Barriers to product returns and recovery management in a developing country: investigation using multiple methods

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A B S T R A C T
There is growing recognition of the value that can be recaptured from unproductive assets resulting from returned merchandise using product returns and recovery management (PRRM). This is important as organizations can no longer ignore or accumulate returns at the back of the warehouse. This paper identifies the barriers that impede PRRM among manufacturing firms in Malaysia, and provide useful summary data and analysis to entice firms to consider adopting PPRM. This study reviewed 38 journal articles, which were subsequently validated through field interviews using multiple case study method. The content analysis reveals that the two major obstacles are financial and resource constraints, which fall within the category of internal barriers. However, the results of the interviews with six manufacturers in Malaysia indicate that external barriers are the main obstacles that hinder the adoption of PRRM, thus suggesting that there may be a subtle difference between the results reported in academic research and managers’ perceptions of the barriers of product returns and recovery management. The external barriers, such as customers’ operational performance and perception, are perceived by managers to be detrimental to the adoption of PRRM, which is contradictory to the academic findings. In addition, financial and resource constraints impede the adoption of PRRM. This suggests that further study should be conducted by expanding the sample size to continue to empirically explore the barriers of PRRM. This study helps policy makers in emerging countries in general and Malaysia, in particular, in setting appropriate policies and strategies to improve product returns and recovery of manufacturing firms.

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1. Introduction

Largely due to customer pressures, savvy firms are engaging in supply chain management activities that are sensitive to the ecosystem. Therefore, manufacturing firms continuously strive to learn about the concerns of waste and cope with them in a way to achieve competitive advantage in the marketplace, and to improve their performance. The primary purpose to reduce waste was not for environmental concerns, but economic reasons. Waste means greater economic loss (Lai & Cheng, 2009). However, it is noted that very few Malaysian firms are actively engaged in green supply chain management (GSCM) practices. According to Eltayeb and Zailani (2009), Olugu et al. (2010), Eltayeb et al. (2011), and Nik Ab Halim et al. (2011), product returns and waste recovery have received little attention among Malaysian manufacturers. This could possibly be due to the high cost of adopting green supply chain, lack of capabilities and regulations, low customer pressure, and less attention to the consideration of social responsibility (Eltayeb and Zailani, 2009). Other reasons include high processing cost, high transportation and warehousing cost, insufficient skilled labor, disruption in the manufacturing process to adopt GSCM practices, and poor waste management culture. Indeed, many manufacturing firms see environmental activities as burdensome (Guide et al., 2003b).

Guide et al. (2003b) argue that some companies accept returns even when there is a lack of interest in waste management in the market. However, when lower cost and reduced lead time are paramount, many firms tend to disregard environmental issues (Aronsson and Huge-Brodin, 2006), and few firms can afford to engage in product returns and recovery management (PRRM). In the conventional approach, for instance, many firms tend to ignore the management of used products (Jayaraman and Luo, 2007), and hence creating a serious threat for the development of
sustainability efforts to cope with environmental degradation and the scarcity of resources that the world is facing today. The effect of a manufacturer’s flawed product returns and recovery management can severely reduce the returns value and increase the overall sales cost. This is mainly due to inefficiency in the recovery system of the reverse supply chain process (Guide and Van Wassehove, 2009). Some manufacturers have mistakenly believed that they can handle product returns in the same way as managing the traditional forward flow of the supply chain. In returns management, companies must deal with unique reverse logistics activities that are different from the forward flow, such as the collection of outdated, damaged, and unwanted products and packaging. The more complex the product, the greater the challenge that companies have to face, especially when dealing with a large volume of returns. This derives from several factors like the lack of skilled workers and the mandatory take back of end-of-life products. Rogers and Tibben-Lembke (2001) note that it is difficult to adopt green supply chain without adequate managerial support and designated resources.

The efficiency of product returns and recovery management directly affects the volume of waste because untreated product returns are usually turned into waste in the supply chains. In this respect, several researchers define waste as the main cause or internal returns that are generated by the internal production process, activity or by-products. For instance, De Brito and Dekker (2004), Talbot et al. (2007), and Stindt and Sahamie (2012) define manufacturing returns as returns that emerge during the production process, such as production scrap materials, rejected parts, surplus products, and by-products. The UK Environmental Agency defines returns as discarded products (The Chartered Institute of Purchasing and Supply, 2007). Effectively managing manufacturing returns in the supply chain are vital to successful waste reduction in the manufacturing industry (Mollenkopf et al., 2007).

Malaysia is a developing country and the key to achieve its goal to become a developed nation by the year 2020 lies on its government’s concerted efforts to nurture the industrial sector. Nevertheless, considering the current global environmental condition, it would be irrational to thoughtlessly aim to become a world-leading industrialized nation at significant cost to the environment. To become a leading 21st century industrialized nation, the Malaysian Government has taken vital measures to tackle waste management and conservation issues that could adversely impact the long-term sustainable development of the country. The recent rapid development in Malaysia’s industrial sector has negatively affected its environment due to the rising amount and diversity of toxic and hazardous waste, pollution, and rapid depletion of natural resources (Abdulllah, 1995; Lau, 2004; Agamuthu and Victor, 2011). The amount of scheduled waste generated by businesses in Malaysia increased from 1.1 million in 2006 to 1.8 million tonnes in 2011 (JAS, 2011). In addition, manufacturers in Malaysia contribute to at least thirty percent of the nation’s total solid waste (Nasir et al., 1998), which is estimated to increase at approximately four percent per year. Furthermore, most manufacturers generally tend to ignore their green responsibility by subcontracting it to a third party to manage the recovery process. This has led to the management of the recovery activity being dominated by third party recyclers who are operating in an unsustainable manner (Mohamed et al., 2008), which further adds to the urgent need of an effective and efficient product returns and recovery management system.

