

Investigating the Mediating Role of Organization's Sustainability in The Relationship between Using Greening Technology Information Tools and Organization's General Performance: A Field Study on A Group of Jordanian Business Organization

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Abstract. *This study aims at investigating, the mediating role of business organization sustainability in the relationship and impact of the use of IT Tools on Organizational performance. A selective sample of 110 managers from 30 Jordanian business organizations were the participants of this study. Four parts, 22 statements questionnaire was used to gather the required data. The statistical testing and analysis results of the collected data have indicated that there is a strong positive and statistically significant relationship between the use of IT tools and organization performance. Its tool utilization also has a strong positive impact on organizational performance. The mediating role of organization sustainability was positive in terms of the relationship and impact of using IT tools and business organization performance. The results of this study were consistent with many other previous studies.*

Keywords: Green Technology; IT tools, Corporate Sustainability; Information Technology (IT); Cloud Computing and organization performance

JEL, Codes: M1, M15, M19

1. Introduction

Information Technology (IT) has become a very reliable strategic business partner that facilitates the accomplishment of organizational strategic goals such as operational excellence, efficient decision-making processes, and competitiveness to maintain organizational survival [1], [2], [3]. Organizations nowadays are under social and governmental pressures to implement all possible means and methods to be able to carry out their ethical, social, and environmental responsibilities. Therefore, this situation has led to the appearance of the corporate citizenship concept. (it is also known as corporate sustainability) [4]. Organizational leaders, today, are more emphasizing than before to pursue their plans to transform their organizations to be sustainable [5]. Large multinational organizations such as; Coca-Cola, Wal-Mart, and Nestle, have urged their suppliers to implement sustainability practices in their operations. Therefore, for the majority of

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business organizations consider corporate sustainability as a key strategic organizational practice that must be implemented to become a socially responsible organization. Corporate sustainability initiatives and its reporting is no longer a troublesome task for corporate leaders, but it has become a continuous practice as a part of the normal daily business operations [6]. It might be relevant to mention that advances in technologies and telecommunications have generated a new set of global challenges in the early twenty-first century. A survey conducted by CIO magazine in 2008 on 280 IT executives, has indicated that they are moving towards adopting the “greening” policy in their IT operations. According to that survey, executives have emphasized that two principal reasons are behind their adoption of such practices which are: cost-cutting by utilizing the energy consumption and to be more socially responsible. Grant conducted a survey of more than 500 business executives, has found that all of the business executives surveyed have agreed that maintaining an organization’s sustainability will certainly positively impact the organization’s reputation, its ability to meet its strategic goals, and its profitability. The survey also indicated that 77% of the executives surveyed believe that their organizations’ sustainability initiatives will have a significant impact on their business strategies for years to come. The role of IT in facilitating organizations’ achievement of corporate sustainability has been investigated and researched during recent years. However, the amount of research, that has been allocated to determine which specific IT tool and technology is more effective to assist an organization to become sustainable, was very little. Nevertheless, the role of IT in assisting organizations in meeting their sustainability objectives has been effective in enhancing the organization’s capabilities to improve its economic and its environmental performance [7]. Furthermore, IT was also considered as an enabler of ecological competence according to its role in sustainable activities such as efficient energy consumption, efficient logistics, and transportation [8]. Based on what previously stated, the goal of this study is considering some specific “greening” IT tools and technologies, to measure their efficiency in adopting a successful sustainable policy.

2. Literature Review

2.1. Organizational Performance Measurement

A performance indicator or key performance indicator (KPI) is a measure of a business organization's general performance. KPIs usually, assess the actual achievement (i.e. success or failure) of a business organization or any other kind of activities, such as, tasks, functions, products, projects, and programs, in which this organization is engaged [9], [10], [11].

Performance measures could be classified into two basic kinds: those correlated with final results (i.e. the outputs or outcomes, such as competitiveness or financial performance and multiple expansion) and those addressed the determinants of the final results (i.e. the inputs such as quality, flexibility, resource utilization, and innovation). A performance measure is a quantified description of assigned work and the actual outcome of that work. The major base for organizational Performance measurements is data, where its analysis would tell the real story about whether a work, activity or effort have achieved its objectives and if significant progress is made to attain the organizational goals [9], [12], [13], [14].

