Returnable transport packaging in developing countries: drivers, barriers, and business performance

ABSTRACT

This study, drawing on natural resource-based view (NRBV), identifies drivers, barriers and the potential benefits of Returnable Transport Packaging (RTP) –that is, the repeated use of packaging items– and conceptualises RTP as a technology and resource. Furthermore, it investigates the impact of RTP on business performance, the effects of drivers on the level of RTP investment, and the effect of barriers on business performance and cost-effectiveness. The data collection took place in Nigeria and South Africa. The findings suggest that RTP has a significant positive impact on business performance. Whilst prior studies seem to suggest that shrinkage and attrition are the major problems identified with the usage of RTP, our findings indicate that there are several other barriers affecting cost-effectiveness of RTP and business performance. Our results also show that there is increasing move towards adoption of RTP but some organisations are faced with financial constraints, especially the small and medium size enterprises. The results further show that extended rate of return on investment is consequent upon inadequate usage of RTP but most organisations recover the amount invested within three years. Finally, the limitations of the study are discussed and future research directions suggested.

Keywords: Reverse logistics, returnable transport packaging, sustainability, business performance; natural resource based view

1. Introduction

Returnable Transport Packaging is part of Reverse Logistics. Reverse Logistics (RL) has recently gained attention in Supply Chain Management (SCM) as the process by which products are returned from consumers for the purpose of gaining their value or planning for their proper disposal (Rogers and Tibben-Lembke, 1999; Dowlatshahi, 2012; Nikolaou et al., 2013). Scholars have identified operational and environmental benefits related to RL (see, Lacerda, 2002; Rogers and Tibben-Lembke, 2001; Chan, 2011; Karia and Wong, 2013), including, among other things, environmental performance and competitive advantage (e.g. Abdulrahman et al., 2014; Bouzon et al, 2015). RL has been also vital to achieving sustainable supply chains, since it

helps in controlling waste and maintaining environmental sustainability (Abdallah et al., 2011; Garetti and Taisch, 2012; Huang et al., 2012; Bouzon et al., 2015). Within RL, Returnable Transport Packaging (RTP) reduces or eliminates waste at the final customer, minimises risks to the environment, reduces warehousing costs, and provides workplace efficiency and safety (Silva et al., 2013; RPA, 2016). At the same time, returnable packages may involve higher costs of procurement, transportation, and other costs related to cleaning, repairing, storing, and managing (Zhang et al., 2015). Nevertheless, the drive for the adoption of RTP is strongly held by the fast growing social expectations that organizations should create a well-improved business practices and a safe working environments by engaging in socially responsible businesses.

Following the Natural-Resource-Based-View (NRBV) (Hart, 1995; Klassen and Whybark, 1999; Vachon and Klassen, 2007; 2008; Hart and Dowell, 2010; Bell et al., 2012; Shi et al., 2012; Jayaram et al., 2015), this research conceptualises RTP as an environmental technology and resource that limits or reduces "negative impacts of products or services on the natural environment" (Srivastava, 1995: in Klassen and Whybark, 1999: p.599) and subsequently investigates the impact of RTP on business performance, the effects of drivers on the level of RTP investment, and the effect of barriers on business performance and cost-effectiveness focusing on developing countries and in particular on the Nigerian and South African contexts. In comparison to developed countries, studies of RTP in developing countries are scarce. Studies have therefore underlined the need for developing countries to adopt sustainable practices and as part of such initiatives more needs to be done in terms of understanding the impact of RTP on business performance in the context of developing countries (Sohrabpour et al., 2012; Guarnieri et al., 2015).

The paper is organized as follows: Section 2 discusses the usage of RTP in RL, whereas section 3 presents the tenets of NRBV. Section 4 discusses our conceptual model and hypotheses, and section 5 our methodology. The findings of our research are presented in section 6, and finally, section 7 presents the conclusions of this paper, the limitations, and future research directions.

2. Returnable Transport Packaging

- Packaging prepares goods for safe, secure, efficient and effective handling, transport, distribution, storage, retailing, consumption and recovery, reuse or disposal combined with maximizing consumer value, sales and hence profit (Ballou, 2004; Saghir, 2004; Lambert *et al,*.

2011). At the same time packaging materials have contributed immensely to natural resource depletion, global warming, ozone layer depletion, and placing excessive pressure on the environment by the unceasing waste disposal (Kroon and Vrijens, 1995; Amienyo and Azapagic, 2016; Xie et al, 2016). In addition, packaging takes up landfill space, serves as sources of toxic materials with health implications and potential for groundwater contamination. To deal with the negative consequences of packaging, RTP enables firms to reduce their operational cost and lessening environmental impact in conformity with government's regulation for sustainable supply chains (Silva et al., 2013; RPA, 2015). RTP signifies a change in attitude towards the environment for the purpose of environmental sustainability, but also for potentially achieving business performance. It is defined as packaging material for conveying large or small, heavy or light components from one phase of supply chain to another while improving the stability of products and reducing their damage (Wu and Dunn, 1995; Hellström and Johansson, 2010). Scholars (Wu and Dunn, 1995) illustrated how environmental and economic performance can be improved by adopting the usage of returnable packaging. Similarly, Kroon and Vrijens (1995) encouraged the usage of RTP so as to minimize environmental impact via waste reduction while reducing operational costs.

However, the usage of RTP may increase operational cost, including for example, transportation, sophisticated equipment, and tracing and tracking. These might pose as barriers to the adoption and use of RTP. Furthermore, barriers to the usage of RTP could maintenance, storage and administration (Kroon and Vrijens, 1995). Furthermore, the management of RTP is resource-intensive. A survey conducted by the Aberdeen Group in 2004 suggested that the cost of managing logistics assets consumes 5% or more of the corporate revenue (Ilic et *al*, 2009). Shrinkage and attrition have posed further challenges in managing logistics assets, and this is mostly caused by theft, customers' failure to return empty RTP, unreported damages of RTP which lead to the emergency purchase of another set of RTP so as to meet demand and supply (Breen, 2006). Twede and Clarke (2004) also identified that RTP are misallocated and misplaced often as they are hardly tracked especially in transit. The need to provide additional fund for supplementary logistics assets and sufficient workforce to manage them poses additional challenges to organizations that would have to manage RTP both effectively and efficiently to avert potential negative consequences. To achieve this, strict measures in the implementation and management of RTP are needed, such as tracking and tracing (Shamsuzzoha and Helo, 2011) for high-level visibility, and quality control of RTP movement using a controlled pool system (Maleki and Reimche,

2011). Tracking systems enhance product's identification and its actual location at any given time by connecting physical material flow with information systems (Stefansson and Tilanus, 2001; Johansson and Hellström , 2007). Furthermore, Tracking and tracing systems manage and control the conveyance of RTP, and reconcile RTP supply with demand (Johansson and Hellström, 2007). To manage tracking, Fritz and Schiefer (2009) posit that the necessary capabilities need to be in place, which facilitate the initial source (backward tracing) and final destination (forward tracing) of a product at any phase of the supply chain.

RTP can be used to achieve logical, marketing, and environmental objectives. For logical objectives, RTP facilitates distribution, protects product, preserves environment, leading thereby to substantial economic and environmental benefits. Furthermore, RTP provides information about product's condition and location even on transit, which in turn brings operational benefits. Regarding the achievement of marketing objectives, RTP expedites graphic design, satisfies legislative demands on environmental sustainability and offers competitive advantage. It also assists firms in meeting their market demands by satisfying the requirements of customers, and guarantees convenience for distribution, which is a major advantage over the single-use packaging. Finally, when it comes to environmental objectives, RTP facilitates recovery and recycling hence progressively reduces waste disposal emanating from single-use packaging (Hellström and Saghir, 2007). However, literature so far has not explored how RTP could improve business performance.

No matter if scholars have acknowledged the benefits accruing from the use of RTP for supply chain effectiveness and sustainability, there is a dearth of studies that focus on potential management capabilities and barriers associated with the usage of RTP in RL. Bernon et al. (2011) as well as other scholars (Rogers and Tibben-Lembke, 1998; Guide and Van Wassenhove, 2009) suggest that despite the importance placed by the liteature on RL, limited empirical research has been undertaken to address the underlying aspects of RL. Furthermore, this research has not focused on developing countries (Abdulrahman et al., 2014). They have, however, acknowledged that the effective usage of RTP in RL will pose unattainable without identifying its barriers to effective implementation and optimal usage. To address the aforementioned gaps this research draws on natural resource based view (NRBV), which is discussed next.

