

PalArch's Journal of Archaeology
of Egypt / Egyptology

COMPARATIVE ANALYSIS OF GREEN ICT PRACTICES AMONG PALESTINIAN AND MALAYSIAN IN SME FOOD ENTERPRISES DURING COVID-19 PANDEMIC

Malik Mustafa
Gulf College

malik@gulfcollege.edu.om

Abdallah Abbas
University College of Science
abdTeachnology
abed.m.abbas@gmail.com

Malik Mustafa, Abdallah Abbas, Comparative analysis of green ICT practices among Palestinian and Malaysian in SME food enterprises during Covid-19 Pandemic-Palarch's Journal Of Archaeology Of Egypt/Egyptology 17(7), ISSN 1567-214x

Abstract: Covid-19 requires the demand to spread awareness among people about the adverse environmental impact of operations done in industries in order to sustain the environment. For that purpose, green information & technology devise the standard in order to incorporate strategies practically to gain a wide range of economic benefits special under critical circumstances of pandemic. Besides, Green ICT plays a significant role in promoting Sustainability in industrial context. Sustainability has become an essential factor for companies and industries nowadays, especially food industry. This study explores a comparative analysis between Palestine and Malaysian food industries in the context of Green ICT during this pandemic. This study comprises of; firstly, analyze the food practices in food industry. Secondly, to investigate the basic factors that affect Sustainability in align to literature. The results of the research showed that environmental, economical, technological and social responsibility are few of those factors that affect the practices. Data was collected with the help of a questionnaire survey, 200 SME managers from the food industry in which 100 from Palestinian food firms and 100 from Malaysian food firms. 60% was the response rate for the survey. SPSS was used to analyze the Validity and Reliability of the data collected earlier. T-sample test was run to examine the effect of different factors. The study concludes that there is a significant influence of suitability operations in the food industry while comparing Palestine and

Malaysia. Thus, it revealed that Malaysian food chain firms were considered as more competent in incorporating Green ICT in terms of Technical and environmental factors as compared to Palestine industries during this pandemic, COVID-19. Furthermore, adopting of ICT helped in enhance the efficiency of environmental supply chain and boost competitive advantage.

Index Terms—Green ICT, Sustainability, Supply Chain Management, Industrial Operations, Green practices, Food industry, SMEs.

Introduction

Global warming is one factor that badly affected the environment due to these environmental friendly techniques promoted on a large scale, especially during this pandemic, COVID-19. Multiple studies were conducted to assess Green information and communication technology, "Green ICT" in several countries. This study explores the adoption and practices of Green ICT in Palestine and Malaysian; Small and Medium Enterprises (SMEs) for the food supply chain. Supply chain activities cause carbon dioxide pollution, energy consumption, water squander, and depletion of resources. Environmental degradation requires the need to switch towards Green ICT practices. Green ICT terms as programs and strategies which led to decrease the negative effect on the environment. Additionally, many food companies are moving towards implementing Green ICT initiatives to employ sustainable technologies for making their businesses sustainable, cost-effective, and environmental-friendly [1]. An increase in the degree of concern regarding climatic change and sustainable environment.

Likewise, the impact of Green ICT on the environment aligns with the idea of "Green ICT" has given much importance to academia, media, and government [2]. [3] points out that across all industries, companies' average direct emissions of their supply chain emissions only 14% before use and disposal; accounting for the emissions in use and destruction of goods would make that percentage even lower. We found that Walmart is profiting from its actions to reduce Green House Gas (GHG) emissions by its operations in the supply chain. Green ICT promotes emission reduction, and its practices are related to cost reduction [4]. This paper organizes as follows: we begin in the next section with a literature review highlighting the main Green ICT factors that affect Sustainable Supply Chain Management (SSCM). The research methodology is explained in Section III. In Section IV, we present the results of the independent sample T-test. In Section V, we discuss the effects. Implications and future work conclude the paper in Section V.

