

## Green Practices Adoption Framework for Small and Medium Sized Logistics Firms in Malaysia

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### Abstract

The main aim of the research is to develop the conceptual framework for green practices adoption by small and medium sized logistics firms in Malaysia and hence study the accelerators and impediments to the adoption and diffusion of green practices in the industry. A lack of understanding of the proper adoption framework may impede the rapid development of green implementation in Malaysian logistics firms. The authors examine the existing empirical studies in technology adoption research relating to green adoption at the organizational level. In most of the studies, factors influencing technology adoption the Technology Organization Environment Model (TOE) framework are used. The combination of Innovation Diffusion Theory (IDT) in the technological context and Thong's SME model make the proposed model more suitable for investigating the factors that influence innovation adoption in the logistics industry. A summary and conclusion along with research contribution, limitations, and the direction for future research are also presented in this paper.

*Keywords:* Technology Organization Environment Model (TOE); Innovation Diffusion Theory (IDT); Thong's Model; Small and Medium Enterprises (SME); Logistics Service Provider (LSP); Third Party Logistics (3PL)

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### 1.0 INTRODUCTION

Malaysia has transformed its economy from agricultural to a nation driven by trade, thus making international trade a critical component of Malaysia's economic engine (Omar & Jusoh, 2011). Export volume has increased from only RM1.4 billion in 1957 to RM605 billion in 2007 (Abdullah, 2008). In 2013, the total Malaysia export volume reached RM719 billion, while import registered RM649 billion, which makes total trade volume of RM1.4 trillion (Malaysia External Statistics, 2014). Logistics has become an indispensable to the well-being of a country as it plays a pivotal role in facilitating international trade (EUMCCI, 2012). In 2013, the contribution of the logistics industry (encompassing transport, storage and communication services) to the Malaysian economy was 8.8 per cent to Malaysia's GDP (EUMCCI, 2012). With higher competition resulting from globalization, a substantial number of companies outsourced most of their logistics activities to third party logistics companies (3PL) so that they can concentrate on their core competencies (Yeung, 2011). Currently, there are more than 22,000 companies in the logistics industry in Malaysia, involved in multiple areas of activities to enhance the economy (EUMCCI, 2012). On the other perspective, we can see that SME are increasingly becoming a vital part of the economies of both developed and developing countries (Kuzilwa, 2005; Margi *et al.*, 2006; Tagliavini *et al.*, 2001). In recent times, small to medium enterprises (SME) have become a topical subject among management and research practitioners (Mafini & Omoruyi, 2013). In Malaysia, SME sector is a key component of the economy, accounting for 97.3% of all total business establishments (SME, 2012). Small and medium sized companies may also form a large percentage of the firms in logistics services similar to those in the other industries. Many of the logistics companies engaged in transport and warehousing activities are small or medium sized and therefore this study would concentrate on the small and medium sized logistics companies. In developing countries, SME can easily be established since their requirements in terms of capital, technology, management, and utilities are not as demanding as those of the large enterprises (Mafini & Omoruyi, 2013). Manufacturing firms, especially those integrated into global production chains, seek not only low transport costs but also a host of sophisticated logistical needs: short transit times, reliable delivery schedules, careful handling of goods, cold storage chains, certification of product quality and superior security system (Carruthers *et al.*, 2003). The passion to reduce operational cost is seen to ignore the need to preserve the environment. All these factors could possibly contribute to the environmental state of degradation that is easily noticed today, thus improvement should rely on innovative solutions (Carvalho & Barbieri, 2012). This phenomenon ultimately calls for a comprehensive study on adoption of green practices in the logistics industry as an innovative process.

Many researchers have proposed various explanations as to the factors that influence firms' adoption of green innovations (Gadenne *et al.*, 2009; Henriques & Sadorsky, 2007; Lin & Ho, 2011). Stakeholder pressure, environmental regulation, company size, managers' characteristics, human resources and industrial sector are relevant variables frequently appeared in related research (Etzion, 2007;

Gonzales-Benito & Gonzales-Benito, 2006). Abdullah (2002) stated that one of the important issues in Malaysia's economic growth is technology adoption among Malaysian SME to enable them to be more competitive in the global business environment. Since the green agenda in Malaysia is at the infancy stage, this study is expected to furnish empirical evidence on green adoption in SME logistics companies (Yacob *et al.*, 2013). SME activities are relatively under-researched and more need to be done to help SME to adopt green environmental initiatives. A review of the literature suggests the existence of a few studies on small and medium sized logistics companies (Gunasekaran & Ngai, 2003). Lately, the role of 3PL companies has become increasingly important, hence inducing the need to study the role of small and medium sized logistics companies as the whole (Gunasekaran & Ngai, 2003).

