An Analysis of Intentions to Reduce ICT-waste among MSC Malaysia Status Companies

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ABSTRACT

An upsurge in consumption of information and communication technology (ICT) products has ignited conflicting debate about the impacts of ICT. On the one hand, ICT accelerates productivity, but on the other hand, environmental degradation issues associated with the rise in the amount of ICT-waste are a matter of deep concern for all. When waste issues come into focus, there is a growing need for long-term solutions. In this context, 'reduce' has been hailed as an effective ICT-waste prevention method by environmentalists and policymakers. Nonetheless, empirical evidence in this discussion remains sparse. The primary objective of this study is to investigate the determining factors of 'reduce' intention among employees in companies with MSC Malaysia status. Premised on the classic theory of planned behaviour (TPB) and survey analysis, this study reports that attitude, subjective norms and perceived behavioural controls are significant predictors of 'reduce' intention. The recommendations put forth in this study consider governmental policies and corporate actions that potentially bring ICT-waste under control.

Keywords: *Theory of Planned Behaviour, Reduce, ICT-waste, Climate Change*

INTRODUCTION

Climate change and its related events such as heavy wind, heat wave, and extreme rainfall span all regions can be the key driver behind economic destabilization and social vulnerability, with particularly severe impacts on low-income countries, according to Zhang (2018) during the International Monetary Fund's (IMF) climate risk summit. In an effort to mitigate the eventual impacts of

environmental degradation, IMF and regulatory bodies alike have given higher priority to sustainable development goals, which primarily focuses on capacity development, macroeconomic analysis, and financial assistance. They are crucial for promoting needed actions to tackle sustainability challenges.

While various industrial policies with practical measures have been put in place to shape and drive green growth, one key area of work that so far attracted public interest notably is resource efficiency. It is defined as a reduced level of resources used in production and consumption activities (European Environment Agency [EEA], 2016). In developing Asia, the governments are likewise putting high emphasis on this matter as non-optimal use of resources has resulted in the rapid growth of waste (Asia Development Bank, 2008). In particular, the ever-increasing volume of ICT-waste is a matter of deep concern. The amount of electronic waste (e-waste) entering the waste stream alarmingly reached an unprecedented level, hitting 44.7 metric tons (Mt) in 2016, with Asia contributing 40.7%, according to the 2017 United Nations University report (Baldé, Forti, Gray, Kuehr & Stegmann, 2017). Out of that quantity of e-waste, the report further revealed that discarded ICT made up a significant portion of 23%.

Rising quantities of ICT-waste and environmental damages are apparently due to the development of human society. The most pressing challenge facing the world currently is the reckless attitudes towards environmental costs and if the trend in excessive demand for natural resources persists, there will be a need for the second Earth-like planet by 2030 (World Wildlife Fund [WWF], 2010). In the context of this situation, eco-friendly actions have become an important force to achieve a more sustainable future for all. This study delved into the determinants of ICT 'reduce' intention of employees seems most relevant to existing needs. Furthermore, there is also a relative sparsity of existing research pertaining to 'reduce' intention within companies, making this study an important one to fill the research gap and simultaneously achieve the goal of better eco-sustainability.

This paper is organized as follows: the next section provides a literature review of pro-environmental behaviours, followed by the research methodology and analysis of this study. The last section draws the conclusion with research implications.

LITERATURE REVIEW

The excessive generation of e-waste is often criticized for leaving the problems of environmental degradation unresolved. Some toxins originate from improper disposal of ICT products (e.g. acid leaching process, landfill, and open burning) appear to have caused pollutions (Giusti, 2009; Zeng, Gong, Chen, & Li, 2016; Zhang, Ding, Liu & Chang, 2017). Health experts believe that through contact with harmful materials contained in ICT, such as lead, nickel, cadmium, and mercury, people are prone to health problems, such as nervous system impairment and lung diseases (Environmental Protection Agency [EPA], 2017).