2 LITERATURE REVIEW

"The needs of the present without compromising the ability of future generations to meet

their own needs" is referred to sustainably according to the United Nations Brundland Commission [1]. The triple bottom line (3BL) helps avoid the impact of enterprise processes and products, resulting in damaging the world and people on it. In this work, we select the practices that align with supply chain management and show where they have been adapted. Our study's findings will customize four factors: environment, social responsibility, economic, and technology [29] [30] in SCM to achieve SSCM.

2.1 Environmental Factor

The environmental factor is concerned with efficiently using energy, controlling GHG emissions, and consuming natural resources. GHG's growth is occurred due to the increased consumption of energy and leads to one of the reasons for climatic change. The assurance of Green ICT can handle these atmospheric changes [6]. Walmart is considered one of those multi-national organizations in terms of revenue but is more famous for its supply chain management innovation. During the past few years, Walmart has been supposed to protect the planet one of its primary duties and enhance its bottom line. [7] Green ICT was recognized for saving energy consumption and monitoring issues of the environment, and the spread of awareness. The capability to secure and protect nature supports Green ICT to take the chance for creating environmental Sustainability. Green ICT can also help lower carbon emissions, GHG, and save energy consumption through supply chain operations. OECD (Organization for Economic Cooperation and Development) recognized in 2010 that "smart" ICT software plays a significant role in the "green growth" of the economy [8]. Manufacturing is one of the significant areas in terms of decreasing the emission of carbon. Green IGT will help a product in terms of its development, from raw material to its final stage. [9] stated that the lack of standards among companies leads to competition and a state of confusion for customers. To bring Sustainability, companies need to identify the essentials: to innovate, develop, size, and facilitate.

2.2 Social Responsibility Factor

[10] stated that social responsibility is referred to those operations that help corporate business in a competitive market in terms of creating differentiation among the products and efficiently using the resources. On the other hand, there is an inadequate need, especially when the consumers switch to other products or the organization bear a loss. [11] suggested that as the literacy rate increases, and so is the awareness about green practices these days in analyzing environmental risks. Besides, organizations need to identify Green ICT as their social duty to promote awareness about the environment. [12] stated that operators were ap-

pointed in European telecom to spread information about global warming and its influence on power consumption. Implementing some initiatives like improving the relevant technology, formulating green strategies, and identifying the best practices to control energy, including improving duties socially among IT companies as far as the telecom sector is concerned. Besides, establishing eco-friendly practices. [13] highlighted the development and opportunities that enhance social responsibility throughout the mineral industry during Covid-19 to upgrade operations and disseminate the influences of environmental issues throughout the world. Green ICT has a positive impact on social aspects across the supply chains.

Moreover, organizations should pay particular attention to Sustainability as far as their operations are concerned. Thus, it improves overall performance by creating a balance between social, environmental, and economic problems [14].

2.3 Economic Factor

[15] stated that Green ICT had influenced the economy positively. Besides, Green ICT usage in German products are more competent worldwide and developing potential for exports. The significance of incorporating Green ICT was because of the economic crisis, and decreasing the costs was one factor for which companies started implementing green practices [16]. [17] Green ICT encourages economic growth and development in the performance of the system used in companies in alignment with social responsibilities. It also increases the ratio of profit by entering new markets and using recycled materials. Environmental Sustainability is one of Green ICT's dimensions that includes the cost of disposal and recycling for the economy. Earlier studies [18] recommended a framework to analyze India's business value in the context of Green ICT. They stated that this software created a positive impact on reducing the consumption of energy. [19] said that companies that spend a large amount on Green ICT result in lowering the cost of implementing Green ICT. Thus, it includes saving energy consumption and fees, which results in increasing the ratio of sales and entering new markets to penetrate as far as the corporate theories of Green ICT are concerned.

