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**Theoretical Framework: The Relationship between  
Management Information Systems and Green Supply Chain  
Management: Green Service Supply Chain Management for  
Performance Enhancement in Hospitals**

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**Abstract.** Green Supply Chain (GSC) is increasingly implemented in healthcare industry. This paper attempts to develop a theoretical framework for analyzing the relationship between management information systems (MIS) and green supply chain management (GSCM): green service supply chain management (GSSCM) for performance enhancement of both Governmental and Private hospitals in Gharbia Governorate/Egypt. A Proposed Research framework based on the literature review of many previous studies related to research variables is explored for analyzing the relationship among MIS, GSSCM and OP for Egyptian healthcare industry. Based on the proposed conceptual framework and reviewed literature, research hypotheses are being developed. Two statistical techniques are adopted for data analyzing; (SEM) to perform the required statistical analysis of data from the survey and Alpha test for ensuring construct validity and reliability. The statistical Package for the Social Sciences (SPSS) version21 is used to analyze the preliminary data and provide descriptive analyses about sample such as means, standard deviations, and frequencies. SEM using AMOS 6.0 is used to test the measurement model. Research population is comprised in Governmental and Private Hospitals in Gharbia Governorate/ Egypt. Sampling methods will be using a structured questionnaire to be distributed to respondents. Finally the researcher discusses and suggests future research work.

**Key Words: Management Information Systems, Green Service Supply Chain Management, and Organizational Performance.**

## 1- Introduction:

Health care is one of the most important sectors in any country. It considers human being, that's why governments give a great deal with its issues. In recent years, along with the growing concerns about medical errors, patient safety, spiraling up medical costs and emergency of epidemics, health care has become a critical issue around the world. Healthcare operate in both public and private sectors in which to improve the society overall health level, and profitability respectively. This requires efficient and effective health organizations delivering healthcare services successfully.

Many studies have discussed the relationship between the organizations and their supply chains concluding that, the efficiency and effectiveness of any organization depends on an efficient and effective supply chain. So, health supply chains have to be managed efficiently and effectively. Additionally, number of studies has discussed the vital role (GSCs) play in influencing the total environmental impact of any organization contributing to performance enhancement. Furthermore, some new research sheds light on their role in addressing the recent covid-19 pandemic.

Last but not the least number of studies has referred to (MISs) and their pivotal role in achieving efficiency and effectiveness of the organization and its supply chain in different parts of economic, social, political, national security and healthcare.

## 2- Research Problem:

Healthcare sector in Egypt suffering a lot of problems causing a clear phenomenon of high cost - low quality services. According to 2018-2019 financial year report, health care services costs a lot while the dedicated resources are no longer suffice ([www.mof.gov.eg](http://www.mof.gov.eg)). Additionally preparing a strategy for digital transformation is necessary to improve the efficiency of the national health system ex, dimensions of justice and social protection, filling gaps of the work force and health data, the environment, besides adopting protective measures in accordance with international rules and standards as well as, increasing number of training programs in managing and anticipating health crises, adopting different visions of human capital; programmers, data exclusionists, and etc., other than doctors, nurses, and other jobs, as well as research and development activities (القاعدة القومية للدراسات عن مصر , ٢٠٢١)

So, with this regard and in conjunction with the digital transformation, along with the new trend towards going green, the following research problem has been developed; to what extent can MIS affect the GSSCM and organizational performance (OP) for Governmental and Private hospitals in Gharbia Governorate/Egypt? especially with the emergency of the new covid-19 epidemic, proposing a frame work to be examined.

### 3- Objectives:

Testing the direct impact of; (1) MIS on GSSCM; (2) GSSCM on OP; (3) MIS on OP; and (4) the indirect impact of MIS on OP through GSSCM.

