مركز الأكاديمية للنشر
ACADEMY Publishing Center
Volume 2, Issue 1, June 2022 - ISSN 2735 - 5969

IBL

International Business Logistics Journal

Academy Publishing Center
International Business Logistics Journal (IBL) First edition 2021

Volume 2, Issue 1, (June.2022)

eISSN: 2735-5969

pISSN: 2735-5950

Arab Academy for Science, Technology, and Maritime Transport, AASTMT Abu Kir Campus, Alexandria, EGYPT
P.O. Box: Miami 1029
Tel: (+203) 5622366/88 – EXT 1069 and (+203) 5611818
Fax: (+203) 5611818
Web Site:http://apc.aast.edu

International Business Logistics (IBL) Journal is a biannual peer-reviewed scholarly open access journal published by Arab Academy for Science, Technology & Maritime Transport. IBL presents a global forum for dissemination of research articles, case studies and reviews focusing on all aspects of logistics and its role in business development worldwide. While articles in any area of business logistics and its related fields are welcomed, the journal is specifically interested in those dealing with management applications of theory and techniques. Articles which provide new knowledge and guidelines for conceptualizing, interpreting or executing the logistics activities and processes are of particular interest. All articles are anonymously reviewed for publication by referees, who look for original ideas that are clearly presented as a contribution to scientific knowledge. IBL publishes original and challenging work that has clear applicability to the business world. High quality contributions are therefore welcomed from both academics and professionals working in the field of management, logistics, supply chain management, transportation and all related fields.

The IBL aims to:

1. Present to the international community important results of work in the fields of business logistics research to help researchers, scientists, manufacturers, institutions, world agencies, societies to keep up with new developments in theory and applications.
2. Provide a platform for new thinking on (new) problems, practices, and techniques of logistics and its related fields.
3. Facilitate the interchange of information about business logistics among business managers and researchers on a worldwide basis.
4. Provide executives and teachers with reports of current developments in the field of business logistics.

Subject areas suitable for publication include, but are not limited to the following fields:

- Logistics
- Supply chain management
- Reverse logistics and green supply chain
- Supply chain resilience
- Modelling of the supply chain and transportation simulations
- Transport systems and processes
- Multimodal transport
- Maritime transport economics
- Retailing
- Last mile logistics
- Sustainable development
- Blockchain
- Global supply chain risk management
- Digital transformation in logistics and supply chain

In addition, IBL also covers multidisciplinary areas such as supply chain finance, supply chain marketing, cross-functional relationships, human resources management in the field of logistics etc.

IBL journal does not collect Articles Processing Charges (APCs) or submission fees, and is free of charge for authors and readers, and operates an online submission with the peer review system allowing authors to submit articles online and track their progress via its web interface.

The journal is financially supported by the Arab Academy for Science, Technology and Maritime Transport (AASTMT) in order to maintain a quality open-access source of research papers on business logistics and related topics.

IBL has an outstanding editorial and advisory board of eminent scientists, researchers and engineers who contribute and enrich the journal with their vast experience in different fields of interest to the journal.

Editorial Committee

Editor-in-Chief

Associate Editors

Editorial Board

Administrative Board

Contents

Articles

Editorial

Measuring the Impact of Adopting Smart Energy on Technological Progress, Operations Performance and Green Environment: Logistics Companies in Alexandria, Egypt as a case study

Nourhan Morsy EL Barbary
College of International Transport and Logistics- Arab Academy for Science Technology and Maritime Transport (AASTMT)
Nbarbary@aast.edu

Taha Kassem
College of Management and Technology – Arab Academy for Science Technology and Maritime Transport (AASTMT)
tahakassem905@gmail.com

Hebatallah Mohamed Elmesmary
College of International Transport and Logistics- Arab Academy for Science Technology and Maritime Transport (AASTMT)
hebaelmesmary@aast.edu

Alexandra Ioanid
Politehnica University of Bucharest, Bucharest, Romania
Ioanid.alexandra@gmail.com

Received on: 06 February 2022 Accepted on: 01 April 2022 Published on: 28 May 2022

Abstract

Purpose: This study aims to investigate the role of the use of smart energy in logistics companies to increase technological progress, improve operation performance and lead to a green environment.

Design/ methodology/ approach: Primary data were collected through a questionnaire. This questionnaire targeted 80 employees of supply chain department working at logistics companies located in Alexandria, Egypt. The collected data were analyzed through using data testing using validity and reliability, descriptive analysis, testing regression assumptions, normality test for the research variables, correlation and regression.

Findings: The results succeeded to prove that the use of smart energy has a significant effect on technological progress, operation performance and green environment.

Research implications/ limitations: This research provides a clear understanding to the decision makers and policy makers of the suitable ways of applying smart energy projects in the logistics companies in Alexandria, Egypt. It also shows the positive effect of smart energy projects on other variables, which encourages applying the smart energy projects, whether in the logistics companies or in other fields. Moreover, this study has a limitation regarding the sample as it depends on a sample of 80 employees at a certain context: the logistics industry.

Originality: This paper adds new dimensions to the framework of smart energy, whereas previous studies only focus on the application and the usage of smart energy without focusing on its impact on other dimensions.
Keywords: Green Environment, Operation Performance, Smart Energy, and Technological Progress.

Introduction

The technological progress, performance of operations and green environment nowadays represent the main factors that companies aim to reach (Fernando et al., 2019). Technological progress was proved as a main factor that leads to achieve economic and financial growth on the long term (Donou-Adonsou et al., 2016). Moreover, operation performance is related to the development of product efficiency, improvement of the processes, conformity of quality and short times lead (Croom et al., 2018). Finally, green environment represents a significant dimension in achieving sustainable development (Nishant et al., 2020).

The importance of the aforementioned three dimensions has forced the companies to look for the best and cheapest ways to achieve them. Smart energy system is considered as an approach in which smart electricity, heat and gas networks are combined with storage technologies to determine the aspects of exclusion among them to achieve an ideal solution for each sector separately and for a comprehensive energy system (Gondal, 2019). Smart energy system reduces the cost of renewable energy systems as it focuses on energy efficiency and provides the final use to create the flexibility of the energy system (Mathieson et al., 2015). Also, there is a great interest in bringing a smart energy system to improve the quality, reliability and efficiency of logistics processes and reduce stress on the system (Gellings, 2020).

Many studies have focused on the adoption of smart energy cities and smart energy projects among different countries. For example, Quijano-Sánchez (2020) studied the development of smart cities in Mexico. Both researchers depended on making semi-structured interviews in order to collect data. The targeted sample was six employees at the Ministry of Economic Development in Mexico City. The researchers identified many drivers that led to smart energy adoption. In addition, they found that any changes or innovations required in the government services and processes in Mexico need to have a legally empowered political decision.

In this research, the researcher focuses on smart energy hub adoption by logistics companies located in Alexandria, Egypt, where it aims to investigate the impact of adopting smart energy inside logistics companies located in Alexandria, Egypt on technological progress, operation performance and green environment. Accordingly, three objectives are developed: the first objective is to identify the effect of smart energy adoption on technological progress. The second objective is to determine the extent to which smart energy affects operation performance. The third objective is to find the effect of smart energy on green environment in the logistics companies located in Alexandria, Egypt.

Through observing the previous literature, the researcher noticed that there are two main gaps: the first gap is that there are no studies that examined the adoption of smart energy in the logistics context inside Egypt. The second gap is that previous studies had focused only on the adoption and establishment of smart energy projects inside one or more countries, without paying any attention to examining the impact of adopting those projects on technological progress, operation performance and green environment. Thus, this paper is trying to fill in those two gaps.

The research has a number of contributions that will add to the academic body of knowledge and literature regarding a clear understanding of smart energy, technological progress, operation performance and green environment. Therefore:

- This research aims to investigate the impact of adopting smart energy inside logistics companies located in Alexandria, Egypt on technological progress, operation performance and green environment, which is rarely found in the literature as there is a shortage of the studies investigating this adoption in Egypt.
- The researcher introduces a clear background of the adoption of smart energy projects and smart cities in Egypt, while the previous literature introduces this concept inside different countries.
- Some of the previous research studies focused

only on the adoption of smart energy in one or more countries without linking it with other factors; therefore, in this research, all the factors are connected to reach to the best results, especially in Egypt.

Therefore, the contribution of theory can be represented as that: to investigate the link between the use of smart energy on technological progress, operation performance and green environment at logistics companies in Alexandria, Egypt. This is something that previous studies have not addressed because the previous literature have not discussed the impact of all of these factors together, so researchers should work on conducting more studies on the impact of more factors on technological progress, operation performance and green environment to ensure the best adoption of smart energy.

However, there are some practical contributions represented in giving the decision makers a comprehensive grasp of the use of smart energy influence technological progress, operation performance and green environment. Furthermore, insights into additional use of smart energy that influence technological progress, operation performance and green environment are shared.

This paper is divided into seven sections: section one is the introduction, section two represents the literature review, section three discusses the research contribution, section four is the research methodology, section five is the research variables and framework, section six represents the empirical studies and findings, and, finally, section seven introduces the research discussion.

Literature Review

This section represents the literature review related to the research topic. It is divided into three parts: adoption of smart energy in different countries, adoption of smart energy in Egypt and, finally, the research hypotheses' development.

Part One: Adoption of Smart Energy in Different Countries

This section is going to discuss previous studies that had introduced the impact of smart energy adoption in different countries; for example, Noppers et al. (2016) aimed to investigate the extent to which the evaluations of instrumental, symbolic and environmental attributes can explain the actual adoption of smart energy systems that facilitate sustainable energy use. The findings assured that the adopters of smart energy systems evaluated the symbolic attributes of these systems more positively than non-adopters, while both groups did not differ in their evaluation of the instrumental and environmental attributes of smart energy systems.

In addition, Macke et al. (2018) identified the development of smart city in Brazil. Data were collected through a questionnaire survey that was distributed among residents, and a total of 400 answers were collected. The analysis of data proved that the success of smart cities is recognized when achieving socio-structural relations, material well-being, environmental well-being and community integration.

Moreover, Wang (2020) introduced the development of smart energy in the logistics industry inside China as a case study. The researcher concluded that China succeeded to achieve a great success in adopting smart energy inside the logistics context. Additionally, China started to work on a transition from a vast logistics country to a worldwide logistics powerhouse.

Furthermore, Tan and Taeihagh (2020) investigated the adoption of smart urban development projects and strategies in developing countries through collecting previous literature that has investigated this adoption. Both researchers depended on analyzing a sample of fifty-six studies and concluded that the adoption of smart urban development projects and strategies in African developing countries has started recently, and it is expected that by year 2050, the African countries will achieve a growth rate of urban population with 16%.

Besides, Bhattacharya et al. (2020) evaluated three smart cities in India through utilizing the index of Smart

Sustainable City Development (SSCDI). This index helped in capturing economic, social, cultural, environmental and lifestyle dimensions inside the three cities.

Bhattacharya et al. (2020) assured the importance of energy efficiency, urban mobility and water supply as well as usage of ICT among citizens in any smart city. In addition, in the Indian context, the researchers indicated that any planning of smart cities needs to ensure good life quality for the citizen, which includes affordable housing with good quality, cost efficient physical infrastructure, safety and security, quality education, entertainment, ease of seeking and obtaining public services, efficient healthcare, transparency and opportunities for participation in governance.

In addition, Rześny-Cieplinska and Szmelter-Jarosz (2021) studied the adoption of smart energy in the logistics industry. The researchers adopted a three-layer methodology: first was collecting previous literature, second was making interviews with urban logistics stakeholders and third was analysis of interviews. The results proved significant differences between the opinions of the interviewed group. Moreover, results can contribute to the scientific discussion about the analysis of the goals of stakeholders of smart logistics.

According to the previous studies, which are investigated in this section, the impact of smart energy adoption had been discussed in different countries, so it is important to know the impact of smart energy adoption in Egypt and know the difference, as the focus of the present study is Egypt. Therefore, the adoption of smart energy in Egypt is discussed in the next section.

Part Two: Adoption of Smart Energy in Egypt

This section identifies the impact of smart energy in Egypt, where it introduces the adoption and development of smart energy in different contexts inside Egypt. Before the 2011 revolution of Egypt, lack of technology and internet access leads to a delay in the institutional service inside Egypt. In addition, urban development was neglected, which negatively affected the performance of public service (Hamza, 2016). Moreover, there was a huge development gap between the rural and the urban parts of Egypt; also, this gap occurred between governorates and cities, as approximately 40% of the development investments took place only inside Cairo Governorate (Gil-Garcia et al., 2015).

After the revolution, the government started to pay more attention to adopting sustainable urban development projects. Those projects were recommended by the World Bank and the European Union, aiming to revive the Egyptian economy. Moreover, the European Union gave financial aid of 200 million euros to the Egyptian government in order to help Egypt in its smart cities projects. Egypt started to work on smart cities that depend on utilizing smart energy.

Smart cities aimed to reach urban development in different fields (economic, social and political). Nowadays, there are 20 projects of smart cities all over Egypt. Those smart projects are being implemented through cooperation between the public and the private sectors (such as the projects of smart electricity). New Cairo project, named "Smart village", represents one of the most important projects of those twenty projects. The central government had chosen New Cairo city to apply smart energy systems in different fields, such as smart healthcare, smart water and smart electricity. New Cairo city council succeeded in making some reforms in public institutions. It also succeeded in making collaboration with the private sector in order to build up the new electricity networks project under the public accountability and military management as a government agency (Alsaid, 2021).

In addition, Hamza (2015) saw that "Smart Village" is a village that was established by the collaboration between the Egyptian government and the investors of the private sector in 2001. This village is considered as a successful model of a smart city since the government established this village aiming to host the information technology companies and provide essential services standards (high standards buildings and landscape, networks security, etc.). Finally, the researcher concludes that this village faced some obstacles regarding practical application.

Although the European Union provided financial aid to the Egyptian government to help it in implementing the smart projects, this aid only covered the cost of infrastructure network in New Cairo project. This pushed the government to depend on the collaboration with the public sector (Alsaid, 2021). On the other hand, the lack of funding forced the Egyptian government to make political pressure on the public institutions around the whole cities (Alsaid and Ambilichu, 2020).

Beside the smart cities projects, the Egyptian government has started to pay a great attention to using clean and renewable resources of energy, as it has started to focus more on the production of natural gas as a cleaner resource of energy than coal or any other harmful resources. The Egyptian government made partnerships with international companies regarding the exploration of natural gas, in which Egypt has succeeded to be a major regional center for its production and exporting. Moreover, Egypt is considered as one of the first Middle Eastern Countries that aims to utilize nuclear power, as it has succeeded in developing technological nuclear infrastructure inside Cairo, after working with the International Atomic Energy Agency (IAEA) and international partners (Bahgat, 2013). Additionally, it is noticed that Egypt has a great chance to produce solar energy from the Western Desert, wind energy from the Gulf of Suez and hydropower energy from the River Nile. However, investments in these resources of energy are still limited (Ibrahim, 2012).

Therefore, it is noticed that Egypt has recently started to adopt smart energy projects. First, smart projects have depended on financial aids that came from external resources. Additionally, projects of smart energy and smart cities represent projects done by the government or by cooperation between the public and the private sectors. It is also noticed that projects of smart energy are very costly to the Egyptian government, which leads the government to put pressure on the public institutions. Besides those projects, the Egyptian government started to depend on renewable and clean resources of energy to be adopted all over Egypt.

Finally, it could be noted that there is a gap in research that investigated the adoption of smart energy in Egypt, as well as those studies that focused only on smart cities projects without focusing on smart energy in a certain industry or project (Hamza, 2016; Alsaid and Ambilichu, 2020 and Alsaid, 2021). Other studies, such as; Ibrahim (2012) and Bahgat (2013), focused only on the conversion from non-renewable resources to renewable and clean resources of energy without focusing on smart energy projects.

Part Three: Research Hypotheses

This section develops the research hypotheses. It is observed that there is a lack of studies that investigate the effect of adopting smart energy on other variables. Regarding this relationship, it is noticed that there are no previous studies that have investigated the effect of smart energy on technological progress, but at the same time, there are some studies that have linked the technological factors and information technology with smart energy. For example, Ferreira et al. (2014) examined the roles of Artificial Intelligence (AI) and Information and Communication Technologies (ICT) on the development of smart grids. This analysis included the research and development processes among different regions in the world. The results had proved that both of AI and ICT had a significant impact on smart grids adoption. On the other hand, this study worked on providing simulation tools that aimed to develop control strategies, which aimed to provide stable solutions to address the challenges that the smart grids' development faces.

In addition, Vijai and Sivakumar (2016) examined the adoption of internet of things (IoT) system located inside smart cities through utilizing India as a case study. Results indicated that the urbanization and growth of population led to increasing the demand of basic resources like water. Therefore, the government adopted IoT systems aiming to reach a proper usage of water, through the commitment of proper monitoring and management of distribution systems of water.

Moreover, Connolly et al. (2016) investigated the impact of smart energy on the technological and economic changes. The findings of analysis showed that by using the approach of smart energy system, a 100 percent of renewable energy system in Europe is technically possible without consuming an unsustainable amount of

bioenergy. This is due to the additional flexibility that is created by connecting the electricity, heating, cooling and transport sectors together, which enables the intermittent renewable penetration of over 80% in the electricity sector.

Furthermore, Biresselioglu et al. (2018) examined the barriers and motivators affecting the European decision-makers in the development of smart and green energy technologies, the adoption of smart energy and green energy technologies among decision makers. The analysis depended on the identification of three levels of formal social decision-making units: Formal Social, Collective Decision-Making, and Individual Consumers engaging in joint contracts. The analysis proved that the definition of "smart grid" is strongly related to the technological developments in the EU energy sector, which causes a lack of a common understanding regarding this concept. This interpretation across member states in turn causes a variance in responses among governing bodies, which are reflected on the public policies and regulations that address this issue.

Besides, Wang et al. (2019) investigated the adoption of smart energy in China and its influence on energy service business model. Through this study, the researchers succeeded in developing new solutions to solve the challenge of smart energy for the State Grid Corporation of China's business model. Moreover, the analysis proved that both of innovation and reformation will be doomed and embraced by smart energy in the Chinese energy system, which includes technological progress and system mechanism reform. This study proved that the technological progress is considered as a main factor that helps in adopting smart energy, while the current study examined the effect of smart energy on technological progress.

According to the above studies, it clearly appears that there is a lack in studies that investigated the effect of smart energy on technological progress. Thus, the current study has a contribution in studying this relation as well as it has another contribution regarding testing this relation in Logistics Context inside Egypt. Therefore, the researcher develops the first hypothesis:

H_1: There is a significant relationship between the use of smart energy and technological progress of corporation

Regarding this hypothesis, it is noticed that most of studies have focused only on the adoption of smart cities inside the country and evaluating the performance of these cities without investigating the effect of smart energy on the operation performance inside a certain industry. For example, Noppers et al. (2016) aimed to investigate the extent to which the evaluations of instrumental, symbolic and environmental attributes can explain the actual adoption of smart energy systems that facilitate sustainable energy use. The findings assured that the adopters of smart energy systems evaluated the symbolic attributes of these systems more positively than non-adopters, while both groups did not differ in their evaluation of the instrumental and environmental attributes of smart energy systems.

In addition, Chasin et al. (2020) aimed to analyze the effect of smart energy projects on the business model. Moreover, a comparative study was done between the business models that use smart energy and those that use traditional ones. The researchers depended on analyzing 175 energy firms. The results showed that the traditional energy had a hesitancy regarding the revision of their BMs. Instead, smart energy prefers to build on BM extensions by outsourcing the innovation activities in subsidiaries or by using partnerships. Finally, this study had provided an overview of the current smart energy market for private households, which can represent a starting point for BM innovation, especially for energy utilities.

Moreover, Bhattacharya et al. (2020) evaluated three smart cities in India through utilizing the index of Smart Sustainable City Development (SSCDI). This index helped in capturing economic, social, cultural, environmental and lifestyle dimensions inside the three cities. Bhattacharya et al. (2020) ensured the importance of energy efficiency, urban mobility and water supply as well as usage of ICT among citizens in any smart city. In addition, in the Indian context, the researchers indicated that any planning of smart cities needs to ensure good life quality to the citizen, which includes

affordable housing with good quality, cost efficient physical infrastructure, safety and security, quality education, entertainment, ease of seeking and obtaining public services, efficient healthcare, transparency and opportunities for participation in governance.

Furthermore, Liang et al. (2020) succeeded in reviewing concept models of global smart cities and smart energy systems. Moreover, they succeeded in developing a business model. Data were collected through reviewing the connotations of smart energy systems, smart energy city, and the definition of SET according to China's national conditions. Through this review, the gaps and barriers of developing SET in China were identified. In addition, the researchers determined four main stakeholders in China: China's central government, international organization, China's regional government, and enterprises, where some recommendations were provided to those stakeholders regarding the development of smart energy towns in China. Finally, a business model innovation was designed that aims to support the economic development.

Accordingly, it is noticed that there are no studies that showed the impact of smart energy adoption on operation performance, neither in the logistics field nor in other fields. Therefore, the current study has a contribution regarding this point and by that the second hypothesis is developed, which states that:

H_2: There is a significant relationship between the use of smart energy and operation performance

Regarding this hypothesis, it is noticed that previous studies have only focused on studying the effect of smart energy on pollution and carbon dioxide. For example, Liu et al. (2012) investigated smart cities in China. The Chinese government had an aim in establishing low-carbon cities. Thus, the researchers aimed to introduce the success of adopting low-carbon cities in China through taking Suzhou of Jiangsu Province as a case study. After collecting data about the province, the results proved that it is impossible to investigate an absolute carbon emission reduction, but at the same time it was possible to reduce the intensity of carbon dioxide emissions in China.

In addition, Pan et al. (2020) examined the adoption of smart energy inside the logistics in China, which leads to reducing the carbon emissions. Therefore, the researchers worked on investigating the main factors influencing the establishment of Smart Logistics in Chinese cities through utilizing the Binary choice model. Results proved that freight volume, logistics employment and total social retail represented main factors that determine whether the city needed to establish Smart Logistics or not. Moreover, results proved that smart logistics helped in reducing carbon emissions.

Moreover, Shi et al. (2020) aimed to investigate the relationship between smart energy, artificial intelligence and low-carbon economy. The researchers aimed to examine this relation, as there are problems existing in the optimization of power generation industry in China. The researchers collected data about annual load, electricity price, climate data of a southern power grid, uses the statistical variation particle swarm optimization algorithm, and uses the historical runoff and rainfall data. Depending on the collected data, an optimal operation model of power industry was established, where this model was developed based on both of the artificial intelligence and the protection of low-carbon environment.

Furthermore, Fenton (2020) analyzed the adoption of smart energy in the logistics context inside Europe. This research referred to an example of the Clean truck project that was established in Stockholm city. This project aimed to utilize the renewable fuels on the logistics transport in order to reduce greenhouse gas emissions and air pollution caused by the logistics industry. The success of this project led to making the City of Stockholm and two fuel suppliers own the European funding for a project that engaged stakeholders in the logistics context and purposed to overcome first-mover problems.

