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A STUDY ON THE FACTORS IMPACTING MANAGERS' GREEN IT PERCEPTIONS

Abstract:

Recently, concerns with environmental issues enabled businesses to transform their practices to become more environmentally sensitive. It is widely accepted that carbon emissions have an increasing impact on the climate and environmental problems. It is further known that information technology (IT) makes a significant contribution to carbon emissions, albeit not being directly perceptible to the general public. That's why, a new term called green IT emerged recently to create a positive and environmentally sensitive movement in IT field. Green IT is defined as the practices and technologies for designing, manufacturing, using, and disposing of computers, servers, and associated devices such as monitors, printers, storage devices, and networking and communication systems to minimize impact on the environment. Businesses have recently become aware of the issues related to green IT, as practicing green IT has a positive impact not only on the environment and global warming, but also on the profits through decreasing energy consumption costs. For this reason, it is necessary to study green IT practices and perceptions of businesses and managements as well as the factors influencing it. This study examines the impact of environmentally sensitive management and human resources on green IT practices. The current study used the data collected via a structured survey conducted in Kahramanmaraş province of Turkey, by incorporating 121 businesses operating in textile, food, steel kitchen utensils, and other sectors. The data analysis with respect to the structural model and the psychometric properties of the research model was done by partial least squares (PLS) method by using SmartPLS software. The results of the data analysis reveal that the measurement model meets all the required criteria (reliability, discriminant validity, convergent validity). According to the results of the structural model, the perceptions of managers concerning the environmentally sensitive management and human resources are positively related to green IT practices. The findings of the current study reveal that businesses that consider environment in their strategic decisions and businesses that have human resources that are aware of the environment in their activities are more likely to have positive attitudes towards practicing green IT.

Keywords:

Green IT, environment, environmental sensitivity, environmentally sensitive management, environmentally sensitive human resources

JEL Classification: M15, C12, C83

Introduction

Although information technology (IT) plays a significant role in rapidly developing and changing global business environment, greenhouse gas (GHG) emissions and wastes stemming from these technologies harm the environment to a great extent. Today, approximately 3 percent of GHG emissions are caused by IT, and this rate will possibly be increasing due to the pervasive nature of IT-enabled businesses and lifestyles (Marugesan et al., 2013). According to another statistic, IT departments spend 70 cents of every dollar powering and cooling a new data server (IDC, 2006).

Businesses become aware and environmentally sensitive in their activities as well as the technologies they use, because of these negative developments. That's why, a new term, called green IT, emerged recently to create a positive and environmentally sensitive movement in IT field.

Green IT is basically "the study and practice of using computer resources efficiently" (Unhelkar, 2013, p. 56). It is also defined as "the practices and technologies for designing, manufacturing, using, and disposing of computers, servers, and associated devices such as monitors, printers, storage devices, and networking and communications systems to minimize impact on the environment" (Laudon and Laudon, 2012, p. 184). An awareness among businesses has recently been created on the issue under discussion, as practicing green IT has a positive impact not only on the environment and global warming, but also on the profits through the decrease of energy consumption costs. Therefore, it is of great importance to study green IT practices and perceptions of businesses and managements as well as the factors influencing it.

The objective of the current study is to examine the impact of environmentally sensitive management and human resources on green IT practices. In the context of this study, a structured survey was conducted in Kahramanmaraş province of Turkey. The data analysis was done by Partial Least Squares (PLS) method by using SmartPLS software.

Impact of Environmentally Sensitive Management and Human Resources

Environmentally sensitive (or green) management is defined as a philosophy that takes ecological environment as the basis of technical and organizational activities which aim to remove the negative impacts. The objective of environmentally sensitive management is to reduce the negative impact of businesses to the environment. This understanding should be applied in all business activities, which can be stated in an integrated approach (Akdoğan, 2003). Managements that target to become environmentally sensitive must operate and conduct their practices by taking environment to the forefront in all of their functions, organization structure, and production processes. This contributes to the protection of environment and development of cleaner technologies and provide managerial awareness to fulfill the

principles of environmental protection (Karabulut, 2004). Managers that are environmentally sensitive consider themselves mainly responsible for the environment and allocate a separate budget for environmental activities (Usta, 2007).