SME originate from entrepreneurial individuals, who can identify new opportunities in a society and motivated to exploit such opportunities (Mafini & Omoruyi, 2013; Burke, 2006). Therefore, in terms of their characteristics, SME are also analogous to the entrepreneurial new ventures, especially in areas such as risk taking, flexibility, innovation, creativity and hands-on management (Mafini & Omoruyi, 2013; Ellegaard, 2006). The characteristics of the owner-manager play a pertinent role in technology adoption. Only some limited research has focused on the role of the owner-manager in technology adoption (Elbeltagi *et al.*, 2013; Martin, 2005; Windrum & Berranger, 2004). Given the limited empirical research on SME in Malaysia, and in particular, SME in the logistics industry, this research will focus on the role of the owner-manager in green practices adoption in Malaysia.

Several researchers have studied extensively the adoption and use of new technologies in SME in both developed and developing countries (Haller & Siedschlag, 2008; Kaynak *et al.*, 2005; Mutula & Brakel, 2007; Elbeltagi *et al.*, 2013). However, much of the research focuses on the barriers to adoption, identifying external and internal factors likely to cause slow uptake and use of new technologies. SME can be of particular significant to green concept as their total impact towards environmental degradation is huge (Yacob *et al.*, 2013).

This paper therefore will study the topic about technological innovation for the logistics industry as well as the factors that influence small and medium sized logistics service providers (LSP) to adopt green practices. As such, the main purpose of this paper is to study the factors that affect the adoption of green innovations for SME from the perspectives of technical innovation and stakeholders' requirements.

## ■ 2.0 THEORIES RELATED TO GREEN PRACTICES ADOPTION

Recent literature reviews reflect lack of theoretical development in sustainable supply chain management or better known as SSCM (Alexander & Walker, 2013). Several authors have mentioned that a theoretical background for SSCM is often found to be missing (Svensson, 2007; Carter & Rogers, 2008; Morali & Searcy, 2013). It is further recognized that efforts to introduce theoretical frameworks for SSCM are still in their infancy (Morali & Searcy, 2013; Gold *et al.*, 2010). However, there is evidence of theories that are imported from other disciplines. Giannakis *et al.* (2004) for instance has explained five main disciplines that have influenced the thinking in SSCM; systems theory, transaction cost economics, game theory, inter-organizational relationships & industrial network theories, and e-business. Chicksand *et al.* (2012) further identified eight important theories in supply chain management (SCM); integrated SCM, network theory, transaction cost economics, resource dependency theory, agency theory, industrial organization, resource based view and dynamic capabilities. Then, Sarkis *et al.* (2011) described additional nine theories that deal with issues of SCM. The nine theories described are the complexity theory, ecological modernization theory, information theory, institutional theory, resource based view theory, resource dependence theory, social network theory, stakeholder theory and transaction cost economics theory. In the same study too, Sarkis *et al.* (2011) postulated four promising theories used in SSCM: diffusion of innovation theory; path dependency theory; social embeddedness theory and structuration theory.

This study is conducted to understand the basic factors that influence organizations to adopt new innovations on green practices. Observations by researchers (Alam, 2009; Ismail & Ali, 2013; Alatawi *et al.*, 2012), suggests that most research on technology adoption by businesses are based on the theory of planned behaviour (TPB) (Ajzen, 1991), technology acceptance model (TAM) (Davis, 1989), diffusion of innovation diffusion theory (IDT) (Rogers, 1995), resource-based view theory (RBV) (Wernerfelt, 1984) and technology organization environment model (TOE) (Tornatzky, 1990). A thorough review of the literature on technology adoption identified some significant works at the individual level. The study too is able to identify several models and theories that are being used for technology adoption at the individual level such as theory of planned behaviour (Ajzen, 1991), unified theory of acceptance and use of technology theory (Venkatesh *et al.*, 2003). However, it is noted that there are fewer studies at the organizational level. This study will attempt to fill the wide gap in the study.