2.4 Technology Factor

[20] stated that during COVID-19, organizations utilized green data centers to encourage energy conservations, designs, and service virtualization for green data. Energy conservations referred to practices used to incorporate data centers are eco-friendly; for example, the hydrogen fuel cells are used as an alternative source of power in terms of green. The total consumption of power for servers could be decreased as the heat is generated. Designs that are

eco-friendly in nature are used to promote mechanical and electrical systems to increase the efficiency specially for products that are recycled. Lastly, virtualization encourages the use of an infrastructure, which is physical, is required to host a number of servers virtually, reducing the number of servers. [21] Green ICT helps lessen the demand for goods in stages like manufacturing, installation, transportation, etc. Thus, it improves the quality of life styles and work methods; telecommunication and video conferencing are a few of those changes to reduce the need for transportation. [22] investigated the advantages of Green ICT practices and thus found that it helps enhance the efficiency of energy in terms of using telecommunication tools, saving power consumption in the long run.

3 RESEARCH METHODOLOGY

3.1 Data Collection

A questionnaire was used as a tool to collect data and copies were distributed over a total of 200 managers of SMEs from the food industry; 100 managers were from Malaysian food companies and 100 from Palestinian food companies, where the response rate was 60%.

3.2 Reliability Analysis

It is used to analyze the questionnaire's consistency among each field and the mean of the questionnaire's whole fields. The acceptable range for Cronbach's alpha coefficient value was from 0 and 1 [23], where the higher values reflect a more substantial degree of consistency among the variables internally. The Cronbach's alpha coefficient was calculated for the individual field; Table 1 illustrates the results.

TABLE 1

CRONBACH'S ALPHA COEFFICIENT	
Factor	Cronbach's alpha coefficient
Environment (5 items)	0.953
Social responsibility (6 items)	0.911
Economic (6 items)	0.924
Technology (4 items)	0.880
Overall Reliability (21 items)	0.932

3.3 Independent Sample T-Test

T-test was run independently to identifying the difference among the mean of two countries and was accurate when the samples were independent. When two samples were independent, the first one did not influence the chance of the occurrence of the other sample. This research showed that each sample did not affect other samples. The results of T-test were presented according to the factors of Green ICT.

3.4 Hypotheses

To carry out the study, we have set the following four hypotheses:

H1: There is a significant difference between Malaysian and Palestinian companies regarding eco-friendly practices.

H2: There is a significant difference between Malaysian and Palestinian companies in using technical practices.

H3: There is a significant difference between Malaysian and Palestinian companies in economic benefits.

H4: There is a significant difference between Malaysian and Palestinian companies in the context of socially responsible

4 RESULTS

In order to compare the adoption of Green ICT in Malaysian and Palestinian companies, independent sample T-test was conducted for each of the four stated in the introduction.

4.1 Environment Factor

An independent sample T-test was conducted to test the hypothesis H1. Showed for companies in Malaysia (M = 3.52; SD = 0.631) and in Palestine (M = 3.06, SD = 0.739), $t = -2.553$, $p < 0.05$. The results revealed that the Malaysian companies incorporated green ICT practices more as compared to companies in Palestinian. Table 2 indications the T-test analysis.

TABLE 2
INDEPENDENT SAMPLE T-TEST FOR ENVIRONMENTAL FACTOR

Factor	Country	Mean	Std.D	Test-value`	p-value
Environment	Malaysia	3.06	0.739	-	0.013*
	Palestine	3.52	0.631	2.553	

4.2 Technology Factor

An independent sample T-test was conducted to test the hypothesis H2. A significant difference was found among the Malaysian companies ($M = 3.36$, $SD = 0.474$) and the Palestinian companies ($M = 2.91$, $SD = 0.794$), $t = -3.898$, $p < 0.000$. From the findings, it can be seen that the companies in Malaysia had more awareness as compared to Palestine about technological issues. The results of the T-test analysis are shown in Table 3.