Environmentally sensitive (or green) human resources (HR) refers to the HR activities aiming at hiring and retaining employees that are able to represent the mission of the business regarding the environmental sensitivity. In order for a business' HR activities to be environmentally sensitive, its employees should have an awareness about the environment and should be knowledgeable about the treats and the measures to be taken for the environmental issues (Çağ, 2011). Recent developments in green HR understanding enabled businesses to reduce paper usage due to the digitally-enabled business processes, to arrange virtual meetings, to encourage vehicle sharing, to organize the buildings and office spaces compatible with the environment.

In the context of the current study, we propose that managers' perception of environmentally sensitive management and human resources positively affect the perceptions of green IT practices. It is articulated in this study that businesses will be more likely to have positive attitudes towards practicing green IT, if managerial thinking, strategic decision making as well as the human resources practices are conducted by taking the environmental issues into account. Thus, we porpose the following hypotheses:

> *Hypothesis 1: Managers' perception of environmentally sensitive management is positively related to the perception of green IT practices.*
>
> *Hypothesis 2: Managers' perception of environmentally sensitive human resources is positively related to the perception of green IT practices.*

Methodology

The items used to measure the research constructs were developed based on the prior literature as well as the opinions of the experts and managers. Table 1 presents the items used in the final survey and data analysis. The table details the measurement items, means, standard deviations and loadings for each of the items used to measure the latent constructs.

In the context of this study, the data have been collected by a structured survey. The survey has been administered in Kahramanmaraş province of Turkey. The survey questions have been responded by managers of the businesses operating in various sectors (i.e., textile, food, steel kitchen utensils, and other). A total of 197 surveys were distributed to the managers of the businesses in Kahramanmaraş province. At the end of the data collection process, a sample of 121 usable questionnaires was available for the final data analyses. The descriptive statistics with respect to the profile of the firms and managers participated in the survey are detailed in Table 2.

Table 1: Measurement items, means, standart deviations, and loadings

	ESM	ESH	GIT	AVR	STD
ENVIRONMENTALLY SENSITIVE MANAGEMENT (ESM)					
Environmentally sensitive business strategies contribute greatly to enable sustainable growth.	**0,68**	0,37	0,36	4,14	0,86
Businesses should have a practicable environment policy.	**0,82**	0,55	0,54	4,26	0,88
Businesses should take into consideration the environmental sensitivity when determining the business strategy.	**0,85**	0,52	0,52	4,23	0,81
Managers should have an interest with respect to the environmental sensitivity.	**0,80**	0,61	0,51	4,40	0,67
Businesses should start a certain activity/business, after handling the environmental impact of that specific activity/business.	**0,72**	0,46	0,42	4,17	0,82
ENVIRONMENTALLY SENSITIVE HUMAN RESOURCES (ESH)					
Businesses should increase the environmental awareness of the employees and managers.	0,46	**0,72**	0,48	4,39	0,61
Businesses should train the employees with the environment-related topics.	0,52	**0,79**	0,53	4,25	0,79
The curent and prospective employees should be individuals who are able to represent the mission of the business regarding the environmental sensitivity.	0,55	**0,73**	0,45	4,10	0,86
Businesses should encourage the employees for reducing the paper usage.	0,48	**0,77**	0,63	4,38	0,77
Businesses should reduce the number of business trips of the employees by using the Internet-enabled communication methods, such as teleconferencing.	0,44	**0,71**	0,60	4,02	1,02
GREEN INFORMATION TECHNOLOGY (GIT)					
Businesses should prefer the technologies having less energy consumption in procuring the computer hardware, software, etc.	0,46	0,58	**0,80**	4,37	0,75
Businesses should be charged less tax when they purchase environmentally sensitive computer hardware and software.	0,47	0,52	**0,79**	4,18	0,85
Businesses should raise the awareness of the employees on the subject of hibernating or shutting down the computer when they do not use it.	0,54	0,63	**0,84**	4,36	0,79
Businesses should support the environmentally sensitive practices regarding the information technologies.	0,56	0,65	**0,87**	4,25	0,85
Businesses should be supported on the subjects such as telecommuting and teleconferencing.	0,50	0,57	**0,81**	4,19	0,85
Businesses should take measures, such as digitally tracking and storing the documents, in reducing the paper waste.	0,44	0,61	**0,74**	4,46	0,78