According to Salleh and Rohde (2005), technology acceptance model and the theory of planned behaviour only focus on technological perspective. The works is based on perceptions, attitudes and they have commonly been used as groundwork for IT research at the individual level. Ramanathan *et al.* (2012) later was able to quantify that RBV has been used to provide the theoretical underpinning to understand how the adoption of innovation is linked to firm performance. Since the aim of this study is to examine green practice adoption in SME logistics, company's models at the organization level are found most suitable.

Upon reviewing the literatures cautiously, this study found that the TOE framework is a suitable framework for the study of factors influencing the adoption of green practices. The TOE framework is also consistent with Rogers' (1983) innovation diffusion theory. Many researchers have used the TOE framework to study innovation adoption impacts. For instance, Lin and Ho (2008) used the TOE framework to study green practices adoption in the logistics industry in Taiwan. Then, Weng (2011) studied green innovation adoption in SME in China. Lertwongsatien and Wongpinunwatana (2003) showed the suitability of the TOE framework for studying the e-commerce adoption study in Thailand SME. Literatures have proved that many studies combined TOE frameworks with other theories to better explain technology adoption (Alatawi *et al.*, 2012).

Interestingly, IDT theory also has been found to be compatible with TOE theory. Therefore for this study; Rogers' (1983) IDT theory will be combined to test with the TOE model. Thong (1999) on the other hand suggested TOE theory in four dimensions when studying SME sectors (Ismail & Ali, 2013). Since the chief executive officers (CEO) or owner managers of a company play pertinent role in policy adoption in SME, the "individual" context was introduced as the fourth observation dimension. Following Thong (1999), Al Qirim (2007)

also tested the fourth dimension in the research. In agreement with the significant role played by the owner-manager's in SME, this study shall apply Rashid and Al Qirim's (2001) model by including the decision-maker characteristics as one of the main variables together with technological, organizational and environmental context. All the variable stated in Rashid and Al Qirims (2001) original model are adopted in this study. Thong (1999) expanded the concept of IDT and the three-context framework from the Tornatzky and Fleischer (1990) study and suggested four factors that influence the technology adoption decision: (1) characteristics of management, (2) characteristics of technological innovation, (3) characteristics of organization, and (4) characteristics of environment in which the organization operates. Summing up the four contexts along with their factors would depict the green practices adoption framework shown in Figure 1.

