

Green Information Technology Practices among IT Professionals: Theory of Planned Behavior Perspective

Praktyki zielonych technologii informatycznych wśród profesjonalistów z zakresu IT – perspektywa teorii planowanego zachowania

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Abstract

According to the existing literature, the determinants of environmental attitudes and behavior are important. In this paper impact of information technology adoption environment has been investigated. Some of the studies have successfully utilized Theory of Planned Behavior (TPB) for adoption behavior. This study proposed TPB to explain IT professionals' intentions for Green Information Technology (GIT) practices. For this purpose, a survey was conducted among IT professionals from public and private sector organizations. Core factors of TPB were included in the analysis. Overall, results revealed that the TPB model explains behavioral intent, and all four core constructs were significant predictors of the intent. Limitations of the study, and implications for theory are also discussed.

Keywords: Theory of Planned Behavior, Sustainability, Green Information Technology, IT professionals, ANOVA

Streszczenie

Według wskazań literaturowych, determinanty ekologicznych postaw i zachowań odgrywają istotną rolę w ich kształtowaniu i warto badać wpływ, jaki wywierają na nie stosowanie technologii informatycznych. W tej pracy wykorzystano teorię planowanego zachowania (Theory of Planned Behavior – TPB), aby wyjaśnić podejście profesjonalistów z zakresu IT do praktyk związanych ze stosowaniem zielonych technologii informatycznych (Green Information Technologies – GIT). Badania wśród pracowników IT przeprowadzono w firmach reprezentujących dwa sektory: państwowym i prywatnym. Otrzymane wyniki pokazały, że model TPB, uwzględniający cztery filary, wyjaśnia determinanty odnoszące się do zachowania. W artykule omówiono także napotkane ograniczenia, a także implikacje dla teorii TPB, które z przeprowadzonych badań wynikają.

Słowa kluczowe: Teoria planowanego zachowania, zrównoważoność, zielone technologie informatyczne, profesjonaliści z zakresu IT, ANOVA

Introduction

Sustainability has increasingly become an important issue for both management scholars and practitioners. This recent advance can be attributed to the facts that while the last two decades have brought much economic growth, there is much concern surrounding both wealth disparity and natural resource depletion (Dao et al., 2011). Research has acknowledged

that addressing sustainability issues is critical to the long-term existence and thriving of companies (Porter and Kramer, 2006). This concern has manifested itself in legislation expanding the responsibility of firms, increasing attention on training managers in sustainable management, and the development of theory to support sustainable managerial decision making (Hart and Milstein, 2003). In order to reduce the degree of deterioration of environmental sustain-

ability, it is necessary to understand and change the relevant human behavior (Steg & Vlek, 2009). Conformity with the environmental regulations, keeping a pace with the competitors, overhauling of the organizational image, keeping the presence in the new markets and value addition to the products are some of the reasons compelling the firms to think about environmentally sustainable products (Chen, 2010). There is clear evidence that the Information Technology (IT) has a predominant role in reducing energy consumption, both as a tool to monitor and optimize the energy efficiency of any production process, and as a target of energy efficiency initiatives (Capra et al., 2012). The production, use, and disposal of IT have a direct effect on the natural environment and eco-sustainability (Hilty et al., 2006). Estimates indicate that the IT industry account for 2% of global CO₂ emissions, which is equivalent to the amount generated by the aviation industry (Gartner, 2008).