2.2 Sustainability concept

The concept of Corporate Sustainability (CS) which is also referred to as Corporate Social Responsibility (CSR) is not a new concept in the business field literature. According to Marrewijk and Were

[15], the corporate sustainability denotes to a deliberate organizational undertaking, which is often voluntary, that focus on the level of realization of the societal and ecological apprehensions of the organizational processes and transactions [16]. The Green IT and Green Computing are both referred to as the utilization of IT resources and tools in an ecologically sustainable way, which will encourage and assist an organization to become socially responsible. The IT research that addressing the impact of Green Computing on business sustainability has been directed towards how to make IT and its tools more energy-efficient and more environmentally protecting. Meanwhile, no much research has been devoted to the practices that organizations must undertake to utilize IT as an enabler for business sustainability. Murugesan [17] has stated that green computing should focus on the practices of developing, engineering, utilizing, and adopting relevant IT hardware such as computers, monitors, and storage devices competently and responsibly that will not negatively impact the environment. In other words, the question which needs to be asked is: Should “Green IT” be manufactured or it should be utilized in a “Green” manner to accomplish business sustainability? In this context, green IT is seen as being the responsibility of the IT-related tools and equipment manufacturers as well as the end-users (the organizations) for such tools and equipment. According to Molla et al. [18], the role of IT in smoothing out organizations' efforts to meet their sustainability aims can be approached based on a standpoint that IT plays an important role in decreasing the negative environmental impacts of the organization's computing infrastructure. Brooks et al. [19] have proclaimed that the utilization of such infrastructure needs conducting changes to the way that an organization running its daily business to ensure an improvement of energy consumption; which will eliminate the negative environmental impacts of the organization's computing infrastructure. Based on reviewing the related literature, several green IT tools and practices can be identified. Those tools & practices are, widely, considered as of major positive impact in assisting organizations to become sustainable. The above-mentioned greening IT tools and practices can be summarized as follows:

2.3 Collaboration tools (CT)

Collaboration tools are used to boost team productivity and competence while providing the means for an organized and effective project management operation. However, this study has adopted a subset of what has been considered as collaboration tools and software that could have a positive impact on organizational sustainability. This subset includes remote and online collaboration tools and software such as Skype, Zoom, Slack, etc. [20].

A- Cloud computing for power management and resource optimization (CCPM)

Cloud computing (CC) has been known for its positive impact on organizational sustainability through the reduction of excessive electric energy consumption, which is usually, related to the traditional data centers [21]. The increasing demand for cloud computing services led to the prediction that cloud computing providers might need to add many kinds of new servers to be able to handle such expected demand changes which will most likely cause an increase in the carbon footprint [22]. Therefore, a more sustainable cloud computing power management will decrease energy consumption; therefore, reducing through the utilization of solar renewable energy and making use of the excessive heat generated by the cloud computing servers [23].

B-Automation of workstation shutdown when not in use (AWS)

Business organizations are one of the major users for many kinds of electric devices especially PCs and monitors that are known by their excessive consumption of energy. Moorefield [24] stated that PCs and monitors account for 66% of the total energy consumed by office devices. The utilization of technologies that automatically shut down PCs and monitors when they are out of use for any reason (ie. during breaks, holidays, employee vacation, and a slowdown of business operations) will certainly aid the organization to highly reduce its consumption of energy.

C-Workflow technologies (WT)

Workflow technologies help organizations in leveraging their product management efforts by providing relevant means for coordinated, collaborative, and integrated processes. Workflow management relies on a workflow engine that helps in generating and adjusting different tasks that must be performed to complete these processes efficiently. This will eliminate any duplication of the processes and reduce overhead. The workflow engine also provides the ability to automate these tasks and processes which will eliminate paperwork and human efforts required for completing these tasks and processes [25].

D-Virtual Networking (VN)

A virtual network is not a machine that acts as a server on a network, but it is a specialized software that is developed and to act as a physical server providing highly efficient networking services. Virtual networking smooths out the creation of data centers that provide an appropriate and resourceful networking platform through the utilization of software instead of physical hardware and servers. Such virtualization of data centers reduces organizational overhead and the energy consumption level to run such data centers [26].