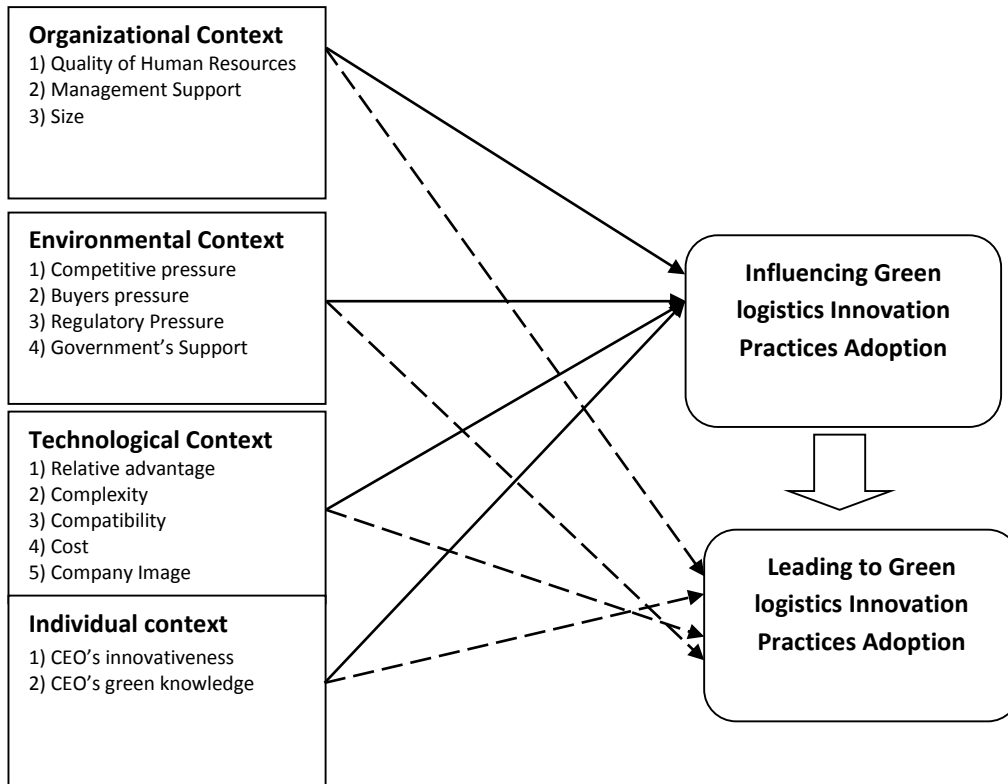


Figure 1 Green practices adoption framework

The above framework portrays the various factors and their effect on the adoption decision for green practices as a first level. Whether such relationships would lead to green practices adoption would depict a second level of effects. Thus, the first level would depict how the potential adopters generally viewed green practices (Rashid & Al-Qirim, 2001). On the other hand, the second level would depict an adoption criterion that is salient to each SME, hence would emphasize certain factors more than the others. The proposed framework is expected to highlight the impact of the various contexts and their factors on green practices adoption at the two levels (Rashid & Al-Qirim, 2001).

### 3.0 PROPOSED CONCEPTUAL MODEL

The main objective of this study is the find the likelihood of green innovation adoption in small and medium sized logistics firms in Malaysia. Figure 1, using the combined TOE and IDT model, proposes that there are significant relationships between organizational, environmental, technological and individual contexts and the likelihood of green practice adoption in companies. The organizational context contains factors such as quality of human resources, management support and organization size. Organizational factors adopted in this study are in line with Lin and Ho's (2008) observation. The environmental context relates to the factors such as competitive pressure, buyer pressure, regulatory pressure and governmental support. As for the technological context relative advantage, complexity, compatibility, cost and company image is being studied. Finally, the individual contexts comprised of the owner manager's knowledge and innovativeness. To the best of the author's knowledge, there are no known studies in relation green logistics practice adoption in logistics.

In this research, the endogenous variable is the likelihood of green practices adoption. It is, however, not possible to study all the factors identified in the technological innovation literatures. According to Thong & Yap (1995) innovation researchers have argued that it may not be possible to develop a unifying theory of innovation due to the fundamental differences between innovation types. This study

would therefore examine selected factors that are more appropriate to the adoption of green practices in the logistics industry. Each of the factors in Figure 1 is discussed appropriately below and a corresponding hypothesis enunciated accordingly.

### 3.1 Organizational Context

According to the TOE framework, organizational adoption of technological innovation can be influenced by the organizational context (Ismail & Ali, 2013). Organizational context refers to the effect of organizational characteristics on the decision to adopt green practices (Ismail & Ali, 2013; Lippert & Govindarajulu, 2006). The organizational context represents the factors internal to an organization influencing an innovation adoption and implementation (Tornatzky & Fleischer, 1985). Tornatzky and Fleischer (1985) has identified several studies which discussed the variety of factors that influences organizational characteristic such as the quality of human resources, top management's leadership skills, organizational support, organizational culture and organizational size. In this study we further limit the scope only on the quality of human resources, management support and organization size.

### 3.2 Environmental Context

The environmental context is the area in which the firm does business (Tornatzky & Klein, 1982). The environment can be interpreted as the surroundings of the organization which looks at how external influences affect barriers to adopt an innovation. According to Frambach and Schillewaert (2002) the variables that are commonly appearing in the literature of technical innovations are: environmental uncertainty, environmental munificence, governmental support, industry type, competition and network relations. A thorough literature review further shows that significant external factors that might influence SME's e-commerce adoption are competitive pressures (Dholakia & Kshetri, 2004; Zhu *et al.*, 2003; Scupola, 2009), pressure from trading partners such as buyers and suppliers (Scupola, 2009; Iacovou *et al.*, 1996; Grandon & Pearson, 2003), and the role of government (Scupola, 2009; Scupola, 2005; Kuan & Chau, 2001). This study focus is on influences competitive pressure, buyer's pressure, regulatory pressure and government's support.