Waste recovery of resources in Malaysia is still at an infancy stage. Malaysia is still struggling in finding effective measures to reduce the increasing volume of waste generated, especially from the manufacturing industry. To ensure the sustainability of industrial waste recovery, proper government support is needed through sensible policy and legislation. The existing industrial waste management system in Malaysia favors an end-of-pipe approach that promotes the use of treatment and disposal rather than recovery. It is not uncommon to dump waste in Malaysia without any recovery attempt (Kalanatarifard and Yang, 2012). However, this method creates various environmental problems, including, among others, illegal dumping and the need for new land for disposal facilities. There are many cases of illegal and inappropriate dumping of hazardous industrial waste that has affected human and environmental health (Mohamed, 2009). This clearly indicates that manufacturing firms in Malaysia are facing various challenges and barriers that hinder their efforts to embrace product returns and recovery management.

Our literature review clearly shows that there is an urgent need for a study to unearth the underlying obstacles that hinder the adoption of product returns and recovery management in Malaysia. We attempt to answer the question that “what are the barriers that prevent manufacturers in Malaysia to adopt product returns and recovery management?” We need to answer this question for two reasons. First, researchers have overlooked sustainability and green supply chain management, especially in the area of product returns and recovery in developing nations. Second, practitioners in developing countries typically perceive product returns and recovery management as a grave burden on scare resources. Thus, it is vital to educate the practitioners that effective product returns and recovery management is a unique form of competitive advantage. More specifically, knowledge of the barriers that inhibit adoption of product returns and recovery management helps manufacturers in developing countries to understand their corporate responsibility towards environmental conservation. Moreover, valuable research findings provide practical guidance for manufacturing firms to adopt sustainable environmental policy.

The following section discusses the theoretical foundation of product returns and recovery management literature. Next, we discuss the research methodology and data collection, follow by the research findings and study implications.

2. Literature review

2.1. Product returns and recovery management (PRRM)

Product returns and recovery management can be defined as all the activities involved in managing product returns such as avoidance, gate keeping, reverse logistics, disposal, warranty, remanufacture, reclaim, and other green practices (Rogers et al., 2002). How to proficiently and ecologically managing product returns has attracted intense attention from practitioners and academia (Srivastava and Srivastava, 2006). For managers, effective returns management is essential since product returns affect a firm’s profitability and relationships with customers and stakeholders (Mollenkopf et al., 2007). Without such a focus, the company is at risk of losing money since product returns can contribute to higher cost of operations. The literature shows that the two main reasons that motivate firms to proactively engage in product returns and recovery management in the developed countries are to support commercial returns in the United States, and fulfill strict environmental policy and legislation in Europe (Guide and Van Wassenhove, 2009).

Product returns can be grouped according to the three phases of the supply chain: manufacturing, distribution, and customer use or consumption (De Brito and Dekker, 2004; Talbot et al., 2007; Stindt and Sahamie, 2012). Manufacturing returns occur during the production stage whereas distribution returns refer to returns while
distributing the products. Customer returns are initiated by the customers after they have received the products but chose to return the products due to a variety of reasons, such as warranty, service, and end-of-use items. Manufacturing and customer returns are synonymous with internal and external failure costs in the total quality management literature. From another perspective, manufacturing returns come from internal sources, whereas customer and distribution returns originate from external sources (Wenerfelt, 1984, 1989). Amit and Schoemaker (1993) distinguish resources from capabilities. A resource-based view (RBV) and stakeholder theory. The RBV argues that a firm’s ability to assemble, integrate, and deploy resources. The RBV green supply chain literature focuses on environmental and firm-level factors and assumes that rational decision makers will choose the optimal solution based on their rational analysis of institutional, industrial, and organizational factors. The RBV has emerged as a dominant tool to explain manufacturing firms’ green supply chain management. Principally, successful product returns management requires both resources and capabilities.

The RBV theory is relevant to product returns and recovery management research in several ways. First, the RBV describes how firms choose to deploy resources by investing in product returns. Insufficient resource commitment is cited as one of the biggest problems in developing successful product returns programs (Walsh, 2006). Second, the RBV describes proactive resource allocation and decision-making, which emphasize the importance of using internal resources (Coates and McDermott, 2002). Finally, the RBV is closely tied to the stakeholder theory (Freeman, 1984), which argues that firms produce externalities that affect their internal and external stakeholders. Indeed, firms are forced to engage in green supply chain activities that are sensitive to the ecosystem and sympathetic to the views of all stakeholders. Specifically, stakeholders may reward firms for being environmentally responsible and good societal citizens, but punish environmentally oblivious firms.

The supply chain comprises a variety of stakeholders, even more so than individual enterprises within the supply chain, especially when environmental issues are introduced (De Brito et al., 2008). Stakeholder analysis for a green supply chain is especially pertinent as not all green practices are conducive in enhancing the competitiveness of an organization but instead are necessary due to stakeholders’ pressure. Stakeholder theory is usually presented as an explanatory theory to explain the antecedents or contingencies of adopting green practices, like product returns and recovery management. Stakeholder theory has been used extensively in green research, such as specific stakeholder influences on green purchasing (Björklund, 2010; Maignan and McAlister, 2003), life cycle analysis in the supply chain (Matos and Hall, 2007), environmentally-oriented reverse logistics (Sarkis et al., 2010), ‘closing the loop’ for greening supply chains (Zhu et al., 2008), and green logistics practices (Chien and Shih, 2007; González-Benito and González-Benito, 2006). Stakeholder theory has also been used to investigate and identify the roles of various stakeholders within green practices (De Brito et al., 2008; Gunther and Scheibe, 2005). This research contributes to the green supply chain literature by applying the RBV and stakeholder theory to derive at a set of guidelines for firms seeking to improve profitability and green performance through competent product return and recovery management.

3. Methodology

The objective of this research is to uncover and understand the barriers that impede the development of product returns and recovery management in Malaysia. To meet this objective, our study uses two data sources: journal publications (secondary data) and field interviews (primary data). First, we searched the literature and reviewed relevant environmental publications to develop an initial set of barriers on product returns and recovery management. The scope of the environmental publications was pre-determined based on the research objective. This was used to establish the foundation of our research framework. Next, we utilized case study method to conduct field interviews of six manufacturers located in the northern part of West Malaysia. A summary of the study design is illustrated in Fig. 1.
3.1. Quantitative content analysis of the literature

Content analysis is a useful means for assessing the symbolic content of published articles in a systematic manner to unearth research opportunities drawn from the diverse literature base. Content analysis is performed once relevant information is extracted from the set of selected journal papers. Dapiran and Mollenkopf (2010) argue that content analysis is used to clarify or confirm information gathered from field interviews. Hence, the content analysis method has been applied widely to examine the literature base of numerous subject areas. For example, Gold et al. (2010) use a quantitative content analysis approach to examine the role of sustainable supply chain management as a medium for generating valuable inter-organizational resources. Their study discovers that sustainable supply chain management is a catalyst to a firm’s sustained competitive advantage.