3. Natural resource based view of the firm

The Natural-Resource-Based View of the firm (NRBV) (Hart, 1995; Hart and Dowell, 2010) builds on the earlier theory of Resource-Based-View (RBV) of

the firm, which postulates how competition can be attained through intra-firm resources and capabilities (Barney, 1991). The RBV acknowledges and emphasizes political, economic, social, and technological environment to the virtual exclusion of the natural environment (Hart, 1995; Shrivastava, 1995). The RBV focuses on the accumulation and deployment of firm-specific resources that are difficult to imitate and substitute (Wernerfelt, 1995; Hallgren et al, 2010). Resources are a combination of assets developed over time (Day, 1994; Perunovic *et al*, 2012) to provide distinctive capabilities that are the firm's sources of sustainable competitive advantage (Barney, 1991).

The RBV theory does not consider the impacts of the firm's operations on the natural environment or the life-cycle environmental costs of its products and services. However, given the growing concern for the ecosystem, this omission has rendered the theory inadequate as a basis for explaining sources of competitive advantage and for it to remain relevant, it must address and embrace the challenges of environmental sustainability.

Hart (1995) proposed the NRBV and suggested that the challenges regarding natural and social environments determine a company's competitive advantage as stemming from its capabilities to facilitate environmentally responsible activities. NRBV has been used to stress the importance of management capabilities in terms of achieving environmental performance and subsequently sustainable competitive advantage (e.g. Klassen and Whybark, 1999; Vachon and Klassen, 2007). Klassen and Whybark (1999) investigated the impact of pollution prevention and control technologies and found that those firms that implemented pollution prevention technologies improved their performance in terms of cost, speed, quality, and flexibility. Vachon and Klassen (2007) looked at the application of NRBV to link environmental collaboration to supply chain, as they studied environmental collaborative activity through logistical and technological integration.

In this paper, we follow the study of Klassen and Whybark (1999) and use NRBV to conceptualise the role of RTP as an environmental technology and a resource that could potentially impact positively on profitability whilst curtailing negative interactions with society and promoting environmental stewardship. A conceptual model is proposed, which is discussed in the next section.

4. Conceptual model of RTP and hypotheses

Scholars (Kroon and Vrijens, 1995; Wu and Dunn, 1995; Twede and Clarke, 2004; Breen, 2006; Hellström and Saghir, 2007; Ilic et al., 2009) have elucidated on the drivers of, and barriers to, the usage of RTP. The key issue

with RTP is the operational costs required for the effective and efficient management of the logistics assets. Operational costs are cost of transportation, cost of sophisticated equipment, cost of tracing and tracking and some other inevitable expenses. The management of RTP is resource-intensive (Aberdeen Group, 2004) due to the high operational costs required for a sustainable environment (Ilic et al., 2009). Furthermore, there is need for RTP investment justification to the shareholders. As such, it is essential to measure the cost-effectiveness of the usage of RTP based on the company size, the level of investment and the return on investment duration of RTP. Similarly, the challenges of organizational inertia and resistance to change are vital, including, the lack of understanding of the potential benefits associated with the adoption of RTP. Therefore, in industrial sectors such as fast moving consumer goods (FMCG) and manufacturing companies, where the usage of RTP is highly paramount, it is important to understand the impact of RTP on business performance.

Figure 1 extrapolates our conceptual model of RTP, consisting of seven dimensions: (i) adoption of RTP, (ii) company turnover, (iii) drivers of RTP, (iv) barriers to RTP, (v) investment on RTP, (vi) return on investment duration, (vii) business performance.

Our conceptual model determines the strength of relationships among the seven dimensions with the arrows indicating the direction of influence. As indicated in the conceptual model, it is expected that the company's size as defined by annual turnover will influence the adoption of RTP in an organization. Conceptually, larger companies would be inclined to adopt the usage of RTP at a larger extent compared to smaller companies. The proposed drivers of RTP are government regulation, environmental consideration, economic benefits, operational benefits, social benefits, environmental benefits, competitive advantage, and advantages over single-use transport packaging. These are proposed to determine the adoption of RTP in RL and the level at which organizations invest on RTP in their businesses. The level of investment on RTP is projected to influence the return on investment duration. Similarly, business performance is measured based on the following performance measures (Klassen and Whybark, 1999): speed, quality of service/products, sales turnover, low cost, net profit, customer loyalty, competitive advantage, customer satisfaction, innovation, technology and internal rate of return.

Practically, the barriers to the usage of RTP should be relatively proportional to company size as defined by annual turnover. The barriers to the usage of RTP are loss of RTP, unavailability of sufficient storage space, costly sophisticated equipment, cost of tracing and tracking of RTP, high transportation cost of RTP, sorting and cleaning of used RTP, mix-ups during

allocation and return of RTP, difficulties in managing /controlling RTP and additional cost required for effective management of RTP. These barriers are anticipated to deteriorate the business performance and extend the duration of return on investment.

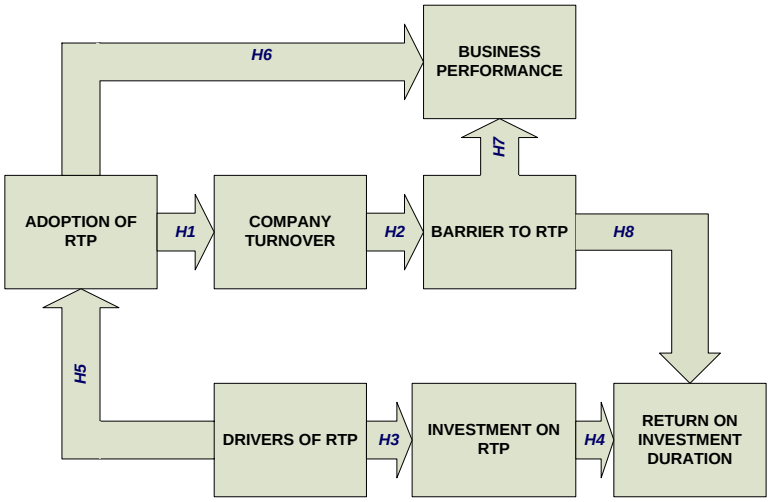

Figure 1: Conceptual model of RTP

Therefore, we hypothesise as follows:

H1: There is a significant relationship between a company's turnover and the adoption of RTP in RL;

H2: Size of the company as defined by annual turnover restrains the range of barriers to the use of RTP in RL;

H3: The drivers of RTP determine the level of investment on RTP;

H4: The level of investment on RTP determines the return on investment duration;

H5: The drivers of RTP influence its adoption;

H6: The adoption of RTP improves business performance;

H7: The barriers to the use of RTP deteriorate the business performance;

H8: The barriers to the use of RTP affect the return on investment.

5. Research Methodology

5.1 Survey development

A survey was conducted resulting in one hundred and twenty (120) respondents from various business sectors in both countries. We chose the survey methodology to test for theoretical relationships in large samples from businesses (Wacker, 1998). Survey appears to be the most-appropriate methodology for generating data from a large population (Wilson, 2014) and to test hypotheses. We used a non-experimental survey for data collection, using the approach by Dillman (2000).

The survey (see Appendix) entailed three (3) sections of thirty-nine (39) questions that aimed at providing answers to the research questions. The first section (Part A) was designed to build the company profile of the participants. Open-ended questions regarding name, address, telephone number, email, and category questions regarding annual expenditure, the total number of employees of the company, among others, were included. The second section (Part B) investigated the single-use transport packaging and the factors debarring some organizations from switching to RTP by using of multiple-choice questions. The third section (Part C) enquired the RTP under some subsections which included the commonly used RTP, cost effectiveness of RTP, potential benefits of RTP, managing and controlling RTP, possible challenges of RTP and the assessment of the usage of RTP. Questions in the third section entailed a combination of Likert-scale questions – to seek the best reflection of the respondents' opinion; closed-ended questions – to restrict the respondent to some specific and potential answers so as to make a comparative analysis of qualitative answers easy; multiple choice questions –where overlap in the choices was thoroughly avoided and open-ended questions – to give room for lengthy answers where applicable (Wilson, 2014). The questions in the second and third sections covered the major concerns of the RTP (Breen, 2006; Saghir, 2004; Wu and Dunn, 1995) as discussed earlier. They were relevant to those respondents whose company is yet to adopt the concept of RTP in their business. The questions in Part C were relevant to the respondents whose company has adopted the concept of RTP in their businesses. For instance, question 27 was formulated to buttress the point made by scholars (Kroon and Vrijens, 1995; Wu and Dunn, 1995) on how environmental and economic performance can be improved by adopting RTP. The question equally investigated how other organizations' performance can be improved by adopting RTP.