### 3.3 Technological Context

The technological context represents the pool of technologies available to a firm for adoption (Scupola, 2009). Technological context, in general, refers to the application of new technology adoption (Lippert & Govindarajulu, 2006). Tornatzky and Fleischer (1990) describes technological context as both internal and external technologies relevant to the firm. Technological factors have often been taken into account in the literature on technical innovation (Lin & Ho, 2010). Lin and Ho (2010) opines that technological factor is scarcely analysed in green practices adoption. Several technological factors have been discussed on their influences of technical innovation, including relative advantage, compatibility, complexity, trial ability, observe ability, ease of use, perceived usefulness, information intensity, and uncertainty (Tornatzky & Klein, 1982; Frambach & Schillewaert, 2002; Rogers, 1983; Lin & Ho, 2010; Jeyaraj *et al.*, 2006). Rogers (1983) further identified five critical characteristics of the innovation that influences its adoption: relative advantage, compatibility, complexity, trial ability and observe ability. This research considers only three innovation characteristics in the context of green practices adoption: relative advantage, compatibility and complexity. Compatibility, relative advantage and complexity too were found to have consistent associations with innovation behaviours (Tornatzky & Klein, 1982; Kuan & Chau, 2001).

The focus on compatibility, relative advantage and complexity is important because these three factors have consistently been found to be more important in influencing adoption behaviour of technical innovation than the other factors (Tornatzky & Klein, 1982; Jeyaraj *et al.*, 2006; Sia *et al.*, 2004). In additional to the above mentioned three technological factors this study investigates additional factors of cost and company image which were adopted from Rashid and Al-Qirim's model (2001).

### 3.4 Individual Context

In most organizations, the decision for technology adoption process is directly affected by top management exposure. In SME perspective, the chief executive officers or owner manager normally assumes the role of senior management. Thus, it is often difficult to separate SME owners from their firms since all decisions from daily functions or activities to future investments are made by them (Thong, 1999). The CEO or the owner managers of the firm will play a pertinent role in decisions involving adoption of any technology and the same would be the case in the adoption of green practices. For example, Antlova's (2009) in his study found that one of the significant barriers to innovation acceptance in SME is the resistance to organizational changes, especially in connection with older owner managers. Thong and Yap (1995) observes that the rate at which a small business changes depends not only on factors like business size or market forces, but also on the inclinations of the owner manager and the extent to which he is able to prepare to change (Antlova, 2009). Owner manager's characteristic is a key adoption predictor of Thong's (1999) decision maker technology organization environment model (DTOE). Thong (1999) further explores to separate decision-makers characteristics from organization in TOE and gave it boost to bring the revised model (Ismail & Ali, 2013). The proposed four conceptual adoption predictors assume a more detailed set of factors that assist to predict the likelihood of technology adoption among SME (Ismail & Ali, 2013). On the other hand, Rashid & Al-Qirim's model (2001) proposes CEO's knowledge and CEO's innovativeness as predictors for technology adoption. This study adopted two owner manager characteristics from previous TOE and DTOE literatures which include owner-manager's knowledge of green practices and innovativeness.

#### ■4.0 SUMMARY AND CONCLUSION

Environmental issues in the logistics industry are crucial for studying. However, only a limited number of articles analyse environmental issues in the logistics industry (Lin, 2011). Much remains to learn empirically about the factors influencing logistics companies' attitude toward environmental management practices (Ho & Lin, 2012).

The proposed research model has been devised on careful examination of various models and review of literature used in previous adoption studies at the organizational level. The developed research model was based on the TOE framework combined with IDT theory. As the TOE framework includes the environment context, it becomes better able to explain intra-firm innovation adoption; which will then be able to uphold this model to become a more complete one (Oliveira & Martins, 2011). The use of this framework therefore will not only empirically validate its usefulness but will also test the performance of the IDT theory. Based on the works of Rashid and Al-Qirim's (2001) and Thong (1999) a TOE resource-based model for SME is developed. The integration of TOE framework, IDT theory, Thong's model and Rashid's 2001 model is further expected to create specialized model for SME in the logistics sector.

#### 4.1 Limitation and Future Research Directions

The formulation of the proposed research model is based on the empirical validation of the constructs taken from different research studies of new technology adoption at the organizational level and not fully exploited from the extent research on green practices adoption. The proposed constructs for this model, therefore, needs to be empirically validated. The next step in this research is to collect data from various small to mediums sized logistics firm in Malaysia in the future in order to support the various hypotheses of the proposed research model. If this model is found suitable in the Malaysian context it can be model as foundation studies for other developing and third world countries.

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