In our study, to ensure that results drawn from the secondary data are reliable, we adopt a widely used four-step approach (Gold et al., 2010). In the first step, we define the process structure and data source for the research. We limit the scope of articles to high quality academic journal papers published between 1990 and 2012 in reputable outlets, such as Science Direct, Emerald Insight, Springer, Taylor & Francis, Wiley Online Library, and IEEE Xplore Digital Library. In the second step, we delineate the classes for grouping articles identified in the first step, and summarize crucial dimensions of the articles, including the name of the journal, year of publication, and type of product returns and recovery management barriers. In the third step, we isolate the main barriers based on content analysis of the articles. Finally, we cross validate the barriers identified via content analysis to field interviews of practitioners.

3.2. Qualitative content analysis of the field interviews

Qualitative content analysis uses an interpretive paradigm to assess case studies. It is a valuable supplementary approach to cross-validate the findings of traditional quantitative content analysis. Its goal is to identify important themes or categories within a body of content, and to provide a rich description of the social reality caused by the themes and categories in a particular setting. Through meticulous and thorough data preparation and interpretation, the result of qualitative content analysis not only can be used to support the development of new theories, it also can be used to validate existing theories or research models to provide detail description of research phenomena. As shown in Fig. 1, this exploratory research is based on multiple case studies. Qualitative content analysis by means of case study method has been used successfully to explore new phenomena for developing new theories in operations management (Voss et al., 2002). Larsson and Lubatkin (2001) contend that case study can be more appropriate than empirical research for exploring basic knowledge of a research topic. However, the major issue with case study is the difficulty to generalize research results. Nevertheless, case study is one of the most frequently used methods in reverse supply chain research (Lau and Wang, 2009).

In terms of sampling for the case study part of our research, we use six firms that vary in size, focus, and mission. While relatively small, the samples size is sufficient considering the exploratory nature of our study (Eisenhardt, 1989). Moreover, we select only major and representative firms in our sample to improve the ability to generalize the case study results (Lau and Wang, 2009). We use semi-structured interviews to ascertain the scope of product returns and recovery management in the automotive, electrical, and electronic industries. Similar set of questions are posed to all respondents, and the interviewers take the stand that respondents are free to answer the open-ended questions and their responses are not limited to the boundaries of the posed questions. In order to increase our likelihood of identifying all the barriers to the adoption of product returns and recovery management, we restrain the sampling frame to manufacturers with certified international quality management and environmental compliance management standards. The purposive sampling technique is used to select manufacturers based on the expectation that they possess the expertise and information that are of interest to this research (Sekaran, 2003).

The subject of our case study interviews is the production manager since the scope of this study is within their job description. To ensure accurate decoding of the interviews, all interviews are tape-recorded and subsequently transcribed. Each interview takes about an hour. At the opening of each interview, the researcher provides a brief overview of the study and the general ideas pertaining to product returns and recovery. The interviewees are given the freedom to answer each question, but the researcher may pose new queries to clarify a given answer if needed. Next, the cross-case technique is used to analyze the interview data (Caniatric et al., 2012), and results are generalized where appropriate.

4. Results of quantitative content analysis

As discussed in a previous section, this study contributes to the green supply chain literature by exploring the adoption barriers of product returns and recovery management, especially in developing countries. Since there is a lack of knowledge and useful guidelines regarding these barriers, we use quantitative content analysis to examine the literature from different body of studies (Dapiran and Mollenkopf, 2010). Our literature review reveals that barriers for product returns and recovery, reverse logistics and green supply chain management are discussed in general. Several authors have classified the barriers into internal and external barriers. According to Hillary (2004), internal barriers are the impediments that exist in the company itself that impede the adoption of environmental efforts, whereas external barriers involve hindrance from outside of firms that disrupt the adoption of green practices. González-Torre et al. (2010) reveal that the literature classifies barriers in reverse logistics into industry-specific barriers and organizational barriers. This classification scheme supports Hillary’s (2004) internal-external classification since organizational
barriers are similar to internal barriers whereas industry-specific barriers are synonymous with external barriers.

González-Torres et al. (2010) discern nine barriers that hinder the adoption of reverse logistics in the automotive sector, which they classify into external and internal barriers. They discover that the lack of know-how with respect to reverse logistics is the main internal barrier for implementing reverse logistics. For external barriers, they find that government and social actors, as a whole, do not sufficiently encourage the adoption of reverse logistics. Instead, government and social actors act as barriers. They also find that the major barriers to reverse logistics among Spanish automotive firms are mainly external barriers. This is because the smaller firms, which comprise the sample of their study, are incapable of dealing with the external barriers.

In a different study, Ravi and Shankar (2005) identify the important barriers to the adoption of reverse logistics activities in the automotive supporting industry in India. Their study classifies 11 barriers into four groups: autonomous, dependent, linkage, and independent barriers. Autonomous barriers have a weak influence and weak dependence on other barriers, whereas dependent barriers have a strong dependence but are weak to affect other barriers. Linkage barriers contain barriers that have a strong influence and are dependent on other barriers. Lastly, independent barriers have a strong driving power but are weakly dependent on other barriers. The study finds to find any linkage or autonomous barriers among the dependent and independent barriers. The study also finds that independent barriers were lacking in awareness and management support, in that both are parts of the strategic management problem. However, the study discovers that the dependent barriers, which consist of the lack of information and technological systems, nonexistence of performance metrics, reluctance of support from supply chain partners, resistance to change to reverse logistics practices, lack of training, and uninterested firm, are very much dependent on other obstacles, such as lack of awareness, lack of commitment, absence of strategic planning, quality problems, and limitation on financial issues (Ravi and Shankar, 2005).