E-Virtual Private Networks (VPN)

Virtual Private Networks (VPNs) help organizations to ensure private connections (using encrypted connections) with their employees using local public networking infrastructure. The use of VPNs is the base for the deployment of what so-called “work at home” concept. VPNs make it possible for employees to connect remotely with their organization’s network infrastructure and perform their assigned tasks as if they were physically present in their job posts. VPNs, also, help boost employee productivity and efficiency, and it eliminates the need for physical attendance of an employee at the workplace; which will reduce traffic congestion, transportation cost, and fuel consumption [27].

F-Electronic Mail (Email) (EM)

Pitney Bowes [28] has estimated that 19% of the “world’s total annual wood harvest is used to produce approximately 355 million tons of paper and paperboard products.” One of the major benefits of email service is the drastic reduction of paper consumption that led to the reduction of the negative impact caused by deforestation. The use of email service has significantly reduced the amounts of waste produced by using the traditional mail system. Charlton [29] has suggested that the utilization of email as marketing means has accounted for about 23% of business organizations' total sales compared to 18% in 2013.

G-Video Conferencing (VC)

Video conferencing is an effective means for business organizations to successfully implement their economic sustainability initiatives and achieve adopted corporate social responsibility objectives. Utilizing video conferencing technologies can help business organizations to reduce employee travel expenses and the

associated costs considerably. According to Lee [30], the utilization of video conferencing technologies can be an energy-efficient alternative for business organizations which can drastically decrease the level of carbon emissions created by business travel.

Advanced technology and IT have eased the implementation of the sustainable strategy by business organizations. Yes, using high-technology is costly for small and medium sizes companies but, it is not so, for big organizations that have to be pioneers in this context. Sustainability policies and, efforts adopted by business organizations have become a very critical social need because it is been considered as an effective mean for protecting our environment from pollution and securing human life.

3. Methodology

This study concentrates on the re-engineering of the business organization's process as a necessity to maintain business efficiency and consolidate competitive advantage. It seeks to examine the relationship between the business's process re-engineering dimensions (BPRD) and employee's performance at a group of Jordanian public shareholding companies.

3.1. Variables of the study

The main variables of this study are the following:

- The Independent Variable is “the use of IT technology tools “
- The Dependent variable is “organization general performance”.
- The Mediator Variable is “business organization sustainability”.

3.2. Study Hypotheses

The main hypotheses of this study were formulated as follow:

Based on previous studies and literature review and specified variables of the study, the main hypotheses were formulated as follows:

- First hypothesis -There is a statistically positive significant relationship between the use of IT technology tools and business organization general performance.
- Second hypothesis -The use of IT technology tools has an appositive significant effect on business organization general performance.
- Third hypothesis -Business organization sustainability has a positively significant role in enhancing both the relationship and impact of the use of IT technology on business organization general performance.

3.3. Participants

The participants of this study were all managers at the 30 Jordanian companies under study. The researchers have made several visits to the headquarters of these companies to get the official permission for conducting the study and ensuring the managers' participation in the study. A selective sampling was used as 102 managers were chosen as a study sample. To gather the required data a four parts questionnaire was designed, reviewed, evaluated, refereed, modified, and finalized .102 questionnaires were distributed 74 were completed and returned (i.e. the return percentage was 72.5%), which were used for the intended

statistical analysis and testing. A five scores Likert scale was implemented to measure the study variables based on participant's responses to the questionnaire's statements. As it is illustrated by table (1) 60 % of the participants were male and 14 % female. A great majority of the sample were bachelor holders (78 %) and 14% were diploma holders .94% of the sample individuals were between 30 – 50 years old. In terms of working experience, about 89 % of the participants have tenure of more than 10 years.

