is a significant correlation between GL activities and GH dimensions.

Table (4) shows the values of the correlation coefficient between GL activities and GH dimensions.

| **I.V.**<br>**GL activities** | **Green Transportation** | **Green Packaging** | **Green Warehousing** | **Green Procurement** | **Total indicator** |
|---|---|---|---|---|---|
| **D.V.**<br>**Green Hospital** | 0.68** | 0.53** | 0.51** | 0.49** | 0.66** |

Source: Prepared by Author (**) referred to the significant level N=270 P**≤0.05

The results of Table (4) indicate that there is a positive significant correlation between GL activities and GH dimensions, the total index reaches (0.66**) at a significance level (0.05), which means that the more interest in GL activities as a whole, the more the GH dimensions will be increased. At the individual level of logistics activities, it can be noted that all activities have a positive significant correlation at a good and acceptable level with the GH dimensions, and GT was more related, while green purchasing was less related. Based on these results, the first main hypothesis will be accepted.

### 4.4. Testing the Impact Hypothesis

The content of the second main hypothesis indicates that there is a significant impact of the GL dimensions on the GH dimensions.

**Table (5)**. Analysis of the impact relationship of the GL dimensions variable, in general on the GH dimensions

| I.V. Green Logistics | Beta | B | $R^2$ | T | F | Significant level |
|---|---|---|---|---|---|---|
| D.V. Green Hospital | 0.663 | 2.33 | 0.75 | 7.3 | 53.4 | 0.000 |

Source: Prepared by Author (**) referred to the significant level N=270 P**≤0.05

The results of Table (5), which are related to regression analysis at the collective level indicate the presence of a significant positive effect of the GL variables as explanatory variables in the GH variable as responsive variables, which is what was indicated by the analysis results of coefficients values (B) and calculated value (F) reaches (53.4) and its significance level (P-value) at (0.000), which is less than the standard significance level of the research (0.05), supported by the value of the coefficient of determination (R2) (0.75), which means that the GL dimensions together contributed and explained (75%) of the variance present in the GH variable together, and the rest is due to random variables that cannot be controlled or are not included in the regression model at all.

While the impact relationships of GL activities separately with the GH variable, they are shown in Table (6) as follows:

**Table (6)**. Analysis of the impact relationship of GL activities separately with the dimensions of the green hospital.

| I.V. Green Logistics | D.V. Green Hospital | | | | | |
|---|---|---|---|---|---|---|
| | Beta | B | $R^2$ | T | F | Sig. |
| Green transportation | 0.68 | 2.4 | 0.60 | 7.5 | 58.6 | 0.000 |
| Green packaging | 0.53 | 3.2 | 0.53 | 10.7 | 26.8 | 0.000 |
| Green warehousing | 0.50 | 3.0 | 0.51 | 8.5 | 23.5 | 0.000 |
| Green procurement | 0.49 | 3.4 | 0.49 | 12.0 | 22.3 | 0.000 |

Source: prepared by author P≤0.05 N=70 df= 1-270

The results of Table (6) indicate that there is a positive significant effect for all GL activities separately on the dimensions of the green hospital, which is what was indicated by the analysis results of the coefficients values (B) and the calculated value (T) and the significance level of (0.000) for all activities, which is less than the standard significance level of the stydy (0.05). This means that all GL activities have a significant effect on the dimensions of green hospital, even if they are separate. It can be noted from the coefficient value of determination (R2) that the GT activity has a greater impact, in a while the green purchasing activity had a lesser impact. Based on the previous results, the second main hypothesis of the study will also be accepted.

**5. Discussion of the Results**

The results of the table (3) show the description and diagnosis of the items of the questionnaire dimensions, which were 30 items, and show that all the individuals surveyed who are departments' managers of (transportation, warehouses, purchasing, packaging, management director, general managers) strongly agree on the questions related to GL activities and GH dimensions. This indicates the great interest shown by the individuals surveyed as a result of their awareness of the importance of the subject because they actually practice these activities in practical reality and they are the closest to making decisions related to their activities and addressing the problems they face. The results of Table (4) show that there is a strong correlation between GL and the dimensions of the green hospital, i.e. the more attention is paid to all GL activities, the greater the possibility of enhancing all dimensions of the green hospital: environmental management system, waste management, energy management, hazardous materials management, water management, environmental procurement Management and materials management, and this result is very consistent with the results of the study (Akdağe et al., 2016).