TABLE 3
INDEPENDENT SAMPLE T-TEST FOR TECHNOLOGY FACTOR

Factor	Country	Mean	Std.D	Test-value`	p-value
Technology	Malaysia	3.91	0.794	-	0.000*
	Palestine	3.36	0.474	3.898	

4.3 Economic Factor

An Independent sample T-test was conducted to test the hypothesis H3. It was found that there was a significant difference between the Malaysian companies that exercised ($M = 3.55$, $SD = 0.516$) and the Palestinian companies which exercised ($M = 3.07$, $SD = 0.602$), $t = -3.259$, $p < 0.05$. The findings revealed that the Palestinian companies had less awareness about economic issues compared to the Malaysian companies. Table 4 shows the results of the T-test analysis.

TABLE 4
INDEPENDENT SAMPLE T-TEST FOR ECONOMIC FACTOR

Factor	Country	Mean	Std.D	Test-value`	p-value
Economic	Malaysia	3.07	0.602	-	0.002*
	Palestine	3.55	0.516	3.256	

4.4 Social Responsibility Factor

To test the hypothesis H4, an independent sample T-test was conducted. The results showed that there was a significant difference between the companies in Malaysia ($M = 3.46$, $SD = 0.585$) and in Palestine ($M = 2.68$, $SD = 0.626$), $t = -4.935$, $p < 0.05$. Based on the results, it can be concluded that Malaysia's companies possessed awareness compared to companies in Palestine on social issues. Table 5 indicates the findings of the T-test.

TABLE 5
INDEPENDENT SAMPLE T-TEST FOR SOCIAL RESPONSIBILITY FACTOR

Factor	Country	Mean	Std.D	Test-value`	p-value
Social Responsibility	Malaysia	2.68	0.626	-	0.000*
	Palestine	3.46	0.585	4.935	

5 DISCUSSION

The results supported the assumed hypotheses indicating significant differences between Malaysian and Palestinian companies in all four factors: environment, social responsibility, financial, and technology. Firstly, the results showed a significant difference between Malaysian and Palestinian companies in the Green ICT related to the environment that supported hypothesis H1. Malaysian companies were more successful than Palestinian ones in adopting Green ICT concerning the atmosphere. The success could be due to the Malaysian government's effort in taking the green environment as a severe issue like other developed nations [24]. Secondly, the results revealed a significant difference between Malaysian and Palestinian companies in Green ICT related to technological factors, supporting hypothesis H2. In the technology issue of Green ICT, Malaysian companies were more successful than Palestinian ones. This success could be attributed to modern ICT equipment, especially since the data centers had been designed to be energy-efficient with the optimum performance [25]. Thirdly, from the results, it is seen that there was a significant difference between Malaysian and Palestinian companies in Green ICT related to economic factors, which supported the hypothesis H3. Malaysian companies had more profits than Palestinian ones due to the adoption of economical Green ICT practices, which influenced the Malaysian firms' overall performance. Lastly, the results of tests on Green ICT related to social responsibility revealed a significant difference between Malaysian and Palestinian companies, in supporting the hypothesis H4. The results suggested that Malaysian samples favor successfully adopting green computing related to social responsibility factors. The success could be attributed to motivation to enhance employees' organizational commitment and job satisfaction with the benefits of internal social responsibility towards employees' attitudes and behaviors.

6 CONCLUSION AND FUTURE WORKS

This study has explored four Green ICT factors among the SMEs of the food supply chain in two countries (Malaysia and Palestine). We examined for comparison between the two countries on Green ICT adoption in terms of the environment, social responsibility, economic, and technology factors. The study has presented an independent sample T-test to examine the four hypotheses associated with the comparison. The findings reported significant differences in all four elements in favor of Malaysian companies during the pandemic of Covid-19. Although the results and their interpretation supported the hypotheses proposed, further

research is called for to analyze any other factors that might influence the sustainable supply chain to improve the degree of knowledge about the problem. Future research repeating this study on different industries or sectors (e.g., electrical and electronic manufacturing, clothes manufacturing, and tourism) will discover the impact of Green ICT practices in their supply chain. Comparison among different industrial sectors in the same country compared to Green ICT applications' effects on each. Furthermore, this study was done with a small number of companies in a limited industry (food supply). A larger sample in a more significant industry is sought to provide a clearer picture of Green ICT application factors' influence on the whole industry.