Although many of the recent studies classify the barriers into internal and external barriers, like Murillo-Luna et al. (2011), Liu et al. (2012), and Walker and Jones (2012), classifying barriers by focusing on the roots or sources of the obstacles are worthwhile in identifying the important barriers so that correct remedial actions can be taken (Thornley et al., 2009; Thornley and Prins, 2009). In other words, identifying the right barriers is the key for firms to take corrective actions to ensure that their product returns and recovery effort is successful. In this respect, we identified 38 journal articles that met our pre-determined criteria for the content analysis study.

We classified the obstacles from these 38 articles into two major groups: internal barriers and external barriers (Table 1). There are 15 internal barriers and 8 external barriers, suggesting that there are ample opportunities for manufacturers to improve their product returns and recovery effort since internal barriers are generally under the direct control of the firm. Hence, firms should consider taking extra motivation to tackle internal issues to improve environmental efforts, including product returns and recovery management. The internal barriers are employee attitude (EA), top management support (TS), communication (CM), resources (RE), wrong perceptions (WR), difficulty in adoption (DI), organizational barriers (OR), culture (CU), strategic capabilities (SC), financial (FI), performance metrics (PM), uncertainty of results (UR), technology (TC), risk issues (RI), and infrastructure (IF). External barriers consist of economics (EC), competitive pressure (CP), regulations (RG), technical information (TI), uncertainty of returned products (UP), institutional weaknesses (IW), support and guidance (SG), and market barriers (MK). Next, we briefly define each barrier.

1) Internal barriers
(1) Employee attitude (EA): Employees refuse to change their attitude towards environmental practices due to their concern for failure and fear of the unknown (Wooi and Zailani, 2010).
(2) Top management support (TS): Top management is reluctant and impartial in implementing environmental activities (Luthra et al., 2011). It is obvious that top management’s involvement and support are necessary for successful implementation of green initiatives because they control key resources of the firm (González-Torres et al., 2010).
(3) Communication (CM): Lack of communication capability prevents information from being transmitted to the right place at the right time, impeding environmental commitment across all levels of the firm. Informal network linkages with better communication can support organizations in implementing green activities (Yu Lin and Hui Ho, 2008).
(4) Resources (RE): One of the main barriers to green practices (for example reverse logistics) is the lack of human resources with the correct skill and capability because of insufficient training and education (Sharma et al., 2011).
(5) Wrong perceptions (WR): Green practices are not perceived by the firm as a vital responsibility. Also, the firm fails to understand the benefits of being environmentally responsible, and there is a lack of confidence in the green solutions in the firm (Van Hemel and Cramer, 2002).
(6) Difficulty in adoption (DI): This includes all the difficulties in implementing green practices such as complexity in handling product returns and recovery, and inaccuracy in forecasting and planning due to the huge variety of goods and complex flow of returns (Sharma et al., 2011).
(7) Culture (CU): This barrier involves a negative culture in the firm towards green practices or indifference towards environmental concerns (Hillary, 2004).
(8) Organizational barrier (OR): This type of barrier is related to the managerial and organizational obstacles in implementing green practices, such as distraction in green activity process, longer time to make decisions, assign low priority to green practices (Walsh and Thornley, 2012), and concentrating resources and focus on other activities to raise production and building market share (Shi et al., 2008).
(9) Strategic capability (SC): Barriers that obstruct the proactive nature of an organization’s involvement in green practices and failure to adopt environmentally protective measures due to the lack of strategic capabilities (Murillo-Luna et al., 2011).
(10) Financial (FI): Factors such as a shortage of funds, high cost, and low return on investment (Sardianou, 2008) are examples of financial barriers in green practices. Very often, investment in product returns and recovery or other green practices is not considered an important initiative to boost return on investment (Walsh and Thornley, 2012).
(11) Performance metrics (PM): These are barriers that hinder the measurement of end-to-end performance of green practices due to the lack of proper performance metrics (Sharma et al., 2011).
(12) Uncertainty of results (UR): This barrier happens when a firm is doubtful about the intended results of their green practices, as well as the complexity in measuring environmental effects. This includes the challenge of defining the essential elements of green activities (Chan, 2008).
<table>
<thead>
<tr>
<th>No.</th>
<th>Authors</th>
<th>Year of publication</th>
<th>Classifications of barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Walsh &amp; Thornley</td>
<td>2012</td>
<td>Structural/market/interaction/performance</td>
</tr>
<tr>
<td>2</td>
<td>Liu</td>
<td>2012</td>
<td>Structural/regulation/cultural/contextual</td>
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<td>3</td>
<td>Walker and Jones</td>
<td>2012</td>
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<td>4</td>
<td>Liu et al.</td>
<td>2012</td>
<td>Internal/external</td>
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<tr>
<td>5</td>
<td>Andić et al.</td>
<td>2012</td>
<td>Not specified</td>
</tr>
<tr>
<td>6</td>
<td>Murillo-Luna et al.</td>
<td>2011</td>
<td>Internal/external</td>
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<tr>
<td>7</td>
<td>Luthra et al.</td>
<td>2011</td>
<td>Various level</td>
</tr>
<tr>
<td>8</td>
<td>Sharma et al.</td>
<td>2011</td>
<td>Driving/driven</td>
</tr>
<tr>
<td>9</td>
<td>Wen-hui et al.</td>
<td>2011</td>
<td>Not specified</td>
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<tr>
<td>10</td>
<td>Palm and Thollander</td>
<td>2010</td>
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<td>11</td>
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<td>2010</td>
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<tr>
<td>12</td>
<td>Erol et al.</td>
<td>2010</td>
<td>Internal/external</td>
</tr>
<tr>
<td>13</td>
<td>Wooi and Zailani</td>
<td>2010</td>
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<td>14</td>
<td>Gonzalez-Torre et al.</td>
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<tr>
<td>15</td>
<td>Lau and Wang</td>
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<tr>
<td>19</td>
<td>Chan &amp; Chan</td>
<td>2008</td>
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<td>Bist</td>
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<td>2003a</td>
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<td>Guide et al.</td>
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<td>2003</td>
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<td>31</td>
<td>van Hemel and Cramer</td>
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<td>38</td>
<td>Post and Altman</td>
<td>1994</td>
<td>Organizational/industry</td>
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**Footnote:** "O" indicates that the study found specific impediments to environmental action. Types of barrier: EA = Employee attitude, TS = Top management support, CM = Communication, RE = Resources, WR = Wrong perceptions, DI = Difficulty in implementation, CU = Culture, OR = Organizational barriers, SC = Strategic capabilities, TC = Technology, FI = Financial, PM = Performance metrics, UR = Uncertainty of results, RI = Risk, IF = Infrastructure, EC = Economics, CP = Competitive pressure, RG = Regulations, TI = Technical Information, UP = Uncertainty returned products, IW = Institutional weaknesses, SG = Support and guidance, MK = Market barriers.
(13) Technology (TC): This barrier is due to the resistance of a firm to adopt green technology to promote its green practices (Luthra et al., 2011).