Besides, Zhu et al. (2021) illustrated the challenges, obstacles, and, on the other hand, the opportunities that face the adoption of smart energy in the context of carbon dioxide reduction. Through this research, four opportunities and ten obstacles were identified regarding the conducting of smart energy systems to reduce carbon emissions. Finally, the researchers provided

some recommendations, which were represented in the following points: smart energy system research should begin with a combination of technological innovation and practical application. In addition, the smart energy systems key technology should consider the needs of people's daily life to evolve in a more intelligent and diverse path.

According to the above studies, it clearly appears that there is a lack in studies that investigated the effect of smart energy on green environment. Thus, the current study has a contribution to studying this relationship in the Logistics Context inside Egypt. By that, the third hypothesis is developed; which states that:

H_3: There is a significant relationship between the use of smart energy and green environment

This research aims to investigate the impact of adopting smart energy inside logistics companies located in Alexandria, Egypt on technological progress, operation performance and green environment. Smart energy represents an advanced source of energy that depends on clean and renewable resources of energy that are characterized by their low costs. Therefore, this energy helps in reaching technological progress, improving the performance of operations and leading to a green environment (Omer, 2008).

Through surveying the literature review, the researcher succeeds in identifying different definitions related to the concepts and terminologies of the research variables, as well as choosing the suitable definition of each of the independent variables (smart energy) and dependent ones (technological progress, operation performance and green environment) related to the research topic (Dincer and Acar, 2018).

The previous literature also helped the researcher to get a clear background of the adoption of smart energy projects and smart cities inside different countries. Moreover, previous studies showed that each country depends on its own way regarding the adoption of smart projects, where some of them fully succeeded in adopting those projects, while others find some obstacles in the application (Dryjanski et al., 2020).

From the previous literature, the researcher found that there are shortages of studies that investigated the adoption of smart energy projects in Egypt. There are few studies, such as Hamza (2016), Alsaid and Ambilichu (2020), and Alsaid (2021) that only focused on smart cities in Egypt without focusing on particular projects, industry or context that adopted smart energy. On the other hand, there are studies that have investigated the adoption of smart energy projects in the logistics context in other countries, such as Liu et al. (2012), Pan et al. (2020), Fenton (2020), Wang (2020), and Rześny-Cieplinska and Szmelter-Jarosz (2021).

Finally, it could also be noticed that most of the previous studies have focused only on the adoption and establishment of smart energy projects inside one or more countries, without paying any attention to examining the impact of adopting those projects on other factors, as only the studies of (Noppers et al., 2016) examined the relationship between instrumental, symbolic, environmental attributes and smart energy, and the study of Fenton (2020) investigated the effect of smart energy on greenhouse gas emission and air pollution. Moreover, Pan et al. (2020) tested the effect of smart logistics on carbon emissions. Also, Bhattacharya et al. (2020) examined the effect of smart energy on six dimensions of smart sustainable city development.

Therefore, the contribution of this study is represented in linking smart energy projects and their impact on the technological progress, operation performance and green environment inside logistics companies located in Alexandria, Egypt.

Research Methodology

This study depends on positivism philosophy and deductive approach, which are suitable to the research topic. The research also depends on the quantitative design as numerical data were collected using a questionnaire that targeted employees working in supply chain departments at logistics companies in Alexandria, Egypt. The statements of the questionnaire were adopted from previous studies in order to fit the main aim of this research, so there is no need for a pilot study;

it is only a pretest to ensure that the formulation of these statements is conveying the meaning. Finally, the study depends on several techniques of data analysis: descriptive analysis, regression analysis and correlation analysis.

This study also depends on collecting primary data, through making a questionnaire that targeted employees working in supply chain departments at logistics companies in Alexandria, Egypt. To achieve this, the questionnaire was designed to be clear and unbiased, easy to understand and maintain the respondent's interest and motivation.

This questionnaire aims to measure the study variables: smart energy, technological progress, organizational performance and green environment, where they are measured through a 5-point Likert-scale. A Five-point Likert scale questionnaire is used to measure the impact of adopting smart energy inside logistics companies on technological progress, operation performance and green environment of agreement or disagreement with 20 items. These items were adapted and refined from previous studies as the Smart Energy statements were adapted from Kahma and Matschoss (2017), Technological Progress statements were adapted from Cohen and Olsen (2013), Operation Performance statements were adapted from Sylva (2020) and Green Environment statements were adopted from Yacob et al. (2019).

Therefore, data are described here using tables of frequencies, which show the number and the percentage of respondents sharing in the questionnaire under each category, as shown in Table 1. Therefore, in this section, the explanation about age, gender, and education are introduced with specific statistics obtained from the data collection approaches. In total, it shows that the total sample participated in this research is N=80.

Regarding age, it could be noticed that respondents at the age group of '30-39 years.' are the most frequently appearing, with a number of 33 respondents and a percentage of 41.3% of the sample under study. Considering the gender, the number of "Male" respondents are more frequently appearing than female ones, with a number of 46 responses and a percentage of 57.5%. In addition, regarding the education level, it was noticed that "Master's degree" was the most frequently appearing, with a number 35 responses and a percentage of 43.8%.

Table I: Descriptive Analysis for Respondents' Profile

Item	Frequency	Percent %	Total
Age			
22-29	5	6.3	80
30-39	33	41.3	
40-49	30	37.5	
50-59	10	12.5	
60 or older	2	2.5	
Gender			
Male	46	57.5	80
Female	34	42.5	
Education			
Bachelor's degree	32	40.0	80
Master's degree	35	43.8	
Professional degree	12	15.0	
Doctorate degree	1	1.3	

Research Variables and Framework

The main aim of this study is to examine the role of the use of smart energy in logistics companies in increasing technological progress, improving operation performance and leading to a green environment. Accordingly, research variables could be represented as follows:

Independent Variable: The Use of Smart Energy

Dependent Variables: Technological Progress of Corporation, Operation Performance and Green Environment

The following figure represents the framework of the research.

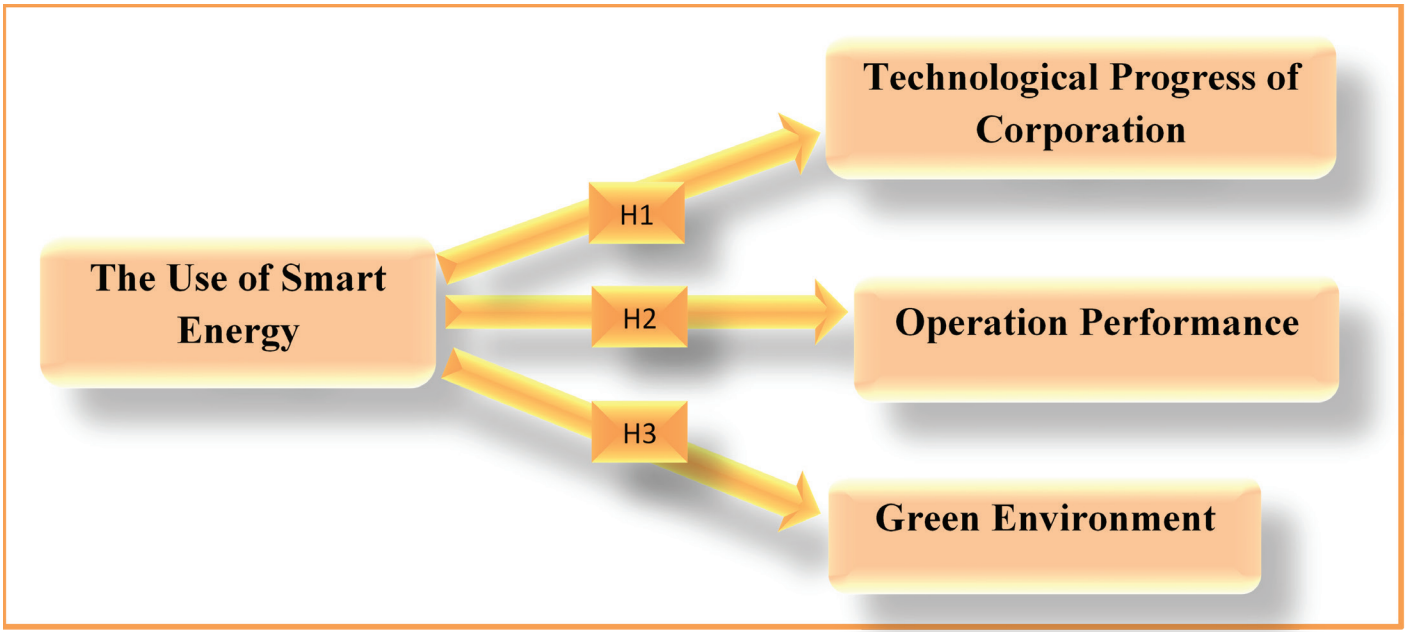

Fig. 1: Research framework

Empirical Studies and Findings

This section introduces the empirical study with the main findings and results after running the data analysis.

Data Testing for the Research Variables

In this section, the validity and reliability, discriminant validity, and confirmatory factor analysis for the statements used to measure the research variables are presented. The independent variable is Smart Energy. Additionally, the dependent variables are technological progress, operation performance and green environment.

Reliability

The reliability of the measurement model can be assessed by the Composite Reliability (CR). The measure of reliability and internal consistency of the measured variables represent a latent construct. In order to achieve the construct reliability, a value of CR ≥ 0.6 is required. From Table II, it could be observed that the values of CR for all constructs are greater than 0.60. Therefore, the composite reliability was achieved at the required level (Ahmad et al., 2016).

Table II: The Composite Reliability of the Model

Variables	Composite Reliability
Smart Energy	0.937
Technological Progress	0.936
Operation Performance	0.948
Green Environment	0.932

Descriptive Analysis

The descriptive statistics is a tool that explains and gives a distinct understanding of the features of certain data set, by giving short summaries about the respondents and how the diversification had been applied to select a representative sample for the population under study. This section is divided into two sub-sections, which are descriptive analysis for respondents' profile and descriptive analysis for the research variables.

Descriptive Analysis for the Research Variables

Table III illustrates the descriptive analysis for the research variables using the Minimum, Maximum, Mean and Standard Deviation for the research

variables. The mean value of Smart Energy is found to be 4.5500, with a standard deviation 0.63445 with minimum and maximum equal to 3.00 and 5.00, respectively. In addition, the mean value of Technological Progress is found to be 4.5875, with a standard deviation 0.60991 with minimum and maximum equal to 3.00 and 5.00, respectively. Moreover, the mean value of Operation Performance is found to be 4.5750, with a standard deviation 0.63195 with minimum and maximum equal to 3.00 and 5.00, respectively. The mean value of Green Environment is found to be 4.6375, with a standard deviation 0.57904 with minimum and maximum equal to 3.00 and 5.00, respectively.

Table III: Descriptive Analysis for Research Variables

Variables	N	Mean	Std. Deviation	Minimum	Maximum
Smart Energy	80	4.5500	.63445	3.00	5.00
Technological Progress	80	4.5875	.60991	3.00	5.00
Operation Performance	80	4.5750	.63195	3.00	5.00
Green Environment	80	4.6375	.57904	3.00	5.00

Testing the Research Hypotheses

This section tests the research hypotheses, where the study has three hypotheses that are tested using correlation and regression analysis.

Testing the Relationship between Smart Energy and Technological Progress of Corporation
This section represents the results of testing the relationship between the research variables (Smart Energy, Technological Progress of Corporation, Operation Performance and Green Environment), where the Spearman's correlation is used depending on the results of normality test in Table IV.

It could be observed that there is a significant relationship between them as P-value is less than 0.05 (P-value =0.000). Moreover, a positive relationship is proved between Smart Energy and Technological Progress, as the correlation coefficient is more than zero (r =0.744).

In addition, it could be observed that there is a significant relationship between Smart Energy and Operation Performance as P-value is less than 0.05 (P-value =0.000). Moreover, this relationship is proved to be positive, as the correlation coefficient is more than zero (r =0.698).

Moreover, it could be observed that there is a significant relationship between Smart Energy and Green Environment as P-value is less than 0.05 (P-value =0.000). In addition, this relationship is proved to be positive, as the correlation coefficient is more than 0 (r =0.677).

Table IV: Correlation Matrix between Smart Energy, Technological Progress, Operation Performance and Green Environment

		Smart Energy	Technological Progress	Operation Performance	Green Environment
Smart Energy	Corr. Coeff.	1.000	.744**	.698**	.677**
	Sig.	.	.000	.000	.000
	N	80	80	80	80
Technological Progress	Corr. Coeff.	.744**	1.000		
	Sig.	.000	.		
	N	80	80		
Operation Performance	Corr. Coeff.	.698**		1.000	
	Sig.	.000		.	
	N	80		80	
Green Environment	Corr. Coeff.	.677**			1.000
	Sig.	.000			.
	N	80			80

Table V shows the regression model of the relationship between Smart Energy and Technological Progress. It could be noticed that there is a positive significant relationship between Smart Energy and Technological Progress, as the regression coefficient is 0.665 ($\beta > 0$) and P-value is 0.000 (P-value < 0.05). Moreover, the R-square is 0.479, which means that 47.9% of the variation of the Technological Progress can be explained by the Smart Energy.

Table V: Regression Test of Smart Energy on Technological Progress

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	R-Square
	B	Std. Error	Beta			
(Constant)	1.561	.361		4.325	.000	0.479
Smart Energy	.665	.079	.692	8.463	.000	
a. Dependent Variable: Technological Progress						

According to the above results, the first hypothesis, which is "**There is a significant relationship between the use of smart energy and technological progress of corporation**" is fully supported.

Testing the Relationship between Smart Energy and Operation Performance

Table VI shows the regression model of the relationship between Smart Energy and Operation Performance. It could be noticed that there is a positive significant relationship between Smart Energy and Operation Performance, as the regression coefficient is 0.651 (**β** > 0) and P-value is 0.000 (P-value < 0.05). Moreover, the R-square is 0.427, which means that 42.7% of the variation of the Operation Performance can be explained by the Smart Energy.

Table VI: Regression Test of Smart Energy on Operation Performance

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	R-Square
	B	Std. Error	Beta			
(Constant)	1.613	.392		4.114	.000	0.427
Smart Energy	.651	.085	.654	7.625	.000	
a. Dependent Variable: Operation Performance						

According to the above results, the second hypothesis, which is "**There is a significant relationship between the use of smart energy and operation performance**" is fully supported.

Testing the Relationship between Smart Energy and Green Environment

Table VII shows the regression model of the relationship between Smart Energy and Green Environment. It could be noticed that there is a positive significant relationship between Smart Energy and Green Environment, as the regression coefficient is 0.596 (**β** > 0) and P-value is 0.000 (P-value < 0.05). Moreover, the R-square is 0.426, which means that 42.6% of the variation of the Green Environment can be explained by the Smart Energy.

Table VII: Regression Test of Smart Energy on Green Environment

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	R-Square
	B	Std. Error	Beta			
(Constant)	1.926	.360		5.357	.000	0.426
Smart Energy	.596	.078	.653	7.614	.000	
a. Dependent Variable: Green Environment						

According to the above results, the third hypothesis, which is "**There is a significant relationship between the use of smart energy and green environment**" is fully supported.

Table VIII shows the SEM analysis of the impact of the Smart Energy on Technological Progress, Operation Performance, and Green Environment. It could be noticed that there is a positive significant effect of Smart Energy on Technological Progress, as the estimate coefficient is 0.754 (**β** > 0) and P-value is 0.000 (P-value < 0.05).

Moreover, the R-square is 0.549, which means that 54.9% of the variation of the Technological Progress can be explained by the Smart Energy.

Also, it could be noticed that there is a positive significant effect of Smart Energy on Operation Performance, as the estimate coefficient is 0.717 (**β** > 0) and P-value is 0.000 (P-value < 0.05). Moreover, the R-square is 0.480, which means that 48% of the variation of the Operation Performance can be explained by the Smart Energy.

Finally, it could be noticed that there is a positive significant effect of Smart Energy on Green Environment, as the estimate coefficient is 0.749 (**β** > 0) and P-value is 0.000 (P-value < 0.05). Moreover, the R-square is 0.558, which means that 55.8% of the variation of the Green Environment can be explained by the Smart Energy.

Table VIII: SEM Analysis for the Research Model

			Estimate	P	R^2
Technological Progress	<---	Smart Energy	.754	***	.549
Operation Performance	<---	Smart Energy	.717	***	.480
Green Environment	<---	Smart Energy	.749	***	.558

The model fit indices CMIN/DF = 1.180, GFI = 0.818, CFI = 0.981, AGFI= 0.772, and RMSEA = 0.048 are all within their acceptable levels. The SEM model conducted for the effect of the Smart Energy on Technological Progress, Operation Performance, and Green Environment is illustrated in Figure 2.

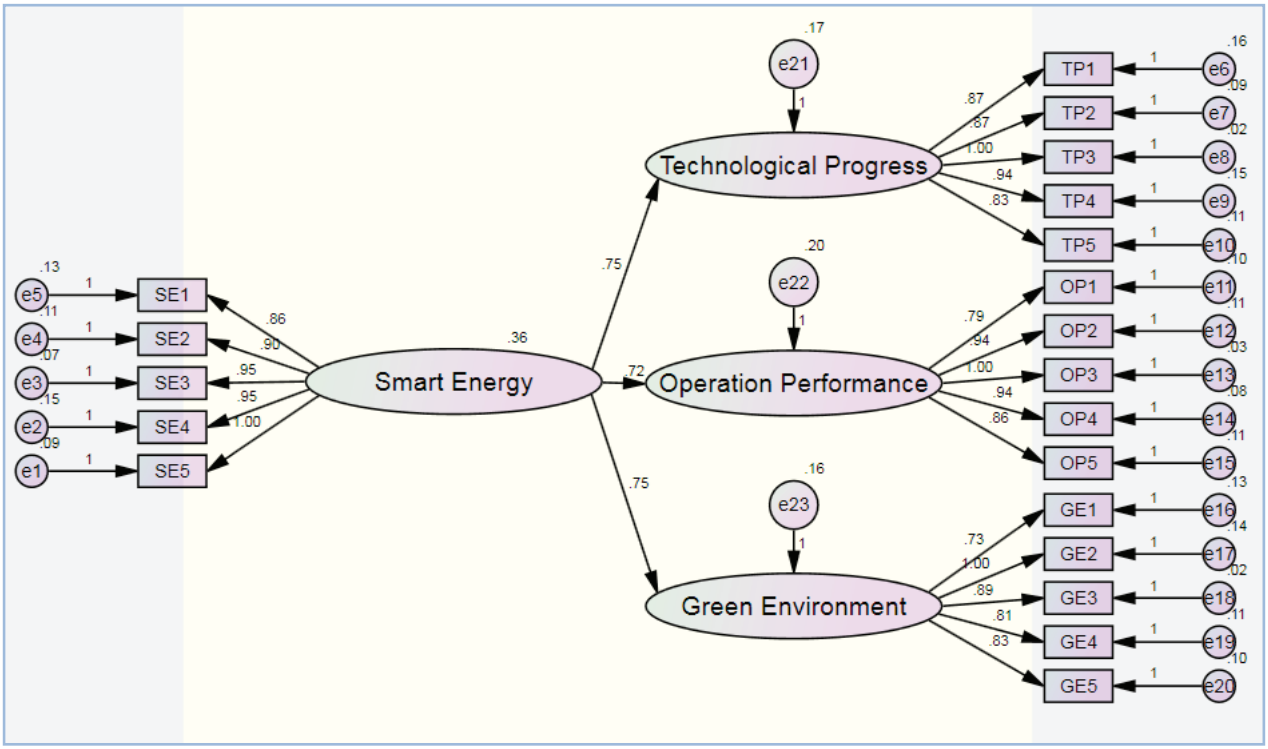

Fig. 2: SEM for the research model

Validity

This section presents the validity, discriminant validity, and confirmatory factor analysis for the statements used to measure the research variables. The independent variable is Smart Energy. Additionally, the dependent variables are technological progress, operation performance and green environment.

Convergent Validity

The convergent validity of the measurement model can be assessed by the Average Variance Extracted (AVE). Moreover, the AVE measures the level of variance captured by a construct versus the level due to measurement error; values above 0.7 are considered very good, whereas the level of 0.5 is acceptable (Ahmad et al., 2016). From Table 9, it could be observed that the value of AVE for all constructs are greater than 0.70. The required level was achieved (Ghadi et al., 2012).

Table IX: Convergent Validity of the Measurement Model

Variables	AVE
Smart Energy	0.747
Technological Progress	0.747
Operation Performance	0.785
Green Environment	0.735

Discriminant Validity

It is computed by comparing the square root of AVE values of each construct with the correlations between such construct and other constructs. Acceptable discriminant validity is achieved when the square root of AVE values of the construct is greater than the correlations between such construct and other constructs. Table X shows the discriminant validity of the

research variables, where it could be observed that all square roots of AVE values are greater than the correlations between the corresponding construct and other constructs (Zait and Bertea, 2011).

Table X Discriminant Validity of the Research Variables

	1.	2.	3.	4.
1. Smart Energy	**(0.865)**			
2. Technological Progress	.692**	**(0.864)**		
3. Operation Performance	.654**	.590**	**(0.886)**	
4. Green Environment	.653**	.611**	.542**	**(0.857)**

Confirmatory Factor Analysis

Confirmatory Factor Analysis (CFA) is a required step to confirm the factor structure extracted by the researcher as a measurement scale for each dimension before launching the structural equation modelling (SEM). AMOS 24 program was used, and ML method was applied to show the factor loading for each variable and their model fit (Marsh et al., 2014). Regarding the CFA using the covariance method, it had been illustrated using Figure 3 and the results had been shown as follows:

The model fit of the confirmatory factor analysis was computed, where it was found that the minimum discrepancy or chi-square divided by the degrees of freedom (CMIN/DF) was 1.162; the probability of getting as larger discrepancy as occurred with the present sample (p-value) was 0.000; goodness of fit (GFI) was 0.823; adjusted goodness of fit index (AGFI) was 0.774 – that evaluated the fit of the model versus the number of estimate coefficients or the degrees of freedom needed to achieve that level of fit; the Bentler-Bonett normed fit index (NFI) was 0.891, and the Tucker-Lewis index or Bentler-Bonett non-normed fit index (TLI) was 0.980 – which assesses the incremental fit of the model compared to a null model; the comparative fit index (CFI) was 0.983.

Also, the root mean square residual (RMR) was 0.018 – which shows the amount by which the sample's variances and covariances differ from their estimates obtained under the assumption that the model is correct; the root mean square of approximation (RMSEA) was 0.045 – which is an informative criterion in covariance structure modelling and measures the amount of error present when attempting to estimate the population (Hair et al., 2016). Table XI shows these indicators' value in CFA and the recommended values for them.