5.2 Data collection

In line with Yun and Trumbo (2000), a multi-mode approach –a combination of internet and paper mail survey was implemented while administering the questionnaire– to generate responses from a greater range of individuals and

boost the response rate. The multi-mode also known as mixed-mode approach equally creates a possibility of compensating for the flaws of each mode at affordable cost (De Leeuw, 2005). The paper mail questionnaire was initially sent out to potential participants, and a far less costly Internet survey was released for follow-up data collection. A covering letter was attached with the questionnaire to encourage the potential respondents in completing the questionnaire. Pre-notice and follow-up calls were used to facilitate the response rate (Yun and Trumbo, 2000)

After six (6) weeks of administering the questionnaire, 7.5% response rate was generated via postage while 18.3% response rate was generated via electronic mails and 40% was generated via the web. Some responses were found unusable as the second and third sections of the questionnaire were left blank. Missing data (which were uncontrollable by the researcher) were assigned a missing code, which enabled the researcher to exclude the missing data from the analysis and hence avoid any negative impact on the survey.

6. Results and analysis

Data were analysed with descriptive and inferential statistical methods and SPSS. Normality, reliability, validity and non-response bias tests were conducted on the data to measure for result generalization on the usage of RTP in RL. Furthermore, Pearson chi-square test and Spearman's rank order correlation were used to test hypotheses. Other tests including cross-tabulation, coefficient of determination, factor analysis, Kaiser-Meyer-Olkin and Bartlett's test were used to assess the relationships of the research variables. However, some of the results of the analysis are not included in this paper in order not to exceed the stipulated length.

6.1. Profile of the respondents

Table 1 depicts the profile of the respondent firms. The respondents' profiles were described by supply channel position, size of organizations evaluated by number of employees and size of organizations evaluated by the annual turnover. With regard to the supply channel position, 30.4% of the respondents operate as retailers while 43% operate as wholesalers. The highest response rate under the category of supply channel position (i.e. 60.8%) was the manufacturers. This indicates that the sample population is well-distributed across the three supply channel positions. Furthermore, the respondents were classified with respect to each company's number of employees (Table 1). Following the classification made by the European Union, a small and medium enterprise (SME) is made up of enterprises with

a labour force less than 250 and an annual turnover not more than £40M (Europa, nd). This indicates that in terms of number of employees, a total of 66.3% of the respondents are SMEs, while 33.8% are large enterprises. Also, from the perspective of annual turnover, that 68.9% of the respondents are SMEs while 31.1% are large enterprises.

Table 1: Profile of the respondents

Criteria		Percentage
Supply Channel Position		
Manufacturers	Yes	60.8
	No	39.2
	Total	**100.0**
Wholesalers	Yes	43.0
	No	57.0
	Total	**100.0**
Retailers	Yes	30.4
	No	69.6
	Total	**100.0**
Number of Employees		
1-10		2.6
11-50		27.3
51-250		36.4
251-500		10.4
501 and above		23.4
Total		**100.0**
Annual turnover		
< £5M		29.9
£5M-£20M		31.2
£21M-£50M		7.8
£51M-£100M		10.4
>£100M		20.8
Total		**100.0**

6.2: Normality, reliability, and validity tests

To test for normality, skewness and kurtosis tests were used (Thode, 2002). All the essential variables for this study were assessed for normality, and they all fell within the required range (value less than 3) of normality as in skewness and kurtosis test (Tabachnick and Fidell, 2001) (Table 2).

Table 2: Skewness and Kurtosis test of normality for research variables

Variables	Min	Max	Mean	STD. Dev.	Skewness	Kurtosis
Loss of RTP	1	5	3.38	1.001	-0.037	-0.621
Sorting and cleaning of RTP	1	5	3.43	1.059	-0.186	-0.493
Quality of service/products	1	5	4.39	0.846	-1.987	2.875
Sales turnover	2	5	4.23	0.786	-0.907	0.63
Cost saving	2	5	4.57	0.657	-1.672	0.754
Storage efficiency	1	5	4.39	0.867	-1.739	1.603

Cronbach's Alpha was used to perform the reliability test in the case of this study (Flynn *et al.*, 1990; Forza, 2002). Table 3 shows Cronbach alpha values

for the major constructs in this study. From Table 3, it can be deduced that the coefficient alpha for all the main elements are so close to 1, which implies a strong internal consistency of the variables in the scale, thus reliable (Forza, 2002).

Table 3: Reliability test output

Constructs	Cronbach's alpha
Business performance measures	0.857
Barriers to the usage of returnable transport packaging	0.866
Drivers of returnable transport packaging	0.884

SPSS ANOVA independent t-test was used to test the external validity for potential non-response bias based on the 65.8% response obtained. The variability in the first and second half of the responses is not significantly different as the values for Levene's t-test, and the two-tailed significance are greater than 0.05 (Table 4).

Table 4: ANOVA test of non-response bias.

Variable	1st Wave	2nd Wave	df	Sig. (2-tailed)	Levene's test
Speed	3.69	3.74	53	0.125	0.113
			31.643	0.164	
Low cost	3.55	3.82	52	0.952	0.057
			33.575	0.956	
Sales turnover	3.04	3.28	54	0.822	0.863
			46.36	0.823	
Net profit	2.73	2.97	54	0.853	0.993
			49.792	0.851	
Market share	3.82	3.71	54	0.667	0.729
			49.359	0.663	
Customer loyalty	3.82	3.64	54	0.007	0.152
			53.912	0.005	
Competitive advantage	3.55	3.59	54	0.15	0.685
			46.291	0.154	
	3.2	3.38	53	0.139	0.208

Customer satisfaction			52.361	0.104	
Quality of service/products	3.17	3.3	54	0.334	0.439
			36.862	0.365	
Innovation	3.47	3.82	54	0.017	0.815
			51.149	0.015	
Technology	3.02	3.14	54	0.246	0.059
			52.501	0.229	
Internal rate of return	2.45	2.86	54	0.826	0.192
			48.901	0.824	

6.3. General Observations

Analysing the data, it was observed that 70.9% of the respondents have adopted the usage of RTP considering the potential benefits it holds, while 29.1% are yet to adopt (Table 5). This is an indication that the majority of the companies in Nigeria and South Africa have switched from the conventional single-use transport packaging to the usage of RTP.

However, as indicated in Table 5, a very low response rate (4.3%) of those that are yet to adopt the usage of RTP in their businesses are absolutely sure of implementing RTP in the future. 73.9% are not sure of considering its implementation while 21.7% are not considering RTP. This result might be connected to lack of funds or of knowledge regarding the potential benefits of RTP.

Table 5: Observed adoption level of RTP

Constructs	**Percentage**
Adoption of RTP	
Yes	70.9
No	29.1
Total	100.0
Future consideration for the adoption of RTP	
Absolutely yes	4.3
May be	52.2
May be not	21.7
Absolutely no	21.7
Total	100.0

Furthermore, as elucidated by Breen (2006), shrinkage and attrition were detected as significant problems encountered by organizations in using RTP, which could be considered as barriers to the usage of RTP. The analysis also reflects other barriers that could be linked to the rationale behind the non-adoption of RTP by some organizations in Nigeria and South Africa (Table 6).