(14) Risk (RI): This is due to the risk of losing market share as green practices affect a firm’s image. For example, customers may perceive that a firm’s products are of lower quality or standards if it reuses recovered parts (Kumar and Malegeant, 2006).

(15) Infrastructure (IF): The absence of infrastructure to support the development of green practices, such as the lack of space and equipment adds to this barrier (Thiruchelvam et al., 2003).

II) External barriers

(1) Economics (EC): The impediment of economics to the adoption of green practices is related to the external economic situation that is beyond control of the firm, but may affect its priorities, especially with respect to environmental activities. The situation is even worse for firms that are uncertain of the value of green practices (Hillary, 2004).

(2) Competitive pressure (CP): This external barrier is due to the pressure from market competition, which forces firms to reduce their green commitment (González-Torre et al., 2010).

(3) Regulations (RG): These barriers are due to unclear government regulations and policies, which make it difficult for firms to decide on appropriate strategies (Jiu, 2012).

(4) Technical information (TI): This barrier relates to the complexity in getting and making use of green related information due to the lack of competency in gaining access to external technical support (Shi et al., 2008).

(5) Uncertainty of returned products (UP): This impediment in the green practices of reverse logistics includes the uncertainty in the product recovery and replacement process, such as quantity, timing, and quality of returns. It also includes uncertainty in the collection process of used products and packaging (Jayaraman and Luo, 2007).

(6) Institutional weaknesses (IW): Barriers that are derived from the institution’s weakness, such as the lack of promotion of green practices and the absence of a central source of information governing the legislation of green practices (Hillary, 2004).

(7) Support and guidance (SG): These barriers originate from a lack of external assistance, such as consultants, trade associations, and business networks. The guidance and support can be in the form of information flow or assistance in clarifying evaluation criteria, process, or compliance (Sharma et al., 2011).

(8) Market barriers (MK): These are barriers that limit the market demand for repurchasing returned products through recycling, refurbishing, and remanufacturing (Geyer and Jackson, 2004).

It can be seen in Table 1 that 16 of the 38 articles provide a classification scheme of the barriers of green practices. While several classification schemes have been proposed, the most common classification scheme separates barriers into internal-external barriers. This classification scheme is straightforward and yet appropriate for academics and easily understood by practitioners. A major advantage of this classification scheme is the ease of identifying counter-measures or solutions to resolve the barriers that impede the effective adoption of environmental practices. Our analysis reveals that the two main obstacles of environmental actions in the literature are financial (FI) and resource constraints (RE), each with 10 percent occurrences, followed by organizational barriers (OR), lack of top management support (TS), and lack of support and guidance (SG) with 6.8 percent occurrences each.

Based on the 38 articles reviewed, there are 153 references of internal barriers, and 68 references of external barriers. It is clear that there are more than twice as many internal barriers than external barriers. In this context, many authors agree that internal barriers are the major obstacles that prevent green or environmental practices. According to De Canio (1998) and Hillary (2004), internal barriers are the main obstacle in good environmental management, though a certain level of influence is acknowledged to exist from external sources.

Similarly, researchers also argue that, in comparison, internal barriers are more challenging than external barriers to resolve (Dahlmann et al., 2008; Hillary, 2004; Murillo-Luna et al., 2007; Post and Altman, 1994). A subsequent study by Murillo-Luna et al. (2011) also supports this argument. They further explain that while external barriers merely complicate the environmental process, the actual prevention of environmental measures comes from internal barriers. Nevertheless, a few researchers also stress the considerable impact of external barriers considered internal in respect to the adoption of environmental practices.

As put forward in the study by González-Torre et al. (2010), the main impediments to the adoption of reverse logistics practices among Spanish automotive firms are more external rather than internal impediments. This is due to the inability of smaller firms to face the magnitude of the impact from external barriers relative to internal barriers. Similar findings are also reported by Shi et al. (2008), in which, from 20 barriers identified, external barriers are found to dominate the list of cleaner production adoption barriers among small- and medium-sized enterprises (SMEs) in China. As in the case of reverse logistics in the electronics industry in China, Lau and Wang (2009) observe and report that barriers are common among firms whose external source is dominant compared to internal barriers. From this analysis, we can conclude that although considerable progress has been made in the study of classifying environmental barriers, the literature falls short of conclusively providing evidence to support which source of barrier is actually the greatest obstacle to environmental efforts. Thus, this subject warrants further research to better understand the phenomena, especially with respect to different green practices.

5. Results of qualitative content analysis

This section presents the results of our field interviews with six manufacturing firms in the northern part of Malaysia. They are manufacturers producing semi-finished and finished goods, and they are certified in ISO 14001, TS 16949, and/or ISO 9001 international standards. To ensure anonymity of our responding firms, we labeled the companies as Company A, B, C, D, E, and F. Three of these six companies are from the electrical and electronics industry (A, E, F), and the remaining three are from the automotive industry (B, C, D). We focused our case study samples on the automotive, and electrical and electronic sectors because these two industries generate a substantial amount of waste and are more likely to engage in green practices. Additionally, these two industries are more likely to be controlled by stringent government policies and regulations. Hence, they are excellent candidates to study product returns and recovery management. The key profiles of the selected firms are shown in Table 2.