Table XI: Fit Indices and Thresholds for Measurement Model

Measure	Results	Threshold
Chi-square/df	1.162	< 2 excellent; < 3 good; < 5 sometimes permissible
P-value	0.000	> 0.05
GFI	0.823	> 0.80
AGFI	0.774	> 0.80
NFI	0.891	> 0.80
TLI	0.980	> 0.85
CFI	0.983	> 0.80
RMR	0.018	< 0.09
RMSEA	0.045	< 0.10

Figure 3 shows the confirmatory factor analysis applied, where the factor loadings are shown on arrows implying good factor loadings (Factor Loadings > 0.4) for the confirmatory factor analysis. These factor loadings are shown in numbers using Table XII.

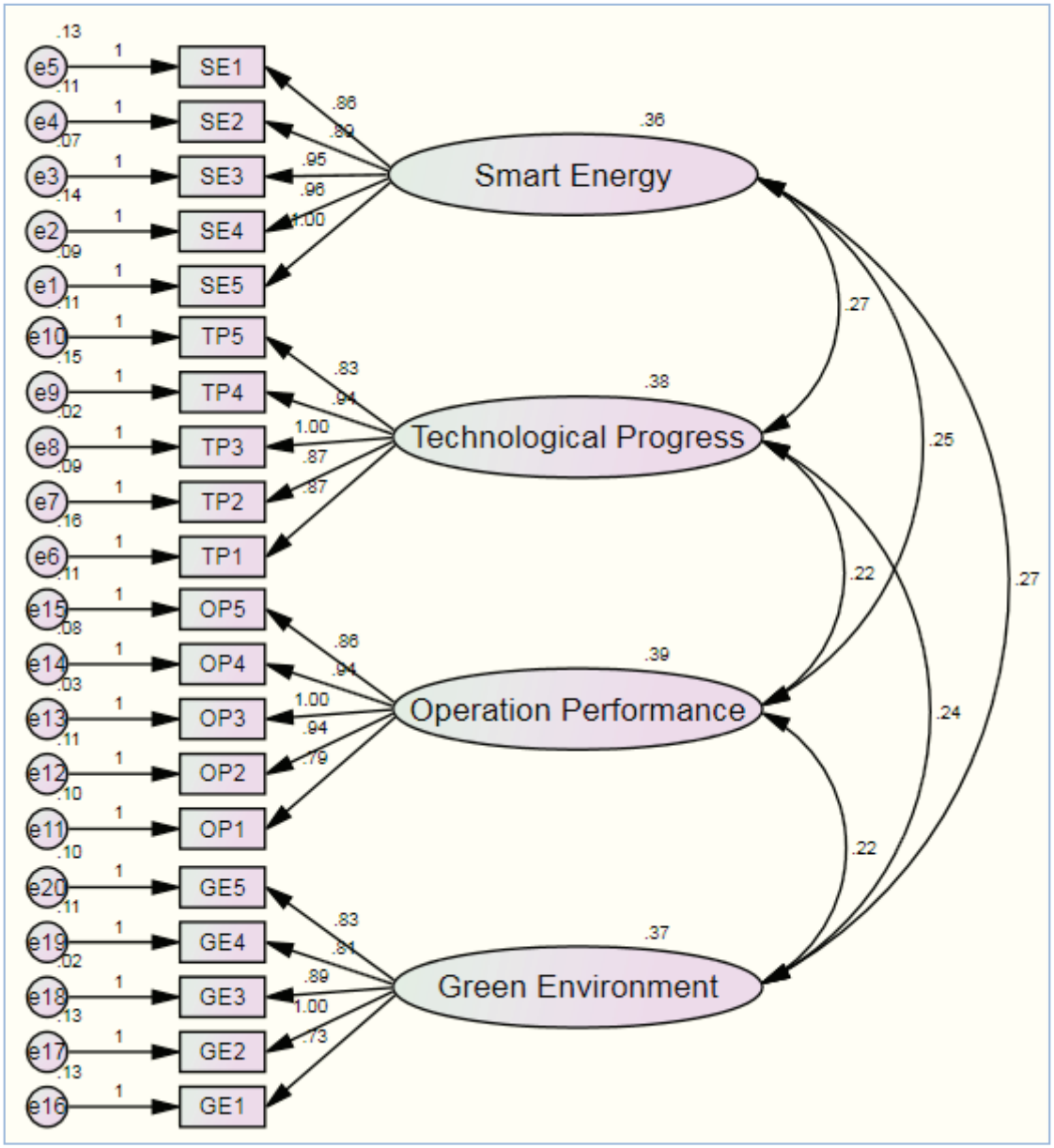

Fig. 3: CFA for the measurement model

Table XII shows that all factor loadings (FL), which represent the size of the loadings of items on their corresponding variables, are greater than or equal to 0.40, implying the fact that the constructs under study have adequate validity. Also, all the P-values are less than 0.05, showing the significance of the corresponding statements to their constructs.

Table XII : Factor loadings (FL)

			Estimate	S.E.	C.R.	P
SE5	<---	Smart Energy	1.000			
SE4	<---	Smart Energy	.955	.091	10.459	***
SE3	<---	Smart Energy	.953	.075	12.681	***
SE2	<---	Smart Energy	.892	.082	10.879	***
SE1	<---	Smart Energy	.862	.085	10.112	***

TP1	<---	Technological Progress	.871	.080	10.837	***
TP2	<---	Technological Progress	.872	.062	13.994	***
TP3	<---	Technological Progress	1.000			
TP4	<---	Technological Progress	.935	.078	12.068	***
TP5	<---	Technological Progress	.831	.068	12.138	***
OP1	<---	Operation Performance	.792	.066	12.035	***
OP2	<---	Operation Performance	.939	.070	13.460	***
OP3	<---	Operation Performance	1.000			
OP4	<---	Operation Performance	.944	.062	15.245	***
OP5	<---	Operation Performance	.863	.069	12.532	***
GE1	<---	Green Environment	.727	.085	8.540	***
GE2	<---	Green Environment	1.000			
GE3	<---	Green Environment	.886	.069	12.854	***
GE4	<---	Green Environment	.806	.085	9.542	***
GE5	<---	Green Environment	.829	.083	9.998	***

Research Discussion and Conclusion

This study aims to investigate the role of the use of smart energy in logistics companies to increase technological progress, improve operation performance and lead to green environment. Therefore, this research has three main hypotheses: the first hypothesis, there is a significant relationship between the use of smart energy and technological progress of corporation; the second hypothesis, there is a significant relationship between the use of smart energy and operation performance, and the third hypothesis, there is a significant relationship between the use of smart energy and green environment.

H_1: There is a significant relationship between the Use of Smart Energy and Technological Progress of Corporation

The correlation matrix for the relationship between the use of smart energy and technological progress of corporation proved a significant relationship between them, where P-value is less than 0.05. It is also proved that there is a positive relationship between them, as the correlation coefficient is more than 0.

The regression model for the relationship between the use of smart energy and technological progress of corporation showed that there is a positive significant relationship between them, as the regression coefficients are more than 0 and P-values are less than 0.000.

These results are consistent with some previous studies such as, Ferreira et al., (2014), Connolly

et al. (2016), Vijai and Sivakumar (2016), Biresselioglu et al. (2018), and Wang et al. (2019). Therefore, according to the above results, the first hypothesis, which is "**There is a significant relationship between the use of smart energy and technological progress of corporation**" is fully supported.

H_2: There is a significant relationship between the Use of Smart Energy and Operation Performance

The correlation matrix for the relationship between the use of smart energy and operation performance proved a significant relationship between them, where P-value is less than 0.05. It also proved a positive relationship between them, as the correlation coefficient is more than 0.

The regression model for the relationship between the use of smart energy and operation performance showed that there is a positive significant relationship between them as the regression coefficients are more than 0 and P-values are less than 0.000.

These results are consistent with some previous studies, such as Noppers et al. (2016), Chasin et al. (2020), Bhattacharya et al. (2020), and Liang et al. (2020). Therefore, according to the above results, the first hypothesis, which is "**There is a significant relationship between the use of smart energy and operation performance**" is fully supported.

H_3: There is a significant relationship between the Use of Smart Energy and Green Environment

The correlation matrix for the relationship between the use of smart energy and green environment proved a significant relation between them, where P-value is less than 0.05. It also proved a positive relationship between them, as the correlation coefficient is more than 0.

The regression model for the relationship between the use of smart energy and green environment showed that there is a positive significant relationship between them as the regression coefficients are more than 0 and P-values are less than 0.000.

These results are consistent with some previous studies, such as Liu et al. (2012), Pan et al. (2020), Shi et al. (2020), Fenton (2020), and Zhu et al. (2021). Therefore, according to the above results, the first hypothesis, which is "**There is a significant relationship between the use of smart energy and green environment**" is fully supported.

Accordingly, the study provides some recommendations to the decision makers. It is recommended to depend on the corporation between both of the private and the public sector regarding the adoption and the application of smart energy projects. This step will help in establishing big projects of smart energy that is characterized by its high costs as well as it enables better risk sharing. The researcher also recommends the government to increase the awareness of the importance of replacing traditional energy with smart one through making awareness campaigns as well as facilitating obtaining loans that are needed for smart energy projects.

Additionally, the research recommends that logistics companies should rely on the adoption of smart energy projects in their industry, which helps them to improve their performance and increase their efficiency. However, these projects need to be well planned and established so that companies can implement them effectively and with the lowest costs.

Secondly, it is recommended that future research studies investigate the impact of the independent variable, which is smart energy, on the dependent ones, which are technological progress, operation performance and green environment, as prior studies only focus on examining the smart energy projects or cities without testing their influence on other dimensions.

Furthermore, the researcher also recommends that the future research add new dependent variables to the framework in order to see whether smart energy has an effect on them, as well as searching for other variables that could affect the efficiency of the projects of smart energy.

Finally, as any other research study, this research has many limitations. First, the limitation of the sampling as the study sample was a random sample of 80 employees working at supply chain department at logistics companies located in Alexandria, Egypt. Therefore, the researcher suggests increasing the sample size and conducting more research on the logistics industry, in order to see whether the results of this study can be generalized inside this sector.
The researcher also suggests making other studies on different sectors to see whether the same results can be reached.
The study also limited its research on Egypt as there is a lack in studies that took Egypt as a case study. Therefore, the researcher suggests conducting more studies in Egypt. The researcher also recommends making comparative studies between Egypt and other developing countries. The study also had a limitation regarding the timing, as the data collected for the study include a limited duration of time, so the study recommends for the future research to include a wider period of time. Finally, the research suggests for the future research to include more variables that may be affected by smart energy, as well as to try to examine factors that could affect the adoption and usage of smart energy.

Appendix 1

This questionnaire aims to measure the study dimensions; smart energy, technological progress, organizational performance and green environment, where they are measured through a 5-point Likert-scale, which shown as follows:

Table XIV : Research Variable Operationalization

Variables	Statements	References
Smart Energy	1. Is smart energy usage considered as a cost reductive than the usage of traditional resources?	**Kahma and Matschoss (2017)**
	2. Does your company maintain the electricity displays at the real time in order to monitor the consumption of energy?	
	3. Does your company maintain and install the electricity guiding equipment (technical equipment)?	
	4. Do services for the purchase or installment of equipment lead to energy saving (as heat pumps)?	
	5. Does your company utilize services related to micro-production technology for energy production (such as solar panels or small-scale wind power plants)?	

Technological progress	1. Does your company use standard technical systems?	**Cohen and Olsen (2013)**
	2. Does your company use scalable technology systems?	
	3. Does your company deal with multiple technological applications?	
	4. Does your company use agreed standard technology systems?	
	5. Does your company have high degree of application integration?	
Operation Performance	1. Does your company provide service that is clean and pleasant?	**Sylva (2020)**
	2. Do the employees handle complaints quickly and effectively?	
	3. Does your company have an effective supply chain network?	
	4. Is your company ahead of its competitors in the introduction of new services offerings?	
	5. Do-the adopted technologies in your company harm the environment?	
Green environment	1. Does your company follow certain environmental criteria before offering any service?	**Yacob et al. (2019)**
	2. Are the provided services designed in a way that minimizes the harmful impact on the environment?	

References

[1] Ahmad, S., Zulkurnain, N. and Khairushalimi, F. (2016) "Assessing the Validity and Reliability of a Measurement Model in Structural Equation Modeling (SEM)," British Journal of Mathematics & Computer Science, 15(3). Available at: https://doi.org/10.9734/bjmcs/2016/25183.

[2] Alsaid, L.A.Z.A. (2021) "Performance measurement in smart city governance: a case study of an Egyptian city council," Journal of Accounting in Emerging Economies, 11(3). Available at: https://doi.org/10.1108/JAEE-09-2020-0244.

[3] Alsaid, L.A.Z.A. and Ambilichu, C.A. (2021) "The influence of institutional pressures on the implementation of a performance measurement system in an Egyptian social enterprise," Qualitative Research in Accounting and Management, 18(1). Available at: https://doi.org/10.1108/QRAM-03-2020-0027.

[4] Bahgat, G. (2013) "Egypt's energy outlook: Opportunities and challenges," Mediterranean Quarterly, 24(1). Available at: https://doi.org/10.1215/10474552-1895367.

[5] Barossi-Filho, M., Silva, R.G. and Diniz, E.M. (2005) "The Empirics of the Solow Growth Model: Long-Term Evidence," Journal of Applied Economics, 8(1). Available at: https://doi.org/10.1080/15140326.2005.12040617.

[6] Barro, R.J. and Sala, X.I.M. (1992) "Public Finance in Models of Economic Growth," Review of Economic Studies, 59(4). Available at: https://doi.org/10.2307/2297991.

[7] Bhattacharya, T.R. et al. (2020) "Sustainable smart city development framework for developing countries," Urban Research and Practice, 13(2). Available at: https://doi.org/10.1080/17535069.2018.1537003.

[8] Biresselioglu, M.E. et al. (2018) "Examining

the barriers and motivators affecting European decision-makers in the development of smart and green energy technologies," Journal of Cleaner Production. Available at: https://doi.org/10.1016/j.jclepro.2018.06.308.

[9] Chasin, F. et al. (2020) "Smart energy driven business model innovation: An analysis of existing business models and implications for business model change in the energy sector," Journal of Cleaner Production, 269. Available at: https://doi.org/10.1016/j.jclepro.2020.122083.

[10] Chavez, R. et al. (2016) "The Effect of Customer-Centric Green Supply Chain Management on Operational Performance and Customer Satisfaction," Business Strategy and the Environment, 25(3). Available at: https://doi.org/10.1002/bse.1868.

[11] Cohen, J.F. and Olsen, K. (2013) "The impacts of complementary information technology resources on the service-profit chain and competitive performance of South African hospitality firms," International Journal of Hospitality Management, 34(1). Available at: https://doi.org/10.1016/j.ijhm.2013.04.005.

[12] Connolly, D., Lund, H. and Mathiesen, B. v. (2016) "Smart Energy Europe: The technical and economic impact of one potential 100% renewable energy scenario for the European Union," Renewable and Sustainable Energy Reviews. Available at: https://doi.org/10.1016/j.rser.2016.02.025.

[13] Dincer, I. and Acar, C. (2018) "Smart energy solutions with hydrogen options," International Journal of Hydrogen Energy, 43(18). Available at: https://doi.org/10.1016/j.ijhydene.2018.03.120.

[14] Dryjanski, M. et al. (2020) "Adoption of Smart Cities with a Practical Smart Building Implementation," IEEE Internet of Things Magazine, 3(1). Available at: https://doi.org/10.1109/iotm.0001.1900050.

[15] Farmer, J.D. and Lafond, F. (2016) "How predictable is technological progress?," Research Policy, 45(3). Available at: https://doi.org/10.1016/j.respol.2015.11.001.

[16] Fenton, P. (2020) "Port-City Redevelopment and Sustainable Development," in. Available at: https://doi.org/10.1007/978-3-030-36464-9_2.

[17] Fernando, Y., Chiappetta Jabbour, C.J. and Wah, W.X. (2019) "Pursuing green growth in technology firms through the connections between environmental innovation and sustainable business performance: Does service capability matter?," Resources, Conservation and Recycling, 141. Available at: https://doi.org/10.1016/j.resconrec.2018.09.031.

[18] Ferreira, A., Leitao, P. and Vrba, P. (2014) "Challenges of ICT and artificial intelligence in smart grids," in Proceedings - 2014 IEEE International Workshop on Intelligent Energy Systems, IWIES 2014. Available at: https://doi.org/10.1109/IWIES.2014.6957039.

[19] Gellings, C.W. (2020) The Smart Grid: Enabling Energy Efficiency and Demand Response, The Smart Grid: Enabling Energy Efficiency and Demand Response. Available at: https://doi.org/10.1201/9781003151524.

[20] Ghadi, I. et al. (2012) "Construct Validity Examination of Critical Thinking Dispositions for Undergraduate Students in University Putra Malaysia," Higher Education Studies, 2(2). Available at: https://doi.org/10.5539/hes.v2n2p138.

[21] Gil-Garcia, J.R. and Aldama-Nalda, A. (2013) "Smart city initiatives and the policy context: The case of the rapid business opening office in Mexico city," in ACM International Conference Proceeding Series. Available at: https://doi.org/10.1145/2591888.2591931.

[22] Gil-Garcia, J.R., Pardo, T.A. and Nam, T. (2016) Smarter as the New Urban Agenda: A Comprehensive View of the 21st Century City, Computer Law & Security Review.

[23] Gondal, I.A. (2019) "Hydrogen integration in power-to-gas networks," International Journal of Hydrogen Energy, 44(3). Available at: https://doi.org/10.1016/j.ijhydene.2018.11.164.

[24] Hamza, K. (2016) "Smart City Implementation Framework for Developing Countries: The Case of Egypt," in Public Administration and Information Technology. Available at: https://doi.org/10.1007/978-3-319-17620-8_9.

[25] Ibrahim, A. (2012) "Renewable energy sources in the Egyptian electricity market: A review," Renewable and Sustainable Energy Reviews. Available at: https://doi.org/10.1016/j.rser.2011.07.149.

[26] Kahma, N. and Matschoss, K. (2017) "The rejection of innovations? Rethinking technology diffusion and the non-use of smart energy services in Finland," Energy Research and Social Science, 34. Available at: https://doi.org/10.1016/j.erss.2017.05.024.

[27] Liang, X. et al. (2020) "Development of smart energy towns in China: Concept and practices," Renewable and Sustainable Energy Reviews, 119. Available at: https://doi.org/10.1016/j.rser.2019.109507.

[28] Liu, W. et al. (2012) "Transition to a low-carbon city: Lessons learned from Suzhou in China," Frontiers of Environmental Science and Engineering in China, 6(3). Available at: https://doi.org/10.1007/s11783-011-0338-y.

[29] Lund, H. et al. (2017) "Smart energy and smart energy systems," Energy. Available at: https://doi.org/10.1016/j.energy.2017.05.123.

[30] Macke, J. et al. (2018) "Smart city and quality of life: Citizens' perception in a Brazilian case study," Journal of Cleaner Production, 182. Available at: https://doi.org/10.1016/j.jclepro.2018.02.078.

[31] Mankiw Gregory, N., Romer, D. and Weil, D.N. (1992) "A contribution to the empirics of economic growth," Quarterly Journal of Economics, 107(2). Available at: https://doi.org/10.2307/2118477.

[32] Marsh, H.W. et al. (2014) "Exploratory structural equation modeling: An integration of the best features of exploratory and confirmatory factor analysis," Annual Review of Clinical Psychology. Available at: https://doi.org/10.1146/annurev-clinpsy-032813-153700.

[33] Moldan, B., Janoušková, S. and Hák, T. (2012) "How to understand and measure environmental sustainability: Indicators and targets," Ecological Indicators, 17. Available at: https://doi.org/10.1016/j.ecolind.2011.04.033.

[34] Morelli, J. (2011) "Environmental Sustainability: A Definition for Environmental Professionals," Journal of Environmental Sustainability, 1(1). Available at: https://doi.org/10.14448/jes.01.0002.

[35] Nishant, R., Kennedy, M. and Corbett, J. (2020) "Artificial intelligence for sustainability: Challenges, opportunities, and a research agenda," International Journal of Information Management, 53. Available at: https://doi.org/10.1016/j.ijinfomgt.2020.102104.

[36] Noppers, E.H. et al. (2016) "The importance of instrumental, symbolic, and environmental attributes for the adoption of smart energy systems," Energy Policy, 98. Available at: https://doi.org/10.1016/j.enpol.2016.08.007.

[37] Omer, A.M. (2008) "Energy, environment and sustainable development," Renewable and Sustainable Energy Reviews. Available at: https://doi.org/10.1016/j.rser.2007.05.001.

[38] Pan, X. et al. (2020) "The effects of a Smart Logistics policy on carbon emissions in China: A difference-in-differences analysis," Transportation Research Part E: Logistics and Transportation Review, 137. Available at: https://doi.org/10.1016/j.tre.2020.101939.

[39] Quijano-Sánchez, L. et al. (2020) "Recommender systems for smart cities," Information Systems. Available at: https://doi.org/10.1016/j.is.2020.101545.

[40] Ranjit, K. (2019) "Research Methodology: A Step-by-Step Guide for Beginners - Ranjit Kumar - Google Books," Sage [Preprint].

[41] Rześny-Cieplińska, J. and Szmelter-Jarosz, A. (2021) "Stakeholders' analysis of environmental sustainability in urban logistics: A case study of tricity, Poland," Energies, 14(5). Available at: https://doi.org/10.3390/en14051274.

[42] Shi, C., Feng, X. and Jin, Z. (2022) "Sustainable development of China's smart energy industry based on artificial intelligence and low-carbon economy," Energy Science and Engineering, 10(1). Available at: https://doi.org/10.1002/ese3.856.

[43] Singh, A., Triulzi, G. and Magee, C.L. (2021) "Technological improvement rate predictions for all technologies: Use of patent data and an extended domain description," Research Policy, 50(9). Available at: https://doi.org/10.1016/j.respol.2021.104294.

[44] Slavova, M. and Okwechime, E. (2016) "African Smart Cities Strategies for Agenda 2063," Africa Journal of Management, 2(2). Available at: https://doi.org/10.1080/23322373.2016.1175266.

[45] Sylva, W. (2020) "Dimensionality and validity of the operational performance construct in the aviation industry: a factor analytic approach," Pressacademia, 7(4). Available at: https://doi.org/10.17261/pressacademia.2020.1326.

[46] Tan, S.Y. and Taeihagh, A. (2020) "Smart city governance in developing countries: A systematic literature review," Sustainability (Switzerland), 12(3). Available at: https://doi.org/10.3390/su12030899.

[47] Tekin Bilbil, E. (2017) "The Operationalizing Aspects of Smart Cities: the Case of Turkey's Smart Strategies," Journal of the Knowledge Economy, 8(3). Available at: https://doi.org/10.1007/s13132-016-0423-3.

[48] Vijai, P. and Sivakumar, P.B. (2016) "Design of IoT Systems and Analytics in the Context of Smart City Initiatives in India," in Procedia Computer Science. Available at: https://doi.org/10.1016/j.procs.2016.07.386.