Table 6: The potential barriers to the adoption of RTP in Nigeria and South Africa companies

Barriers to adoption of RTP	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)	Total (%)
High transportation cost of RTP	3.6	8.9	39.3	28.6	19.6	100.0
Loss of RTP in transit	1.8	17.9	35.7	30.4	14.3	100.0
Unavailability of sufficient storage space	3.6	10.7	21.4	30.4	33.9	100.0
Costly sophisticated equipment	1.8	17.9	41.1	25.0	14.3	100.0
Delay of other deliveries	3.6	14.3	51.8	17.9	12.5	100.0
Delay in RTP pick-up by suppliers	3.6	8.9	42.9	33.9	10.7	100.0
Sorting an cleaning of used RTP	3.6	14.3	35.7	28.6	17.9	100.0
Mix-ups during RTP allocation and return	3.6	16.1	44.6	19.6	16.1	100.0
Cost of tracing and tracking of RTP	3.6	16.1	37.5	23.2	19.6	100.0
Difficulties in managing and controlling RTP	5.4	17.9	37.5	16.1	23.2	100.0
Additional cost required for managing and controlling RTP	1.8	12.5	28.6	41.1	16.1	100.0

6.4 Hypotheses' testing

6.4.1 Test of Hypothesis One (H1)

Cross-tabulation was carried out between the average annual turnover of the company and respondents' adoption of RTP. Table 7 shows that 18.2% of the respondents belonging to companies with less than £5M turnover (e.g. the SMEs) were yet to adopt the usage of RTP while 11.7% have adopted RTP. Likewise, 58.5% of the large and multinational enterprises have adopted RTP in their businesses while 11.7% are yet to adopt.

This implies that the companies' average annual turnover impacts on the adoption of RTP in RL. The majority of the large and multinational enterprises have adopted this concept while a higher percentage of the SMEs is yet to adopt RTP. Furthermore, Pearson Chi-square test was conducted to test the null hypothesis and the result (Table 8) depicts that the significant level is 0.003 which is less than the alpha level of 0.05. Therefore the null hypothesis is rejected and the alternate hypothesis is accepted. This implies that there is a statistically significant relationship between the company's annual turnover and the adoption of RTP in Nigeria and South Africa. It can be construed statistically that companies with high annual turnover (i.e. large enterprises) tend towards the adoption of RTP more than companies with low annual turnover (i.e. the SMEs).

Therefore,

H_1: There is a significant relationship between company's turnover and the adoption of RTP in Nigeria and South Africa.

H_o: There is no significant relationship between company's turnover and the adoption of RTP in Nigeria and South Africa.

Table 7: Cross tabulation between the company's average annual turnover and adoption of RTP

Crosstabulation				
		Adoption of RTP		Total
		Yes	No	
Company's Average Annual Turnover	< £5M	11.7%	18.2%	29.9%
	£5M-£20M	27.3%	3.9%	31.2%
	£21M-£50M	6.5%	1.3%	7.8%
	£51M-£100M	9.1%	1.3%	10.4%
	>£100M	15.6%	5.2%	20.8%
Total		70.10%	29.90%	100.00%

Table 8: Chi-Square statistics of the relationship between the company's average annual turnover and adoption of RTP

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.841[a]	4	.003
Likelihood Ratio	15.599	4	.004
Linear-by-Linear Association	4.543	1	.033
N of Valid Cases	77		

6.4.2 Test of Hypothesis Two (H2)

Spearman's rank order correlation (Pallant, 2010) was used to measure the relationship between the two categorical variables, that is, annual turnover and barriers to the use of RTP. Our results (see Table 9) show that the significant level of the concerned variables (annual turnover and barriers) are all greater than 0.05 (p-value), hence the null hypothesis is adopted. It is therefore proven statistically that the size of the company as defined by

annual turnover does not moderate the range of barriers to the use of RTP in reverse logistics. The effect of the relationship between the annual turnover and barriers to the use of RTP was also determined by Spearman's correlation (Table 9). High transportation cost of RTP, unavailability of sufficient storage space, and difficulties in managing/controlling of RTP recorded -0.066, -0.026 and -0.061 respectively. This depicts an inverse slight relationship with annual turnover. This could be regarded as a relationship so low as to be random. Loss of RTP in transit recorded as 0, which means it has no relationship with annual turnover and could be concluded that the observed results were produced based on chance. However, some of the enlisted barriers pose to indicate an iota of association with annual turnover, which is measured statistically. Cost of tracing and tracking of RTP, costly sophisticated equipment, delay of other deliveries, delay in RTP pick-up, sorting and cleaning of used RTP, mix-ups during RTP allocation and return, and additional cost required for managing/controlling RTP recorded 0.064, 0.122, 0.103, 0.161, 0.273, 0.236 and 0.22 respectively, which describes a very weak relationship with annual turnover.

Furthermore, the coefficient of determination is calculated to determine the proportion of variance that exists between the two variables. Using the formula, coefficient of determination = rho^2(x 100) % variance, where the correlation coefficient is denoted by rho in Spearman's rank order coefficient. The respective proportion of variance is illustrated in Table 9.

According to Burns and Burns (2008), there are four (4) different relationships that could exist in variables as follows:

- No common variance as a result of no correlation.
- 9% common variance as a result of a small correlation of +0.3.
- 49% common variance as a result of a high correlation of +0.7.
- 90% common variance as a result of an extremely high correlation of +0.95.

The proportion of variance that exists between annual turnover and the barriers to RTP as indicated in Table 9 can be classified as "no common variance" as a result of no correlation.

Therefore,

H_2: The size of the company as defined by annual turnover restrains the range of barriers to the use of RTP in reverse logistics.

H_o: The size of the company as defined by annual turnover does not restrain the range of barriers to the use of RTP in reverse logistics.

Table 9: Correlations

Correlations				
Spearman's Rank Order Correlation				
Annual Turnover and Barriers to RTP				
	Correlation Coefficient	**Sig. (1-tailed)**	**N**	**Variance %**
Annual Turnover	1.000	.	77	
High Transportation Cost of RTP	-0.066	0.318	54	0.436
Loss of RTP in Transit	0.000	0.500	54	0.000
Unavailability of Sufficient Storage Space	-0.026	0.427	54	0.068
Costly Sophisticated Equipment	0.122	0.189	54	1.488
Delay of Other Deliveries	0.103	0.229	54	1.061
Delay in RTP Pick-up	0.161	0.123	54	2.592
Sorting and Cleaning of Used RTP	0.273	0.023	54	7.453
Mix-ups during RTP Allocation and Return	0.236	0.043	54	5.570
Cost of Tracing and Tracking of RTP	0.064	0.322	54	0.410
Difficulties in Managing / Controlling of RTP	-0.061	0.330	54	0.372
Additional Cost Required for Managing / Controlling RTP	0.220	0.055	54	4.840

6.4.3 Test of Hypothesis Three (H3)

Table 10 shows that the significant level of the level of investment and drivers of RTP are greater than the p-value of 0.05. Therefore, the null hypothesis is retained. This means that the drivers of RTP do not have any influence on the level of investment on RTP.

The correlation varies as a specific driver has a precise effect size (where exists any) of relationship. However, drivers such as government regulation, environmental consideration and environmental benefits seem to possess slight correlation of 0.29, 0.172 and 0.166 respectively, which is not significant to be considered random. Also the other drivers, that is, economic benefits, operational benefits, social benefits, competitive advantage and advantages over single-use transport packaging are -0.082, -0.044, -0.089, -0.033 and -0.188 respectively. These depict inverse slight relationship and can be taken as relationship so low as to be considered random. Additionally, the coefficient of determination was calculated (Table 10).

Therefore,

H_3: The drivers of RTP have influence on the level of investment on RTP.

H_o: The drivers of RTP do not have any influence on the level of investment on RTP.

Table 10: Spearman's rank order correlation of the drivers of RTP and level of investment on RTP

Correlations				
Spearman's Rank Order Correlation				
Investment on RTP and Drivers of RTP				
	Correlation Coefficient	Sig. (1-tailed)	N	Variance%
Investment on RTP	1.000	.	53	
Government Regulation	0.290	0.018	53	8.410
Environmental Regulation	0.172	0.109	53	2.958
Economic Benefits	-0.082	0.279	53	0.672
Environmental Benefits	0.166	0.118	53	2.756
Operational Benefits	-0.044	0.378	52	0.194
Social Benefits	-0.089	0.265	52	0.792
Competitive Advantage	-0.033	0.407	52	0.109
Advantages over Single-use	-0.188	0.091	52	3.534

6.4.4 Test of Hypothesis Four (H4)

Cross-tabulation is used to measure the connections between the concerned variables of this hypothesis, that is, the level of investment on RTP and the return on investment duration categorically (Table 11). Hence, it can be inferred that as the predictor variable (level of investment on RTP) increases, the response variable (return on investment duration) increases. This is based on the category of response variable with the highest percentage as measured against each category of the level of investment on RTP as marked green in Table 11. This implies that there exists a statistically significant relationship between the level of investment on RTP and return on investment duration.