As the force of the Moore law continues to shorten the average life span of IT, electronic-waste is emerging as one of the fastest growing waste that requires serious attention. For instance, in Australia, over 1.6 million computers are dumped in landfills each year and e-waste is growing faster than general municipal waste (Harper, 2006). Although estimates vary, the IT sector had produced 1.3% of global green house gas emissions in 2007 and used 3.9% of electricity (Malmodin et al., 2010). The Internet alone accounts for 10% of energy consumption in the US (Berthon and Donnellan, 2011). For these reasons, concerns regarding climate change along with an increased environmental awareness have spurred interest in sustainable development and Green Information Technology (GIT) both in the field of information systems (IS) (Melville, 2010) and among IT practitioners (Webb, 2008). Jenkin (et al., 2011a) suggested that organizations are still in infancy stage of awareness and adoption of *Green IT/Information System (IS)*. They found four types of gaps in this context: knowledge gaps, practice gaps, opportunity gaps, and knowledge-doing gaps. Jenkin (et al., 2011b) also envisaged that environmental orientation is made up of three components – environmental attitudes, cognitions, and behaviors – at both the employee and organizational levels. This orientation reflects the degree to which the organization and its employees have implemented and institutionalized the organization's environmental initiatives.

A wide range of studies focused on the role of moral and normative concerns underlying environmental behavior from different theoretical perspectives (Steg and Vlek, 2009). As they stated, some of these studies examined environmental beliefs and behavior on a basis of the value (see for example: De Groot & Steg, 2008; Nordlund & Garvill, 2002). Another group of studies focused on the role of envi-

ronmental concern by using different conceptualisations (See for example: Dunlap et al., 2000). A third line of research focuses on moral obligations such as willingness to change behavior (e.g. Nordlund & Garvill, 2003) and policy acceptability (e.g. Steg et al., 2005). These studies involve different antecedents of environmental behavior along with their perspectives. Theory of Planned Behavior (TPB) is a parsimonious conceptual frame work developed as an extension to the theory of reasoned action (TRA) (Ajzen, 1991). The TPB is well established for human behavior related studies and used to hypothesize the individuals' intention to perform the behavior (Nchise, 2013). It also has strong predictive power for wide range of human behavior (Ajzen, 1991). TPB is proven to explain behavioral intentions in information technology (Mykytyn and Harrison, 1993) and environmentally responsible behaviors (Bamberg & Schmidt, 2003). As supported by the literature (Bose and Luo, 2011), there are limited empirical studies in the field of green IT and we could not find any study which relates green IT and TPB together towards incorporating practicing GIT and individuals' behavioral intention. Therefore, there is currently a strong need to develop and gain empirical support for TPB towards adoption of green information technology. The findings of such a study may provide significant implications to identify awareness individuals towards environmentally sustainable approaches in their different tasks.

Therefore, the present study has been conducted to analyse GIT usage behavior with using TPB. The data collected from ICT professionals since GIT is a new concept and IT professionals are observed to be of higher awareness on the issue than other groups. Their utilizations of such new services and technologies may show more informative patterns than other groups in the society at this stage (Jin et al., 2007). Therefore, Findings may undertake a leading role for future studies considering other groups.

The article proceeds as follows; The following section introduces the theoretical development for the hypotheses. Afterwards, research design is stated clearly. The results of the study are, then, presented and discussed. Finally, the paper concludes with conclusions, limitations, and directions for future research in this area.

Hypothesis

In many cases, substantial theoretical and empirical support has accumulated in favor of conceptual framework usage. The Theory of Planned Behavior (TPB) (Ajzen, 1991) is one of those frameworks, which has been applied to environmental issues since it offers a theoretical base for the consideration of behavioral attributes in technology adoption (Nchise, 2013). Some of the latest studies include *testing the effect of environmental friendly activities*

(Han et al., 2010), *exploring environmental behavioral intentions in the workplace* (Greaves, et al., 2013) and investigate the determinants of environmental behavior among youth (Niaura, 2013).

Although, previous studies have examined environmental issues from different perspectives, studies on environmental policies and strategies regarding individuals' Green Information Technology (GIT) preferences and attitudes toward green practices have been rare (Bose and Luo, 2011). Investigation of individuals' GIT behavior is important since these technologies have been identified to have a detrimental influence on the environmental footprint of organizations (Sieglar & Gaughan, 2008), which also provides significant information to evaluate the effects of individuals' interventions systematically.