[49] Wang, L. (2020) "Development of China's Logistics Industry During 40 Years of Reform and Opening-Up: Achievements, Thrusts, and Outlook," in. Available at: https://doi.org/10.1007/978-981-15-6945-6_1.

[50] Wang, Z. et al. (2019) "A review of smart energy and integrated energy service business model," in Applied Energy Symposium 2019: Low carbon cities and urban energy systems, pp. 1–6.

[51] Yacob, P., Wong, L.S. and Khor, S.C. (2019) "An empirical investigation of green initiatives and environmental sustainability for manufacturing SMEs," Journal of Manufacturing Technology Management, 30(1). Available at: https://doi.org/10.1108/JMTM-08-2017-0153.

[52] Zait, A. and Bertea, P.S.P.E. (2011) "Methods for testing discriminant validity," Management & Marketing Journal, 9(2), pp. 217–224.

[53] Zhu, H. et al. (2022) "Key technologies for smart energy systems: Recent developments, challenges, and research opportunities in the context of carbon neutrality," Journal of Cleaner Production. Available at: https://doi.org/10.1016/j.jclepro.2021.129809.

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.024

The Impact of the Covid-19 Pandemic on Teleworking and the Logistics of Work in Egypt

Mike Leat
Plymouth University, Plymouth, UK
Mike.leat@plymouth.ac.uk

Ghada El-Kot
Arab Academy for Science, Technology and Maritime Transport, Egypt
gelkot@aast.edu

Received on: 13 March 2022 Accepted on: 10 May 2022 Published on: 20 June 2022

Abstract

Purpose: *The aim of this paper is to investigate the impact of the Covid-19 pandemic on the implementation of teleworking and other flexible work practices, and the logistics of work in Egypt.*

Design Methodology/approach: *A review of relevant literature and a survey were conducted. Survey data were collected from a purposive sample of women working in professional and managerial roles in Alexandria and Cairo. The data were collected online between March and May in 2021. The questionnaire was in English. A sample of 1089 employees participated in the study. Data were collected on the perceived impact of the Covid-19 pandemic on employing organizations implementation of teleworking, other flexible work practices and childcare provision. A range of demographic and employing organization data was collected. Paired comparison and T-test analysis were employed in this study.*

Findings: *The survey results indicated that before Covid-19 implementation of flexible working policies, workplace childcare and childcare allowances were limited. However, Covid-19 is significant in explaining marked increases in the implementation of all flexible working policies and across all organisational ownership types and size groupings, this is not the case for the policies on childcare where there has been little change to rates of affirmation of implementation. Ownership type and organisational size were also significant in explaining some of the variations in rates of perceived implementation both before and after the pandemic.*

Research implication/limitation: *The study has limitations in terms of the sample being limited to women working in professional and managerial roles in Alexandria and Cairo, the results are therefore not generalisable. Nevertheless, it provides evidence of and confirms the significant influence of Covid-19 on the incidence of teleworking and other flexible work practices in Egypt. Research is needed to investigate this impact amongst a wider population. Research should also establish employee and employer perceptions of success, satisfaction with the arrangements, the logistics of work in this new environment and plans for the future.*

Employers in Egypt had adopted similar responses to the pandemic as others in many parts of the world in that Teleworking, WFH and flexitime had all been used to enable continuity of business activity during the pandemic. Greater flexibility in working hours had also been implemented through greater provision of opportunities for reduced hours and part-time working, possibly to cope with reduced levels of activity, as an alternative to laying staff off and as a means of enabling staff to cope with new realities in terms of a blurring of boundaries between work and home life and the demands imposed by children and other family responsibilities.

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.024

Practical implication/limitation: *What the authors have witnessed in Egypt as in many other countries is teleworking, WFH and flexibility as transformation in response to crisis, the test is to see whether these new modes of working would endure once the pandemic is over and whether the lessons learnt are utilised to inform and cultivate the future of work. There are some obvious challenges here for the Egyptian business, both in terms of the logistics of ensuring appropriate technical and environmental infrastructure and equipment for employees, but also clearly in transforming management structures, systems, mind-sets and organisational cultures.*

Originality: *There is little evidence of the extent of teleworking and other modes of flexible working and employer childcare provision in Egypt. The survey results reported here constitute important initial findings on the impact of the pandemic on employee perceptions of their employers' implementation of flexible work and childcare policies, both before and after the Covid-19 pandemic and in organisations varying by ownership and size.*

Keywords: *HRM policies and Practices, Covid-19, Teleworking, Logistics of work, SDG, Egypt.*

Introduction

Background to Covid-19 and its impacts

The Covid-19 pandemic with lockdowns, forced closures, social distancing, business, social uncertainty and anxiety has had a profound effect upon the way in which work is organised and the way in which it is conducted. Working lives have in many cases been permanently altered and new roles and demands have been imposed upon organisations, managers and supervisors and of course employees. This has inevitably had significant implications for the organisation and logistics of work.

As Robben (2021) asserts employers and employees were forced to adapt to a virtual-first way of working to rapidly adopt digital tools and Work From Home (WFH) solutions but with question marks around the quality of implementation.

The OECD (2020) and Hamouche (2021) among many others; (for example Aitken-Fox et al. (2020a, 2020b); Gourinchas (2020) and Koirala & Acharya (2020) identify the pandemic inspired imperative for many businesses and employees to adopt teleworking, remote and WFH practices whether they had embraced these practices in the past or not. For many, these were very new experiences for which many were unprepared. The OECD refers to societies, business and employees effectively undergoing forced experiments. New demands were made in terms of technological, legal and digital security conditions.

The detachment of work from place enabled by technology and identified as a growing trend by Felstead and Henseke (2017) was given massive impetus by the requirements of and responses to the pandemic and the authors have witnessed a very rapid development of both the Digital workplace and the Digital workforce. It would seem likely that many organisations will be enhancing their investment in Digital transformation as a result of the pandemic.

While the authors are unaware of any statistics on the extent of teleworking in Egypt either before or as a result of the pandemic many employees were effectively prevented from attending their offices after March 2020 and many of these continued to work remotely. The survey results reported later also confirm a significant increase in employing organisations implementing remote and other flexible working arrangements.

However, Teleworking is not a universal possibility, many businesses and employees are unable to take advantage of and utilise these opportunities. Many jobs require physical presence and proximity and the OECD (2020) identifies the possibility that differential opportunities to use teleworking

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.024

may exacerbate existing inequalities given that young, less educated workers at the bottom of the wage distribution are much more likely to be working in jobs requiring this physical presence.

While noting that the potential for the Pandemic prompted positive and exciting innovations to the organisation and conduct of work, the ILO (2020) also noted that millions of workers either had or were in danger of losing their jobs and their livelihoods and that these impacts were falling disproportionately on those already in vulnerable and precarious positions, women and young people, and small businesses.

It is important to note that responses to the pandemic included other forms of flexible working, reduced hours, part time working, and temporary layoff or furlough were mechanisms used to counter the impact of the pandemic and obviate the need for organisations to dismiss employees in the face of the disruption to normal business caused by for example lockdowns, forced closures and the need to move activities online.

The pandemic has highlighted the failure of many businesses to have appropriate contingency plans (for example; Belzunegui-Eraso,2020) has placed enormous focus on the need for business to develop resilience. For many; the use of teleworking as a go-to contingency to enable continuing operation was an indicator of this failure to plan.

The pandemic has also highlighted the issue of health and well-being at work and the logistics of work in the context of a need to socially distance, sanitise and protect from infection. Once again teleworking was perceived by many businesses as a solution for these health and well-being issues, to some extent obviating the need for organisations to address the issues associated with physical presence and proximity but which imposed often new and additional logistical issues for organisations and employees.

In this article we focus on the impact of the Covid-19 pandemic on the implementation of teleworking, other flexible work practices and the logistics of work.

Teleworking

There is no one definition of teleworking but it is generally accepted to involve the use of information and communication technologies such as smartphones, tablets, laptops, and/or desktop computers, for work that is performed outside the employer's premises. So it implies a separation of work from an employer's workplace, and the use of ICT to enable and support this remote working. As ACAS (2005: p.24) note; "teleworking permits employees to spend all or part of their working week at a location remote from employers' workplaces", and Aboelmaged and El Subbaugh (2012: p.4) suggest, "teleworking can be defined as accomplishing work-related tasks from a different site that is remote from the traditional office on a periodical or exclusive basis via the support of ICT".

There are a number of different categories or modalities of teleworking which include home working, mobile working such as salesmen or truck or delivery drivers, and working from other shared facilities outside the office and the home. Teleworking can also be regular or occasional and irregular, partial, for example so many days a week but not fulltime, and permanent or temporary. The response to the pandemic involved many workers being required to work remotely at home using information and communication technologies on a regular full time basis.

However, as the impact and severity of the pandemic eases, many organisations have required or have provided the opportunity for their employees to return to the business workplace either full time or partially. Others have seen advantages from teleworking which encourage them to continue the practice; for example, as a strategy of infrastructure cost reduction to reduce contamination related to mobility or to generate a favourable climate for combining and integrating work and family life. It is clear that there is a range

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.024

of hybrid options of remote and non-remote being utilised by organisations to suit their own circumstances, culture and preferences. These can range along a continuum from almost entirely off premises to almost entirely on premises with many combinations of partial remote and partial on premises in between. So, for example; Chargebee is adopting a fully remote model, Codility is going mostly remote but with hybrid hubs and sponsored workspaces, and TomTom has given employees the choice of working in a company office or home office. Whereas the famous Goldman Sachs and Barclays have both indicated a desire to get their employees back on company premises with little; if any, remote and teleworking. What does seem to be clear is that there will be greater flexibility in the future and that this will apply both to location and hours and that ICT will be an inherent component of enabling the future organisation and location of work.

Country Context

Prior to the pandemic Egypt had started on the path of becoming a Digital Society to which the fostering of digital workplaces and workforce were integral. The pandemic with the emphasis it placed on digital solutions for the continuation of business activity is likely to have boosted interest in digital transformation in relation to the organisation and conduct of work. PWC (2020 and 2021 a and b).

The Egyptian Government Digital Transformation Strategy (Egypt Digitalization Report, 2021); which is an integral part of the Government's Vision 2030; that focuses on investment in the technological infrastructure and the need to develop a digitally literate workforce. It has begun the development of five smart cities, has built innovation and creativity centres and has begun the process of developing human capital through the national Academy for Training and a focus on ICT knowledge and skills.

However, while governments can encourage and provide appropriate enabling and supportive technological and human development infrastructure for business to take advantage of, the actual investment in the creation of digital workplaces needs to be made by business. The authors have already noted the impact of the pandemic in forcing business to adopt digital solutions but as noted earlier there is little evidence of the extent to which business in Egypt has adopted teleworking and other flexible work organisation solutions.

The authors address this in a later section where they report on the outcomes of initial research into employees' perceptions of the impact of the pandemic on the organisational adoption of such solutions. Certainly there is some evidence in relation to the Middle East as a whole that the process of digital transformation in business had been accelerated by the pandemic, PWC (2020, 2021a). PWC here report that 50% of Middle Eastern CEOs were intending to increase their investment in Digital Transformation by more the 10% over the following three years and the PWC (2021a) report confirms that greater priority was being given in Middle Eastern business to the upskilling and wellbeing of their workforce.

Logistics of work, employment organisation and management and HRM

As was pointed out by Egypt Digitalization Report (2021), the challenge of the pandemic was to introduce effective teleworking and WFH to individual workers at the same time as maintaining teams in the new virtual context. They identify the need for organisations to ensure continuous communication, the provision to employees of proper corporate technical equipment, that they are using tools compatible with Corporate IT requirements, that poor connectivity will not negatively impact employee performance and effective engagement and that security is not compromised.

Robben (2021) refers specifically to the logistics of implementing successful WFH solutions, though the points are equally relevant to teleworking in general. He stresses the crucial ability of an employer to empower their employees with the right tools and infrastructure necessary to do their jobs without risking

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.024

productivity and information security. He further suggests that this requires focus on two key areas; Digital Infrastructure and Cybersecurity Infrastructure and policies.

- *The Digital Infrastructure* needs to enable employees to connect to the internet reliably enabling effective access to company servers and services and in order to facilitate this business should supply employees with employer laptops and other devices. It is also important that employees have strong internet and phone connections and where necessary these should be upgraded at the business expense.

- *The Cybersecurity Infrastructure* should ensure that employees can work remotely using encrypted devices over secure networks and platforms. In this context Robben (2021) identifies the importance of employees behaving appropriately in order to ensure compliance and security and the crucial role that can be played by training and company policies in achieving a resilient security culture.

The ILO (2021) also identify the need to ensure that employees are provided with appropriate ergonomic office furniture and equipment and that they have an appropriate workspace and that issues of work and job design are addressed. It is important that managements realise that implementing new technologies and ways of working such as implied by teleworking and WFH is not just a matter of ensuring employees have appropriate equipment and facilities with which to effectively perform their jobs in a remote and virtual environment. This is best regarded as a prerequisite but It is important that other potential barriers to and conditions for the effective adoption of new working practices are also addressed and in particular the so called people, leadership and cultural factors.

The Pandemic in prompting a very rapid and widespread forced adoption of teleworking has heightened awareness and the need to address issues that have been identified by researchers for number of years as being relevant to the effective implementation of new digital information and communication technologies into the organisation of work and into people's jobs and lives. Some of these issues are examined in the following sections and the authors separate issues for employees from those for employers and managers.

For employees the impact of teleworking and the implied detachment of work from place, work colleagues and supervisors on employee behaviour and attitudes, levels and sources of organisational commitment, involvement, engagement, job satisfaction, technostress and physical and psychological well-being, work life-balance, integration and conflict, and job performance, have all been identified as potentially positive or negative.

For example; Felstead and Henseke (2017) found that remote working is associated with higher organisational commitment, job satisfaction and job-related well-being, but these benefits come at the cost of work intensification and a greater inability to switch off. They also found support for social exchange theory with remote workers doing unpaid work, working harder and/or putting in extra effort in return for the opportunity to alter where and when they work. Remote workers also find it difficult to redraw the line between home and work as predicted by Border theory, thereby impacting work life-balance.

Mostafa's (2021) research in Egypt found that remote working was associated with flexibility benefits that could enable appropriate integration and balance between work and personal domains, and health protection benefits, but that these are also at the expense of work intensification, longer working hours, feelings of job insecurity and difficulties with motivation and connecting with team members. However, Mostafa also found that while working at home the availability of effective ICT facilitated enhanced psychological wellbeing through enabling communication and mitigating the effects of feeling lonely and isolated.

Zhang (2020) focussed on teleworking and the

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.024

relevance of being a parent and found that having children and whether a single parent played an important role influencing levels of work to family and family to work conflict.

Prasad and Vaidya (2020) focus on remote working and its impact on employees' mental health and psychological wellbeing and thereby on performance. They identify isolation due to lack of interaction with colleagues and supervisors, family distractions, role overload and role conflict related to a lack of clear differentiation between multiple roles. Molino et al. (2020) identify the possibility of technostress in the context of perceptions of permanent availability and information overload.

Leighton and McKeown (2020); Spurk and Straub (2020) both argue that the pandemic and responses to it have transformed traditional relationships between employees and supervisors. There are potential benefits for employees in terms of autonomy, control, flexibility regarding working hours and location and the impact on organisational commitment, job satisfaction and well-being can be positive and may well provide opportunities for enhanced work-life balance.

For organisations and supervisors. In addition to the logistical issues identified above, teleworking can impose new requirements regarding the nature of leadership and supervision. Bondarouk et al. (2017), PWC (2020) and El-Kot et al. (2022) all argue for the need for changed mind-sets and transformational leadership. Maher (2013) notes that managing remote working in Egypt requires cultural change and that managers need to change from their traditional approach of Management by walking to an approach characterised as management by performance or objective. Supervision must be based in empowerment and trust of employees (PWC, 2020) rather than control, culture should be empowering, collaborative and participative, and performance measurement should focus on outputs rather than inputs and presence.

Teleworking inevitably provides challenges for the traditional methods of exerting control through face to face interaction, visibility and physical presence and undoubtedly some supervisors and managements will see teleworking and greater flexibility over working hours and location as an opportunity for employees to shirk. The provision of appropriate Information and Communications technology for the employee should enable at least some mitigation of this as effective communications are empowered and supervisors receive training in how to manage and supervise in the new working environment.

In a comprehensive assessment of the challenges of managing remote workers Larson et al. (2020) confirm the management need to address issues related to lack of face to face supervision, and employees lack of access to information both formal and informal from interaction with colleagues, what they refer to as mutual knowledge. Employees' social isolation and distractions at home, especially associated with children, are also challenges for management and they suggest that employees should not be allowed to work remotely without the provision of both a dedicated workspace and adequate childcare. Solutions to these issues they suggest include; structured daily check ins with staff working remotely, rules of engagement and availability, a comprehensive and varied range of ICT options, opportunities for staff to engage in remote social interaction with colleagues, and management need to listen to workers and their anxieties and provide encouragement and support.

It seems clear, and as noted by the OECD (2020), that policy makers should facilitate the diffusion of best practice managerial practices developed in response to the increased use of telework. Managers need to adapt to the opportunities and challenges posed by telework. Adherence to outdated managerial practices may prevent managers from adopting telework, thus foregoing the benefits inherent in the use of telework. The attendant reduction in direct oversight may require managers to shift from a culture of presentism to an output-oriented assessment of worker performance.

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.024

As noted in the introduction, the pandemic and the teleworking and WFH responses to it has forced employers to confront the need to protect their employees from infection and to focus more on their health and well-being. The need to control the spread has also introduced an imperative that employees themselves take responsibility for behaving in accordance with the protocols for ensuring protection. Metwally (2021) locates this need for greater focus and action in the context of the concept of internal CSR, employee oriented CSR practices. While teleworking may seem a solution to many of these issues, especially those related to physical proximity and contact, the argument is extended to the social and psychological welfare and health of remote employees and it is suggested that teleworking imposes a greater need for focus on work-family relationships, close relations between organisational members, mutual trust between employees and management, networks, cooperative behaviours, voluntarism and commonly shared norms.

The impact of a shift to teleworking on traditional work-family/non-work boundaries and roles is something the authors have already referred to and it provides opportunities for both benefits and costs to the employee, their family and their employer. **It is important for organisations to be aware and to adopt approaches and policies which seek to minimise the costs and maximise the benefits.** Among **solutions to these issues** is the need for organisations to be flexible, to allow their employees flexibility and wherever possible to make teleworking a choice. As Zhang (2020) points out **children are an important influence on the success of teleworking especially if home based,** and, as Larson et al. (2020) also identify, organisations need to avoid a situation in which employees are expected to work with unsatisfactory technology, unsatisfactory workspaces and environment and with child caring responsibilities at a time they are required to be working.

Provision of effective ICT will potentially enable mitigation of feelings of isolation and loneliness. Wherever possible organisations should avoid close electronic monitoring and rigid time schedules, provide flexitime opportunities for employees to choose when and where to work around core hours if necessary, and respect employees' rights to be disconnected. They may further need to address variations in existing childcare provisions and policies, especially if provision was within or close to the traditional workplace.

Hamouche (2021) notes that the pandemic disrupted many organisations performance measurement and performance based payment systems, the new working arrangements often posing insurmountable challenges. More long term as the OECD (2020) identify teleworking requires that performance is measured more by outputs and results than by inputs such as time at work. They note that this shift may be perceived as some relaxation of control but combined with the need for more trusting relationships it is also likely that digitisation may enable more information to be available to monitor performance.

A major concern for organisations is the issue of performance and productivity and many see teleworking and other forms of flexible working as threats to the performance and profitability of the business. The OECD (2020) point out that the impact of teleworking on firm performance can be either positive or negative.

ACAS (2005) and the OECD (2020) suggest there are significant opportunities for improvement in performance through cost savings associated with teleworking. These savings can be derived from lower capital costs, for example through savings in office space and equipment. It may be that there is a potential for lower labour costs from an enlarged pool of labour supply, lower hiring costs if the change to teleworking has positive effects on labour retention and lower wage costs if it is possible to tap into pools of labour that require flexibility; for example, because of caring responsibilities or disability, and will work for less in return.

Felstead and Henseke (2017) and the OECD (2020) identify the potential and crucial role

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.024

of improvements in employee commitment, engagement, satisfaction and well-being for performance and productivity improvements and gains. This potential would appear to be at least partially confirmed by the PwC (2020) survey in the Middle East on the impact of the pandemic found that a third of respondents thought that the new forms of flexible and teleworking with employees working remotely or choosing their working hours combined with access to new digital information, communication and collaboration tools had promoted productivity. Evans-Greenwood et al. (2021) in noting the impact of the Pandemic on the detachment of work from place also identify that an improved workforce experience leads to increased productivity and improved business results.

We can conclude from this review of research that effective and successful implementation and adoption of teleworking as a solution to the issues created by the pandemic (and in the longer term) therefore, requires that organisations ensure employees have access to an appropriate fast, reliable and secure ICT infrastructure, and an appropriate and effective home or other work environment. Employees' rights to have a choice and to be disconnected must be recognised and protected, and where possible opportunities for necessary flexibility of time and location. The relationship between employee satisfaction and wellbeing and performance and productivity should have significant influences on the management approaches and policies adopted by organisations including approaches to management, supervision, control and to the organisational culture.

The survey

As noted in the introduction there is little evidence of the extent of teleworking and other modes of flexible working and employer childcare provision in Egypt and the authors report here the findings of an initial survey of employee perceptions of their employers' implementation of flexible work and childcare policies, both before and after the Covid-19 pandemic. The authors analyse the impact that the Covid-19 pandemic had on the implementation of these policies in a range of organisations in Egypt and examine the impact of organisational size and ownership type.

The flexible working practices investigated were: Part time working, Reduced Hours, WFH, Telework, and Flexi time. The data were collected from a purposive sample of working women in professional and managerial roles in a range of different organisations in Alexandria and Cairo. The data were collected online between March and May in 2021.The authors also collected organisational data including organisational ownership type, number of employees and the existence of written HR policies and practices and whether the organisation had a written Equal Opportunities Policy. The questionnaire was in English. A range of demographic data was also collected including age, educational level attained, employment status, marital status, motherhood, and role.

Sample Characteristics

As shown in Table 1 below; in total 1089 women completed the questionnaire. The majority of the respondents (66.4%) were aged 35 or less, 47% were married, 42% had children. The vast majority of the respondent population worked full time (93.5%). All of the respondents were educated to at least the Bachelor degree level. 63% of the respondents occupied managerial roles.

Organisational characteristics

As shown in Table 1 below; a majority of the respondents (53%) worked in organisations classified as private/family ownership, 37% in MNCs and 10.5% in the public/government sector. Nearly half (46%) of the respondents worked in organisations employing 1000 employees or more with 11% in organisations employing less than 50. Nearly all (94%) of the respondents affirmed that their employing organisation had written HR policies and 82% said this was also the case for an equal opportunities policy.