### 4- Literature Review:

(4-1) **MISs:** collect data from internal and external sources of the organization, process, publish, and provide it to certain people at different organizational levels to achieve the organizational goals. It includes devices, soft wares, people and communication systems and the information itself. At different Managerial levels, there are different types of (MIS); (1) Transaction processing systems: serve the operational level in which to execute and record daily routine transactions; (2) Knowledge work systems: for setting up and merging the new knowledge ex, computer Aided design (3) Office Automation Systems: for text and email processing, and scheduling; (4) Decision support systems (DSS): collect data and set up the analytical models to support structural and non-structural decisions; (5) Executive support systems (ESS): process the unstructured decision making (strategic level); (6) Charts. ESS: to access easily to the internal and external information related to the strategic decisions and executive responsibilities.

(سراج، ٢٠٢٠) (القصر اوى & يوسف، ٢٠٢٠)

### (4-2) DeLone& McLean IS Success model (2016):

They had reviewed the different IS success definitions and their corresponding measures, classifying them into six major categories introducing general and comprehensive definition of (IS) success. Ten years after the publication of their first model and based on the evaluation of many contributions to it, they proposed an updated Model; 2003 then 2016. The model Dimensions encompasses:

**1- System quality:** related to ease of use, flexibility; credibility and reliability, as well as intuitiveness, sophistication, and being maintained and modified easily and continuously.

**2- Information quality:** it is about the desirable characteristics of the system outputs; i.e., management reports and Web pages.

**3- Service quality:** the quality of support users receive from information systems, organization and IT support personnel.

**4- Use / intention to use:** the degree and manner in which employees and customers utilize the capabilities of an information system.

**5- User Satisfaction:** users' level of satisfaction with reports, Web sites, and support services regarding the easiness and comprehensiveness.

**6- Net Impacts:** the extent to which information systems are contributing (or not contributing) to the success of individuals, groups, organizations, industries, and nations.

(سراج، ٢٠٢٠) (Urbach, 2011)

#### **(4-3) Hospital information systems (HIS):**

(HISs) have played a leading role in influencing all aspects of health services (Almotawkel, et al.2021) in which to collect, store, process, and read out patient's cares and administrative data supporting hospitals activities at all levels. Thus improves service quality, reduces costs and provides a country distributed database and relationships with the world health networks, as well as research and training support to promote community health (Aghazadeh, et al . 2012). The emergency of COVID-19 pandemic has led to redesign the public health system from reactive to proactive. Effective innovations have helped identifying coronavirus spread, diagnosing patients and monitoring their condition, and improving the treatment (Ye et al, 2020).

**(4-4) Supply Chain Management (SCM) & service supply chain management (SSCM):**

SCM has been developed mainly for manufacturing sectors. It is the management of information, processes, goods, department, and funds from the earliest supplier to the ultimate customer, including disposal. Over time the concept has expanded to include reverse logistics (Smith, 2013). SCM definition fits without modification to some areas of services, such as retail trade. However, in professional services, there is no transfer of goods. Buying a service represents a transfer of the service supplier's capacity to its customer in form of a service. Thus, SCM definition is modified for professional services in which adding the management of capacity, and service performance (Ellram, et al. 2004).

**(4-5) (GSCM) & (GSSCM):**

The increased interests toward environmental improvement, and minimizing or eliminating wastes, have driven developing the GSCM in which adding a green component to the SCM practices (Chin, et al.2015). It encompasses; Green manufacturing, reverse logistics, eco-design, green purchasing (Assumpção, et al.2019), Green packaging, green distribution (Özkan et al.2016), and waste management (Amemba, 2013).These dimensions have been applied for both manufacturing and service organizations. However the researcher has not found an explicit definition of the GSSCM (at the best of the researcher knowledge). The researcher contributes the definition at the discussion section.

**(4-6) Hospital Waste management (HWM):**

HWM has been a sensitive issue around the world. It includes; generation: wastes generated from medical activities; segregation: separating the different waste streams using color-coding system and well- labeled bags or containers; storage: moving containers or bags to temporary storage (on - site storage) before being treated / disposed on - site or transported off – site; collection and transportation: on and off site transportation carried out by staff members of the facility; treatment & disposal: treatment turns wastes into

harmless materials either on-or out site; disposal: either with general solid wastes after treatment or directly by incineration, Landfilling or recycling; training and supervising: to enhance handling issues and ensure both standard and harmonized procedures are applied (Khan, et al. 2019).