Table 2 shows that all the companies have been established for more than a decade and are certified in ISO 9001 Quality Management Systems. Two companies (A and F) are certified in ISO 14001 Environmental Management Standard. Company A is a finished-product manufacturer, whereas the remaining five companies produce semi-finished products or component parts. Two companies (A and B) hire more than 1000 workers. Company C
To uncover useful ideas and valuable concepts from the field interviews, we analyzed the interview transcripts using key point coding technique (Glaser, 1992). In this analysis, open codes were assigned to the points or issues that were considered important for the study. This is the preferred approach because it helps to minimize the chance of over-conceptualizing interview data (Allan, 2003; Dey, 1993; Miles and Huberman, 1984). Every point or issue identified in the interview transcripts was assigned an identifier that denotes the points in the interview transcripts where it is found. For example, the first key point found is given the identifier P1 and subsequent key points were assigned P2, P3, and so on. Based on the interview statements from our six participating firms in this phase of the study, we identified several major barriers to the adoption of product returns and recovery management for manufacturing firms in Malaysia. The barriers are summarized in Table 3.

As mentioned previously, all the open codes assigned to the transcripts were then analyzed and those with a related theme were grouped together to create an inclusive list of similarities that could be labeled as concepts. For example, the code generated from P1 was customer’s perceptions. The codes from the other key points were compared to P1 to assess their similarities. It was found that several other codes shared the same theme as P2, such as the key point from P3. The common theme among these key points was customer’s operational performance, which was one of the main concepts found in the data, as depicted in Table 3. This step was done in accordance with Glaser and Strauss (1967) that each key point should be analyzed thoroughly to generate new concepts that are relevant to the study. Apart from customer’s perceptions and customer’s operational performance, another concept that emerged from the interview with Company A was the lack of regulations. We summarized the key points from the interviews with companies B, C, D, E and F in Table 4.

Based on the interview transcripts, we summarized the type of barriers in Table 6. There are three major internal barriers (costly operations — CO, limited materials usage — LM and lower adoption — LA) and four external barriers (customers’ perceptions — PC, lack of regulations — LR, customers’ operational performance — CP and inadequate support — IS) that impede the adoption of product returns and recovery management among manufacturing firms in Malaysia. For comparison with the type of barriers identified in the content analysis, we have matched the classification (in bracket) corresponding to the barriers identified in Table 1. As such, the costly operations (CO) is placed into financial (FI) category, limited materials usage (LM) with difficulty in implementation (DI), lower adoption (LA) with organizational barriers (OR), customers’ perception (PC) with market barriers (MK), lack of regulations (LR) with regulations (RG), customers’ operational performance (CP) with uncertainty returned products (UP) and inadequate support with support and guidance (SG) respectively.

Our analysis shows that the ratio of external barriers exceeds that of the internal barriers. This can be seen from the 33.3 percent domination of customers’ operational performance (CP) due to the difficulty in obtaining the right volume and timing of returned goods to support production. The next most frequently occurring external barriers are customer’s perception (PC). As a matter of fact, the recovered or remanufactured products may be perceived as of inferior quality. Therefore, it is difficult to sell recovered products at the same or higher price than existing new products in the market. It has been mentioned that internal barriers contribute to the obstacles through costly operations (CO) (28.6 percent) and limited materials usage (LM) (14.3 percent). Costly operations (CO) refer to a higher production cost, which is inappropriate in view of its inclination towards a higher recoverable product price in the market. The limited materials usage (LM) is related to the unsuitability of the product’s material for further processing and recovery. In this case, it is not worthwhile for the company to collect the returns since the products are not suitable for further reuse or recycling.

6. Discussions

This study attempts to identify the major barriers that impede the adoption of product returns and recovery management among manufacturing firms in Malaysian. In order to meet the objective of the study, we obtained data from two sources—journal publications (secondary data) and field interviews (primary data)—through the case study method. The main reason for such a method is to compare the major barriers from studies conducted around the world to the actual obstacles in the Malaysian context. To achieve this, several steps have been used to ensure the reliability of the information obtained from the two sources. The quantitative
content analysis of the 38 selected journal articles reveals that the major obstacles to environmental action are internal barriers, which entails the financial, resource constraints, organizational barriers, and lack of management support. In respect of the external barriers, the lack of support and guidance are among the highest obstacles, though not as detrimental as the effect of internal barriers.

On the other hand, results of the case study, through interviews with six manufacturers in Malaysia, suggest that external, rather than internal barriers are the main obstacles that impede the adoption of environmental initiatives. The major external barrier that disrupts green initiatives is customers’ operational performance (CP) due to the difficulty in obtaining the appropriate volume and timing of returned goods to support production.

Table 3
Key points and codes from interview transcripts.