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.024

Table 1. Sample and Organisational characteristics

Item	Frequency	%	Item	Frequency	%
Ownership:			**Current employment:**		
Government	114	10.5	Full time	1018	93.5
Private/family business	576	52.9	Part time	71	6.5
Multinational	399	36.6	**Marital status:**		
Organizational Size:			Single	574	52.7
Below 50	123	11.3	Married	515	47.3
From 50-249	281	25.8	**Have Children:**		
250-999	185	17.0	Yes	456	41.9
1000 and more	500	45.9	No	633	58.1
Organization Policies:			**Educational level:**		
Written Policy -yes	1024	94.0	Bachelor Degree	847	77.8
Written Policy - No	65	6.0	Master Degree	217	19.9
Written EO policy – YES	895	82.2	Doctorate degree	25	2.3
Written EO policy – NO	194	17.8	**Current Position:**		
Age:			Non-Management	406	37.3
35 and less	723	66.4	Lower Management	246	22.6
36 and above	366	33.6	Middle Management	272	25.0
			Senior Management	165	15.2

Before Covid-19

Table 2 shows that the implementation of these flexible working and childcare policies was limited, the most commonly affirmed being flexitime, with 44% of respondents saying that their employer operated such a policy. Teleworking was implemented in the employing organisations of 36% of the respondents and WFH by 22%.

Table 2. The implementation of flexible working and childcare policies before and after COVID-19 virus.

	Before	Before	After	After
	Yes (Frequency)	**Yes %**	**Yes (Frequency)**	**Yes %**
Flexibility policies				
Part-time work	312	28.7	539	49.5
Reduced hours	167	15.3	680	62.4
WFH	240	22.0	844	77.5
Telework	393	36.1	761	69.9
Flexi-time	477	43.8	711	65.3
Childcare				
Workplace childcare	219	20.1	223	20.5
Childcare allowances	277	25.4	325	29.8

After Covid-19

The picture for flexible working policies after Covid-19 is very different and a majority of respondents indicate that their organisation is now implementing all of these policies except part-time working (49.5%). There were increases in the implementation of all the flexible working policies after COVID-19 and the increases were large, the largest being from 22.0 % of respondents affirming that their employer implemented WFH policies before whereas after Covid-19 this percentage was 77.5%. The comparable figures for teleworking were 36% increased to 70% and for flexitime from 44% to 65%. Before COVID-19 none of these policies were implemented by a majority of the respondents employing organisations, whereas afterwards all except part time work (49.5%) were implemented by the majority. There is some evidence of an increase in the provision of childcare allowances after the pandemic but the number of respondents affirming provision of workplace childcare remains much the same.

The authors conducted Paired **sample** and **T-Test** analysis to establish statistical significance of the impact of COVID-19 on the implementation of these policies and the outcome is presented in Table 3 below.

Table 3: Paired Comparison t-test

HR policies & practices	M	SD	t	*df*	Significant (2-tailed)
Workplace Childcare - Before Corona **Workplace Childcare - After Corona**	.004	.43	.283	1088	.777
Childcare allowances - Before Corona **Childcare allowances - After Corona**	.04	.46	3.178	1088	.002
Part-time work - Before Corona **Part-time work - After Corona**	.21	.53	13.063	1088	.000
Reduced hours - Before Corona **Reduced hours - After Corona**	.47	.59	26.397	1088	.000
WFH - Before Corona **WFH - After Corona**	.55	.55	33.284	1088	.000
Telework - Before Corona **Telework - After Corona**	.34	.54	20.836	1088	.000
Flexi time - Before Corona **Flexi time - After Corona**	.21	.53	13.421	1088	.000

COVID-19 was significant in explaining affirmed differences in the implementation of all the flexibility policies, and as noted above there were increases in implementation of all these policies. The pandemic was significant in explaining the increased affirmation of provision of childcare allowances.

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.024

The relevance of written HR policies

The main outcome from the data, and notwithstanding the overwhelming majority of respondents affirming that their employing organisation had written policies, is evidence that the absence of written HR policies is associated with greater likelihood of implementation of flexibility policies both before and after Covid-19.

The absence of written HR policies is also associated with less likelihood of both workplace childcare and childcare allowances being implemented after Covid-19 than before, this may be a reflection of employers taking advantage of the flexibility provided by the absence of written policies, flexibility possibly constrained by and not available to those with written policies, to reduce provision of what are presumably relatively expensive policies to implement. It may also be associated with the apparent substantially greater propensity for implementation after the pandemic of reduced hours and WFH policies by employers without written policies (See Table 4 below).

The relevance of written Equal Opportunities policies (EOP)

The frequency of respondents affirming that their employing organisation had written Equal Opportunities Policies was less than for HR policies (82% against 94%) and the differences in implementation of flexible working policies between those that did and those that did not were much less marked. Before Covid-19 there was evidence that organisations with written EOPs were less likely to implement teleworking but this difference did not persist after Covid-19. The provision of childcare policies by those employers without an EOP was less likely than for those with, both before and after the pandemic (See Table 4 below).

Table 4: Comparison based on Organizational policy and equal opportunity

HR Policies and Practices	Organizational policy written (Before)		Organizational policy written (After)		Organizational policy – equal opportunity (Before)		Organizational policy – equal opportunity (After)	
	Yes N= 1024	**No N= 65**	**Yes N= 1024**	**No N= 65**	**Yes N= 895**	**No N= 194**	**Yes N= 895**	**No N= 194**
Childcare								
Workplace Childcare	1.80	1.72	1.79	1.97	1.79	1.86	1.77	1.91
Childcare allowances	1.75	1.72	1.68	1.97	1.72	1.83	1.68	1.80
Flexible practices								
Part-time work	1.73	1.40	1.53	1.34	1.71	1.71	1.51	1.46
Reduced hours	1.86	1.65	1.39	1.09	1.85	1.82	1.37	1.39
WFH	1.81	1.34	1.24	1.06	1.70	1.70	1.22	1.26
Telework	1.67	1.09	1.32	1.08	1.69	1.42	1.31	1.27
Flexi-time	1.59	1.08	1.36	1.09	1.58	1.50	1.33	1.41

The relevance of Organisational Size

The respondents were asked to identify the number of employees in their organisation and were forced to choose one of four categories (see Table 5 below).

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.024

Table 5: Comparison based on Organizational Size

HR Policies and Practices	Below 50 N= 123		From 50 to 249 N= 281		From 250 to 999 N= 185		1000 and more N= 500	
	Before	After	Before	After	Before	After	Before	After
Childcare								
Workplace Childcare	1.80	1.80	1.81	1.91	1.78	1.74	1.80	1.75
Childcare allowances	1.80	1.80	1.81	1.91	1.80	1.58	1.67	1.60
Flexible practices								
Part-time work	1.29	1.21	1.78	1.57	1.78	1.39	1.75	1.58
Reduced hours	1.67	1.13	1.92	1.40	1.88	1.38	1.84	1.42
WFH	1.41	1.16	1.85	1.25	1.85	1.16	1.80	1.25
Telework	1.44	1.19	1.61	1.25	1.72	1.34	1.67	1.34
Flexi-time	1.44	1.32	1.60	1.42	1.62	1.30	1.55	1.33

Study of the responses suggests that the smallest organisations, those employing less than 50 employees, were substantially more likely to implement flexible working policies both before and after Covid-19 than the larger organisations. After Covid-19 implementation of flexible working policies as reported increases for organisations in all size categories and there is some narrowing of the differential rates of implementation between the size groupings.

Before the pandemic, there was relative consistency across the size groups in the provision of workplace childcare, after the pandemic the smaller organisations are less likely to make such provision than the larger organisations. Before Covid-19, the largest organisations appear more likely to have been implementing policies on childcare allowances, after Covid-19 this seems to be even more likely.

In order to facilitate a T-test based on organisational size the authors reclassified the organisations into below 250 and 250 and above, for each human resources policies and practices before and after Covid-19 (See Table 6 below).

Table 6: t- test based on Organization Size before and after

HR Policies and Practices	Public/ Government N= 114		Private/ Family Business N= 576		Multinational N= 399	
	Before	After	Before	After	Before	After
Childcare						
Workplace Childcare	1.91	1.85	1.76	1.85	1.81	1.69
Childcare allowances	1.72	1.54	1.73	1.77	1.77	1.65
Flexible work policies						
Part-time work	1.60	1.53	1.71	1.47	1.75	1.54
Reduced hours	1.81	1.24	1.86	1.36	1.84	1.44
WFH	1.89	1.16	1.76	1.29	1.77	1.15
Telework	1.84	1.41	1.60	1.26	1.64	1.32
Flexi-time	1.61	1.33	1.63	1.38	1.44	1.30

As can be seen from the table, number of employees was significant in explaining the provision of policies on Childcare allowances, part time work WFH and teleworking before the pandemic and afterwards it was significant for all policies except WFH. The authors noted above the tendency for the differentials between the size groups to narrow after the pandemic but size remains a significant explanatory variable with the exception of WFH, with the smaller organisations seemingly more likely to be implementing teleworking, part time working and reduced hours and less likely to be implementing flexi time. After the pandemic, the smaller organisations are less likely to be implementing policies on workplace childcare and allowances and size is significant as an explanatory variable.

The Relevance of Ownership Type

The respondents employing organisations were categorised into three ownership groupings, distinguishing Public and Government sector organisations, Private and Family owned, and Multinational. The enhanced likelihood of implementation of flexible working policies after Covid-19 is consistent across all policies and ownership types.

Table 7: Comparison based on ownership

	HR policies & practices	Size	N	Before					After				
				M	SD	t	df	Significant p (2-tailed)	M	SD	t	df	Significant p (2-tailed)
1	Workplace Childcare	Less than 250	404	1.80	.39	-.67	866	.504	1.90	.33	-5.15	1.87	.000
		From 250 & up	685	1.80	.40				1.75	.43			
2	Childcare Allowances	Less than 250	404	1.81	.39	-4.03	1087	.000	1.90	.33	-10.11	1087	.000
		From 250 & up	685	1.71	.46				1.60	.49			
3	Part-time Work	Less than 250	404	1.63	.48	4.51	1087	.000	1.46	.50	2.14	845	.033
		From 250 & up	685	1.76	.43				1.53	.50			
4	Reduced Hours	Less than 250	404	1.84	.37	.354	830	.724	1.32	.47	3.05	1087	.003
		From 250 & up	685	1.85	.36				1.41	.49			
5	WFH	Less than 250	404	1.72	.45	3.80	1087	.000	1.23	.42	-.02	844	.987
		From 250 & up	685	1.82	.39				1.22	.42			
6	Telework	Less than 250	404	1.56	.50	4.24	1087	.000	1.23	.42	3.81	1087	.000
		From 250 & up	685	1.70	.46				1.34	.47			
7	Flexi Time	Less than 250	404	1.60	.50	.51	842	.610	1.40	.49	-2.21	1087	.027
		From 250 & up	685	1.60	.50				1.32	.47			

Prior to the pandemic, the public sector organisations appear to have been most likely to have implemented policies on part time working and least likely to have policies implementing WFH and teleworking. Multinational organisations were most likely to implement flexitime. After the pandemic; the public sector organisations remain the least likely to be offering teleworking but not WFH and while Multinationals remain most likely to be implementing flexitime, the differentials with the other ownership groups have narrowed substantially.

Before Covid-19, Public and government organisations were least likely to have implemented policies on Workplace Childcare and there was relative consistency in the implementation of policies on childcare allowances. Perhaps the most interesting aspect of these results is that after the pandemic private and family business appear to less likely to be implementing policies on workplace childcare and childcare allowances than before the pandemic, whereas both the public sector and Multinational organisations seem more inclined to be implementing policies on these issues than before the pandemic.

In order to facilitate a T-test based on organisational ownership the authors reclassified the ownership groups into public and private including multinational, for each human resources policies and practices before and after Covid-19 (See Table 8 below for t-test).

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.024

Table 8: t-test based on organizational Ownership

HR policies & practices		Ownership	N	Before					After				
				M	SD	t	*df*	*p*	M	SD	t	*df*	*p*
1	Workplace Childcare	Public	114	1.91	.28	-3.20	1087	.001	1.85	.36	-1.56	1087	.120
		Private/ Multinational	975	1.80	.41				1.79	.41			
2	Childcare Allowances	Public	114	1.72	.45	0.66	138	.510	1.54	.50	3.91	1087	.000
		Private/ Multinational	975	1.75	.43				1.72	.45			
3	Part-time Work	Public	114	1.60	.49	2.93	1087	.003	1.54	.50	-0.68	1087	.498
		Private/ Multinational	975	1.73	.45				1.50	.50			
4	Reduced Hours	Public	114	1.81	.40	1.24	1087	.215	1.24	.43	3.25	1087	.001
		Private/ Multinational	975	1.85	.36				1.40	.49			
5	WFH	Public	114	1.90	.32	-2.90	1087	.004	1.16	.37	1.81	1087	.070
		Private/ Multinational	975	1.77	.42				1.23	.42			
6	Telework	Public	114	1.84	.37	-4.82	1087	.000	1.41	.49	-2.74	1087	.006
		Private/ Multinational	975	1.62	.49				1.29	.45			
7	Flexi Time	Public	114	1.61	.49	-1.18	1087	.237	1.33	.47	0.33	141	.743
		Private/ Multinational	975	1.56	.50				1.35	.48			

Table 8 reveals that this classification of ownership type indicates that before the pandemic it was significant in explaining differences of implementing provision of Workplace childcare, WFH and teleworking with the public sector organisations less likely to be implementing provision. It was also significant in explaining differences of provision of part time work but here the public sector was more likely to implementing provision.

After the pandemic, ownership type was a significant factor in explaining the implementation of policies on childcare allowances and reduced hours working, where the public sector was more likely to be implementing, and also in the implementation of teleworking where the public sector was less likely to be implementing provision. Teleworking is the only policy area where ownership type is a significant factor both before and after the pandemic and in both cases the public sector was less likely to be implementing provision according to the respondent employees.

Discussion and Conclusions

The results presented here demonstrate that employers in Egypt had adopted very much the same responses to the pandemic as others in many parts of the world in that Teleworking, WFH and flexitime had all been used to enable continuity of business activity during the pandemic. Greater flexibility in working hours had also been implemented through greater provision of opportunities for reduced hours and part-time working, possibly to cope with reduced levels of activity, as an alternative to laying staff off and as a means of enabling staff to cope with new realities in terms of blurring of boundaries between work and home life and the demands imposed by children and other family responsibilities.

Before Covid-19, and in the employing organisations of the selected sample of working women in professional and managerial roles, implementation of flexible working policies, workplace childcare and childcare allowances were limited.

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.024

Clearly Covid-19 has been significant in encouraging employing organisations in Egypt to implement a range of flexible working policies and practices but this is not the case for policies on childcare. There have been marked increases in the implementation of all the flexible working policies and across all organisational ownership types and size groupings, the rates of affirmation for childcare policies remain very much the same as before the pandemic.

Clearly also the vast majority of respondent employing organisations had both written HR and EO Policies. There is some evidence from this research that absence of written HR policies is associated with a greater likelihood of implementation of flexible working policies both before and after Covid-19. The absence of written policies is also associated with less likelihood of both workplace childcare and childcare allowances being implemented after Covid-19 than before. This may be a reflection of employers taking advantage of opportunity provided by the absence of written policies to reduce provision of what are potentially relatively expensive policies. The absence of written HR and EO policies providing employers opportunity to be more agile both in introducing and removing policies.

Organisational size is clearly a factor influencing the implementation of these flexible working and childcare policies either before or after the pandemic. The smallest organisations, those employing less than 50 employees, were substantially more likely to implement flexible working policies both before and after Covid-19 than the larger organisations.

This research also confirms ownership type as significant to the implementation of the range flexible working and childcare policies between groups either before or after the pandemic. Teleworking is the only practice where it is significant both before and after.

Implications for Egyptian Businesses

There can be little doubt given the results from the survey and the evidence from the PWC (2021 b) survey of Egyptian Family Business, that there has been a significant shift to Teleworking, including WFH, and greater flexibility around working hours and schedules in response to the conditions and concerns imposed by the Covid-19 pandemic and the urgent need to engage with remote working where possible. Teleworking as noted earlier must be facilitated by the effective implementation of appropriate, reliable and secure digital technology and PWCs 2020 Digital HR survey reports that 72% of respondents said the pandemic had accelerated their organisations digital transformation. The authors noted earlier (2021a) ME CEOs reported intentions to increase investment in digital transformation in the future. These results need to be set aside those from the PWC Family Business survey which shows much lower levels of intention to invest in digital transformation and this sector comprises a majority of Egypt's companies and the nation's income and employment.

According to the evidence from PWCs (2021a) survey, this has given considerable impetus to a realisation among CEOs that digitisation and employee upskilling are crucial to their future competitiveness and sustainability, with 70% of the CEOs believing a skilled, educated and adaptable workforce to be a top business priority. This survey also provided evidence that the issue of employee health and welfare has been heightened and the report found that 50% of ME CEOs thought that employee health and welfare were priorities that businesses should help to deliver and that the mental health of employees was a particular concern given the disruption the pandemic caused to work and family lives. Though the survey Results do not support notions that business has responded to this increased awareness by improving the incidence of provision of workplace childcare or childcare allowances. It may be of course that other approaches are being adopted.

Introducing new working arrangements which utilise or are dependent on new digital technologies; such as the information and communication technologies and infrastructure that facilitate teleworking and other forms of remote and flexible working will often require

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.024

change to traditional management practices and organisational cultures (OECD, 2020). Unwillingness to change on the part of either employees or management will hamper the effective implementation of these new modes of working. The PWC (2020) report argues that the biggest obstacle to digital transformation is often the change required to traditional mind-sets and cultures, and that one of the main ways of navigating through the new ways of working is to empower employees. The PWC (2021b) report notes that family businesses, the majority of businesses in Egypt, should be wary of assuming that traditional structures and cultures that have served them well in the past and through the first stage of the pandemic will be fit for purpose in the newly competitive and digitally transformed future. They will need to work harder to introduce digital technologies across the business.

It is important to note the conclusions of El-Kot, et al. (2022) who note that the traditional organisational form, culture, and management and leadership styles in Egypt are bureaucratic, hierarchical, autocratic and controlling. Leadership has been transactional and management has been disinclined to delegate and empower their workforces, and relationships have been characterised by respect and loyalty on the part of employees and low trust on the part of management. Teleworking is likely to be most effective when underpinned by an appropriate technological and environmental infrastructure and where organisational structure and policy are flexible, relationships are trusting, employees are empowered and their wellbeing nurtured, performance measurement focuses on outputs, and where leadership is transformational. Maher (2013) also noted the bureaucratic, centralised, authoritarian structures, cultures and approaches to management as challenges to the introduction and effective utilisation of remote working in Egyptian organisations. He also identified a lack of strategic planning and the formulation of clear strategic goals, poor management skills in planning, organising, motivating and controlling and that most employees have developed habits of poor timekeeping and an inability to work on their own.

What the authors have witnessed in Egypt as in many other countries is teleworking, WFH and flexibility as transformation in response to crisis, the test will be to see whether these new modes of working will endure once the pandemic is over and whether the lessons learnt are utilised to inform and cultivate the future of work. There are some obvious challenges here for the Egyptian business, both in terms of the logistics of ensuring appropriate technical and environmental infrastructure and equipment for employees, but also clearly in transforming management structures, systems, mind-sets and organisational cultures.

References

[1] Gamal Aboelmaged, M. and Mohamed el Subbaugh, S. (2012) "Factors influencing perceived productivity of Egyptian teleworkers: An empirical study," Measuring Business Excellence, 16(2). Available at: https://doi.org/10.1108/13683041211230285.

[2] ACAS (2005) Changing Patterns of Work. Available at: https://www.yumpu.com/en/document/ view/7477377/changing-patterns-of-workacas.

[3] Aitken-Fox, E. et al. (2020) COVID-19 and the changing employee experience, LSE Business Review. Available at: https://blogs. lse.ac.uk/businessreview/2020/06/24/covid- 19-and-the-changing-employee-experience/.

[4] Belzunegui-Eraso, A. and Erro-Garcés, A. (2020) "Teleworking in the context of the Covid-19 crisis," Sustainability (Switzerland), 12(9). Available at: https://doi.org/10.3390/su12093662.

[5] Bondarouk, T. v. and Ruël, H.J.M. (2009) "Electronic human resource management: Challenges in the digital era," International Journal of Human Resource Management. Available at: https://doi.org/10.1080/09585190802707235.

[6] Ghoneim, A.W. (2021) Egypt Digitalization in Alignment with Egypt vision 2030 for SDGS, Information and Decision Support Centre (IDSC). Available at: https://idsc.gov.eg/Upload/DocumentLibrary/Attachment_A/4798/3%20%20EGYPT%20DIGITALIZATION.pdf.

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.024

[7] El-Kot, G., Leat, M. and Masry, S. (2022) "Digital Human Resource Management in Egypt," in HRM in the Global South. Cham: Springer International Publishing, pp. 371–398. Available at: https://doi.org/10.1007/978-3-030-98309-3_14.

[8] Evans-Greenwood, P., Stockdale, R. and Patson, T. (2020) The digital-ready workplace: Supercharging digital teams in the future of work. Available at: https://www2.deloitte.com/us/ en/insights/focus/technology-and-the-futureof-work/supercharging-teams-in-the-digitalworkplace.html.

[9] Felstead, A. and Henseke, G. (2017) "Assessing the growth of remote working and its consequences for effort, well-being and work-life balance," New Technology, Work and Employment, 32(3). Available at: https://doi.org/10.1111/ntwe.12097.

[10] Gourinchas, P.-O. (2020) "Flattening the Pandemic and Recession Curves," Mitigating the COVID Economic Crisis: Atc Fazt and Do Whatever It Takes [Preprint].

[11] Hamouche, S. (2021) "Human resource management and the COVID-19 crisis: Implications, challenges, opportunities, and future organizational directions," Journal of Management and Organization [Preprint]. Available at: https://doi.org/10.1017/jmo.2021.15.

[12] ILO (2020) COVID-19 and the world of work: Impact and policy responses. Available at: https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/briefingnote/wcms_738753.pdf.

[13] Bratton, J., & Gold, J. (2017) "Human Resource Management, 6th Edition: Theory and Practice," in Google Books.

[14] Koirala, J. and Acharya, S. (2020) "Dimensions of Human Resource Management Evolved with the Outbreak of COVID-19," SSRN Electronic Journal [Preprint]. Available at: https://doi.org/10.2139/ssrn.3584092.

[15] Larson, BarbaraZ., Vroman, S.R. and Makarius, E.E. (2020) "A Guide to Managing Your (Newly) Remote Workers," Sustainability (Switzerland), 4(1).

[16] Leighton, P. and McKeown, T. (2020) Work in challenging and uncertain times: The changing employment relationship.

[17] Maher A. (2013) "Remote Employment: Advantages and Challenges for Egypt's Labor Force (After the 25th January Revolution)," International Journal of Economics and Management Engineering, 7(6), pp. 1615–1620.