**(4-7) OP:** means surpassing the achievements of a firm's rivals; Financial: concerned with measuring return on investment, return on assets, and market share; Non- financial: concerned with fulfilling Clients' needs and expectations; Operational: related to the organization ability to produce and deliver products and services more efficiently (Abdallah, et al., 2017); and environmental: related to reducing air emissions, wastes, and toxics (Sarkis, 1998).

#### **(4-8) Balanced Scorecard (BSC) and Environmental Balanced Scorecard (EBSC):**

BSC is an approach devised by Kaplan and Norton 1992 and then redefined in later publications, 1993; 1996; and 2000. It uses both financial and nonfinancial measures to evaluate all aspects of an organization's operations in an integrated fashion. BSC measures fall into four perspectives: Financial, Customer, Internal process, and Learning and growth. However, it had faced many criticisms. Managers had to decide on the manner in which the environmental aspects will be integrated into the BSC driving EBSC development (AL-Zwyalif, 2017).

**5- Techniques of Data collection:** (1) Journal Articles, Books, Scientific Periodicals, and Reports, electronic sources, and... etc., (2) gained by the researcher for research assignment, using questionnaires directed to department managers working in the healthcare sector in Gharbia governorate.

#### **6- Methodology:**

To understand the relationship among research variables, the following hypotheses are set up to be tested;

H1: MIS has a significant positive impact on GSSCM;

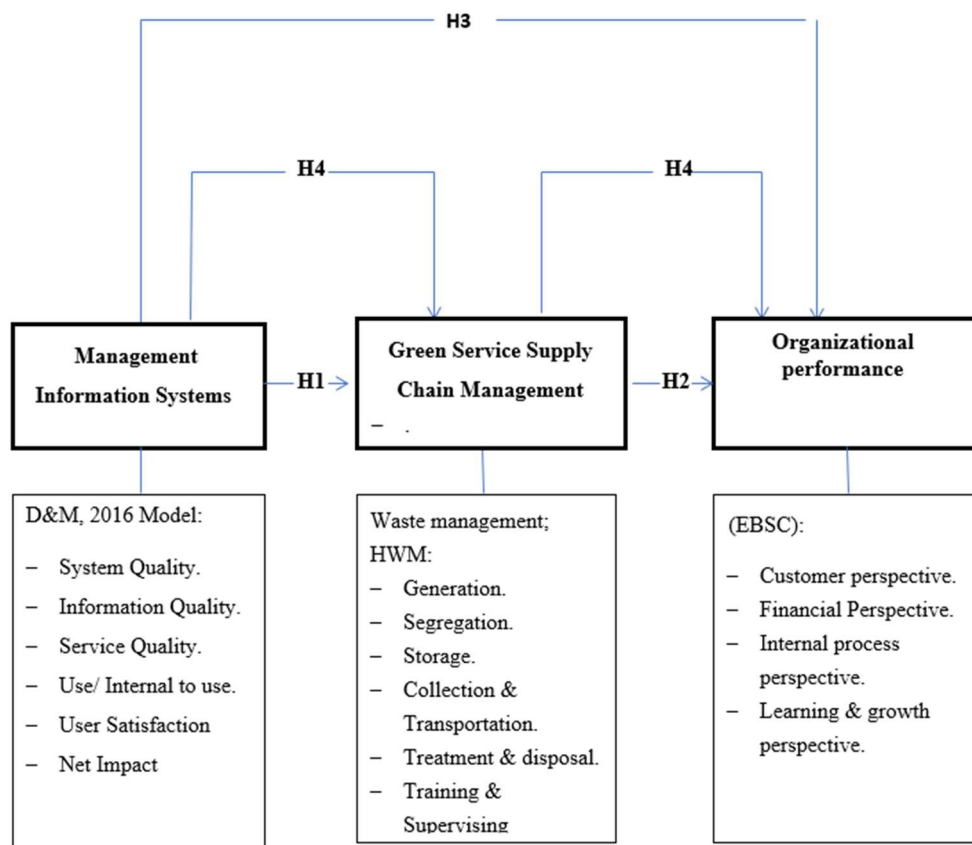
H2: GSSCM has a significant positive impact on OP;

H3: MIS has a significant positive impact on OP;

H4: GSSCM mediates the relationship between MIS and OP.