Green IT refers to the use of IT resources in an energy-efficient and cost-effective manner (Bose and Luo, 2011). Over the past few years, green IT strategy, design and practice initiatives evolved gradually into an active research area in the information system discipline, and, presently, there are few empirical researches in the area of green IT (Bose and Luo, 2011). However, in a majority of GIT research to date, there is a lack of social and individualistic perspective (Erek et al., 2009). Additionally, GIT is a new concept and professionals' utilizations of such new services and technologies may show entirely different patterns than other groups in the society (Jin et al., 2007). This means, professionals' perceptions and behavior may influence others in the society at later stages. On the other hand, ICT professionals are observed to be of higher awareness on GIT issues and their behavior may play pioneer role for other groups in the society.

Having considered all these, following hypotheses are postulated.

H1: ICT professionals' Behavioral Intention (BI) to practice GIT is effected by Behavioral Intention (BI)

H2: ICT professionals' Behavioral Intention (BI) to practice GIT is effected by Subjective Norm (SN)

H3₁: ICT professionals' Behavioral Intention (BI) to practice GIT is effected by Perceived Behavioral Control (PBC)

H3₂: ICT professionals' Actual Usage (AU) of GIT is effected by Perceived Behavioral Control (PBC)

H4: ICT professionals' Actual Usage (AU) of GIT is effected by Behavioral Intention (BI)

Research instrument and data

A survey was conducted to examine the application of TPB to analyse the acceptance of GIT usage (Figure 1). The data were obtained by means of a questionnaire for this purpose containing 8 questions grouped under 5 constructs according to TPB. The questionnaire inquires data as provided in Table 1. The respondents were IT professionals from major

Jorganizations as the attendees of an annual one-day meeting on issues – problems and developments – in the use of IT in organizations, organized by the Turkish Informatics Association (TIA). The sample was limited to IT professionals since GIT is a new concept and these professionals are believed to possess a higher level of awareness on this issue compared to other groups. The invitations were limited to 190 organizations, and selected from public-and-private sector establishments using *judgment sampling*. A total of 182 completed survey questionnaires were received, and twenty-five responses were discarded from the analysis due to the incomprehensible content. This represents an 82.1% response rate.

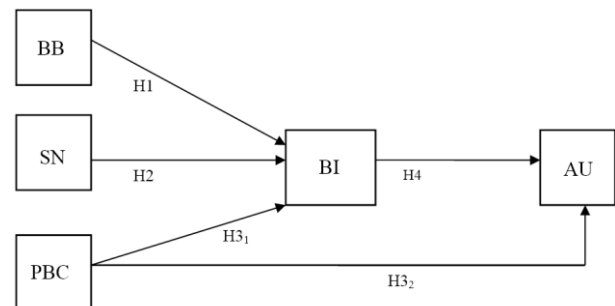


Figure 1. Research model (TPB). Boxes represent the constructs. Casual effects are given by arrows connecting the boxes

Table 1. List of constructs, corresponding items and construct reliabilities

Construct	Item*	Construct Reliab.
Behavioral Beliefs (BB)	Do you think it is easy for you to learn how to practice GIT?	0.950
	Do you think you have no problems in practicing GIT?	
Subjective Norms (SN)	I believe that people, who are important to me, practice GIT.	0.994
	I believe that people, who are important to me, expect me to practice GIT.	
Perceived Behavioral Control (PBC)	How much do you consider the type of your ICT application in practicing GIT?	0.996
Behavioral Intention to Use (BI)	I intend to consider practicing GIT in buying a new hardware.	0.994
	I intend to consider practicing GIT in buying a new software.	
Actual Use (AU)	I practice GIT while using ICT.	-

* A five-point Likert Scale (5 =very much, 4=much, 3=moderate, 2=little, 1=very little) is used for each item.