The essential step towards solving ICT-waste problems is to reduce ICT consumption. 'Reduce', as defined by Tan, Ng, Lim, Lye and Ismail (2018) is the intention or action of minimizing the purchase of new ICT products as long as they are adequate and usable. It represents an effective approach to address ICT-waste issues as this idea morally compels users to consume the product only when necessary (National Environment Agency, 2017). The practice of 'reduce' draws strong supports from environmentalists and Yano and Sakai (2016), for example, regarded 'reduce' as a very high-priority action in the waste management hierarchy. Through the decision on not creating it in the first place (United States Environmental Protection Agency [US EPA], 2017), it is understandable that 'reduce' intention provides an opportunity to deal with sustainability issues more effectively.

This study attempts to explain why employees have the intention to practice 'reduce' at workplace. A literature review shows that the theory of planned behaviour (TPB) has been widely adopted to predict factors of individuals' intentions, due mainly to its good explanatory power. It emerges as a robust theoretical model in explaining various pro-environmental behaviours documented in prior studies with respect to recycling (e.g. Botetzagias, Dima & Malesios, 2015; Knussen, Yule, MacKenzie & Wells, 2004; Kumar, 2019; Tonglet, Phillips & Bates, 2004), environmental-friendly products purchase (e.g. Liobikienė, Mravickaitė & Bernatonienė, 2016; Tan, Ooi & Goh, 2017; Yadav & Pathak, 2016), green hotel visit (Chen & Tung, 2014), and energy saving behaviour (Chen, 2016; Gadenne, Sharma, Kerr & Smith, 2011).

TPB is an extension model of the theory of reasoned action (Fishbein & Ajzen, 1975) which posits that an individual's behaviour is primarily determined by people's intention to perform a particular act or not. That in turn is affected by one's attitude, subjective norms, and perceived behavioural control (PBC) (Ajzen, 1991; Ajzen & Fishbein, 1977). This theory assumes that people would behave in a rational way and he or she has the ability to exert self-control with respect to a particular behaviour (Ajzen, 1991).

In the TPB model, attitude is defined as the personal interest towards certain behaviours (Ajzen, 1991). Schwartz (1992) explained that attitude is the preference that a person has about an object or act. It can be either positive or negative evaluations of an act. According to Eagly and Chaiken (1993), attitude is the psychological emotion associated with an activity that an individual takes part in. As such, a person with a more positive attitude is more likely and readily to perform a given behaviour.

Subjective norms are defined as the social pressure of the key stakeholders (Flannery & May, 2000) such as suppliers, customers, creditors, friends, and governments. They are close and important to the individual and hence their opinions on certain issues can have an influence on behavioural intentions. More specifically, the literature on TPB suggests that social influence or the feeling of social pressure of a person in relation to a specific behaviour could impact the person's intention to take a certain action (Ajzen, 1991). That is to say, an individual is likely to act according to the expectation of reference groups of whom he or she perceives important (Tan et al., 2018).

Behavioural intentions are far more unpredictable than people realize. They are complicated by other concerns (Armitage & Conner, 2001). In addition to attitude and subjective norms, PBC is another factor in the TPB model used to explain behavioural intention. PBC is defined as a person's perception of the difficulties when performing a specific behaviour (Ajzen, 1991). In the case when the behavioural choice is not under complete volitional control, if the person has high PBC, refers to their abilities to carry out the duty, which include opportunities, skills, and resources (Liska, 1984; Park & Ha, 2014), then they are more likely to perform the behaviour.

RESEARCH METHODOLOGY

Theoretical Model

This study explores whether or not employees working in companies with MSC Malaysia status have the intention to practice ICT 'reduce' in response to environmental issues; and investigates factors influencing 'reduce' intention at workplace. MSC Malaysia status is a recognition awarded by Malaysia's government to "ICT and ICT-facilitated business that develop or use multimedia technologies to produce

and enhance their products and services" (Multimedia Development Corporation [MDec], 2018). They are most relevant with respect to the scope of this study emphasising on ICT-waste. Moreover, actions of companies warrant even greater attention as they extensively generate negative impacts on the environment in their daily operations (Brammer, Hoejmose & Marchant, 2011; Stern, 2000). It is imperative for them to embed environmental considerations into all business decisions.