REFERENCES

- [1] Lamb J. The greening of IT: how companies can make a difference for the environment. IBM Press; 2009.
- [2] Malik Mustafa, & Omaila Ali Ahmed JalaAldein. (2020). Examining Perception of Malaysian autistic children social interaction for Virtual Reality (Version original). <http://doi.org/10.5281/zenodo.4420802>
- [3] Molla A, Cooper VA, Pittayachawan S. IT, and Eco-sustainability: developing and validating a green IT readiness model. In: Proceedings of international conference of information systems. 2009.
- [4] Matthews, H.S., Hendrickson, C.T., Weber, C.L., 2008. The importance of carbon footprint estimation boundaries. *Environ. Sci. Technol.* 42, 5839–5842.
- [5] Plambeck, E.L., Denend, L., 2007a. Walmart's Sustainability Strategy. OIT-71A and B Stanford Graduate School of Business Case Study. Updated 2010. Plambeck, E.L., Denend, L., 2007b. The greening of Wal-Mart's supply chain. *Supply Chain Manag. Rev.* 11 (5), 18–25.
- [6] Mustafa M., Alzubi S., Alshare M. (2020) The Moderating Effect of Demographic Factors Acceptance Virtual Reality Learning in Developing Countries in the Middle East. In: Singh M., Gupta P., Tyagi V., Flusser J., Ören T., Valentino G. (eds) *Advances in Computing and Data Sciences. ICACDS 2020. Communications in Computer and Information Science*, vol 1244. Springer, Singapore. https://doi.org/10.1007/978-981-15-6634-9_2
- [7] Swink, M., et al., *Managing operations across the supply chain*. 2017: McGraw-Hill Education New York, NY.
- [8] Chung, M. G. T., Kanhaiya Lal Gupta, Saneh Saiwong, Hyojin Kim, Yong-Woon Kim 2011. *Introduction to Green ICT Activities* ASTAP Working Group on ICT and Climate Change
- [9] Mustafa M., Alzubi S. (2020) *Factors Affecting the Success of Internet of Things for Enhancing*

Quality and Efficiency Implementation in Hospitals Sector in Jordan During the Crises of Covid-19. In: Chakraborty C., Banerjee A., Garg L., Rodrigues J.J.P.C. (eds) Internet of Medical Things for Smart Healthcare. Studies in Big Data, vol 80. Springer, Singapore. https://doi.org/10.1007/978-981-15-8097-0_5

[10] Andreopoulou, Z. 2012. Green Informatics: ICT for green and Sustainability. *Journal of Agricultural Informatics* 3(2): 1-8.

[11] OECD (2010), "Greener and Smarter: ICTs, the Environment and Climate Change", in *OECD Information Technology Outlook 2010*, OECD Publishing, Paris, https://doi.org/10.1787/it_outlook-2010-7-en.

[12] Harter, G., Sabbagh, K., Shehad, R. & Karam, D. 2010. *ICT for a Low-Carbon World Activism, Innovation, Cooperation*. World Economic Forum/Booz Allen.

[13] Hingley, M., Lindgreen, A., Reast, J. & Manning, L. 2013. Corporate and consumer social responsibility in the food supply chain. *British Food Journal* 115(1): 9-29.

[14] Alkhatib K., Al-Aiad A., Mustafa M., Alzubi S. (2021) Impact Factors Affecting Entrepreneurial Intention of Jordanian Private Universities Students: A Mediation Analysis of Perception Toward Entrepreneurship. In: Ahad M., Paiva S., Zafar S. (eds) *Sustainable and Energy Efficient Computing Paradigms for Society*. EAI/Springer Innovations in Communication and Computing. Springer, Cham. https://doi.org/10.1007/978-3-030-51070-1_3

[15] Chen, H.-G. & Chang, J. 2014. A Study on Green IT Adoption. *Computer Science and Information Technology* 2(8): 315-323.