Table 1: Sample Characteristics

Description	Category	Frequency	Percentage %
Sex	Male	60	81
	Female	14	19
	Total	74	100%
Education	Diploma	10	14
	Bachelor	58	78
	Master	5	7
	Doctorate	1	1
	Total	74	100%
Age	30 – 35 Years	15	20
	36 – 44 Years	35	47
	45 – 50 Years	20	27
	51 ---- Years	4	6
	Total	74	100%
Tenure	3 – 9 Years	8	11
	10 – 15 Years	20	27
	16 –20 Years	32	43
	21--- Years	14	19

	Total	74	100%
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3.4. Procedures

A four parts questionnaire was used to obtain the required data. Each questionnaire consists of 45 statements that describe and measure the variables of the study. Participants were briefly instructed to read each statement of the questionnaire and place an “X” in the score-cell that he or she believes it is relevant. Likert’s five scales were used to quantify the participants' responses to the questionnaire’s statements, where the highest possible score was 5 which indicates highly agreed against the lowest score of 1 that indicates highly disagreed. The obtained data were reviewed and deliberately checked out before it was used for the intended statistical analysis and testing. A validity test was conducted to ensure the consistency of the questionnaire statements and its appropriateness to measure the study variables.

To examine the relationships between the variables of the study and find out the impact of the independent variable on the dependent variable, correlation and regression tests were carried out. To determine the mediating role of the organization’s sustainability (if any) on the relationship and impact of the independent variable on the dependent variable both tests were re-carried out with the inserting of the mediator variable.

To ensure the validity and reliability of the data collection mean Cronbach alfa and KMO coefficients were calculated.

3.5. Validity and Reliability

To ensure the validity and reliability of the research instrument utilized for this research effort, a pre-test pilot was conducted which included 30 participating large Jordanian companies. These companies were selected to participate in this study due to their large IT operations. Limiting the participants to for-profit organizations was to aid in the validity of the study since non-for-profit organizations might not be concerned with being competitive which is mandatory for this study.

Reliability and validity testing results presented by table (2) have indicated that Cronbach alfa values were varied between 0.73 and 0.83 while the KMO values were between 0.35 and 0.704 which assure that the implanted research instrument used for data collection was reliable and valid.

Table 2: Reliability Statistics

Variable	Cronbach's Alpha	KMO
Independent variables green it tools	.83	.704
Dependent variable organizational benefits	.77	.681
Moderator variable Organizational commitment and their perception of	.73	.635

sustainability		
total	.776	.673

4. Results Discussion & Conclusions

4.1. Results Discussion

The correlation and regression statistical testing results presented by table 3 have referenced that the dependent variable is positively and significantly correlated with the independent variable as the correlation coefficient $R = 0.754$ and $R^2 = 0.568$ at 0.000 level of significance with a calculated **F-Value** of 94.738 against tabulated **F-value** of 5.342. In terms of the impact, the regression and ANOVA testing results portrayed by tables 3,4 have denoted that the independent variable has a strong positive effect on the dependent variable as the Beta value was (0.754) with calculated **t-value** of 9.733 at 0.000 level of significance.

Table 3: The relationship between the use of greening technology tools and organizational performance

R	R^2	F- Value	Tabulated F- Value	Sig
0.754	0.568	95.738	5.442	0.000

Table 4 illustrated the correlation and regression testing results when considering organization sustainability as a mediator. It was found that the correlation coefficient value was increased from $R = 0.701$ to (0.773) and R^2 was changed from (0.581) to (0.597) at 0.000 level of significant with calculated f-value = 94.738 to F-value = 96.177 against tabulate f-value = 6.813. Beta value also increased from $\beta = 0.754$ to (0.773) with calculated t-value = 11.133

Table 4: The relationship between the use of greening technology tools and organizational performance

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	-1.215	.428		-2.836	.006
The use of greening technology tools	1.355	.139	.754	9.733	.000

4.2. Conclusions

Relying upon the discussion of the statistical analysis results, it would be reasonable to mention that the general performance of the existing business organization is considerably affected by the utilization of greening IT tools. There is a clear and justified dependency between the two elements. Company sustainability a major part of its reputation and competitive advantage because customers are nowadays highly concerned about it. It might be relevant to suggest that the Jordanian companies understudy in particular, and all business organizations, in general, are invited to expend their sustainability efforts and invest more in greening IT tools utilization with relevant training programs to maintain a rational application of these tools.

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Manuscript received: 24.09.2019

Manuscript received in revised form: 27.05.2020

Manuscript accepted: 21.06.2020