While the correlation relationship measured individually, each logistics activity individually varied with all dimensions of the green hospital. It can be noted that GT is one of the most closely related logistics activities with the dimensions of the green hospital, which indicates the importance of this activity and its great impact on the environment and sustainability due to the negative effects of the transportation process on the environment, and hospitals need this logistics activity a lot to manage their activities when providing Health care, and this result is consistent with the (Vienažindiene et al., 2021) study. It was followed by the GP logistics activity with a strong correlation with the dimensions of the green hospital, and this result is consistent with the study of (King, 2011), so the more environmentally friendly materials and alternative and sustainable materials are used in packaging materials and equipment, the greater the contribution to achieving the dimensions of the green hospital, the Third activity is GW. The more hospitals use environmentally designed warehouses, sustainable energy, and an efficient warehousing system, the more they achieve the dimensions of the green hospital. This result is consistent with the (Bartolini et al., 2019) study. The last

activity according to the results is green purchasing, with its correlation with the dimensions of the green hospital. The focus will be purchasing equipment, tools, and medical devices that will save energy and use less hazardous materials and are recyclable and reusable, thus achieving benefits and advantages for the environment and sustainability. This is consistent with the (Orsini et al., 2024) study. As for medicines, their purchase and taking environmental considerations into account are restricted, because the producing companies apply their own standards to preserve them due to the sensitivity of medicines. Therefore, we find that green purchasing obtained the lowest correlation rate in this study, and it may differ in other studies if their purchases are non-medical.

According to the results of Table (4) it shows the impact relationship of all logistical activities with the dimensions of the green hospital, we notice that there is a great impact for these activities if they are focused on collectively and given the same value to all activities, and this result is consistent with the (Sari & Yanginlar, 2025) study. While we notice through Table (5) that the Impact of each activity per unit with the dimensions of the GH differs, as the GT activity was more influential, followed by the green packaging, than the GW, and finally the green purchasing, and it is clear from this that the impact relationship for green logistical activities exists, but its impact varies, and the reason may be due to the researchers' awareness of the impact results for these activities, as they see that transportation is one of the activities that most influences the dimensions of the GH due to the importance of this activity in the work of hospitals because there is an intensive activity in the transportation process towards hospitals, As hospitals need many inputs and are obtained through transportation, and their outputs of materials and waste are through the transportation process. There is also an impact of GP on the dimensions of the green hospital. The more hospitals commit to using environmentally friendly materials, the more positively this impacts the hospital's work and makes it more environmentally friendly.

GW activity came in third place in terms of impact, and its impact is evident in reducing the energy consumed by warehouses by adopting environmentally friendly designs for the warehouse and reducing the levels of storage of materials so that they do not require more space and energy. The results show that Green procurement activity also has a positive impact, but it is the least influential. Hospitals' reliance on purchasing recyclable materials and materials that are less harmful to the environment may effectively affect hospitals' shift towards caring for the environment.

## 6. Conclusions and recommendations

The literature shows that hospitals are increasingly interested in the environment and its preservation, to meet government laws and regulations, and to improve their image towards society and their customers, and many literatures have shown that adopting green logistics activities can contribute to reducing the negative impact of hospitals on the environment and making them environmentally friendly. Regarding the field sideand shows the results of the description and diagnosis showed that there is a great awareness among the logistics managers

working in the hospitals under study of the importance of green logistics activities and their role in promoting the green hospital, also the results of the statistical analysis showed that there is a strong correlation between all green logistics activities, and green hospitals, and green transportation activity was more closely related while green purchasing activity was less closely related , finaly the impact results showed that all green logistics activities affect the green hospital, although green transportation activity had the most impact while green purchasing activity had the least impact.

The study recommended that the hospitals studied promote all green logistics activities because of their significant contribution to reducing the negative impact of hospitals on the environment , and should make the most of green transportation and green packaging activities to achieve maximum environmental benefits and also look for ways to enhance their green procurement and green storage activities, and It is very important for the hospitals studied benefit from the high awareness of logistics managers to reduce the negative impact of hospitals on the environment and make hospitals environmentally friendly, and the hospitals studied in particular and other hospitals in general benefit from the results of the current study and try to benefit from the approved green logistics activities. Finaly , We recommend that researchers conduct further studies on the subject of the current study to confirm the results of the current study, and we suggest studies of the correlation and impact between green logistics activities and green hospital dimensions separately.

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