Therefore,

H_4: The level of investment on RTP indicates the return on investment duration.

H_o: The level of investment on RTP does not indicate the return on investment duration.

Table 11: Cross-tabulation- the relationship between the level of investment on RTP and the return on investment duration

Crosstabulation

		Return on Investment Duration							Total
		Less than a year	1 year	2 years	3 years	4 years	5 years	Not yet	
Level of Investment on RTP	< $8,000	3.77%	9.43%	7.55%	1.89%	0.00%	3.77%	1.89%	28.30%
	$8,000-$17,000	0.00%	5.66%	13.21%	5.66%	3.77%	1.89%	1.89%	32.08%
	$17,000-$40,000	1.89%	1.89%	0.00%	7.55%	0.00%	1.89%	0.00%	13.22%
	$40,000-$85,000	0.00%	1.89%	0.00%	1.89%	3.77%	1.89%	1.89%	11.33%
	> $85,000	0.00%	0.00%	3.77%	3.77%	1.89%	5.66%	0.00%	15.09%
Total		5.66%	18.87%	24.53%	22.64%	7.55%	15.09%	5.66%	100.00%

Spearman's rank order correlation was conducted on the variables, that is, level of investment on RTP and the return on investment duration (Table 12).

Table 12: Spearman's rank order correlation for level of investment on RTP and the return on investment duration

Correlations

			Investment level on RTP	Return on investment duration
Spearman's rho	Investment level on RTP	Correlation Coefficient	1.000	.364**
		Sig. (1-tailed)	.	.004
		N	53	53
	Return on investment duration	Correlation Coefficient	.364**	1.000
		Sig. (1-tailed)	.004	.
		N	53	53

**. Correlation is significant at the 0.01 level (1-tailed).

Table 12 indicates that the significance level is .004, which is less than the p-value of 0.05, and hence the null hypothesis is rejected and the alternate hypothesis is accepted. Also, Table 12 shows that the correlation between the level of investment on RTP and the return on investment duration is .364. This is significant at the 0.01 level, and hence the relationship between the

level of investment on RTP and the return on investment duration can be rated moderate using Cohen's (1992) convention.

From Table 12 it can be inferred that the correlation between level of investment on RTP and return on investment duration rho is .364. Using the formula, coefficient of determination = rho^2 (x 100) % variance, the coefficient of determination = $.364^2$x100 = 13.2496% variance. This implies that 13.25% of the variance in the return on investment duration is predictable from the variance in the level of investment on RTP; there exists a common variance. This also implies that the null hypothesis should be rejected while the alternate hypothesis should be accepted. Therefore, it can be assumed that the level of investment on RTP determines the return on investment duration.

6.4.5 Test of Hypothesis Five (H5)

As shown in Table 13, the significant level of the adoption of RTP and the drivers of RTP are less than the alpha level of 0.05. Therefore the null hypothesis is rejected and the alternate hypothesis is accepted. This implies that there is a statistically significant relationship between the drivers of RTP and the adoption of RTP.

Drivers such as government regulation, competitive advantage and advantages over single-use recorded a correlation coefficient of 0.262, 0.2 and 0.249 respectively, which implies a low correlation with the adoption of RTP. The relationship effect size of these drivers and adoption of RTP can be considered low according to Cohen's (1992) convention. Other drivers (environmental consideration, economic benefits, environmental benefits, operational benefits and social benefits) reported 0.47, 0.358, 0.439, 0.462 and 0.33 respectively implying a moderate correlation. The relationship strength of the later drivers with the adoption of RTP is certainly higher than the aforementioned. This means that most organizations are more interested in the environmental, economic, social and operational benefits when adopting RTP while considering the environment. Government regulation, competitive advantage and advantages over single-use did not seem to be as important as the other drivers discussed.

The coefficient of determination was calculated to determine the proportion of variance that exists between adoption of RTP and drivers of RTP. This is presented in Table 13, indicating that the percentage of variance in adoption of RTP is predictable from the variance in five of the drivers of RTP. For environmental consideration, economic benefits, environmental benefits, operational benefits and social benefits over 9% variance was recorded, which implies a common variance. The other drivers (government regulation,

competitive advantage and advantages over single-use) have no common variance with the adoption of RTP.

Therefore,

H_5: The drivers of RTP influence the adoption of RTP.

H_o: The drivers of RTP do not influence the adoption of RTP.

Pearson Chi-square test was conducted to test the null hypothesis (Table 13). It was found that the drivers of RTP do not influence the adoption of RTP.

Table 13: Pearson Chi-square correlation for drivers of RTP and adoption of RTP

Correlations				
Pearson Chi-square Test				
Drivers of RTP and Adoption of RTP				
	Correlation Coefficient	**Sig. (1-tailed)**	**N**	**%Variance**
Adoption of RTP	1.000	.	56	
Government Regulation	0.262	0.004	56	6.864
Environmental Consideration	0.470	0.004	56	22.090
Economic Benefits	0.358	0.002	56	12.816
Environmental Benefits	0.439	0.005	56	19.272
Operational Benefits	0.462	0.006	54	21.344
Social Benefits	0.330	0.001	55	10.890
Competitive Advantage	0.200	0.001	55	4.000
Advantages over Single-use	0.249	0.007	55	6.200

6.4.6: Test of Hypothesis Six (H6)

H6 tested the following:

H_6: Adoption of RTP improves business performance.

H_o: Adoption of RTP does not improve business performance.

Descriptive statistics were used to summarize the respondents' opinions on the impact of RTP adoption on business performance using various performance measures (Table 14). Hence, it can be inferred that the usage of RTP has a high level of positive impact on business performance based on the general performance measures. For instance, 92.9% of the respondents indicated that the usage of RTP has a high level of positive impact on the quality of service and (or) products. This infers that the conveyance of their

products by RTP from one phase of the supply chain to the other has significantly increased the quality of their products and services. Also, 87% of the respondent clarified that the usage of RTP has a high positive impact on their company's performance based on low cost. This can be justified by the rate at which revenue is generated from RTP when the company recuperated their capital invested on the RTP within three years or as per individual case.

Table 14: Impact of RTP adoption on business performance

	Impact of RTPs on Company's Performance Measures (in %)				
Performance Measures	**Very Negative Impact**	**Some Negative Impact**	**No Impact**	**Some Positive Impact**	**Very Positive Impact**
Quality of service/products	1.8	3.5	1.8	39.3	53.6
Speed	1.8	1.8	9.1	63.6	23.7
Low cost	0	1.9	11.1	59.3	27.7
Sales turnover	0	3.6	10.7	44.6	41.1
Net profit	0	1.8	10.7	53.6	33.9
Market share	0	3.6	39.3	44.6	12.5
Customer loyalty	0	3.6	16.1	64.3	16.2
Competitive advantage	0	3.6	17.9	50	28.7
Customer satisfaction	0	1.8	12.7	54.6	30.9
Innovation	0	1.8	17.8	51.8	28.6
Technology	0	1.7	30.4	55.4	12.5
Internal rate of return	1.7	3.6	12.5	64.3	17.9

Therefore, based on the above dataset and analysis, it can be inferred that adoption of RTP improves business performance.

The null hypothesis was further tested using the Pearson Chi-square test. It was found that the adoption of RTP does not improve business performance (Table 15).