'Reduce' plays a pivotal role in achieving a sustainable future but, as far as the authors are concerned, no attempt has been made to investigate the factors influencing 'reduce' intention of employees (managers or supervisors) in companies. In the absence of a more appropriate theoretical framework and for the given high explanatory power evidenced in prior empirical works, this study extended TPB to understanding 'reduce' intention, as depicted in Figure 1.
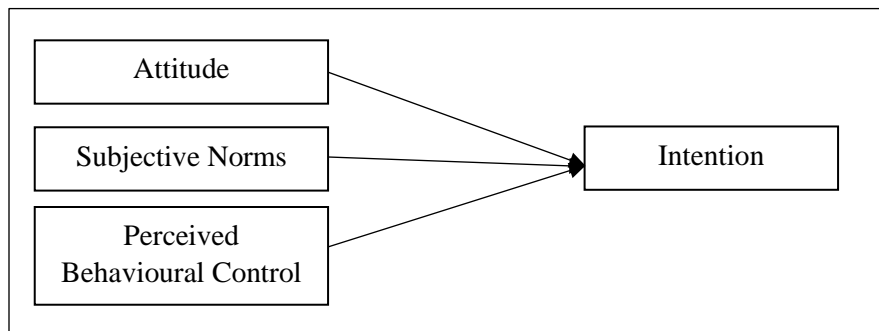

Fig 1 Research Model

The intention to 'reduce' is a cognitive process about the degree of readiness of a person to 'reduce' ICT-waste. Attitude plays a vital role in shaping a person's intention to perform an action. If the person has the preference in advancing the environmental interests, he or she will have the intention to reduce ICT-waste at workplace. As advocated by Wood (1991), individuals with concerns for environmental issues are more likely to fulfil their social responsibility in companies. Likewise, when an individual has a positive attitude towards the environment, he or she is will be morally compelled to behave in an environmentally responsible way (Stern, 2000). Tudor, Barr and Gilg (2008), through their case study of the health service industry, reported that employee interest, belief, and the level of awareness of environmental issues determine their sustainable waste management behaviour at workplace. Along with this theoretical account, this study posits that attitude has a positive relationship with 'reduce' intention.

Through the lens of institutions, an organization is likened to an open system that stakeholders will create a huge sense of pressure (Meyer & Rowan, 1977). Multiple rational expectations from individuals, local community, suppliers, employees, management and shareholders (Chen, Yu & Hu, 2018; Lee, Kim & Kim, 2016) appear to influence the ways the organization functions and could be a trigger for change. With that, it is hypothesised that subjective norms are positively related to 'reduce' intention.

Ajzen (1991) highlighted that PBC, refers to the perception of a person towards the potential difficulties to perform a certain behaviour likely affects their intention to take the action. Considering that when money, time and chance are not under their control (Chen & Tung, 2014), the people might find it

difficult to engage in and hence losing the interest to act accordingly (Knussen et al., 2004). As such, this study proposes a hypothesis that PBC has a positive relationship with 'reduce' intention at workplace.

Sampling

A quantitative survey was used to analyse the data in this study. Items of the questionnaire were adapted from prior studies (Chen & Tung, 2014; Han, Hsu & Sheu, 2010; Knussen et al., 2004) and reviewed by four experts. Hence, they are appropriate for questionnaire distribution and valid for data analysis.

The questionnaires were sent out by email and mail to collect responses from managers or supervisors working in MSC Malaysia status companies. Referring to the list of companies registered under MSC Malaysia as of 22 February 2018, there were 3241 active companies with this status running their operations in Malaysia, such as Klang Valley, Selangor, Kedah, Penang, Melaka, Perak, Johor and Pahang (MDEC, 2018).

Based on the systematic approach, a total of 463 questionnaires were distributed between March, 2018 and October 2018. The sampling interval was calculated by dividing 3241 business entities by 341, of which is the desired sample size suggested by Krejcie and Morgan (1970) for a study with a known population. This method suggests that each 9.5th company from the list will be selected as the sample. Nonetheless, every 7th business entity was drawn from the directory because the authors of this study foresee the presence of nonresponse. Only a total of 354 usable survey was collected, resulting in a 72.5% response rate. The Statistical Package for Social Sciences Software (SPSS) was used to do the hypotheses testing and provide descriptive statistics.