Table 2. ANOVA test results

Dependent variable	Test variables	Hypothesis	F-value	d.f.	p-value
Behavioral Beliefs	Behavioral Intention	H1	5.03	10/181	0.000*
Subjective Norm	Behavioral Intention	H2	8.65	10/181	0.000*
Perceived Behavioral Control	Behavioral Intention	H3 ₁	22.54	9/181	0.000*
Perceived Behavioral Control	Actual Usage	H3 ₂	37.30	8/176	0.000*
Behavioral Intention	Actual Usage	H4	1.82	9/176	0.066**

* indicates statistically significant at 0.01 significance level,

** indicates statistically significant at 0.10 significance level

The overall internal reliability as measured by Cronbach's alpha was found as 0.707 (Brown, 2002). Thus, data exhibit adequate reliability (Yu, 2007). The factor loadings for multi-item constructs BB, SN, PBC and BI were used to assess the construct reliabilities and these loadings are 0.950, 0.994, 0.996 and 0.994 respectively (Table 1).

This shows existence of construct reliability. For the establishment of content validity, the items and their correspondings constructs were adapted from prior studies and modified according to the context of this study.

Test results

One of the principal areas of statistical inference is the test of statistical hypotheses. These tests deal with drawing inferences about a population parameter on the basis of sample data drawn from the population (Mishra and Akman, 2010). The proposed hypotheses based on the research model were tested individually using the ANOVA technique, and the results are given in Table 2. The ANOVA test provides a nonparametric alternative to the one-way analysis of variance and is robust in its resistance to the outliers and errors in the data relative to the usual normal theory F test (Milton and Arnold, 2003).

Inspection of the p-values shows that the factors, BB and SN have significant impact on BI. Therefore, the hypotheses H1 and H2 are accepted at 0.01 significance level. This means, BB and SN can be used to explain the respondent's behavioral intention while practicing GIT. These show the existence of indirect effect of BB and SN on actual behavior in the adoption of GIT. As a consequence, a motivational stage of intention setting and a volitional stage of intention striving appear to be two significant stages for changing behavior of individuals (Bamberg, 2013). On the other hand, PBC is significantly related to BI and AU at 0.01 significance level and therefore it has indirect and direct effect on GIT adoption behavior of IT professional. This leads to acceptance of H3₁ and H3₂. In other words, PBC can be used to explain the respondent's behavioral intention while practicing GIT. Interestingly, PBC has been observed to have a far greater impact than BB and SN in determining behavioral intention. The direct effect of PBC on AU was also supported by Chau & Hu (2002). Furthermore, the test results have shown that BI has significant direct effect on actual behavior (p-value=0.066) for adopting GIT behavior at 0.10 sig-

nificance level, which indicates direct effect of BI on AU. This is an indication of the fact that behavioral gap in individuals intention is an important factor for the level of their GIT actual usage and therefore barriers effect the relationships between intention and actual usage (Bamberg, 2013). Overall, it is interesting to note that all the hypotheses relating to TPB constructs were all supported either for p-value<0.01 or p-value<0.10. This indicates that most of the variance for professionals' attitude for GIT usage may be explained by TPB constructs, which may also leads to the fact that employees believe that they have control over their ability for actual behavior (Greaves et al., 2013). Therefore, the individual's intention to engage in adoption of GIT in their IT activities is strongly positively related to their attitudes.

Discussion

The objectives of this study were all supported by the test results and therefore conclude that TPB constructs have direct and indirect effects on individuals behavior in adopting GIT. In other words, according to the ANOVA test results, there is a positive significant relationship between TPB constructs (subjective norm, perceived behavioral control, intention and actual behavior) and therefore, the conceptual model represents the data.