[16] Etno 2010. *Sustainability Report 2009*. Retrieved 14 Jan 2015, from <http://www.etno.be/LinkClick.aspx?fileticket=00IsAMIDCv0%3d&tabid=1073>.

[17] Dong, S., Burritt, R. & Qian, W. 2014. Salient stakeholders in corporate social responsibility reporting by Chinese mining and minerals companies. *Journal of Cleaner Production* 84(0): 59-69.

[18] Molla, A., Abareshi, A. & Cooper, V. 2014. Green IT beliefs and pro-environmental IT practices among IT professionals. *Information Technology & People* 27(2): 129-154.

[19] Welfens, P. J. & Lutz, C. 2012. Green ICT dynamics: key issues and findings for Germany. *Mineral Economics* 24(2-3): 155-163.

[20] Sarkar, P. & Young, L. 2009. Managerial attitudes towards Green IT: An explorative study of policy drivers. *Proceedings Pacific Asia Conference on Information Systems PACIS 95*.

[21] Radu, L.-D. 2014. *The Ecological Behaviour Related to Green Information and Commu-*

nication Technology in Romanian Organizations.

- [22] Mithas, S., Khuntia, J. & Roy, P. K. 2010. Green Information Technology, Energy Efficiency, and Profits: Evidence from an Emerging Economy. ICIS.
- [23] Watson, E.T., Boudreau & S., J. W. a. L. 2010a. Telematics at UPS: Energy Informatics in Action. *MIS Quarterly Executive* 9: 203-213.
- [24] Ozturk, A., Umit, K., Medeni, I. T., Ucuncu, B., Caylan, M., Akba, F. &Medeni, T. D. 2011. Green ICT (Information and Communication Technologies): a review of academic and practitioner perspectives. *International Journal of eBusiness and eGovernment Studies (IJEBEG)*(3: 1): 1-16.
- [25] Trimi, S. & Park, S.-H. 2013. Green IT: practices of leading firms and NGOs. *Service Business* 7(3): 363-379.
- [26] Kalle, R. K. &Mathur, A. 2013. Green Information and Communication Technology Standards Development: An India Perspective. *Journal of ICT Standardization* 1(2): 205-220.
- [27] Pallant, J., *SPSS Survival Manual*. 4th Edn. 4th Edn., McGraw-Hill International, Maidenhead, pp: 352, ISBN: 0335242391. , 2007.
- [28] Jumadi, H. &Zailani, S. Determinants of Green Technology Innovation Adoption Among Transportation Companies in Malaysia.
- [29] Abdul Malik, N. &Masud, M. H. 2014. An investigation of the adoption of green ICT in IIUM communities towards sustainable environment. *Science International (Lahore)* 26(4): 1417-1421.
- [30] Kim, S. J., Kara, S. &Kayis, B. 2014. Economic and environmental assessment of product life cycle design: volume and technology perspective. *Journal of Cleaner Production* 75(0): 75-85.
- [31] Savita, K., Dominic, P. &Ramayah, T. 2012. Eco-design strategy among ISO 14001 certified manufacturing firms in Malaysia: green drivers and its relationship to performance outcomes. *International Conference on Computer &Information Science (ICCIS)*, 2012 IEEE.
- [32] Dey, P.K., et al., Environmental management and corporate social responsibility practices of small and medium-sized enterprises. *Journal of cleaner production*, 2018. 195: p. 687-702.
- [33] Abbas, A.M., H. Mohamed and H.M. Judi, The Role of Green Information and Communication Technology
- [34] Practices Towards Sustainable Supply Chain Management, *World Applied Sciences Journal* 33 (8): 1341-1347, 2015.