FINDINGS

Table 1 indicates the demographic representation of the respondents. A majority of the companies have been in existence for 3-6 years in Malaysia ($n = 124$, 35.03%). The second highest proportion, 26.55%, reported having less than 3 years of experiences, followed by 7-9 years (24.57%). There are only 13.85% of the companies claiming that they have been running their business for more than 9 years.

With respect to company size, there are 47% of the respondents have a range of 51 to 100 employees. The rest are 1-50 employees (25.15%), 101-150 employees (18.65%), 151-200 employees (7.63%) and above 200 employees (1.12%).

Pertaining to the company status, there is almost equal number of respondents in both groups - 44% of the companies are multinational firms while 56% of them are local enterprises.

Table 1 Profiles of the Respondents

Characteristics	Frequency	Percentage (%)
Year of Business		
Less than 3 years	94	26.55
3-6 years	124	35.03
7-9 years	87	24.57
More than 9 years	49	13.85
No. of Employees		
1-50	89	25.15
51-100	168	47
101-150	66	18.65
151-200	27	7.63
Above 200	4	1.12
Multinational Firm		
Yes	156	44
No	198	56

The descriptive statistics for questionnaire items are displayed in Table 2. The mean score for *ATT* is between 4.107 and 4.714. This indicates that respondents, in general, agreed that they have a positive attitude towards 'reduce' intention. Likewise, *SN* has a mean score between 3.891 and 4.322. On average, respondents also agreed that they have control over their behaviour, 3.977-4.007.

Table 2 Descriptive Statistics for Questionnaire Items

Items	Mean	Standard Deviation
Attitude (*ATT*)		
In the company, I like the idea of reducing the amount of ICT-waste produced.	4.714	0.663
In the company, I feel satisfied to reduce the amount of ICT-waste produced.	4.266	0.566
In the company, I feel meaningful to reduce the amount of ICT-waste produced.	4.444	0.687
In the company, I feel proud to reduce the amount of ICT-waste produced.	4.230	0.598
In the company, I feel worthwhile to reduce the amount of ICT-waste produced.	4.107	0.566
Subjective Norms (*SN*)		
My superior/ leader/ top management is committed to reducing the amount of ICT-waste produced.	4.322	0.688
In the company, the program of reducing the amount of ICT-waste receives full support from the workers/ subordinates.	4.221	0.899
In the company, my colleague experts me to reduce the amount of ICT-waste produced.	4.002	0.567
Most people who are important to me think that I should reduce the amount of ICT-waste produced in the company.	3.911	0.684
Regulation by government agencies has greatly emphasized on the importance of reducing the amount of ICT-waste produced.	3.891	0.451

Notes: Likert scale – "5" = strongly agree, "4" = agree, "3" = neutral, "2" = disagree" and "1" = strongly disagree. Items were adopted from previous studies: Chen and Tung (2014), Han et al., (2010), Knussen et al., (2004)

Table 2 Descriptive Statistics for Questionnaire Items (Continued)

Items	Mean	Standard Deviation
Our customers feel that reducing the amount of ICT-waste produced is important.	3.977	0.441
Perceived Behavioral Control (*PBC*)		
It is up to me to decide whether to reduce the amount of ICT-waste or not.	4.007	0.665
I am confident that if I want, I can reduce the amount of ICT-waste,	3.977	0.588
There are plenty of opportunities for me to reduce the amount of ICT-waste	4.000	0.621
I have resources, opportunities and time to reduce the amount of ICT-waste.	4.010	0.601
Most people who are important to me think that I should reduce the amount of ICT-waste produced in the company.	3.911	0.684
Intention		
In the company, I intend to reduce the amount of ICT-waste.	4.178	0.654
In the company, I actually had planned to reduce the amount of ICT-waste produced.	4.000	0.554
In the company, I am willing to participate in the ICT-waste 'reduced' program in the near future.	3.977	0.671
In the company, I intend to identify ICT products that can be reduced when needed.	4.089	0.566
Most people who are important to me think that I should reduce the amount of ICT-waste produced in the company.	3.911	0.684

Notes: Likert scale – "5" = strongly agree, "4" = agree, "3" = neutral, "2" = disagree" and "1" = strongly disagree. Items were adopted from previous studies: Chen and Tung (2014), Han et al., (2010), Knussen et al., (2004)

The results in Table 3 show that the model fits well with an R^2 of 0.606. It indicates that approximately 61% of the variance for 'reduce' intention are explained by *ATT*, *SN*, and *PBC* in the regression model. The ANOVA result reports an *F*-value of 179.126 and it is significant at the 0.01 level.