More specifically, behavioral belief (i.e. attitude), subjective norm and perceived behavioral control significantly affect the behavioral intention of ICT professionals in the adoption of Green IT. Considering the model, this means SN, BB and PBC have significant indirect effect on actual usage of GIT. A plausible explanation may be based on motivational theory that GIT adoption may be considered as an intrinsic motivational factor and behavioral belief, subjective norm and perceived control may be extrinsic motivational factors that could help the individuals self-regulate their motivation on GIT adoption (Park, 2007). It is interesting to note that, PBC has been observed to have a far greater impact than BB and SN in determining behavioral intention. This leads to the fact that people's beliefs have significant control over the behavior and therefore performance or non-performance of the behavior is up to them (Nchise, 2012; Ajzen, 2002). But significance of subjective norm may be an evidence of existence of the perceived social pressure to perform the GIT be

havior, which basically relates to one's intuition about others' exertion of influence (Nchise, 2012). On the other hand, The respondents, who believe that major players (PC manufacturers, software developers, users, and government) can reduce the negative effect of ICT on the environment, found adopting GIT convenient, worthwhile, and required activity in their work environment. Moreover, they intend to consider GIT issues while purchasing new hardware and software, and to practice GIT in their ICT usage. A possible explanation for our findings is that, the ICT professionals have significant experience and knowledge on using information and communication technologies and this naturally effects their adoption of new developments. This concludes that professionals' behavioral intention is argued to be stimulated by their attitude, subjective norm and perceived behavioral control to getting information, giving information and ultimately using the information in a manner which enhances GIT adoption (Nchise, 2012). Practically, these results provide important indications for organizations and decision makers for their implementations towards increasing employees GIT usage behavior.

An important theoretical implication of this study is that the TPB constructs significantly explain large amount of total variance in professionals' behavioral intention regarding GIT adoption. One plausible explanation for the high variance explained may be based on Greaves, Zibarras and Stride (2013). They concluded that such a high variance could relate the questionnaire development process, which elicited salient behaviors and beliefs that were relevant to the target population (Greaves, Zibarras and Stride, 2013). More importantly, high proportion of the explained variance makes it possible to investigate and explain the antecedent factors of behavioral intentions, which also leads to understanding the underlying reasons about professionals' GIT usage intentions. Therefore, we can conclude that the application of TPB offers a theoretical base for the consideration of behavioral attributes in technology adoption (Nchise, 2012).

Our finding is supported by some of the recent studies that TPB is capable of explaining the behavioral intention regarding ICT usage and environmental issues (see for example: Han, Hsu and Sheu, 2010; Greaves, Zibarras and Stride, 2013; Niaura, 2013). Han (et al., 2010) analysed a total of 428 responses and showed that TPB model has predictive power for intention to visit a green hotel. Greaves (et al., 2013) explored environmental behavioral intentions in a workplace setting based on a sample of 449 participants' responses. In their study TPB constructs were found to explain between 46% and 61% of the variance in employee intentions to engage in the environmental behaviors, which forms a basis upon which interventions could be developed within the host organization. Niaura (2013) conducted a survey among the respondents aged 17-36 (in total 459). He

used TPB to examine the gap between the environmental attitudes and the actual behavior of young people. TPB was reported to be supported by the analyses and the results revealed that social pressure has impact on youth's perceived behavioral control ($r=0.22$ and 0.36 , $p\text{-value}<0.001$). Just as expected, there are many studies pointing that the majority of people in western society have an awareness for the consequences humans actual behavior on the environment (Fielding, et al., 2008). This leads to display of concerns for the environmental problems from every perspective and there exist countless examples across many nations of the success of people power in preventing environmental degradation (Fielding, et al., 2008).