Table 15: Pearson Chi-square correlation for adoption of RTP and business performance

Correlations				
Pearson Chi-Square Tests				
Adoption of RTP and Business Performance				
	Correlation Coefficient	Sig. (1-tailed)	N	% Variance
Adoption of RTP	1	.	56	
Quality of Service /Products	0.607	0.007	56	36.845
Speed	0.528	0.004	56	27.878
Low Cost	0.448	0.001	56	20.070
Sales Turnover	0.447	0.001	56	19.981
Net Profit	0.333	0.002	56	11.089
Market Share	0.234	0.008	56	5.476
Customer Loyalty	0.359	0.007	56	12.888
Competitive Advantage	0.463	0.001	56	21.437
Customer Satisfaction	0.354	0.009	56	12.532
Innovation	0.299	0.006	56	8.940
Technology	0.252	0.006	56	6.350
Internal Rate of Return	0.354	0.005	56	12.532

Table 15 shows that the significant level for the adoption of RTP and the business performance based on the performance measures listed in Table 14 are less than the alpha level of 0.05. As such, it is sufficient to reject the null hypothesis in favour of the alternate hypothesis, which infers that there is a statistically significant relationship between the two variables, meaning that the adoption of RTP improves business performance. The correlation coefficient (Table 15) can be categorized into two categories (Cohen, 1992). Adoption of RTP and each of the performance measures under category 1 (which comprises of net profit, market share, customer loyalty, customer satisfaction, innovation, technology and internal rate of return) recorded correlation coefficient near 0.2. This indicates a small effect size relationship. Conversely, the adoption of RTP and each of the performance measures under category 2 (which comprises of quality of service/products, speed, low cost, sales turnover and competitive advantage) reported correlation coefficient close to 0.5. This indicates a medium effect size relationship. Largely, it can be established that the adoption of RTP improves business performance, though at different rate.

Furthermore, the coefficient of determination was calculated to determine the proportion of variance that exists between the two variables (Table 15). The percentage of variance in the business performance measures is predictable from the variance in the adoption of RTP, as there exists common variance at various degrees.

6.4.7 Test of Hypothesis Seven (H7)

H7 aims to test the following:

H_7: The barriers to the use of RTP deteriorate the business performance.

H_0: The barriers to the use of RTP do not deteriorate the business performance.

The null hypothesis was tested by spearman's rank order correlation (Table 16). Table 16 suggests that the significant level for most of the barriers and business performance measures are less than the p-value of 0.05, which indicates that the null hypothesis should be rejected in favour of the alternate hypothesis and hence the barriers to RTP deteriorate business performance. However, it is expedient to measure the strength of the relationship that exists between the different barriers and the various business performance measures. The relationship strength differs based on their correlation coefficients and can be categorized into small and moderate effect size (Cohen, 1992) (Tables 17 and 18 respectively).

Table 16: Spearman's rank order correlation for barriers to RTP and business performance

Correlation			Quality of Service / Products	Speed	Low Cost	Sales Turnover	Net profit	Market Share	Customer Loyalty	Competitive advantage	Customer satisfaction	Innovation	Technology	Internal Rate of Return
Spearman's rho	High Transportation Cost of RTP	Correlation Coefficient	.179	.118	.140	-.084	.032	.225*	.195	-.035	.025	.219	.244*	-.094
		Sig. (1-tailed)	.094	.195	.156	.269	.407	.048	.075	.399	.428	.052	.035	.246
		N	56	55	54	56	56	56	56	56	55	56	56	56
	Loss of RTP in Transit	Correlation Coefficient	.188	.148	.156	.422**	.422**	.099	.285*	.211	.204	.147	-.003	.285*
		Sig. (1-tailed)	.083	.141	.130	.001	.001	.234	.017	.059	.068	.140	.490	.017
		N	56	55	54	56	56	56	56	56	55	56	56	56
	Unavailability of Sufficient Storage Space	Correlation Coefficient	.194	.054	-.087	.214	.059	-.254*	-.057	.218	.175	.290*	.007	.162
		Sig. (1-tailed)	.075	.348	.265	.057	.333	.029	.339	.054	.101	.015	.480	.116
		N	56	55	54	56	56	56	56	56	55	56	56	56
	Costly Sophisticated Equipment	Correlation Coefficient	.328**	.237*	-.140	.315**	.271*	-.248*	.086	.205	.085	.190	.131	.156
		Sig. (1-tailed)	.007	.041	.157	.009	.022	.033	.265	.065	.270	.080	.169	.126
		N	56	55	54	56	56	56	56	56	55	56	56	56
	Delay of other Deliveries	Correlation Coefficient	-.045	.027	.070	.028	-.007	-.212	.053	.159	.022	.005	-.105	-.168
		Sig. (1-tailed)	.372	.422	.308	.418	.480	.058	.350	.121	.435	.486	.220	.107
		N	56	55	54	56	56	56	56	56	55	56	56	56
	Delay in RTP Pick-Up	Correlation Coefficient	.049	.048	.172	.202	.215	.056	.074	.008	-.038	.210	.125	.034
		Sig. (1-tailed)	.360	.363	.107	.067	.056	.342	.294	.476	.391	.061	.179	.402
		N	56	55	54	56	56	56	56	56	55	56	56	56
	Sorting and Cleaning of Used RTP	Correlation Coefficient	.052	.225*	.302*	.287*	.256*	.041	.119	0.179	0.188	0.224	.224*	.230*
		Sig. (1-tailed)	.351	.049	.013	.016	.028	.382	.191	.088	.169	.057	.048	.044
		N	56	55	54	56	56	56	56	56	55	56	56	56
	Mix-ups during RTP Allocation and Return	Correlation Coefficient	.053	.184	.271*	.324**	.234*	.097	.096	.163	.232*	.282*	.411**	.245*
		Sig. (1-tailed)	.350	.090	.024	.007	.042	.239	.241	.115	.044	.052	.001	.034
		N	56	55	54	56	56	56	56	56	55	56	56	56
	Cost of Tracing and Tracking of RTP	Correlation Coefficient	.038	.133	.038	.348**	.268*	-.262*	-.126	.090	.016	.126	.068	.277*
		Sig. (1-tailed)	.392	.167	.392	.004	.023	.025	.177	.255	.454	.177	.308	.019
		N	56	55	54	56	56	56	56	56	55	56	56	56
	Difficulties in Managing / Controlling RTP	Correlation Coefficient	.108	.116	.002	.336**	.238*	-.227*	.064	.258*	.181	214	.154	.259*
		Sig. (1-tailed)	.214	.199	.494	.006	.038	.046	.320	.028	.094	.057	.129	.027
		N	56	55	54	56	56	56	56	56	55	56	56	56
	Additional Cost Required for Managing and Controlling RTP	Correlation Coefficient	-.032	.190	.053	.337**	.270*	-.249*	-.055	.294*	.195	.201	.111	.168
		Sig. (1-tailed)	.407	.082	.352	.006	.022	.032	.344	.014	.077	.069	.208	.107
		N	56	55	54	56	56	56	56	56	55	56	56	56

*. Correlation is significant at the 0.05 level (1-tailed).

**. Correlation is significant at the 0.01 level (1-tailed).

Table 17: Small effect size correlation of barriers to RTP and business performance

Correlation			Speed	Low Cost	Sales Turnover	Net profit	Market Share	Customer Loyalty	Competitive advantage	Customer satisfaction	Innovation	Technology	Internal Rate of Return
Spearman's rho	High Transportation Cost of RTP	Correlation Coefficient					.225*					.244*	
		Sig. (1-tailed)					.048					.035	
		N					56					56	
	Loss of RTP in Transit	Correlation Coefficient						.285*					.285*
		Sig. (1-tailed)						.017					.017
		N						56					56
	Unavailability of Sufficient Storage Space	Correlation Coefficient					-.254*				.290*		
		Sig. (1-tailed)					.029				.015		
		N					56				56		
	Costly Sophisticated Equipment	Correlation Coefficient	.237*			.271*	-.248*						
		Sig. (1-tailed)	.041			.022	.033						
		N	56			56	56						
	Delay of other Deliveries	Correlation Coefficient											
		Sig. (1-tailed)											
		N											
	Delay in RTP Pick-Up	Correlation Coefficient											
		Sig. (1-tailed)											
		N											
	Sorting and Cleaning of Used RTP	Correlation Coefficient	.225*		.287*	.256*						.224*	.230*
		Sig. (1-tailed)	.049		.016	.028						.048	.044
		N	55		56	56						56	56
	Mix-ups during RTP Allocation and Return	Correlation Coefficient		.271*		.234*				.232*			.245*
		Sig. (1-tailed)		.024		.042				.044			.034
		N		54		56				55			56
	Cost of Tracing and Tracking of RTP	Correlation Coefficient				.268*	-.262*						.277*
		Sig. (1-tailed)				.023	.025						.019
		N				56	56						56
	Difficulties in Managing / Controlling RTP	Correlation Coefficient				.238*	-.227*		.258*				.259*
		Sig. (1-tailed)				.038	.046		.028				.027
		N				56	56		56				56
	Additional Cost Required for Managing and Controlling RTP	Correlation Coefficient				.270*	-.249*		.294*				
		Sig. (1-tailed)				.022	.032		.014				
		N				56	56		56				

*. Correlation is significant at the 0.05 level (1-tailed).