[18] Metwally, A.B.M., Diab, A. and Mohamed, M.K. (2021) "Telework operationalization through internal CSR, governmentality and accountability during the Covid-19: evidence from a developing country," International Journal of Organizational Analysis [Preprint]. Available at: https://doi.org/10.1108/IJOA-11-2020-2500.

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.024

[19] Molino, M. et al. (2020) "Wellbeing costs of technology use during Covid-19 remote working: An investigation using the Italian translation of the technostress creators scale," Sustainability (Switzerland), 12(15). Available at: https://doi.org/10.3390/SU12155911.

[20] Mostafa, B.A. (2021) "The Effect of Remote Working on Employees Wellbeing and Work-Life Integration during Pandemic in Egypt," International Business Research, 14(3). Available at: https://doi.org/10.5539/ibr.v14n3p41.

[21] OECD (2020) Productivity gains from teleworking in the post COVID-19 era: How can public policies make it happen? Available at: https://www. oecd.org/coronavirus/policy-responses/ productivity-gains-from-teleworking-in-thepost-covid-19-era-a5d52e99/.

[22] Prasad, K. and Vaidya, R.W. (2020) "Association among Covid-19 parameters, occupational stress and employee performance: An empirical study with reference to Agricultural Research Sector in Hyderabad Metro," Sustainable Humanosphere, 16(2).

[23] PWC (2021a) 24th CEO Survey - Middle East findings. Tomorrow Starts Today. Available at: https://www.pwc.com/gx/en/ceosurvey/2021/reports/pwc-24th-global-ceosurvey.pdf.

[24] PWC (2021b) Egypt Family Business survey 2021. Available at: https://www.pwc.com/ m1/en/publications/egypt-family-businesssurvey-2021.html.

[25] PWC (2021c) Middle East Report: Digital HR Survey 2020: challenges and opportunities for Middle East companies. Available at: https://www.pwc.com/m1/en/publications/digitalhr-survey-2020-challenges-opportunitiesmiddle-east-companies.html.

[26] Robben N. (2021) The Logistics of Allowing Employees to Work from Home. Available at: https://www.biz2credit.com/ blog/2021/06/02/the-logistics-of-allowingemployees-to-work-from-home/.

[27] Spurk, D. and Straub, C. (2020) "Flexible employment relationships and careers in times of the COVID-19 pandemic," Journal of Vocational Behavior. Available at: https://doi.org/10.1016/j.jvb.2020.103435.

[28] Zhang, S. et al. (2020) "A work-life conflict perspective on telework," Transportation Research Part A: Policy and Practice, 141. Available at: https://doi.org/10.1016/j.tra.2020.09.007.

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.041

Analyzing the Barriers of Sustainable Supply Chain Fashion Sector in Egypt: A Systematic Literature Review

Rowan Abd Elbary*
Arab Academy for Science, Technology and Maritime Transport, Alexandria, Egypt
Rawan.hamdi@aast.edu

Sahar Elbarky
Arab Academy for Science, Technology and Maritime Transport, Alexandria, Egypt
selbarky@aast.edu

Sara Elgamal
Arab Academy for Science, Technology and Maritime Transport, Alexandria, Egypt
sarahelgamal@aast.edu

Matevz Obrecht
University of Maribor, Maribor, Slovenia
Matevz.obrecht@um.si

Received on: 10 March 2022 Accepted on:07 July 2022 Published on: 30 July 2022

Abstract

Purpose: *This research aims to identify barriers to sustainable supply chain management implementations in the Egyptian fashion industry.*

Design/Methodology/Approach: *A systematic literature review over a period of 17 years was conducted to identify the barriers to the implementation of a sustainable supply chain in Egypt, which included 29 publications published in peer-reviewed journals, conference proceedings, and book chapters.*

Findings: *The economic, social, and environmental barriers to sustainable supply chain management were highlighted and summarized from previous studies indicating whether these barriers are inside or outside each organization. However, it was discovered that most of the production is carried out by the developing countries where limited research on sustainable supply chain barriers and consequently in the fashion industry in particular. This gap is considered the main research findings, where authors worked on highlighting and classifying sustainable supply chain barriers in the fashion industry in developing countries.*

Research Implications/Limitations: *Due to the limited studies on both topics, barriers to sustainable fashion supply chain and sustainability barriers in Egypt as a developing country, this study is a systematic review of the literature; nevertheless, an empirical study may be undertaken in the future. The systematic review covers the years 2005 to 2022, and identifies the barriers to implementing sustainable supply chain management in the Egyptian fashion industry.*

Practical Implications/Limitations: *This study provides academics with a consistent representation of sustainability barriers in the Egyptian fashion sector to motivate additional academic research and assistance for managers to create company sustainability competency by highlighting economic, social, and environmental challenges to implementing sustainable supply chain.*

Originality: *This research classifies the sustainable supply chain barriers into internal and external barriers and moreover as economic, social, and environmental at the same time. It is one of the few studies that explore*

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.041

sustainable fashion supply chain management in developing countries, particularly Egypt. Also, this is the first research about Egypt that classifies sustainability barriers into economic, social, and environmental barriers, and discusses the Egyptian sustainable supply chain barriers for implementation.

Keywords: *Fashion, Sustainable development, Sustainability, Sustainable supply chain, Sustainable fashion, Supply chain barriers, Sustainability barriers, Economic barriers, Social barriers, Environmental barriers.*

Introduction

The Fashion Industry especially textile speaks to a fundamental aspect of individuals' regular daily existence and its products are considered the second most significant object of human craving. The business itself has encountered broad development and accomplishment in the last decades, making it one of the biggest, yet in addition, most polluting, worldwide ventures. Its huge size, an assortment of cycles, and complex worldwide creation networks cause major environmental and social effects. The business consistently gets negative consideration in light of helpless working conditions, low wages, and abuse of labor, particularly in low-cost countries, where most of the production is outsourced (Peters and Simaens, 2020).

The ever-expanding utilization of textile merchandise escalates the current social and environmental issues. As a result of expanding mindfulness, a developing discourse in regards to sustainability emerged inside the textile community. Organizations' overall industry segments have begun to actualize sustainable methodologies and adjust economic, social, and environmental obligations, thinking about expanded benefits and diminished expenses, yet additionally the sustainable development of the organization itself and its environment. It implies logically moving to business sustainability which centers on the requirements of the general public and the planet (Peters and Simaens, 2020).

Based on the above discussion, the research aims to figure out the barriers and factors that mostly affect the sustainable fashion supply chain to develop the industry in Egypt.

Objectives have been identified to achieve this aim:

1- To collect a range of previous studies focusing on barriers to sustainable supply chain implementation.
2- To identify sustainable Fashion supply chain barriers in developing countries especially Egypt.

Literature Review

Sustainable Development

In the last four decades, companies have been facing considerable challenges in satisfying customer needs, paying for materials, utilities, and wages while gaining profits at the same time. According to undisputed demographic growth, the human population is expected to increase by 50% by 2050 compared to 7.5 billion in 2017 (UN/DESA, 2017). In 2020, 7.8 billion inhabitants of the earth struggled with coronavirus and gained new marbles towards the contribution of population density which is expected to reach 9.9 billion by 2050, a rise of more than 25% compared to 2020 (population change, 2020). Despite of the last expectations towards inhabitants' growth rate, organizations still work more on sustainable development and keep on conserving environmental resources from exhaustion.

The Brundtland Report in 1987 proposed the most widely used concept of sustainability, a

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.041

development that satisfies the requirements of the current without jeopardizing future generations' capacity to fulfill their own needs (Ashby et al., 2012). The first steps toward sustainable development were taken in the 1970s when the limits to growth demonstrated the need for a growing population when resources were in short supply. Sustainable development has been built on science and environmental crusade since the 1970s. After that time, several projects have been implemented in the sector but have not been labeled as "Sustainable Development". The ecosystem has been impacted as a result of the construction process, which has been noted by the international community. (Isa et al., 2021)

In the early 1970s, the United Nations Conference on Human Environment, popularly known as the Stockholm Conference, was convened. The conference was being hailed as a watershed moment in international environmental politics. The Brundtland study, released in 1987, was the next major step on the road to sustainability, emphasizing that "Humanity has the potential to make growth sustainable to ensure that it meets the needs of the present without jeopardizing future generations' ability to meet their own needs". Purvis, Mao, and Robinson (2019) claim that the three pillars of sustainability did not originate from a single source, the definition of sustainable development is now predominantly recognized as a three-dimensional concept. The literature initially characterized sustainable development as a three-dimensional concept: economic, social, and ecological, the triple bottom line or the 3P approach of profit, planet, and people were later expanded into a 5P model, which included partnership and peace as well (Redek et al., 2020).

Economic Sustainability is tied in with rousing organizations and associations to watch and obey sustainability rules past their typical authoritative necessities. It ought to likewise motivate the normal individual to do their bit any place they can; one individual seldom accomplishes a lot, however as a group people can go further. Social Sustainability is tied in with keeping up admittance to fundamental assets without trading off personal satisfaction. Environmental Sustainability is affiliated with instructing and urging individuals to contribute to it and tutoring them about the impacts of environmental security (Chokshi, 2020).

The Sustainable Development Agenda began to take shape around the time of the Kyoto Protocol, which was adopted in 1997 and was later revised in Doha and Paris, as well as at a number of other meetings. The Sustainable Development Goals (SDGs) have begun to be introduced in 1992, 178 countries signed the so-called Agenda 21, which aimed to improve global life quality by emphasizing the position of developing and developed countries. Combating was one of the key objectives. Poverty, evolving consumption habits, long-term demographic growth, improving and promoting health, and housing and settlement quality are all issues that need to be addressed. Advancement Environmental concerns were a major part of the debate. Agenda 21, which focuses on resource protection and management, has also defined major groups and their positions, stakeholders, as well as methods of execution that were crucial for achieving the desired outcomes (The United Nations, 2019).

Sustainable Supply Chain Management

The supply chain is a complicated system with numerous actors involved at various levels of interaction and decision-making (from suppliers to their services, transportation, manufacturers, warehouses, retailers, and consumers). As a result, sustainability in the supply chain refers to the activities of all the participants in the chain who work together harmoniously to offer products and services that are regarded not just from an economic but also from an environmental and social standpoint (Tipi and Elgazzar, 2021).
The term "sustainability" has been defined in a variety of ways, ranging from an intergenerational philosophical viewpoint to a multi-dimensional corporate management term. Early sustainability programs tended to focus on environmental concerns, but they have increasingly

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.041

incorporated environmental, economic, and social perspectives-driven approaches to sustainability over time (Tseng et al., 2015).

Haake and Seuring (2009) described SSCM as the set of supply chain management policies, actions, and relationships that are implemented in response to environmental and social concerns in the design, acquisition, manufacturing, distribution, use, reuse, and disposal of a business's goods and services.

Presently, operations, purchasing, and supply chain managers are seeing the incorporation of environmental and social concerns into their everyday activities, including those contained in relevant standards e.g., ISO 9001 and ISO 14001 (Tseng et al., 2015).

SSCM is concerned with the current concept of SCM, which includes practices such as green sourcing, green construction, waste management, reverse logistics, product recycling, pollution mitigation, energy usage, and resource conservation, among others to ensure an environmentally sustainable supply chain (Pietanza et al., 2018). The "triple bottom line" approach underpins the incorporation of societal, cultural, and economic values into the conception of sustainability. While SSCM practices are thought to be connected to environmental performance and social engagement, they have also been linked to improved economic performance (Zayed and Yaseen, 2020). According to Carter and Rogers (2008), SSCM has been characterized as a strategic, transparent, and achievable alignment of social, environmental, and economic objectives for a corporation by systematically coordinating important inter-organizational business operations to improve the long-term economic efficiency of the individual firm and its supply chain.

Sustainable development and the efficient use of natural resources (fuel, land, and water) are incorporated into the implementation of a strategic plan, transparent incorporation, life cycle assessment, and the accomplishment of an organization's social, environmental, and economic goals through the systemic coordination of internal business processes aimed at improving the individual firms and economy's long-term performance (Tseng and Geng, 2012).

Fast fashion and just-in-time production are presently dominating the apparel sector, resulting in increased fashion trends. This, in turn, has led to overconsumption, in which people buy more than they need, resulting in fashion waste (Pookulangara, 2013). Wherefore sustainable supply chain has been applied to the fashion industry to mitigate fashion wastes such as fuel, water, energy, and material usage and maintain life cycle assessment of the industry.

Sustainable Fashion Supply Chain Management

A supply chain in the fashion industry includes the whole phase of production and delivery, including the transition of raw materials to finished goods ready for market launch. It is a structure made up of commodity manufacturers, manufacturing plants, storage processes, and customers (Basak et al., 2014). The supply chain has become fundamentally important in modern retailing in terms of efficient organization, teamwork, and cooperation with the chain's organizations, as well as dexterity and cooperation (Moon et al., 2017).

The difficulty of supply chains has increased due to the emerging trend in the fashion industry of expanding product range, a limited product life cycle, increased outsourcing, and technical advancement (Barnes and Lea-Greenwood, 2006). It has been updated to meet the demands of fashion consumers for new items while retaining fast manufacturing lead times (Lee, 2002). Because of the lengthy, dynamic processes in the clothing industry supply chain, as well as the internet's strong presence, strategic steps have been made and applied to solve long purchasing times and increasingly competitive fashion customers. With new goods being designed every second to meet market needs, new supply chain systems can be built to directly service these demanding consumers (Lee, 2002).

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.041

Ethical fashion, eco-fashion, and sustainable fashion: all these terms have become familiar within the media over the last few years. Sustainable fashion is a bit of the slow fashion movement, developed over the previous decades, and used variably with eco, green, and ethical fashion (Carey and Cervellon, 2014). It is often misleadingly substantive as the opposite of fast fashion. Slow fashion relies on a philosophical ideal that compresses sustainability values, such as good working conditions and decreasing environmental demolition (Pookulangara and Shephard, 2013).

Clark (2008) defined Sustainable fashion as an oxymoron since fashion implies that something comes and goes out of vogue, which contradicts the long-term visions of sustainability. The basics of sustainability in general are the foundations of which this concept appears.

Fashion, particularly fast fashion, places a premium on speed and economy to offer new collections regularly. Nonetheless, the difficulty with this business is its harmful influence on the environment. On the one hand, it employs harmful chemicals that contribute to water contamination and may contaminate soils if improperly shaken off.

Otherwise, there is a great deal of textile waste, and many garments are composed of synthetic fibers that escape into the water as microplastics during the washing process. Thus, if a firm produces clothing using sustainable materials, employs sustainably grown cotton, adheres to circular economy concepts across its value chain, and uses less hazardous chemicals, it is environmentally responsible.

Simultaneously, sustainability is also about being socially responsible. Generally, the fashion industry is not a very responsible one. If one observes most labels show that clothes are being made in remote places such as China, Bangladesh, or Vietnam.

Aside from the contamination of transporting these things, the labor behind the assembling of these garments is what is generally stressed. Individuals in these nations typically get truly low wages and work under awful conditions. They can barely improve their social circumstance and on most occasions continue working just to take care of the tabs and endure. This generally adds to the imbalance people find on the planet since in 2018 the rich went more extravagant and the poor less fortunate.

Additionally, at the vehicles level, the prevalence and industry improvement of choices like electric vehicles (or even hydrogen vehicles) or electric bikes are developing at a high rate. Simultaneously, arrangements like carpooling, through which drivers can get their vehicles filled and set aside some cash and contamination is another option. Also, more organizations are letting their representatives telecommute to spare the quantity of km voyaged as well.

The textile sector has a high embodied energy and natural resource demand, which leads to the rapid development of post-consumer waste. According to current industrial studies, $400 billion in clothes is wasted each year, and the typical Australian purchases 27 kg of new textiles each year, 23 kg of which is tossed into the garbage. Man-made fibers, including natural fibers that take decades to degrade, account for two-thirds of the waste materials. Polymer-based clothes will take 200 years to degrade in a landfill.

With a growing concern about environmental and social sustainability, energy and water consumption, pollution, scarcity of natural resources, and greenhouse gas emissions, the textile industry, which generates a significant environmental footprint from cultivation to the fabric manufacturing to landfill disposal of post-consumer items, is confronted with enormous environmental and resource challenges. As a result, adopting more sustainable behavior in the sector is critical (Shirvanimoghaddam et al., 2020).

Textile reuse and recycling can be a sustainable alternative for decreasing solid waste in landfills, lowering the creation of raw materials and energy consumption, and generating a reduced

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.041

environmental imprint due to the huge amount of textile waste created across the world. The relevance of textile waste recycling from an economic, social, and environmental standpoint has been examined in this study, and numerous ways for reusing textile waste have been emphasized. In addition, various technological uses of textile waste have been studied to give more insight into the textile and fashion circular economy approaches to sustainability (Shirvanimoghaddam et al., 2020).

Egyptian Fashion Sector

The apparel sector is extremely important to the Egyptian economy, and it has recently seen a resurgence and a new spurt of growth. Egypt has around 4800 apparel factories, about %73.1 of these factories are located in Cairo, Alexandria, Al qalyoubia, Al sharkia, and Al gharbia, and the apparel industry is considered the first industry in terms of the labor force, with 1.5 million employees, half of which are women (youm7, 2020). In addition, the apparel sector is the country's most significant manufacturing sector, accounting for about $1.6 billion in exports in 2018; it accounts for 6.5 percent of overall non-petroleum exports. Apparel exports totaled $1.604 billion in 2018, up from $1.459 billion in 2017, representing a 10% increase, with 50% of apparel demand exported to the United States and 30% exported to Europe (Statista, 2019).

According to Mohamed Abdel Salam, Chairman of the Chamber of Readymade Garments, the decline of the ready-made garment sector in China is due to the increase in the cost of production as a result of the high wages, as the average wage of a worker in this industry became from 1000 to 1200 dollars per month, with a lack of labor, in addition to the American trade war against the Chinese. Abdel Salam added that this represents a golden opportunity for Egypt to attract the largest possible number of Chinese investors in the ready-made clothes and textiles sector to invest in Egypt, which would benefit the Egyptian economy. He explained that Egypt is characterized by the abundance of manpower, the availability of all services and the industry requirements (water - gas - electricity), and the achievement of gains for the Egyptian economy in terms of increasing job opportunities and reducing unemployment, transferring the technology of this industry to Egypt, as well as increasing the volume of exports and reducing imports, which all lead to increasing investment and confidence in the Egyptian economy. The apparel industry is one of the labor-intensive industries, as it employs more than one and a half million workers, its exports are close to 30 billion pounds, and the domestic product is close to 250 billion pounds.

It also has the infrastructure that qualifies it to increase the volume of exports, thus creating new job opportunities for young people, including Approximately 500 thousand job opportunities (Mohamed Abdel Salam, 2019). So Egypt as a developing producing country is in a great need to integrate sustainability in the Egyptian supply chain especially in the fashion industry to order to decrease waste and energy consumption, produce up to standard products to satiate the Egyptian consuming market, and compete in the international market.

Since academic papers on sustainable fashion supply chain barriers are limited, the researchers compiled a list of barriers relevant to the sustainable supply chain in general, whether in the fashion sector or other sectors.

Sustainable Supply Chain Barriers

According to a study of the literature on SSCM, far fewer researchers have discussed barriers to Sustainable Supply Chain Management. This can be explained by the fact that researchers sometimes prefer to report positives rather than negatives, or by social desirability bias, in which companies participating in such studies emphasize mainly drivers (Zayed and Yaseen, 2021). SSCM barriers are divided into three main sustainability barriers, Economic Barriers, Social Barriers, and Environmental Barriers. Also, previous research has identified barriers to SSCM adoption, which have been categorized as internal barriers –

People-related concerns have been identified as internal barriers to SSCM implementation – and external factors – those beyond the firm's borders, regulatory difficulties in particular (Oelze, 2017).

Table I summarizes all sustainable supply chain management barriers whether Economic, Environmental, and Social, further outlining the internal (by employees) and external (by supply chain members) hurdles to SSCM deployment.

Table I: Previous Studies on Sustainable Supply Chain Management Barriers
Source: Authors (2022)

Economic Barriers		
Sustainable supply chain implementation faces:	Type	References
Financial challenges such as high initial costs	Internal	(Ayati et al., 2022) (Menon and Ravi, 2021) (Akbar and Ahsan, 2020) (Esen et al., 2017) (Movahedipour et al., 2017) (Ghadge et al., 2017) (Mangla et al., 2017) (Sajjad et al., 2015) (Elbarky, 2015) (Elbarkouky, 2013)
Lack of loans to fund sustainability projects	Internal	
Large capital commitment with a poor return	Internal	
High execution costs	Internal	
Insufficient funding for implementing SSCM	Internal	(Govindan et al., 2014) (Faisal, 2010)
Lack of strategic planning	Internal	(Akbar and Ahsan, 2020) (Muduli et al., 2013) (Faisal, 2010)
Inadequate infrastructure for implementing SSCM	Internal	(Ayati et al., 2022) (Govindan et al., 2014) (Faisal, 2010)
Difficulty in performance assessment processes	Internal	(Movahedipour et al., 2017) (Sajjad et al., 2015) (Elbarkouky, 2013)
Lack of appropriate tangible/financial indicators	Internal	
Higher costs of access to qualified experts	Internal	(Menon and Ravi, 2021) (Mangla et al., 2017) (Esen et al., 2017) (Movahedipour et al., 2017)
Inadequate government funding	External	(Narayanan, Sridharan and Kumar, 2019)
Insufficient incentives to support SSCM adoption	External	(Esen et al., 2017) (Mangla et al., 2017) (Ghadge et al., 2017) (Sajjad et al., 2015) (Elbarkouky, 2013) (Walker and Jones, 2012) (Walker and Sisto, 2008)
Lack of monitoring and control	External	(Govindan et al., 2014) (Muduli et al., 2013) (Zhu and Geng, 2013)

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.041

Social Barriers		
Sustainable supply chain Implementation faces:	Type	References
Lack of motivation in SSCM implementation	Internal	(Govindan et al., 2014) (Muduli et al., 2013)
Lack of SSCM recognition	Internal	(Kashyap and Shukla, 2022)
Lack of information about the gains of sustainability	Internal	(Menon and Ravi, 2021) (Esen et al., 2017) (Movahedipour et al., 2017)
Lack of policies and procedures aimed towards retaining talented and experienced employees	Internal	(Menon and Ravi, 2021) (Akbar and Ahsan, 2020) (Muduli et al., 2013) (Ravi et al., 2005)
Fear of failure in employees' satisfaction	Internal	(Govindan et al., 2014) (Mathiyazhagan et al., 2013) (Luthra et al., 2011)
Absence of well-defined policies and practices	Internal	(Menon and Ravi, 2021) (Mathiyazhagan et al., 2013) (Muduli et al., 2013)
Lack of corporate encouragement: lack of educational courses and seminars	Internal	(Menon and Ravi, 2021) (Movahedipour et al., 2017) (Esen et al., 2017)
Low level of employee engagement	Internal	(Elbarky, 2015) (Elbarkouky, 2013)
Lack of senior management support, lack of involvement on the part of top and middle management	Internal	(Movahedipour et al., 2017) (Esen et al., 2017) (Sajjad et al., 2015) (Elbarkouky, 2013)
Lack of engagement on the part of responsible actors	Internal	
Weak human resources quality	Internal	(Mangla et al., 2017) (Esen et al., 2017) (Movahedipour et al., 2017)
Employees accept working in dangerous conditions	Internal	(Campos Franco, Hussain and McColl, 2019)
Employees accept to be paid low wages	Internal	
Companies follow gender inequity	Internal	
Child and bonded labor exist in companies	Internal	(Movahedipour et al., 2017)
Aversion of change	Internal	(Esen et al., 2017) (Elbarkouky, 2013)

Inadequate laws and policies	External	(Narayanan, Sridharan and Kumar, 2019) (Esen et al., 2017) (Mangla et al., 2017) (Ghadge et al., 2017) (Sajjad et al., 2015) (Elbarkouky, 2013) (Walker and Jones, 2012) (Walker and Sisto, 2008)
Lack of cooperation with suppliers	External	(Menon and Ravi, 2021) (Mangla et al., 2017)
Difficulties tracking suppliers' activities	External	(Ghadge et al., 2017) (Movahedipour et al., 2017) (Elbarkouky, 2013) (Walker and Sisto, 2008)
Lack of mutual trust between members of the supply chain	External	(Mathiyazhagan et al., 2013) (Zhu and Geng, 2013) (Faisal, 2010)
Lack of supply chain support	External	(Zhu and Geng, 2013) (Faisal, 2010) (Ravi et al., 2005)
Lack of supply chain members' performance	External	(Tay et al., 2015) (Govindan et al., 2014) (Luthra et al., 2011)
Customers are unaware of sustainability benefits	External	(Mangla et al., 2017) (Movahedipour et al., 2017)
Egyptian culture is not able to accept sustainability practices	External	(Sajjad et al., 2015) (Elbarkouky, 2013)
Lack of benchmark	External	(Bhanot et al., 2015) (Luthra et al., 2011)

Environmental Barriers		
Sustainable supply chain Implementation faces:	Type	References
Design complexity required to reuse and recycle old products	Internal	(Govindan et al., 2014) (Mathiyazhagan et al., 2013)
Organizations access to unique and rare materials	External	(Lisa Westover, 2022) (Tello and Yoon, 2008)
Suppliers with a negative attitude toward supplying sustainable raw materials	External	(Govindan et al., 2014) (Mathiyazhagan et al., 2013)
Difficulty of engagement to circular economy, recycled to be part of a new product	External	(Lisa Westover, 2022) (Ayati *et al.*, 2022) (Mathews , 2018)
Hazardous waste disposal is costly	External	(Menon and Ravi, 2021) (Bhanot et al., 2015) (Govindan et al., 2014) (Mathiyazhagan et al., 2013)
Lack of markets for recycled products	External	(Faisal, 2010) (Ravi et al., 2005)

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.041

It was noticed that there is a shortage of studies on SSCM barriers in Egypt, a developing country with a limited number of studies, particularly in the fashion sector. Because of internal and external barriers, firms are still hesitant to implement sustainable practices. So, this research aims to identify the barriers to sustainable supply chain management implementation in the Egyptian fashion sector.