Recent literature also provides some conflicting results (see for example: Bamberg, 2013; Aboelmaged and Gebba, 2013). Bamberg (2013) uses a model of action phases as a theoretical basis, whose constructs are also taken from TPB. The research data was based on a sample of 1815 citizens from 5 different European cities. In his study, Bamberg (2013) mentioned existence of intention and behavior gap based unforeseen barriers and temptations. According to his view, this may be due to the fact that forgetting the intention may interrupt the intention behavior relation and, as a consequence, a successful behavioral change requires individuals not only to form a strong behavioral intention (motivational stage) but also to develop skills (Bamberg, 2013). Aboelmaged and Gebba (2013) used TPB from a different perspective of technology usage. They aimed to understand adoption of mobile banking based on a survey data from 119 respondents from undergraduate and postgraduate students. Their results indicated that the effects of behavioral control and usefulness on mobile banking adoption were insignificant and TPB has not been found to provide consistently superior explanations or predictions of behavior. Several plausible explanations may be possible for conflicting results. First of these may be based on Greaves (et al., 2013). Referring to Ajzen (1991), they stated that *the relative importance of the TPB constructs may vary from one behavior and one population to another. This may have led to variation in the extent to which employees believed that they had control over their actual behavior*. Especially, differences in the impact of perceived behavioral control may be based on the fact that perceived behavioral control is made up of both the perception or belief of self-efficacy and the person's perception of control over their performance of a behavior (Aguilar-Luzon et al., 2012; Ajzen, 2002b). Both elements are different and albeit related constructs, so the contribution of one and the contribution of the other on intention and behavior are different. Second explanation may be the difference between the level of knowledge and awareness about usage of GIT between the respondents of the samples with different

characteristics. Third explanation could be due to respondents' higher experience and familiarity with ICT technologies in our sample, which increase their expectancies and utilization of technological developments. Finally, an interesting explanation may be based on the differences between attitudes in the collectivist and individualist societies (Pavlou and Chai, 2002). As noted by Pavlou and Chai (2002), individualists perceive that they are relatively free to follow their own wishes, without regard for others' opinions.

Conclusions, limitations and suggestions

This paper explores individuals' environmental behavioral intentions using the theory of planned behavior (TPB). The factors incorporated in the analysis were selected with due consideration of the elements of TPB. Interestingly, the results revealed that all of the core TPB factors are significant. This is an indication of the fact that there is a great degree of *awareness* and *acceptance* of green computing among IT professionals. This observation is also applicable to their working environment. Yen (et al., 2003) pointed the differences in understanding the required knowledge, subject knowledge and technical skills between different groups in the work place and society. Therefore, special training programs in organizations and awareness-developing advertisements in the media for the society can be initiated so as to increase the level of understanding for the impact of GIT.

This study possesses some limitations that should be noted. First, the questionnaire is based on core factors of TPB and extensions considering external factors may help to have a deeper understanding of the behavior. Second limitation is obviously based on the sample frame. Although analysis of professionals or employees is declared to provide valuable information in technology adoption issues in many studies, assessment of the behavior of other layers in the society will certainly provide complementary information. Third, it may be useful to carry out a comparative study between different societies. Specifically, studies between collectivist and individualist societies may lead to interesting and valuable findings. Finally, using models other than conceptual ones may help to have a wider understanding for the factors affecting GIT usage since conceptual models such as Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB) are mainly focusing to their core factors.