**. Correlation is significant at the 0.01 level (1-tailed).

As shown in Table 17, the identified barriers have a small effect size correlation with most of the performance measures, which can be considered as a weak relationship. For instance, high transportation cost of RTP has a small effect size correlation with market share and technology. Likewise, loss of RTP in transit holds a small effect size correlation with customer loyalty, and internal rate of return. Unavailability of sufficient storage space also retains a small effect size relationship with market share, competitive advantage and innovation.

Table 18: Moderate effect-size correlation of barriers to RTP and business performance

Correlation			Quality of Service / Products	Low Cost	Sales Turnover	Net profit	Technology
	Loss of RTP in Transit	Correlation Coefficient			.422**	.422**	
		Sig. (1-tailed)			.001	.001	
		N			56	56	
	Costly Sophisticated Equipment	Correlation Coefficient	.328**		.315**		
		Sig. (1-tailed)	.007		.009		
		N	56		56		
	Sorting and Cleaning of Used RTP	Correlation Coefficient		.302*			
		Sig. (1-tailed)		.013			
		N		54			
	Mix-ups during RTP Allocation and Return	Correlation Coefficient			.324**		.411**
		Sig. (1-tailed)			.007		.001
		N			56		56
	Cost of Tracing and Tracking of RTP	Correlation Coefficient			.348**		
		Sig. (1-tailed)			.004		
		N			56		
	Difficulties in Managing / Controlling RTP	Correlation Coefficient			.336**		
		Sig. (1-tailed)			.006		
		N			56		
	Additional Cost Required for Managing and Controlling RTP	Correlation Coefficient			.337**		
		Sig. (1-tailed)			.006		
		N			56		

*. Correlation is significant at the 0.05 level (1-tailed).

**. Correlation is significant at the 0.01 level (1-tailed).

From Table 18 it can be construed that some of the barriers hold a medium effect size with some of the performance measures, and this implies a moderate relationship. For instance, loss of RTP in transit is interpreted to lessen a company's sales turnover and net profit moderately while costly sophisticated equipment is translated to diminish the quality of service / products and sales turnover moderately. Therefore, it can be established statistically that barriers to RTP deteriorate business performance.

6.4.8 Test of Hypothesis Eight (H8)

H8 tested the following:

H_0: The barriers to the use of RTP do not affect the return on investment duration.

H_8: The barriers to the use of RTP affect the return on investment duration.

Spearman's rank order coefficient was used to determine the existing relationship between the return on investment duration and the barriers to RTP in order to test the null hypothesis (Table 19). Table 19 illustrates that the significant level of the return on investment and various barriers are less than 0.05 (p-value), giving a basis for rejecting the null hypothesis in favour of the alternate hypothesis. Hence, the barriers to RTP affect the return on investment duration.

Table 19: Spearman's rank order correlation for return on investment duration and barriers to RTP

Correlations				
Spearman's rho				
Return on Investment Duration and Barriers to RTP				
	Correlation Coefficient	Sig. (1-tailed)	N	Variance%
Return on Investment Duration	1	.	53	
High Transportation Cost of RTP	0.353	0.001	53	12.461
Loss of RTP in transit	0.508	0.005	53	25.806
Unavailability of Sufficient Storage Space	0.163	0.002	53	2.657
Costly Sophisticated Equipment	0.107	0.003	53	1.145
Delay of Other Deliveries	0.133	0.007	53	1.769
Delay in RTP Pick-up	0.136	0.004	53	1.850
Sorting and Cleaning of Used RTP	0.306	0.006	53	9.364
Mix-ups during RTP Allocation and Return	0.123	0.004	53	1.513
Cost of Tracing and Tracking of RTP	0.377	0.001	53	14.213
Difficulties in Managing/Controlling of RTP	0.355	0.003	53	12.603
Additional Cost Required for Managing / Controlling RTP	0.525	0.005	53	27.563

The effect size of the relationship between the variables was also computed by Spearman's rank order correlation (Table 19). Unavailability of sufficient storage space, costly sophisticated equipment, delay of other deliveries, delay in RTP pick-up, and mix-ups during RTP allocation and return recorded 0.163, 0.107, 0.133, 0.136 and 0.136 respectively, which depicts a slight relationship with return on investment duration. This means that the aforementioned barriers can affect the return on investment duration at a very minute rate, which is insignificant enough to be considered random; such barriers barely occur when compared with other barriers to RTP. High transportation on cost of RTP, sorting and cleaning of used RTP, cost of tracing and tracking of RTP and difficulties in managing/controlling of RTP reported 0.353, 0.306, 0.377 and 0.355 respectively. This indicates that there is a moderate effect size of relationship between the respective barriers and the return on investment duration. Later barriers can trigger the return on investment duration more than the earlier mentioned ones, since the later ones occur more often than the prior in RL. Loss of RTP in transit and additional cost required for managing /controlling RTP reported 0.508 and 0.525 which can be assumed to have a large effect size of relationship with the return on investment duration (Cohen, 1992). This implies that the loss of RTP in transit and additional cost required for managing /controlling RTP affect the return on investment duration at a very high rate when compared to other barriers. Loss of RTP is continually recorded in reverse logistics and the usage of RTP certainly demands for more operational cost, and these in turn upsurge the return on investment duration.

The coefficient of determination was calculated to determine the proportion of variance that exists between each barrier and return on investment duration. The respective proportion of variance is illustrated in Table 19 where it is

shown no common variance exists in the return on investment duration and in the first set of barriers earlier mentioned, while a common variance exists in the return on investment duration and in the second set of barriers. Similarly, it can be deduced that a common variance ensues in the return on investment duration and in the third set of barriers, which depicts a statistically significant relationship.

7. Conclusion

This paper developed and conceptualised RTP as an environmental technology and resource. It developed and tested a model that explained the usage of returnable transport packaging in RL using natural resource based view (NRBV) (Hart, 1995; Hart and Dowell, 2010). In particular, we analysed the drivers, the barriers to the usage of RTP and its cost-effectiveness, as well as its impact on business performance based on performance measures stemming from the literature. Although NRBV has been used to stress the importance of capabilities in achieving sustainable competitive advantage (e.g. Vachon and Klassen, 2007), in this research we followed Klassen and Whybark (1999) and (i) conceptulised RTP as a technology and resource that can contribute to business performance, and (ii) suggested that RTP can be used to improve business performance measured, among other things, by cost, speed, quality, and flexibility (Klassen and Whybark, 1999). Furthermore, our study was conducted in developing countries, and therefore we have contributed towards: firstly, addressing the gap with regards to the impact of drivers and barriers of RTP; secondly, the impact of RTP on business performance in developing countries (Abdulrahman et al., 2014); and thirdly, towards eliminating the scarcity of studies in RL (Sarkis et al., 2011; Zhang et al., 2011). Interestingly, the findings of this paper show that the majority of firms we sampled in Nigeria and South Africa have adopted the usage of RTP in their businesses. A possible explanation for this could be because of the potential benefits that this holds. This is in contrast to the current belief that RL in developing countries is in its infancy (Sarkis et al., 2011; Zhang et al., 2011). Furthermore, through our results we suggest that more companies are willing to adopt the usage of RTP but some are faced with the challenge of finance, especially the SMEs. This implies that the SMEs need financial support from large enterprises and governments in order to comply with the environmental regulations via the adoption of RTP. Financial challenges have also been stated (with regards to the developed countries) by scholars (e.g. Shaik and Abdul-Kaber, 2013), but not in the context of the developing countries, as in our study. Finally, our study findings suggested both “supply chain contextual” and “inter-firm” factors, with a particular reference to legislative factors, as well as those related to the lack of awareness of the

potential benefits of RTP, either internal or external (Aitken and Harrison, 2013; Shaharudin et al., 2015). In addition to the challenges identified in prior studies (*ibid*), this study indicated that the barriers to RTP affect the usage of RTP by extending the return on investment duration and deteriorating business performance. These are indicative of the need for individual companies in Nigeria and South Africa to work in collaboration with the logistics companies so as to abrogate some of these barriers (if not all) while managing and controlling the usage of RTP in their organizations. This will not only eradicate the barriers, but will also develop mutual relationships across the supply chain of organizations in Nigeria and South Africa. Our results also give clear indications of the cost-effectiveness of the usage of RTP as most organizations recover the amount invested on RTP within three (3) years and afterwards additional revenues are generated from RTP. Our study further establishes the fact that the adoption of RTP in RL has a high degree of a positive impact on business performance while conforming to the governments' regulations on environmental sustainability.