<table>
<thead>
<tr>
<th>Company</th>
<th>Key point</th>
<th>Open code assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>PA1 The first barrier is the perception and acceptance of the refurbished products. It is difficult for customers to buy second-hand products except for those in the different markets.</td>
<td>Customers’ Perceptions</td>
</tr>
<tr>
<td></td>
<td>PA2 The second barrier is the returns quantity, which, sometimes, is not enough to meet the production schedule.</td>
<td>Performance</td>
</tr>
<tr>
<td></td>
<td>PA3 The third barrier is the timing of returns, which can cause delays to the planned production schedule.</td>
<td>Performance</td>
</tr>
<tr>
<td></td>
<td>PA4 The fourth barrier is the lack of regulations pertaining to the product take-back, which can make the process more difficult to enforce. For example, the WEEE regulations on product take-back and ROHAs on materials have forced manufacturers to comply if they wish to export their products to Europe. The absence of regulations to control the returns makes it difficult for the company to acquire them from the market. The law should regulate that products should be returned to the original manufacturer, such as EPR, and then the manufacturers can obtain their used products easily.</td>
<td>Lack of Regulation</td>
</tr>
<tr>
<td>B</td>
<td>PB1 Firstly, it is difficult to obtain the returns from the market since there is no available network that can support the process of returns. The external recyclers are more attractive since they are already established with the appropriate facilities to support the recovery process.</td>
<td>Operational</td>
</tr>
<tr>
<td></td>
<td>PB2 Secondly, the used products or defective products (non-warranty items) are sold to the scrap dealer at a higher price.</td>
<td>Performance</td>
</tr>
<tr>
<td></td>
<td>PB3 Thirdly, the companies have tried once but failed to receive support due to the acquisition price factor.</td>
<td>Inadequate Support</td>
</tr>
<tr>
<td></td>
<td>PB4 Fourthly, the product returns process is costly, especially the disposition and segregation process to recover certain materials from the product returns.</td>
<td>Costly Operation</td>
</tr>
<tr>
<td></td>
<td>PB5 Fifthly, the uncertainty quantity, quality, and timing of the returns are further complicating the recovery process, thus making the recovery process more difficult.</td>
<td>Performance</td>
</tr>
<tr>
<td>C</td>
<td>PC1 There are many reasons why the company does not establish its own recycling process. Firstly, the components are themselves complicated and the risk of causing total damage to the parts is higher when the dismantling activity is applied during the recovery process.</td>
<td>Limited Materials Usage</td>
</tr>
<tr>
<td></td>
<td>PC2 Secondly, the reused parts are uncertain in terms of the quality and it might cause difficulty in the planning for future production volume.</td>
<td>Performance</td>
</tr>
<tr>
<td></td>
<td>PC3 Thirdly, the cost might be higher and ineffective to return defective parts to its original condition. The company might be willing to do recycling if the cost is lower than the cost of the existing parts.</td>
<td>Costly Operation</td>
</tr>
<tr>
<td>D</td>
<td>PD1 Firstly, the company does not see this activity as necessary since the rejection rates are still at the lower acceptable level (~5%).</td>
<td>Lower Adoption</td>
</tr>
<tr>
<td></td>
<td>PD2 Secondly, not all products can be recycled, especially metal stamped parts that are not reusable modules and are isolated. The complete products are normally bound to specifications and to re-form them is not appropriate and incurs a higher cost. This relates to the weakness of the material itself that further hinders the recovery process. In addition, the returned parts are not suitable for the stamping process as different processes require different moulds, while, at the same time, the rejection types are varied. The best solution is to dispose of to the steel manufacturer to carry out the foundry process on the parts.</td>
<td>Limited Materials Usage</td>
</tr>
<tr>
<td></td>
<td>PD3 Thirdly, setting up the reverse flow process is costly and not cost-effective since it involves many man-hours to recover the products.</td>
<td>Costly Operation</td>
</tr>
<tr>
<td>E</td>
<td>PE1 Firstly, the material problem that hinders the adoption of product recovery is the material itself. The old plate in the battery itself is not suitable for reuse as it might affect the performance of a new battery (as in the case of plate shedding and the loss of active materials). However, certain materials like battery lead can be recycled and is normally being done by a DOE-licensed recycler.</td>
<td>Limited Materials Usage</td>
</tr>
<tr>
<td></td>
<td>PE2 The second impediment to the adoption of product recovery is that it is cost-ineffective. This is because the cost is expected to be the same as producing the new batteries but produces less reliable products. New production batteries can last up to two and a half years while the reconditioned batteries have a shorter life, sometimes only one year.</td>
<td>Costly Operation</td>
</tr>
<tr>
<td></td>
<td>PE3 Customers will also be dissatisfied as the products might be sold at the same price but have a shorter life cycle. Nevertheless, the reconditioned batteries might be suitable for secondary markets, but, again, the higher offering price is unsuitable for this particular market.</td>
<td>Perception Customers</td>
</tr>
<tr>
<td></td>
<td>PE4 Thirdly, the cost of materials and labor spent on the recovery is as high as the cost for producing new products. It is justifiable to simply stick to the current operations and let the recycling tasks be carried out by other parties.</td>
<td>Costly Operation</td>
</tr>
<tr>
<td>F</td>
<td>PF1 Primarily, it is the cost. The cost to remanufacture is sometimes more than producing a new product. Thus, the element of product competitiveness will be absent as the selling price might be higher than the competitor’s price.</td>
<td>Costly Operation</td>
</tr>
<tr>
<td></td>
<td>PF2 Secondly, the uncertainty in terms of product returns quality, quantity, and timing contributes to the difficulties in relying on returns as the source of materials.</td>
<td>Performance</td>
</tr>
</tbody>
</table>

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This situation can pose a continuous complexity in operations, as the quantity and timing of returned goods are uncertain and unpredictable. For quality issues, the returned products require different treatment as the defects or reasons for returned goods vary significantly from batch-to-batch. Returned goods require different kind of handling and reprocessing to deal with the un-predictable quality parameters (Schultmann et al., 2003). Another barrier that causes a significant obstacle to the adoption of product returns and recovery management is customers’ perceptions (PC). In this case, many customers perceive that recovered products are inferior in quality compared to new products. Thus, it is difficult for customers to buy recovered products unless they are sold in different markets and at a cheaper price. Therefore, looking at the two main barriers, from a performance standpoint, firms stand to gain from strong relationships with customers as the relationship through the reverse supply chain can lead to the creation of value for the firm (Hillman and Keim, 2001).

In relation to the internal barriers, the majority of the interviewees agree that the main obstacles are costly operations (CO) and limited materials usage (LM), which from a practicality viewpoint is hard to implement. In comparing the results of quantitative content analysis and case study, the barriers found in the two analyses are dissimilar. This suggests that there may be a subtle difference between the results reported in academic research and managers’ perceptions of the barriers of product returns and recovery management. For example, the external barriers, such as the uncertainty in acquiring the appropriate volume and timing of the returns (customers’ operational performance), are perceived by managers as major barriers, in contradiction to the academic research that cites financial and resource constraints as major barriers impeding the adoption of product returns and recovery management. Although other barriers are not showing the same significance from batch-to-batch. Returned goods require different kind of handling and reprocessing to deal with the un-predictable quality parameters (Schultmann et al., 2003). Another barrier that causes a significant obstacle to the adoption of product returns and recovery management is customers’ perceptions (PC). In this case, many customers perceive that recovered products are inferior in quality compared to new products. Thus, it is difficult for customers to buy recovered products unless they are sold in different markets and at a cheaper price. Therefore, looking at the two main barriers, from a performance standpoint, firms stand to gain from strong relationships with customers as the relationship through the reverse supply chain can lead to the creation of value for the firm (Hillman and Keim, 2001).