Methodology

Systematic literature review and investigation is a type of secondary research that involves locating, assessing, and interpreting relevant material for a certain topic or phenomena of interest. Planning, doing the review, analyzing the results, and reporting the findings are all important elements of the process. They help the researcher in demonstrating a clear and repeatable procedure of selecting, analyzing, and reporting past research on a certain topic as well as the review at hand. Figure (1) shows the literature review steps.

The researcher initially discussed and determined the article inclusion and exclusion criteria after collecting materials and before relevant publications selection. The timeframe of 2005 to 2022 was chosen following the research topic, as evidenced by the substantial amount of academic literature published during this period on the subject. Academic journal papers give rich material on a wide range of topics that is sufficient for achieving research objectives, and peer-review assures a certain degree of quality. Some have also been informed by industry reports, book chapters, and conference proceedings. Articles were found using keywords like "Fashion, Sustainable development", "Sustainability", "Sustainable supply chain", "Sustainable fashion", "Supply chain barriers", "Sustainability barriers", "Economic barriers", "Social barriers", and "Environmental barriers" in the fashion industry.

Web of Science, Science Direct, Scopus, Emerald Insight, and Springer Links were used to compile a list of published publications. As a consequence, this review includes a number of 29 publications.
The publications were then thoroughly analyzed to determine conformity with the study's scope after careful reading of titles and abstracts. A previous study on the topic aided in the evaluation of internal validity. Duplicates and non-relevant publications were excluded for adequate reasoning and valid reasons, such as papers that were not in the scope of the study, did not meet the quality criteria or were not completely accessible. Selected publications were imported to Mendeley reference management software to help with data management.

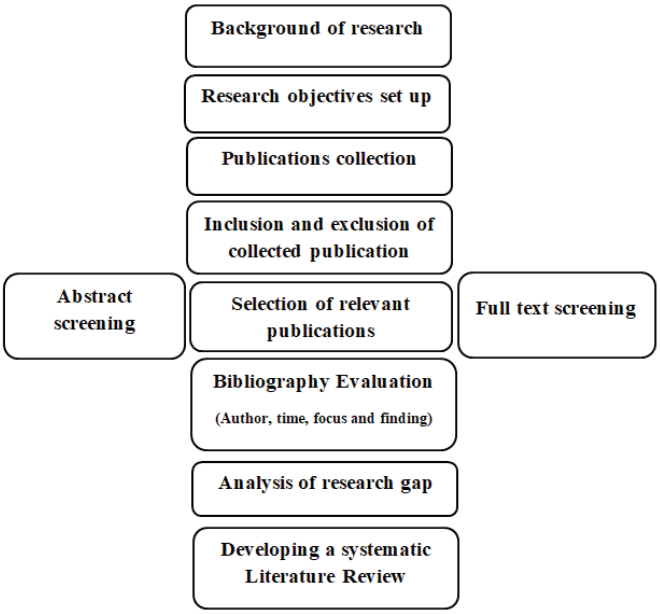

Fig. 1: Systematic literature review process
Source: Authors (2022)

After selection of the relevant 29 publications to the research area based on Figure 1, Table II evaluates each paper in the systematic literature review in terms of author names, year of publication, paper title, the aim of each paper, and findings for the sake of achieving the research objectives. Publications are evaluated also to find the area for future work and identify research gap.

Table II: A Systematic Literature Review on Sustainable Supply Chain Barriers Source: Authors (2022)

No	Author & Year	Paper Title	Focus	Finding
1	Abhishek Kashyap & Om Ji Shukla (2022)	Analysis of critical barriers in the sustainable supply chain of MSMEs: A case of Makhana (Foxnut) industry	Barriers to sustainable supply chain of the Makhana industry in northern India were investigated.	There are seven key barriers to sustainable supply chain adoption, such as lack of sufficient knowledge. These essential barriers must be addressed first since they have the most driving power and are directly driving other barriers.
2	Sayed Mohammad Ayati, Ehsan Shekarian, Jukka Majava & Brian Vejrum Waehrens (2022)	Toward a circular supply chain: Understanding barriers from the perspective of recovery approaches	The impact of barriers from the standpoint of reusing, remanufacturing, and recycling recovery methodologies was conceptualized.	The findings show that restrictions connected to economics and finance, governments and regulations, and society and culture have a significant impact on businesses' ability to implement recovery measures in the early stages.
3	Lisa Westover Piller (2022)	Designing for circularity: Sustainable pathways for Australian fashion small to medium enterprises	It investigates how Australian fashion SMEs are overcoming the obstacles to run fashion businesses based on the basic principles of product stewardship and circularity.	This study investigates the obstacles to a circular economy (CE) in the Australian fashion sector as well as the practices of Australian SMEs with a circular economy in overcoming these constraints.
4	Rakesh R. Menon & V. Ravi (2021)	An analysis of barriers affecting the implementation of sustainable supply chain management in the electronics industry: a Grey-DEMATEL approach	It investigates constraints in the context of the electronics sector for businesses to better develop sustainable supply chain initiatives.	It has been discovered that the biggest causal obstacle influencing operations of sustainable supply chain management is lack of legislation and direction from authorities.
5	Suraiyah Akbar & Kamrul Ahsan (2020)	Investigation of the challenges of implementing social sustainability initiatives: A case study of the apparel industry	Obstacles Bangladesh apparel supplier firms encounter when developed safety procedures were examined.	Key hurdles for garment supplier organizations in implementing social sustainability programs are related to resources and institutional issues.
6	Gunjan Soni, Surya Prakash, Himanshu Kumar, Surya Prakash Singh, Vipul Jain & Sukhdeep Singh Dhami (2020)	Interpretive structural modeling of drivers and barriers to sustainable supply chain management	The sustainability aspects of supply chain management strategies were investigated in this study.	According to the findings of this research, society, government, and commercial banks need to pay greater attention to the unorganized state of the stone and marble industry.
7	Esraa Osama Zayed & Ehab A. Yaseen (2020)	Barriers to sustainable supply chain management implementation in Egyptian industries: Interpretive structural modeling (ISM) approach	Barriers to sustainable supply chain management adoption in Egyptian businesses were investigated as well as the interrelationships between these barriers, to give a structured detailed model for barriers and suggest ideas to address these barriers.	Other than the previously indicated impediments to SSCM adoption in Egyptian businesses, the results revealed minor variances. ISM analysis aided in the formation of obstacles into a detailed structured model with well-defined interrelationships.
8	Kamyar Shirvanimoghaddam, Bahareh Motamed, Seeram Ramakrishna & Minoo Naebe (2020)	Death by waste: Fashion and textile circular economy case	The importance of circular fashion and textile was emphasized in this paper as well as numerous techniques for reuse, recycling, and repurposing textile waste. Also, disruptive scientific advances, inventions, and initiatives toward a circular textile economy were highlighted..	The findings suggest that fabrics reuse and recycling can be a sustainable alternative for reducing solid waste in landfills, as well as reducing the creation of virgin materials, energy consumption, and environmental footprint.
9	Jacqueline Campos Franco, Dildar Hussain & Rod McColl (2020)	Luxury fashion and sustainability: Looking good together	Significant sustainability difficulties that luxury fashion enterprises face were highlighted and examples of best practices in reacting to these challenges were illustrated.	The findings indicate that six critical lessons concerning sustainable practices have been established, with significance for managers in luxury apparel and other industries.

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.041

10	Selin Kucukkancabas Esen & Sahar Sobhy El Barky (2019)	Drivers and barriers to green supply chain management practices: The views of Turkish and Egyptian companies operating in Egypt	Literature on GSCM drivers and impediments from a new cultural context, particularly in Egypt, was added in this article.	According to the findings of this study, there are numerous motivators, but opposition to GSCM methods by internal and external stakeholders is unquestionably a problem.
11	Anilkumar Elavanakattu Narayanan, Rajagopalan Sridharan & P.N. Ram Kumar (2018)	Analyzing the interactions among barriers to sustainable supply chain management practices	Hurdles to implementing sustainable practices in the rubber goods manufacturing business in Kerala, India were identified, modeled and prioritized in this article.	According to the hierarchical connection developed using ISM methodology, the primary challenges to implementing sustainable practices in the rubber products manufacturing industry are lack of government initiatives and lack of benchmarks on sustainability measurement in Indian settings.
12	Abhijeet Ghadge, Merilena Kaklamanou, Sonal Choudhary & Michael Bourlakis (2017)	Implementing environmental practices within the Greek dairy supply chain Drivers and barriers for SMEs	The important factors influencing the environmental performance of SMEs in the Greek dairy supply chain was investigated.	The report highlights five barriers and six drivers for green practice implementation within the dairy SC. While external variables have a substantial impact on market structure and logistics network, the government, rivals, and customers are the driving forces behind improved environmental performance.
13	Sachin Kumar Mangla, Kannan Govindan & Sunil Luthra (2017)	Prioritizing the barriers to achieving sustainable consumption and production trends in supply chains using fuzzy Analytical Hierarchy Process	The obstacles to achieving sustainable production and consumption trends in a supply chain were identified and prioritized.	The findings revealed that the primary barriers and their sub-barriers were identified using both literature and expert feedback.
14	Nelly Oelze (2017)	Sustainable supply chain management implementation– Enablers and barriers in the textile industry Germany	Reasons for and procedures for implementing environmental and social supply chain policies were examined.	The findings indicate that the industry plays an important role in building alignment concerning observed barriers and enablers in sustainable policy adoption along the supply chain.
15	Aymen Sajjad, Gabriel Eweje & David Tappin (2015)	Sustainable supply chain management: Motivators and barriers	Drivers and impediments to SSCM adoption in the New Zealand corporate sector were investigated for better understanding of the motivators and challenges to SSCM implementation.	The findings show that senior management's sustainability principles, a desire to decrease risk, and stakeholder management are key motivators for SSCM adoption. In contrast, hurdles to SSCM implementation include lack of supplier awareness, negative attitudes, and insufficient government backing.
16	Mee Yean Tay, Azmawani Abd Rahman, Yuhanis Abdul Aziz, & Shafie Sidek (2015)	A review on drivers and barriers towards sustainable supply chain practice	Obstacles and drivers to implementing sustainable supply chain management were identified.	The findings indicate that a variety of factors have been established to impact an organization's decision to employ SSCM.
17	Sahar Elbarky & Sara Elzarka (2015)	A green supply chain management migration model based on challenges faced in Egypt	Limitations and challenges that Egyptian firms experience were identified, while implementation of green supply chain management to serve as the foundation for a GSCM migration model was discussed..	The researchers discovered many hurdles that were shared by businesses from various industries. They also discovered that education was the fundamental cause of the observed restrictions.
18	Bhanot et al. (2015)	Enablers and barriers of sustainable manufacturing: Results from a survey of researchers and industry professionals	The perspectives of many scholars and industry professionals on the main enablers and barriers of sustainable manufacturing were discussed.	Presents the perspectives of many scholars from around the world and industry professionals on the key enablers and hurdles, and analyses them using statistical approaches to reveal disparities in perspectives for strategic SM implementation.

19	M. M. G. Elbarkouky & G. Abdelazeem (2013)	A green supply chain assessment for construction projects in developing countries	Through a review of the literature and conversations with experts, a framework for determining critical GSCM criteria for the construction industry was proposed.	According to the findings, the key drivers of GSCM implementation in Egypt are ISO 14001 certification and market competitiveness, whereas the main impediment is lack of legislation.
20	Kamalakanta Muduli, Kannan Govindan, Akhilesh Barve & Yong Geng (2013)	Barriers to green supply chain management in Indian mining industries: A graph-theoretic approach	Variables and sub-factors that are impeding GSCM deployment were identified.	To assess the negative impact of these hurdles on GSCM implementation, a graph theoretic and matrix approach was adopted. An assessment of the barriers' impeding strength assists decision-makers in ranking them and deciding on a course of action that will make the best use of resources during times of scarcity.
21	K. Mathiyazhagan, Kannan Govindan, A. NoorulHaq & Yong Geng (2013)	An ISM approach for the barrier analysis in implementing green supply chain management	Barriers among the indicated obstacles and the imperative and mutual interaction of the twenty-six hurdles for GSCM were identified.	According to the findings of this study, the problem of maintaining suppliers' environmental awareness (B1) barrier is a major impediment to the adoption of GSCM. Industries must pay special attention and prioritize removing this barrier.
22	Kannan Govindan, Mathiyazhagan Kaliyan, Devika Kannan & A.N. Haq (2013)	Barriers analysis for green supply chain management implementation in Indian industries using analytic hierarchy process	Procurement-related impediments to the adoption of a green supply chain management were identified.	The outcome demonstrates that a total of 47 barriers was discovered through a comprehensive literature review and discussions with industry experts, as well as a questionnaire-based survey of several industrial sectors. The analytic hierarchy approach is used to identify critical barriers/priorities. A sensitivity study is also performed to assess the stability of priority ranking.
23	Helen Walker & Neil Jones (2012)	Sustainable supply chain management across the UK private sector	Sustainable SCM difficulties in companies that have been regarded as industry leaders as well as the factors that influence SSCM were discussed.	The results indicated the classification of: Internal focusers, Reserved performers, External respondents, and Agenda setters as the four types of businesses. Predictions regarding the future of SSCM in businesses was also investigated.
24	Sunil Luthra1, Vinod Kumar, Sanjay Kumar & Abid Haleem (2011)	Barriers to implementing green supply chain management in the automobile industry using interpretive structural modeling technique-An Indian perspective	A structural model of the constraints to GSCM implementation in the Indian automobile sector was proposed.	Eleven impediments to implementing GSCM in the Indian automobile sector have been identified, according to the findings. The (ISM) methodology was used to identify contextual linkages between several hurdles to GSCM implementation in the Indian automobile industry.
25	Qinghua Zhu & Yong Geng (2010)	Drivers and barriers of extended supply chain practices for energy saving and emission reduction among Chinese manufacturers	Types of drivers motivate ESC practices for Sustainable Energy and Emission Reduction program goals were investigated, and whether impediments affect successful ESC practice adoption.	This study has policy implications for Chinese governments in terms of developing laws and standards for their ESER program, which can be utilized to promote relevant sustainable practices among Chinese manufacturers.
26	Mohd. Nishat Faisal (2010)	Analysing the barriers to corporate social responsibility in supply chains: An interpretive structural modelling approach	The impediments to (CSR) in supply chains were identified and analyzed.	According to the findings, not all supply chain CSR barriers demand the same level of attention. There are barriers with high driving power but low dependency demanding maximal concentration, and barriers with high dependence but low driving power.
27	Helen Walkera, Lucio Di Sistob & Darian McBain (2008)	Drivers and barriers to environmental supply chain management practices: Lessons from the public and private sector	Factors that motivate or discourage organizations from implementing GSCM efforts were investigated.	This study discovered that organizational drives and impediments can be both internal and external. External instead of internal drivers appear to have a greater influence on organizations.

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.041

28	Steven F. Tello & Eunsang Yoon (2008)	Examining drivers of sustainable innovation	Perspectives and driving factors of sustainable innovation offer a future research program and the relative importance and interplay of the sustainable innovation drivers were investigated.	This study proposes a methodology for investigating the relationship between a company's perspectives on economic development and environmental responsibility, the mechanisms that require company reaction, and the interaction between the firm, the drivers, and stakeholder groups.
29	V. Ravi, Ravi Shankar (2005)	Analysis of interactions among the barriers of reverse logistics	Interaction of the primary constraints that impede or inhibit the use of reverse logistics in the automobile industry was examined.	The findings indicate that by assessing the barriers using the ISM model, the researchers may identify critical barriers that impede reverse logistics processes. It can be shown that some barriers have both strong driving power and reliance, requiring additional attention.

To perform a comprehensive literature review on the desired topic, the researchers began to search for sustainable fashion supply chain barriers in the Egyptian fashion sector but it was in vain. So, the researchers decided to break down the concept into simple terms to locate academic articles, such as supply chain barriers, sustainability barriers, fashion barriers, Egyptian supply chain barriers, Egyptian fashion barriers, sustainable supply chain barriers, and sustainable fashion barriers. Consequently, 29 relevant academic publications were used to conduct a systematic review of these previous studies.

Previous researchers have identified many barriers to SSCM adoption, which have been categorized as internal factors – those related to situations within the company – and external factors – those beyond the firms' boundaries. Other researchers also divided sustainability barriers into three main categories; Economic barriers, Social barriers, and Environmental barriers. But some publications are not divided into categories, only hanging out general sustainability or sustainable supply chain barriers. Surprisingly, the very recent publications have a unique and updated categorization for the barriers.

 Based on the systematic Table II, around 11 publications out of 29 divided the barriers either sustainability barriers or sustainable supply chain barriers into Internal and External categories, starting from 2008 till 2020. Zayed and Yaseen (2020) divided the barriers into seven internal barriers such as financial constraints and three external barriers like lack of sustainability awareness. Elbarkouky and Abdelazeem (2013) divided a green supply chain barriers into ten internal barriers like high initial cost and 13 external barriers such as resistance to change, while Walker and Sisto (2008) divided the green supply chain management barriers into around seven internal barriers including lack of management and five external barriers such poor supplier commitment.

 About 16 academic articles during the period of 2005 – 2022 are dividing sustainable supply chain barriers either into main sustainability barriers without categorization or categorizing them into Economic barriers, Social barriers, and Environmental barriers.

- Economic barriers such as lack of financial indicators, large capital commitment with a poor return, high cost to access qualified experts, lack of loans to fund sustainability projects, and subsidy from the government to the firm that is required for investment in R&D so that the company may survive in the future. Lack of government support may lead to poor performance in this sector and reluctance on the part of businesses to apply SSCM practices, which aids in responsible production and consumption. Furthermore, a bank loan is required for the continuation of business operations, the purchase of new equipment, the development of the business, and the reduction of unforeseen expenditures, all of which contribute to the company's stability. To implement SSCM techniques, large amounts of funding are necessary. One of the greatest obstacles is the commercial bank's non-supportive

character.

- Social barriers such as the pressure of job creation is regarded as one of the most important impediments since employment is the most important aspect of an individual's growth. Furthermore, because of their workability and strength, women are compensated less than their male spouses. Weak government regulations as government rules are a collection of laws that regulate how a company can function. It is an important social element in SSCM. Government rules should guarantee that no unlawful or unethical action occurs. As a result, it is regarded as one of the primary impediments. Child and bonded labor have been discovered in numerous mining, according to various accounts, and are still in use. All of the previous points and many more are considered social barriers that hinder sustainable supply chain implementation.
- Environmental barriers such as the design complexity required to reuse and recycle old products, lack of markets for recycled products, the difficulty of engaging in a circular economy, information on new technology, and how to utilize it are all part of the environmental barriers for sustainable supply chain implementation.

 The Remaining two recent publications created their own unique and updated categorization for the barriers. According to Ayati et al. (2022), circular supply chain barriers are divided into seven main categories of barriers, each one has some related barriers. However, Menon and Ravi (2021) divided sustainable supply chain management barriers into four main categories containing another 11 barriers. Technology and financial barriers are common between both of them.

 Despite the fact that more than one academic research have shown that there is a shortage in research about the sustainable supply chain in developing countries, India possessed ten out of 29 publications from 2005 through 2022 about sustainable supply chain barriers in several industries such as rubber product manufacturing, auto components, mining industries, automobiles, electronics and stone, and marble sector. Other ten publications out of 20 are about barriers to implementing sustainable supply chain in different sectors like fashion, textile, and dairy products industries in countries like Bangladesh, Greek, New Zealand, Egypt, the UK, and China.

 Only four publications were found about sustainable or green supply chain management barriers in Egypt from 2013 to 2020 dividing barriers into two categories; internal and external.