Tablo 2: Descriptive statistics

Variable	Categories	Frequency	Percentage (%)
Gender	Male	97	80,2
	Female	24	19,8
Position in the firm	Lower-level manager	7	5,8
	Middle-level manager	59	48,8
	Top-level manager	25	20,7
	Owner/partner	19	15,7
	Other	11	9,1
Number of employees	1-49	40	33,1
	50-249	34	28,1
	250 and above	47	38,8
Sector	Textile	83	68,6
	Food	9	7,4
	Steel kitchen utensils	25	20,7
	Other	4	3,3
Years of operation	1-9 years	40	33,1
	10-19 years	41	33,9
	20-29 years	17	14,0
	30 and above years	23	19,0

N=121

The hypotheses presented in this study were tested using the final measurement items presented in Table 1. The assessment of the measurement model, including the testing of the psychometric properties of the measurement scales, was performed by using the partial least squares (PLS) method. The PLS approach, being a component-based approach, is typically used for the prediction of exploratory models. The use of PLS for this study was appropriate given that the investigation was exploratory in nature and the hypotheses under discussion were not tested before. The reliability and validity of the measurement model were examined to assess the quality of the reflectively measured research constructs (Barclay et al., 1995). The SmartPLS software package (Version 2.0.M3) was used to estimate the parameters of the research constructs (Ringle et al., 2005).

The results of reliability assessment from testing the measurement model are reported in Table 3. The table shows that the measures are robust in terms of their internal consistency reliabilities indexed by their composite reliabilities. The composite reliabilities of the measures exceed the recommended threshold level of 0.70 (Nunnally, 1978). In addition, in accordance with the recommendations of Fornell and Larcker (1981), the average variance extracted (AVE) for each measure exceeds the value of 0.50. Cronbach's alpha values are also acceptable, as they are greater than 0.70 (Gefen and Straub, 2005; Nunnally, 1978), indicating that our constructs have adequate reliability assessment.

Table 3: Composite reliabilities, cronbach's alpha, AVE, and latent variable correlations

	AVE	Composite reliabilities	Cronbachs Alpha	ESM	ESH	GIT
Environmentally Sensitive Management (ESM)	0,60	0,88	0,84	**0,78**		
Environmentally Sensitive Human Resources (ESH)	0,55	0,86	0,80	0,65	**0,74**	
Green Information Technology (GIT)	0,66	0,92	0,90	0,61	0,73	**0,81**

The results of assessing the discriminant validity of the measure scales are reported in Table 3 as well. The square root of AVE values for each construct was compared to the other correlations in the correlation matrix. These values, which are shown as the diagonal elements of the correlation matrix in Table 3, were greater than the corresponding off-diagonal construct correlations. In addition, we performed a confirmatory factor analysis and examined the cross-loadings of the individual items on other research constructs. All of the items loaded at least 0.10 less on other constructs in line with the recommendations (Gefen and Straub, 2005) (see Table 1). This provides adequate evidence of discriminant validity for the constructs.

The results of testing the convergent validity of the measurement scales are reported in Table 1. Convergent validity was tested using SmartPLS by extracting the factor loadings and cross loadings of all the measurement items to their respective constructs. The results reveal that all of the measurement item loadings on the intended constructs were between a lower bound of 0.68 and an upper bound of 0.87 and were at least 0.10 less on their loadings on other constructs (Gefen and Straub, 2005). In addition, each item's factor loading on its respective construct was highly significant (p<0.001). Therefore, the loadings presented in Table 1 confirm the convergent validity of the measures for research constructs.

Findings

The results from testing the structural model show that managers' perception of environmentally sensitive management is positively related to the perception of green IT practices (β = 0.24, p<0.05). Results also reveal that there is a positive and significant association between managers' perception of environmentally sensitive human resources and the perception of green IT practices (β = 0.58, p<0.01). Therefore, we conclude that Hypothesis 1 and Hypothesis 2 are supported. Also, R^2 value for the dependent variable is 0.57, which is a relatively high and an acceptable value.

Conclusion

Businesses has recently become aware of the environmental issues and shaped their operations to reduce the adverse effects on the environment. This understanding has also been accepted by the IT field and known as green IT. The current study examined the factors that impact business managers' perceptions of green IT practices. The results show that managers' perceptions of environmentally sensitive management and human resources positively influence the green IT perceptions of managers. The findings of this study reveal that businesses that consider environment in their strategic decisions and businesses that have human resources that are aware of the environment in their activities are more likely to have positive attitudes towards practicing green IT.

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