Research population is comprised in Governmental and Private Hospitals in Gharbia Governorate/ Egypt. Sampling methods will be using a structured questionnaire to be distributed to respondents. Two statistical techniques are adopted for data analyzing; (SEM) to perform the required statistical analysis of data from the survey and Alpha test for ensuring construct validity and reliability. Having analyzed the measurement model, the structural model is tested and confirmed. The statistical Package for the Social Sciences (SPSS) version21 is used to analyze the preliminary data and provide descriptive analyses about sample such as means, standard deviations, and frequencies. SEM using AMOS 6.0 is used to test the measurement model. A Proposed Research framework based on the literature review of many previous studies related to research variables is explored for analyzing the relationship among MIS, GSSCM and OP for Egyptian healthcare industry as presented in Figure1:



(Figure1) Proposed Research Frame work

**7- Discussion and Future Research:** healthcare is the backbone for the community health therefore, it is important to find ways to improve its performance as well as the environment. After revising many studies the researcher found that the efficiency and effectiveness of any organization depends on an efficient and effective supply chain, which also contributes to environmental enhancement by adding a green component to its practices. This in turn derived thinking about having an efficient and effective green healthcare supply chain. Number of studies has discussed the MIS pivotal role in achieving the efficiency and effectiveness of the organization and its supply chain. Therefore the researcher proposes to study the relationship between MIS and GSSCM; in which healthcare supply chain is an implementation of (SSC) into healthcare businesses, for performance enhancement. According to the literature review MIS enhances the overall hospitals performance as well as the environment through GSSCM (HWM). Efficient MIS and new technologies are essential to manage wastes properly, the critical issue in which infectious healthcare waste is the second riskiest waste in the world, (Khan, et al. 2019) that's why the researcher has chosen to study while choosing D& M model in which it attempted to provide an integrated view on IS success. EBSC has been proposed as it combines both financial and non-financial measures while considering the environmental ones thus, it is appropriate for the study population.

This research is to conclude that there is a positive relationship between MIS and GSSCM in which to affect the OP positively as well as enhancing the environment especially with the new covid-19 epidemic, in addition to contributing the following: (1) Introducing an explicit definition of GSSCM. After the concept sustainability has appeared most of researches use the concept sustainable and green interchangeably as green issues lie under the umbrella of sustainability despite the deference. Thus on the way of developing the concept GSCM, the researcher defines GSSCM as integrating the environmental practices with the service supply chain; greening all practices taking place between parties along the service system; (2) applying

(D& M, 2016) model for hospitals.; (3) help filling the gap of rare researches about GSSCM, and HWM especially with the new covid-19 epidemic, in addition to measuring OP using (EBSC) for hospitals; (4) Proposing frame work for research variables, while contributing empirically to the society

In order to develop a medical Informatics industry the researcher recommends to fully understanding the infrastructure planning adopting the security, business, legal, social and cultural and technical infrastructures necessary for ,digital information privacy and protection; financial interactions; laws and regulations related to activities; human resources resistance to changes in the development; and communicating respectively. Additionally following Standard Health care level7; an accepted standard open protocol in the world providing a common language for information exchange in both domestic and abroad (Aghazadeh , et al . 2012 ).

This can help developing strategy for digital health transformation and thus increasing the overall hospitals efficiency as well as enhancing the environment.

On the future agenda, empirical research will conduct to examine the study hypotheses. The previous study review will assist the way in which managers and next researcher to investigate and implement MIS and GSSCM in Egyptian healthcare. Additionally, the researcher proposes studying Green Service practices as a dimension for GSSCM in future researches.

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