- First, Zayed and Yaseen (2020) explored the seven internal and three external barriers to sustainable supply chain management implementation, a sample of 14 companies, ten local Egyptian companies, and four Multinational, the sample distribution of automotive, fast-moving consumer goods, food industry, heavy industry, and pharmaceutical industries.
- Second, Esen and El Barky (2019) identified five main internal and three external barriers to the green supply chain in two different countries, Egypt and Turkey.
- Third, Elbarky and Elzarka (2015) identified barriers that face Egyptian organizations during implementing green supply chain management into six main internal barriers containing 36 sub barriers, and three major external barriers consisting of 15 sub-barriers.
- Fourth, Elbarkouky (2013) identified the barriers to implementing green supply chain management as ten internal and 13 external barriers.

 From the systematic Table II, the researchers found that there are only five publications about sustainable fashion from 2017- to 2022, which indicates rareness in the fashion sector academic research worldwide and researchers have recently started to highlight the sector's importance and its barriers to being sustainable. These five publications starting from the newest to the oldest are as follows:

- Lisa Westover (2022) examines the barriers to a circular economy that exist in

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.041

the Australian fashion sector such as circular purpose drives new business models.
- Akbar and Ahsan (2020) focus on the social barriers to a sustainable Bangladesh apparel sector such as financial barriers and resources management.
- Shirvanimoghaddam et al. (2020) suggest that textile reuse and recycling can be a long-term option for reducing solid waste in landfills, as well as reducing the creation of virgin materials, energy consumption, and environmental footprint.
- Franco et al. (2019) highlight the main sustainability challenges and barriers to addressing luxury fashion manufacturers.
- Oelze (2017) highlights the barriers and drivers for a sustainable textile supply chain in Germany.

From the previous fashion sector publications, the authors found only one publication on the developing country, Bangladesh; however, the developing counties are the greater in need of such research as most of the production worldwide takes place in them. The authors also did not find any previous academic research on the Egyptian fashion sector or the sustainability in the Egyptian fashion sector, which is considered the research gap, so the authors had to highlight sustainable supply chain barriers in general and search further on the sustainable fashion barriers. The main contribution of this research paper is:

1- This research combines the two classifications of the previous studies from 2005 to 2022; classifying the sustainable supply chain barriers into internal and external barriers and also into economic, social, and environmental barriers at the same time.
2- This study is one of the few that explore sustainable fashion supply chain management in developing countries, particularly Egypt.
3- The first paper that discusses sustainable supply chain barriers in terms of sustainability on three bottom lines; economic, social, and environmental in the Egyptian sector.
4- The first academic paper to discuss the Egyptian sustainable supply chain barriers for implementation.

Conclusion and Future Research

The difficulty of supply chains has increased due to the emerging trend in the fashion industry of expanding product range, a limited product life cycle, increased outsourcing, and technical advancement. It has been updated to meet the demands of fashion consumers for new items while retaining fast manufacturing lead times. Because of the lengthy, dynamic processes in the clothing industry supply chain as well as the internet's strong presence, strategic steps have been made and applied to solve long purchasing times and increasingly competitive fashion customers. With new goods being designed every second to meet each customer's needs, new supply chain systems can be built to directly serve these demanding consumers.

Fast fashion, Ultra-fast fashion, and just-in-time production are presently dominating the fashion sector, especially in developing countries like Egypt, resulting in increased fashion trends. This, in turn, has led to overconsumption, in which people buy more than they need, resulting in fashion waste (Pookulangara, 2013). Wherefore sustainable supply chain has been applied to the fashion industry to mitigate fashion wastes such as fuel, water, energy, and material usage and maintain life cycle assessment of the industry. So this research aims to figure out barriers to sustainable supply chain management implementations in the Egyptian fashion industry. Consequently, this research fills in the gaps of sustainable fashion supply chain barriers in the Egyptian industry since there is very limited research focusing on this topic in developing countries, especially in Egypt.

Based on the results and conclusion, the researchers suggest that future research could conduct empirical research whether using an interview to discuss the main results of this research or to use a questionnaire. The future research could consider the comparative study on social sustainability barriers between Egypt with Bangladesh as two developing countries.

Reference List

[1] 2020 World Population Data Sheet (2020) Population (English Edition). Washington, D.C. Available at: https://www.prb.org/2020-world-population-data-sheet/ (Accessed: June 5, 2021).

[2] Akbar, S. and Ahsan, K. (2020) "Investigation of the challenges of implementing social sustainability initiatives: a case study of the apparel industry," Social Responsibility Journal, 17(3). Available at: https://doi.org/10.1108/SRJ-09-2019-0291.

[3] Ashby, A., Leat, M. and Hudson-Smith, M. (2012) "Making connections: A review of supply chain management and sustainability literature," Supply Chain Management. Available at: https://doi.org/10.1108/13598541211258573.

[4] Ayati, S.M. et al. (2022) "Toward a circular supply chain: Understanding barriers from the perspective of recovery approaches," Journal of Cleaner Production, 359, p. 131775. Available at: https://doi.org/10.1016/j.jclepro.2022.131775.

[5] Basak, A. et al. (2014) "Supply chain management in garments industry," Global Journal of Management and Business Research: A Administration and Management, 14(11).

[6] Bhanot, N., Rao, P.V. and Deshmukh, S.G. (2015) "Enablers and barriers of sustainable manufacturing: Results from a survey of researchers and industry professionals," in Procedia CIRP. Available at: https://doi.org/10.1016/j.procir.2015.01.036.

[7] Camargo, L.R., Pereira, S.C.F. and Scarpin, M.R.S. (2020) "Fast and ultra-fast fashion supply chain management: an exploratory research," International Journal of Retail and Distribution Management, 48(6). Available at: https://doi.org/10.1108/IJRDM-04-2019-0133.

[8] Campos Franco, J., Hussain, D. and McColl, R. (2020) "Luxury fashion and sustainability: looking good together," Journal of Business Strategy, 41(4). Available at: https://doi.org/10.1108/JBS-05-2019-0089.

[9] Carter, C.R. and Rogers, D.S. (2008) "A framework of sustainable supply chain management: Moving toward new theory," International Journal of Physical Distribution and Logistics Management. Available at: https://doi.org/10.1108/09600030810882816.

[10] Elbarkouky, M.M.G. and Abdelazeem, G. (2013) "A green supply chain assessment for construction projects in developing countries," WIT Transactions on Ecology and the Environment, 179 VOLUME 2. Available at: https://doi.org/10.2495/SC131132.

[11] Elbarky, S. and Elzarka, S. (2015) "A green supply chain management migration model based on challenges faced in Egypt," in. Available at: https://doi.org/10.1109/ieom.2015.7228093.

[12] Esen, S.K. and el Barky, S.S. (2019) "Drivers and Barriers to Green Supply Chain Management Practices," in Green Business. Available at: https://doi.org/10.4018/978-1-5225-7915-1.ch061.

[13] Faisal, M.N. (2010) "Analysing the barriers to corporate social responsibility in supply chains: An interpretive structural modelling approach," International Journal of Logistics Research and Applications, 13(3). Available at: https://doi.org/10.1080/13675560903264968.

[14] Galal, S. (2019) Value of manufactured clothing exports from Egypt between 2013 and 2018, Statista. Available at: https://www.statista.com/statistics/1005228/egypt-value-of-manufactured-clothing-exports/ (Accessed: May 26, 2021).

[15] Ghadge, A. et al. (2017) "Implementing environmental practices within the Greek dairy supply chain Drivers and barriers for SMEs," Industrial Management and Data Systems, 117(9). Available at: https://doi.org/10.1108/IMDS-07-2016-0270.

[16] Govindan, K. et al. (2014) "Barriers analysis for green supply chain management implementation in Indian industries using analytic hierarchy process," International Journal of Production Economics, 147(PART B). Available at: https://doi.org/10.1016/j.ijpe.2013.08.018.

[17] Haake, H. and Seuring, S. (2009) "Sustainable procurement of minor items - Exploring limits to sustainability," Sustainable Development, 17(5). Available at: https://doi.org/10.1002/sd.424.

[18] Kashyap, A. and Shukla, O.J. (2022) "Analysis of critical barriers in the sustainable supply chain

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.041

of MSMEs: a case of Makhana (Foxnut) industry," Benchmarking: An International Journal [Preprint]. Available at: https://doi.org/10.1108/BIJ-11-2021-0696.

[19] Lee, H.L. (2002) "Aligning supply chain strategies with product uncertainties," California Management Review. Available at: https://doi.org/10.2307/41166135.

[20] Luthra, S. et al. (2011) "Barriers to implement green supply chain management in automobile industry using interpretive structural modeling technique-an Indian perspective," Journal of Industrial Engineering and Management, 4(2). Available at: https://doi.org/10.3926/jiem.2011.v4n2.p231-257.

[21] Mangla, S.K., Govindan, K. and Luthra, S. (2017) "Prioritizing the barriers to achieve sustainable consumption and production trends in supply chains using fuzzy Analytical Hierarchy Process," Journal of Cleaner Production, 151. Available at: https://doi.org/10.1016/j.jclepro.2017.02.099.

[22] Mathews, J. (2018) "Implementing Green Management in Business Organizations," IUP Journal of Business Strategy, 15(2).

[23] Mathiyazhagan, K. et al. (2013) "An ISM approach for the barrier analysis in implementing green supply chain management," Journal of Cleaner Production, 47. Available at: https://doi.org/10.1016/j.jclepro.2012.10.042.

[24] Menon, R.R. and Ravi, V. (2021) "An analysis of barriers affecting implementation of sustainable supply chain management in electronics industry: a Grey-DEMATEL approach," Journal of Modelling in Management [Preprint]. Available at: https://doi.org/10.1108/JM2-02-2021-0042.

[25] Moon, K.L.K., Lee, J.Y. and Lai, S. yeung C. (2017) "Key drivers of an agile, collaborative fast fashion supply chain: Dongdaemun fashion market," Journal of Fashion Marketing and Management, 21(3). Available at: https://doi.org/10.1108/JFMM-07-2016-0060.

[26] Movahedipour, M. et al. (2017) "An ISM approach for the barrier analysis in implementing sustainable supply chain management: An empirical study," Management Decision, 55(8). Available at: https://doi.org/10.1108/MD-12-2016-0898.

[27] Muduli, K. et al. (2013) "Barriers to green supply chain management in Indian mining industries: A graph theoretic approach," Journal of Cleaner Production, 47. Available at: https://doi.org/10.1016/j.jclepro.2012.10.030.

[28] Narayanan, A.E., Sridharan, R. and Ram Kumar, P.N. (2019) "Analyzing the interactions among barriers of sustainable supply chain management practices: A case study," Journal of Manufacturing Technology Management, 30(6). Available at: https://doi.org/10.1108/JMTM-06-2017-0114.

[29] Pietanza, M.C. et al. (2018) "Randomized, double-blind, phase II study of temozolomide in combination with either veliparib or placebo in patients with relapsed-sensitive or refractory small-cell lung cancer," Journal of Clinical Oncology, 36(23). Available at: https://doi.org/10.1200/JCO.2018.77.7672.

[30] Piller, L.W. (2022) "Designing for circularity: sustainable pathways for Australian fashion small to medium enterprises," Journal of Fashion Marketing and Management: An International Journal [Preprint]. Available at: https://doi.org/10.1108/JFMM-09-2021-0220.

[31] Pookulangara, S. and Shephard, A. (2013) "Slow fashion movement: Understanding consumer perceptions-An exploratory study," Journal of Retailing and Consumer Services, 20(2). Available at: https://doi.org/10.1016/j.jretconser.2012.12.002.

[32] Purvis, B., Mao, Y. and Robinson, D. (2019) "Three pillars of sustainability: in search of conceptual origins," Sustainability Science, 14(3). Available at: https://doi.org/10.1007/s11625-018-0627-5.

[33] Raci, V. and Shankar, R. (2005) "Analysis of interactions among the barriers of reverse logistics," Technological Forecasting and Social Change, 72(8). Available at: https://doi.org/10.1016/j.techfore.2004.07.002.

[34] Redek, T., Domadenik, P. and Koman, M. (2020) "Sustainable Development Goals in the Eu and the Challenges in Their Implementation," in Challenges on the Path Towards Sustainability in Europe: Social Responsibility and Circular Economy Perspectives. Available at: https://doi.org/10.1108/978-1-80043-972-620201003.

[35] Sajjad, A., Eweje, G. and Tappin, D. (2015) "Sustainable Supply Chain Management:

Motivators and Barriers," Business Strategy and the Environment, 24(7). Available at: https://doi.org/10.1002/bse.1898.

[36] Shahbandeh, M. (2021) Global apparel market - statistics & facts, Statista.

[37] Shirvanimoghaddam, K. et al. (2020) "Death by waste: Fashion and textile circular economy case," Science of the Total Environment, 718. Available at: https://doi.org/10.1016/j.scitotenv.2020.137317.

[38] Tay, M.Y. et al. (2015) "A Review on Drivers and Barriers towards Sustainable Supply Chain Practices," International Journal of Social Science and Humanity, 5(10). Available at: https://doi.org/10.7763/ijssh.2015.v5.575.

[39] Tello, S. and Yoon, E. (2008) "Examining drivers of sustainable innovation," International Journal of Business Strategy [Preprint].

[40] Tipi, N. and el Gazzar, S.H. (2021) "Considerations Towards a Sustainable and Resilient Supply Chain: A Modelling Perspective," International Business Logistics, 1(1). Available at: https://doi.org/10.21622/ibl.2021.01.1.006.

[41] Tseng, M., Lim, M. and Wong, W.P. (2015) "Industrial Management & Data Systems For Authors Sustainable supply chain management A closed-loop network hierarchical approach," Industrial Management & Data Systems The TQM Journal Iss International Journal of Physical Distribution &amp Logistics Management, 115(1).

[42] Tseng, M.L. and Geng, Y. (2012) "Evaluating the green supply chain management using life cycle assessment approach in uncertainty," WSEAS Transactions on Environment and Development, 8(4).

[43] Walker, H. and Jones, N. (2012) "Sustainable supply chain management across the UK private sector," Supply Chain Management, 17(1). Available at: https://doi.org/10.1108/13598541211212177.

[44] Walker, H., di Sisto, L. and McBain, D. (2008) "Drivers and barriers to environmental supply chain management practices: Lessons from the public and private sectors," Journal of Purchasing and Supply Management, 14(1). Available at: https://doi.org/10.1016/j.pursup.2008.01.007.

[45] Youm7 (2020). Available at: https://www.youm7.com (Accessed: June 1, 2021).

[46] Zayed, E.O. and Yaseen, E.A. (2021) "Barriers to sustainable supply chain management implementation in Egyptian industries: an interpretive structural modeling (ISM) approach," Management of Environmental Quality: An International Journal, 32(6). Available at: https://doi.org/10.1108/MEQ-12-2019-0271.

[47] Zhu, Q. and Geng, Y. (2013) "Drivers and barriers of extended supply chain practices for energy saving and emission reduction among Chinese manufacturers," Journal of Cleaner Production, 40. Available at: https://doi.org/10.1016/j.jclepro.2010.09.017.

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.060

Technologies and Innovations for Improving Performances of Logistics Operators: The Techlog Project

Prof. Gianfranco Fancello*

CIREM – University of Cagliari (Italy)
Techlog Project Coordinator

fancello@unica.it

Introduction

Analyzing world maritime flows, the Mediterranean Sea is playing an increasingly central role in the world scenarios of goods transport and logistics: from 2006 to 2021 maritime traffic in the Mediterranean increased by 108% and today the Mediterranean area is involved in at least 12% of the worldwide maritime flows (Notteboom et al., 2019). in fact, the whole Med area has a strategic role related to its key positioning along the major East-West trading routes that linked all most important world freight markets (regarding Atlantic, European, Asian and African areas). About 40% of worldwide-containerized trade flows is handled by Mediterranean container ports and between 2010 and 2020, the total container volumes in Med area increased about 46% (UNCTAD, 2021).

Despite this quick development, some elements threaten the primary role of the Mediterranean in the scenario of world maritime traffic flows: the artic route represents, alas due to global warming and climate change, a possible and increasingly capable route to significantly reduce the connection time between the Far East and Central Europe; the recent blockage of the Suez Canal has highlighted how it could become a real bottleneck for the development of the Mediterranean Sea, thus, stimulating the identification of new routes (Fancello et al. 2021).

The constant and continuous growth of ships sizes (naval gigantism) is restricting access to only a few Mediterranean ports that are equipped to receive large vessels. This means that the Mediterranean, if it is to remain competitive, will have to prove not only that it has transport infrastructures suited to the demands of shipowners, but above all working and cargo handling standards consistent with what the market requires, adequate to the highest levels of safety and competitiveness (Fancello et al. 2022).

Therefore, in order to adequately respond to this rapid evolution and to be able to play a leading role in the future scenario of world maritime traffic, all the Mediterranean countries must present themself to the outside world as a single and united area, in which working standards are as common as possible, the operating characteristics of all transport systems must be standardized and high at the same time, and the quality of logistical performance must be such that it attracts traffic compared to competing areas (the Red Sea area, ports on Atlantic Africa and above all the Northern Range).

In order to achieve this scenario, ports, logistic operators and all the subjects involved in Mediterranean transport chains need to define univocal training and specialization standards so that permanent networks can be created between ports and logistic operators within the Mediterranean area in order to strengthen its competitiveness (Kaliszewski et al., 2020). This process can be reinforced also involving research

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.060

centers and universities, logistic operators, ships owning companies, and other transport subjects inside some collaboration clusters, where innovation and technological supplies meet enterprises' needs.

Overall aim of "TECHLOG" project

TECHLOG is a project funded by the EU under the call for strategic projects of the ENI CBC Med Programme 2014-2020: as known, ENI CBC Med Programme (before 2014 it was called ENPI) is a specific EU programme finalized to improve cooperation between Mediterranean countries, particularly promoting activities between northern and southern shores. The ultimate scope is to create a competitive and strictly connected Mediterranean area both by economic, social and political points of view. Five are the countries involved: Italy, Egypt, Lebanon, Spain and Tunisia, well located in the whole Mediterranean area. Nine partners from these five countries are involved: two from Italy, CIREM by Università degli Studi di Cagliari (Lead Beneficiary and project Coordinator) and Camera di Commercio Industria Artigianato e Agricoltura della Maremma e del Tirreno; three from Egypt, Arab Academy for Science, Technology & Maritime Transport, the Confederation of European Egyptian Business Associations and the Federation of Egyptian Chambers of Commerce - Alexandria Chamber; two from Tunisia, the Chambre de Commerce et d'Industrie de Sfax and the Université de Sfax; one from Spain, the Escola Europea de Short Sea Shipping; one from Lebanon, the Chamber of Commerce, Industry and Agriculture of Beirut & Mount Lebanon. So, the partnership structure is well balanced, formed both by research and academic centers and by subjects related to business and enterprises world.

In fact, **TECHLOG** aims to strengthen research-industry links in the Mediterranean transport sector by establishing a permanent cross-border EU-Med space where research organizations and transport industries co-create, test and share new technological initiatives based on advanced driving simulation technologies. the objective of the project is to improve the operational and performance standards of logistics operators, particularly crane operators and truck drivers, operating within the involved countries, in order to raise their quality level and thus improve the logistic competitiveness of the entire Mediterranean area.

In order to foster exchanges and cooperation between different subjects, the project envisages the creation of a cross-border Med Open Lab, the aim of which is to facilitate the sharing of knowledge and joint technological initiatives between the academic world and the industry of transport, using advanced simulation processes to improve the training and specialization of operators and therefore the level of competence of transport and logistics operators. This will help trigger knowledge-based development, based on innovation and advanced simulation technologies, which will contribute to the growth of the EU-Med transport economy.

Specifically, two permanent and integrated Living Labs will be set up, one for the West area (Tunisia Italy and Spagna), the other for the East area (Lebanon and Egypt), which will cooperate closely and cohesively with each other. Living Labs are physical-virtual spaces where companies and the researchers' centers will meet and exchange contents, activities, needs, experimental points of view. This can be done on site (where there is geographical proximity), but also through virtual online systems in order to maximize the potential that the system offers, pursuing a real integration within the Mediterranean area.

Among the main beneficiaries of the project there are transport institutions, port authorities, terminal operators, research centers in the field of advanced simulation, transporters, and dockworkers. Concretely, **TECHLOG** will encourage joint technological initiatives for the Mediterranean transport community in order to achieve common and high-quality standards for transport and port specialized staff. These initiatives will be tested through pilot actions, involving real port and transport operators, both using simulators and developing on site activities.

Volume 2, Issue 1, June 2022 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2022.02.1.060

TECHLOG also focuses on building institutions' capacity to manage innovation processes and formulate joint strategies in the field of advanced and certified training for transport staff to strengthen the operational efficiency of the Med Transport and port sectors. In so doing, **TECHLOG** supports public officers in the challenge of designing coherent and common policies in the field of certified advanced training for transport staff.

Thanks to **TECHLOG**, transport operators and institutions will be provided with a reference point to co-design and deliver technology transfer in real-life environment to improve transport performance and competitiveness. Among the main beneficiaries of the project there are transport institutions, port authorities, terminal operators, research centers in the field of advanced simulation, transporters, and dockworkers.

When the project ends, the Mediterranean area will have high training standards for its logistics operators as well as a technological platform based on Living Lab processes, to improve the skills of all port and logistics operators through which in order to increase the competitiveness of the whole Mediterranean Sea.

References

[1] Fancello, G. et al. (2021) "Evaluating the efficiency of Mediterranean container ports using data envelopment analysis," Competition and Regulation in Network Industries, 22(3–4). Available at: https://doi.org/10.1177/17835917211047837.

[2] Fancello, G. et. al. (2022) "The impact of globalization on Mediterranean container terminals," in The International Maritime and Logistics Conference "Marlog 11" Towards a Sustainable Blue Economy.

[3] Kaliszewski, A. et al. (2020) "Key factors of container port competitiveness: A global shipping lines perspective," Marine Policy, 117. Available at: https://doi.org/10.1016/j.marpol.2020.103896.

[4] Notteboom, T.E., Parola, F. and Satta, G. (2019) "The relationship between transhipment incidence and throughput volatility in North European and Mediterranean container ports," Journal of Transport Geography, 74. Available at: https://doi.org/10.1016/j.jtrangeo.2019.01.002.

[5] UNCTAD (2021) Review of Maritime Transport 2021 - Overview, Review of Maritime Transport.

Biography

Dr. Fancello is an Associate Professor at DICAAR – Department of Civil Engineering Environment and Architecture at University of Cagliari; his courses are "Transport Freight and Supply Chain", "Transport Systems Design".

He is General director of CIREM, Center of Transport and Economics Research of Universitity of Cagliari and Sassari; he has been general Manager of Centralabs, Centre of Excellence in Transport of Sardinia, a consortium of companies with Universities of Cagliari and Sassari and several public and private companies in the transport area.

Since 1992 he has been carrying on research activities about interaction between land use and transport, human factors related to active and passive transport safety, maritime transport, freight and supply chain. He is the scientific coordinator and technical director of several national and international research projects. He is the author of 5 books and about 90 papers.He has worked with several public administrations and some private companies for developing projects and plans in the field of transport, traffic and mobility.

International Business Logistics Journal
Volume 2, Issue 1, June 2022 - ISSN 5969 - 2735