It is expected that employees who have a positive attitude about environmental protection would be more likely to state intentions to reduce ICT-waste at workplace. Based on the results reported in Table 3, the coefficient of *ATT* is 0.505, significant at the 0.01 level. Hence, it is suggested that employees with a favourable attitude towards the ecosystem have the intention to reduce ICT-waste in companies.

SN has a coefficient of 0.130 ($t = 2.445$, $p < 0.05$). This result implies that employees are more likely to reduce ICT-waste if they believe people who are important to them think they should do so. In other words, employees will conform to the expectations of others whose opinion they value.

There is a positive relationship between *PBC* and 'reduce' intention, with a coefficient 0.205 ($t = 3.819$, $p < 0.01$). This suggests that when employees found themselves having the ability to reduce ICT-waste at workplace, they will have the intention to act accordingly.

Table 3 Regression Analysis

Variables	Beta	S. E	*t*-value	VIF
CONSTANT	0.594	0.134	4.425***	
ATT	0.505	0.047	10.654***	2.051
SN	0.130	0.053	2.445**	2.796
PBC	0.205	0.054	3.819***	2.644
R²	0.606			
F-value	179.126***			

Notes: S. E is standard errors. *** and ** indicate the significant level of 0.01 and 0.05 respectively. VIF is variance inflation factor.

CONCLUSION

While 'reduce' practice has been hailed as an important driver of sustainability by policymakers, studies on human responses to the idea of 'reduce' remain scant. Therefore, this study was undertaken to provide an analysis of ICT 'reduce' intention within a sample of business entities with MSC Malaysia status. Building on TPB, it is reported that there are three important factors that potentially facilitate ICT 'reduce' programs within companies in this study – attitude, subjective norms and PBC.

Considering the impact of employee's attitude on 'reduce' intention, this study suggests that people with a positive attitude is more likely to have the intention of reducing ICT-waste. When it comes to changing employees' attitude, it is important to develop positive environmental attitudes among themselves through their experiences in the workplace. They need to clearly understand the negative impacts of ICT-waste and more importantly they must aware of their endeavours likely make a difference. Consequently, corporate training programs emphasizing the need for environmental protection are needed in the organizations to ensure that employees are more mindful of the impacts of their behaviour towards the ecosystem. This is because employees' positive attitude is key to whether they have the interest to perform 'reduce' behaviour in the first place.

Social norms are found to have a positive relationship with 'reduce' intention. Therefore, employees need various sorts of encouragement from the top management so they get convinced to conform to those of the influencing groups. The best way to encourage the participation of employees in carrying out ICT 'reduce' is by being a living role model. Managers with good leadership can demonstrate how ICT 'reduce' activities at workplace can minimize ICT-waste issues and thereby achieve sustainability. Also, there is a need for more interactive communication between management and employees so they can exchange ideas and receive feedback on the need to reduce ICT-waste. The companies also need to lay out and uphold their corporate philosophy and principles in relation to the environment. As a complement to the corporate's efforts, the government also plays a significant role in tackling ICT-waste problems. For example, governments may issue guidelines for all industries, including governmental agencies on best-practices to reduce ICT-waste. When individuals realize that governments and companies commit more fully to ICT-waste management, employees will be more willing to respond to their call.

The perception of employees of their ability to reduce ICT-waste at workplace determines how much they willingly intend to participate in ICT 'reduce' activities. In other words, employees would have the behavioural intentions to reduce ICT-waste if these tasks can be more easily accomplished at

workplace. In order to enhance the confidence of employees in keeping ICT-waste minimized, facilities must be readily available for and accessible to employees. They are more likely to have the intention to 'reduce' ICT when they have opportunities to do so. In addition, companies can launch awareness campaigns in companies, emphasizing that ICT 'reduce' is relatively easy to implement with strong support from the management.

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