References

1. ABOELMAGED M. G., GEBBA T. R., 2013, Mobile Banking Adoption: An Examination of Technology Acceptance Model and Theory of Planned Behavior, in: *International Journal of Business Research and Development* 2(1), p. 35-50.
2. AGILAR-LUZON M. del C., a-MARTINEZ J. M. Á. G. CALVO-SALGUERO A. and SALINAS J. M., 2012, Comparative Study Between the Theory of Planned Behavior and the Value-Belief-Norm Model Regarding the Environment, on Spanish Housewives' Recycling Behavior, in: *Journal of Applied Social Psychology* 42 (11), p. 2797-2833.
3. AJZEN I., 1991, The theory of planned behavior, in: *Organizational Behavior and Human Decision Processes* 50 (2), p. 179-211.
4. AJZEN I., 2002, Residual effects of past behavior, habituation and reasoned action perspectives, in: *Personality and Social Psychology Review* 6, p. 107-122.
5. BAMBERG S., 2013, Changing environmentally harmful behaviors: A stage model of self-regulated behavioral change, in: *Journal of Environmental Psychology* 34, p. 151-159.
6. BAMBERG S., & SSCMIDT S., 2003, Incentives, morality or habit? Predicting students' car use for university routes with the models of Ajzen, Schwartz and Triandis, in: *Environment and Behavior* 35, p. 264-285.
7. BERTON P., DONNELLAN B., 2011, The Greening of IT: Paradox or promise?, in: *The Journal of Strategic Information Systems* 20:1, p. 3-5.
8. BOSE R, LUO X., 2011, Integrative framework for assessing firms' potential to undertake Green IT initiatives via virtualization – A theoretical perspective, in: *J. Strateg. Inform. Syst.* 20(1), p. 38-54.
9. BROWN J. D., 2002, The Cronbach alpha reliability estimate, in: *Shiken: JALT Testing & Evaluation SIG Newsletter* 6(1), p. 17-19.
10. CAPRA E., FRANCALANCI C., SLAUGHTER S.A., 2012, Is software *green*? Application development environments and energy efficiency in open source applications, in: *Inf. Softw. Technol.* 54(1), p. 60-71.
11. CHAU P.Y.K., PAUL J. H., 2002, Examining a Model of Information Technology Acceptance by Individual Professionals: An Exploratory Study, in: *Journal of Management Information Systems* 18, p. 191-229.
12. CHEN Y., 2010, The drivers of green brand equity: Green brand image, green satisfaction, and green trust, in: *Journal of Business Ethics* 93, p. 307-319.
13. DAO V., LANGELLA I., CARBO J., (2011, From green to sustainability: Information Technology and an integrated sustainability framework, in: *J. Strateg. Inf. Syst.* 20, 1 (March 2011), p. 63-79.
14. DE GROOT J., STEG L., 2008, Value orientations to explain beliefs related to environmental significant behavior: how to measure egoistic,