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Although other barriers are not showing the same trait, however, the trend towards the same barriers are expected to be identical when the field of product returns are appropriately established among the manufacturing industries in Malaysia. Besides, the barriers identified in this study are still rudimentary in nature due to the early stage of product returns and recovery management adoption among manufacturers in Malaysia.
Nevertheless, practitioners should find the barriers identified in this study useful in assessing their organization’s needs in terms of the effectiveness of their reverse supply chain. This study may also help policy makers in emerging countries, in general, and Malaysia, in particular, in setting appropriate policies and strategies for improving their product returns and recovery management.

In comparison of the specific barriers classification between the quantitative and qualitative methods, we have identified the several consistencies of the major barriers identified from both sources of data. For instance, the main obstacles of internal barriers in content analysis of financial (FI) and organizational support (OR) are matched with the result of internal barriers in the case study. However, the major external barriers have shown complete dissimilarity between the selection barriers in the case study and compilation in the content analysis method.

From a theoretical perspective, we can explain the effect of all these barriers in terms of the RBV and stakeholder theories. We can link the barriers of product returns adoption, such as financial and resource constraints, to the basic elements of RBV that help diffuse the organizational practices among firms. The development of resources and capabilities through product returns management may be exemplified through improvements in the value, rarity, inimitability and non-substitutability aspects of the RBV (Carter and Carter, 1998; Foerstl et al., 2010). Studies have argued that firms should improve its green reputation and image, which is considered a significant resource of the firm (Barney, 1991), and notable strength in the green supply chain (Förstl et al., 2010; Sarkis, 2009).

Not surprisingly, segments of stakeholders have become increasingly receptive to adopting green practices (Crane, 2000; Karna et al., 2003). Therefore, firms are becoming more responsive and responsible on how their operations affect the environment. Many firms have begun implementing product returns and recovery practices that reduce their environmental impact (Min and Galle, 1997). While this pressure for environmental commitment can actually come from numerous stakeholders, it often comes from end-user consumers and from corporate customers who wish to create or maintain a status of being green (Rivera-Camino, 2007).

From a strategic standpoint, firms that are innovators of green products can find this action to be a source of competitive advantage, especially if the firm’s primary stakeholders value environmental initiatives (Rivera-Camino, 2007). Thus, from a stakeholder’s perspective, green consumers are an important primary stakeholder group on which to focus to understand the benefits and consequences of product returns and recovery management. Our findings from the field interviews support that the RBV and stakeholder theories are appropriate for explaining the barriers that affect the acceptance and diffusion of product returns and recovery management in developing countries.

7. Conclusion

The findings in this study have valuable implications for a variety of reverse supply chain stakeholders including industry practitioners, public policy makers, and academic researchers although our results were derived from a small sample. At the minimum, the results highlight some of the major barriers of product returns and recovery management that affect the effectiveness of a firm’s reverse supply chain. In a similar vein, the findings from field interviews provide insights to compare what practitioners are doing in terms of product returns and recovery management. As a result, practitioners can better evaluate and benchmark their firm’s efforts in this area.

Despite the increasing concern about the environment and climate change, many firms are lagging behind and few have actively engaged in product returns and recovery. This situation is inappropriate in view of its direct effect towards contributing to the volume of waste if no proper treatment is in place to turn the discarded products into reusable products. The lack of internal and external forces are prevailing and discouraging firms from establishing proactive environmental strategies within and outside the organizations. The barriers of product returns management identified in this study are still basic due to the early stage of product return management among Malaysian manufacturers. Among the barriers that surfaced in the study are three major internal barriers (costly operations — CO, limited materials usage — LM and lower adoption — LA) and four external barriers (customers’ perceptions — PC, lack of regulations — LR, customers’ operational performance — CP and inadequate support — IS).

The two most frequently cited major external barriers are customers’ operational performance (CP) and perceptions (PC). In respect to the customers’ operational performance (CP) barrier, the state of uncertainty in terms of product returns’ quality, quantity, and time causes difficulty in relying on returned products as the source of material for the production of new or recovered products. The unreliable delivery schedule of returned products negatively affects the planned production schedule and results in higher production cost. From the customer’s perception (PC) perspective, the thing perceived as lower quality returned products command lower price than new products in the market. Also, recovered products are difficult to sell since consumers have labeled them as recovered products. The sales potential for these products are great, but manufacturers must search for different markets and channels for recovered products.

In comparison, the two most widely cited internal barriers are costly operations (CO) and limited materials usage (LM). The former refers to the perceived higher cost of operations for using returned products. Therefore, recovered products are perceived as expensive. This causes dissatisfaction among consumers and further discouraging the purchase thereof. In addition, the limited materials usage for the recovery process hinders the overall efforts towards the adoption of product returns in their organizations. This is the main reason why the present cycle of product returns is outsourced to external recyclers rather than provided by the focal firm’s in-house operations.

Looking at the number and type of barriers, the adoption of product returns and recovery management is still very passive due to the complexity of its diverse obstacles that impede effective implementation. Firms are not only dealing with the barriers that hinder the adoption but are also facing the lack of drivers to motivate them to effectively manage product returns and recovery in their green supply chain programs.

This study used literature review and field interviews. Our approach contains several limitations. First, although we have categorized several barriers of product returns and recovery management into four dimensions, we noted that other barriers outside of these four dimensions exist. Ongoing research should investigate these unexplored barriers. Second, our quantitative content analysis sample is limited to 38 articles. Hence, we may not be able to generalize our results. Also, our field interview sample is limited to six automotive and electronics firms. We have neglected product returns behavior of other industries. Our data was collected from a single country, Malaysia. Future research should examine other emerging markets to remove country-level variance in economic development, legal system, and market size, in an integrated fashion because economic and institutional conditions may influence the environment in which the firms operate. The pattern found in this study could be unique to Malaysia and not representative of other emerging economies like Thailand, Vietnam, or Indonesia. A larger sample size would be useful to better understand the intricate relationship between barriers and perceived
reverse logistics effectiveness. Lastly, empirical research should be conducted to evaluate the effect of barriers on reverse logistics effectiveness.

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