- altruistic, and biospheric value orientations, in: *Environment and Behavior* 40, p. 330-354.
15. DUNLAP R. E., VAN LIERE K. D., MERTIG A. G., JONES R.E., 2000, Measuring endorsement of the new ecological paradigm: a revised NEP scale, in: *Journal of Social Issues* 56(3), p. 425-442.
 16. EREK K., SCHMIDT N.-H., ZARNEKOW R., KOLBE L.M., 2009, Sustainability in information systems: assortment of current practices in IS organizations, in: *Proceedings of the Americas Conference on Information Systems (AMCIS)*. San Francisco, August 2009 (paper 123).
 17. FILEDING K.S., McDONALD R. LOUIS W. R., 2008, Theory of planned behavior, identity and intentions to engage in environmental activism, in: *Journal of Environmental Psychology* 28, 2008, p. 318-326.
 18. Gartner Inc., 2008, *Green IT: The new industry shockwave*. Presentation at symposium/ITXPO conference, <http://www.gartner.com/newsroom/id/503867> (1.01.2014).
 19. GREAVES M., ZIBARRAS L. D. STRIDE C., 2013, Using the theory of planned behavior to explore environmental behavioral intentions in the workplace, in: *Journal of Environmental Psychology* 34, p. 109-120.
 20. HAN H., HSU L-T., SHEU C., 2010, Application of the Theory of Planned Behavior to green hotel choice: Testing the effect of environmental friendly activities, in: *Tourism Management*, 31 (3), p. 325-334.
 21. HARPER P., *Australia's Environment: Issues and Trends 2006*, Australian Bureau of Statistics, Cat. No. 4613.0, <http://www.ausstats.abs.gov.au> (1.06.2008).
 22. HART S., MILSTEIN M.B., 2003, Creating sustainable value, in: *Academy of Management Executive* 17, p. 56-67.
 23. HILTY L. M., ARNFLAK P., ERDMANN L., GOODMAN J., LEHMANN M., WAGER P. A., 2006, The relevance of information and communication technologies for environmental sustainability. A prospective simulation study, in: *Environmental Modelling & Software* 21, p. 1618-1629.
 24. JIN K.G., DROZDENKO R., BASKETT R., 2007, Information technology professionals' perceived organizational values and managerial ethics: an empirical study, in: *Journal of Business Ethics* 71(2), March, p. 149-159.
 25. JENKIN T.A., McSHANE L., WEBSTER J., 2011a, Green Information Technologies and Systems: Employees' Perceptions of Organizational Practices, in: *Business & Society*, 50(2), p. 266-314.
 26. JENKIN T.A., WEBSTER J., McSHANE L., 2011b, An agenda for Green information technology and systems research, in: *Information and Organization*, 21(1), p. 17-40.
 27. MALMODIN J., MOBERG Å., LUNDÉN, D., FINNVEDEN G., and LöVEHAGEN N., 2010, Greenhouse Gas Emissions and Operational Electricity Use in the ICT and Entertainment & Media Sectors, in: *Journal of Industrial Ecology* (4:5), p. 770-790.
 28. MELVILLE N.P., 2010, Information systems innovation for environmental sustainability, in: *MIS Quarterly*, 31(1), p. 1-21.
 29. MILTON J.S., ARNOLD L.C., *Introduction to Probability and Statistics: Principles and Applications for Engineering and the Computing Sciences*, McGraw Hill, Boston 2003.
 30. MISHRA A., AKMAN I., 2010, Information Technology in Human Resource Management: An Empirical Assessment, in: *Public Personnel Management*, 39(3), p. 243-262.
 31. MYKYTYN P.P., HARRISON D.A., 1993, The Application of Theory of Reasoned Action to Senior Management and Strategic Information Systems, in: *Information Resources Management Journal*, Vol. 6(2), p. 15-26.
 32. NCHISE A., 2012, *An Empirical Analysis of the Theory of Planned Behavior, A Review of Its Application on E-democracy Adoption Using the Partial Least Squares Algorithm*, in: *JeDEM* 4(2), p. 171-182.
 33. NIAURA A., 2013, Using the Theory of Planned Behavior to Investigate the Determinants of Environmental Behavior among Youth, in: *Environmental Research, Engineering and Management*, no. 1(63), p. 74-81.
 34. NORDLUND A.M., GARVILL J., 2003, Effects of values, problem awareness, and personal norm on willingness to reduce personal car use, in: *Journal of Environmental Psychology* 23, p. 339-347.
 35. NORDLUND A. M., GARVILL, J., 2002, Value structures behind pro-environmental behavior, in: *Environment and Behavior* 34, p. 740-756.
 36. PARK S.Y., 2007, An Analysis of the Technology Acceptance Model in Understanding University Students' Behavioral Intention to Use e-Learning, in: *Educational Technology & Society*, 12 (3), p. 150-162.
 37. PAVLOU P. A., CHAI L., 2002, What Drives Electronic Commerce Across Cultures? A Cross-Cultural Empirical Investigation of the Theory of Planned Behavior, in: *Journal of Electronic Commerce Research* 3(4), p. 240-253.
 38. PORTER M., KRAMER M., 2006, Strategy and society: the link between competitive advantage and corporate social responsibility, in: *Harvard Business Review* 84 (12), p. 78-92.
 39. SIEGLER K., GAUGHAN B., 2008, *A practical approach to Green IT*, Webinar, <http://www>.

- itmanagement.com/land/green-it-webinar/?tfso=2058 (14.07.2008)
40. STEG L., DREIJERNIK L., ABRAHAMSE W., 2005, Factors influencing the acceptability of energy policies: testing VBN theory, in: *Journal of Environmental Psychology* 25, p. 415-425.
 41. STEG L., VLEK C., 2009, Encouraging pro-environmental behavior: An integrative review and research agenda, in: *Journal of Environmental Psychology* 29, p. 309-317.
 42. WEBB M., 2008, *SMART 2020: Enabling the Low Carbon Economy in the Information Age*, <http://www.theclimategroup.org> (1.01.2014).
 43. YU A., 2007, *Assess students: Item analysis. Instructional Assessment Resources, IAR*, <http://www.utexas.edu/academic/ctl/assessment/jar/students/report/itemanalysis.php> (10.04.2011).