In this study we did not investigate the role of types of products or supply chains within which the packages are used, and such variables may have shaped differently our results. Secondly, the research could have also tested for the role of the products, e.g. those products that are already shipped, to be shipped and will not be shipped in RTP. This may have led to further insights and hence it may be that future studies are devoted to this purpose. Thirdly, we focused on a Nigeria and South Africa, but we did not conduct a study between developing and developed countries. It may be that such studies would be useful in understanding the differences and the underlying factors, barriers, and benefits. Fourthly, although the survey is a robust method in order to examine the use of RTP within RL and coincides with our chosen theoretical lens, that is, NRBV, it may offer a snapshot of the problem and related challenges, benefits, and drivers. Hence, future studies could explore the process of RTP management by using qualitative methodologies, including, for instance, action research, to be able to observe what people are doing.

We hope that the findings of this study set the foundation for further discussion and research by researchers and practitioners in applying RTP in RL.

References:

Abdallah, T., Diabat, A., & Simchi-Levi, D. (2012) Sustainable supply chain design: a closed-loop formulation and sensitivity analysis. *Production Planning & Control: The Management of Operations* 23(2-3), 120-133.

Abdulrahman, M. D., Gunasekaran, A., & Subramanian, N. (2014). Critical Barriers in Implementing Reverse Logistics in the Chinese Manufacturing Sectors. *International Journal of Production Economics* 147 (Part B), 460–471.

Aitken, J., & Harrison, A. (2013). Supply Governance Structures for Reverse Logistics Systems. *International Journal of Operations & Production Management* 33(6), 745–764.

Ballou, R. H. (2004). *Business logistics/supply chain management: planning, organizing, and controlling the supply chain.* 5th ed., Prentice Hall.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management* 17(1), 99-120.

Bell, J.E., Autry, C.W., Mollenkopf, D.A., & Thornton, L.M. (2012). A natural resource scarcity typology: theoretical foundations and strategic implications for supply chain management. *Journal of Business Logistics*, 33(2), 158-166.

Bernon, M., Rossi, S., & Cullen, J. (2011). Retail reverse logistics: a call and grounding framework for research. *International Journal of Physical Distribution & Logistics Management*, 41(5), 484-510.

Bouzon, M., Spricigo, R., Rodriguez, C.M.T., de Queiroz, A., & Miguel, P.A. (2015). Reverse logistics drivers: empirical evidence from a case study in an emerging economy. *Production Planning & Control: The Management of Operations*, DOI: 10.1080/09537287.2015.1049239.

Breen, L., (2006). Give me back my empties or else! A preliminary analysis of customer compliance in reverse logistics practices (UK). *Management Research News,* 29(9), pp. 532-551.

Burns, R.P., & Burns, R. (2008). *Business research methods and statistics using SPSS*. Sage publications.

Chan, K. (2007). A pro-active and collaborative approach to reverse logistics—a case study. *Production Planning & Control: The Management of Operation*s 18(4), 350-360.

Cohen, J. (1992). A power primer. *Psychological bulletin* 112(1), 155.

Day, G. (1994). The capabilities of market-driven organizations. *Journal of Marketing* 58(4), 37-52.

De Leeuw, E.D. (2005). To mix or not to mix data collection modes in surveys. *Journal of Official Statistics* 21(2), 233.

Dillman, D. (2000). *Elements of the Tailored Design Method*. Wiley, New York

Dowlatshahi, S. (2012). A framework for the role of warehousing in reverse logistics. *International Journal of Production Research,* 50(5), 1265-1277.

Europa (nd). 'Small and medium-sized enterprises (SMEs) Available at: http://ec.europa.eu/enterprise/policies/sme/index_en.htm Accessed 16 August, 2014.

Flynn, B.B., Sakakibara, S., Schroeder, R.G., Bates, K.A., & Flynn, E.J., (1990). Empirical research methods in operations management. *Journal of Operations Management* 9(2), 250-284.

Forza, C., (2002). Survey research in operations management: a process-based perspective. *International Journal of Operations & Production Management* 22(2), 152-194.

Fritz, M., & Schieffer, G., (2009). Tracking, tracing, and business process interests in food commodities: A multi-level decision complexity. *International Journal of Production Economics* 117(2), 317-329.

Garetti, M., & Taisch, M. (2012). Sustainable manufacturing: trends and research challenges. *Production Planning and Control: the management of operations* 23(2-3), 83-104.

Guarnieri, P., Sobreiro, V.A., Nagano, M.C., & Serano, A. (2015). The challenge of selecting and evaluating third-party reverse logistics providers in a multicriteria perspective: a Brazilian case. *Journal of Cleaner Production* 96, 209-219.

Guide, V. D. R., Jr., & Van Wassenhove, L. N. (2009). The Evolution of Closed-Loop Supply Chain Research. *Operations Research* 57(1), 10-18.

Hallgren, M., Olhager, J., & Schoeder, R.G. (2010). A hybrid model of competitive capabilities. *International Journal of Operations & Production Management*, 31(5), 511-526.

Hart, S., & Dowell, G. (2010). A natural-resource-based view of the firm: Fifteen years after, *Journal of Management* 37(5), 1464-1479.

Hart, S.L. (1995). A natural-resource-based view of the firm. *Academy of Management Review* 20(4), 986-1014.

Hellström, D., & Saghir, M., 2007. Packaging and logistics interactions in retail supply chains. *Packaging technology and science,* 20(3), 197-216.

Hellström, D., & Johansson, O. (2010). The impact of control strategies on the management of returnable transport items. *Transportation Research Part E: Logistics and Transportation Review* 46(6), 1128-1139.

Huang, Y., Jim, Y., & Rahman, S. (2012). The task environment, resource commitment and reverse logistics performance: evidence from the Taiwanese high-tech sector. *Production Planning and Control* 23, 851-863.

Ilic, A., Ng, J.W., Bowman, P., & Staake, T., (2009). The value of RFID for RTI management. *Electronic Markets* 19(2-3), 125-135.

Jayaraman, V., Ross, A.D., & Agarwal, A., (2008). Role of information technology and collaboration in reverse logistics supply chains. *International Journal of Logistics: Research and Applications,* 11(6), 409-425.

Johansson, O., & Hellström, D., (2007). The effect of asset visibility on managing returnable transport items. *International Journal of Physical Distribution & Logistics Management*, 37(10), 799-815.

Karia, N., & Wong, C.Y. (2013). The impact of logistic resources on performance: a survey of Malaysian logistics service providers. *Production Planning & Control* 24(7), 589-606.

Klassen, R.D., & Whybark, D.C. (1999). The impact of environmental technologies on manufacturing performance. *Academy of Management Journal*, 42(6), 599-615.

Kroon, L., & Vrijens, G., (1995). Returnable containers: an example of reverse logistics. *International Journal of Physical Distribution & Logistics Management* 25(2), 56-68.

Lacerda, L., (2002). Logística reversa: uma visão sobre os conceitos básicos e as práticas operacionais. *Centro de Estudos em Logística–COPPEAD,* pp. 3.

Lambert, S., Riopel, D., & Abdul-Kader, W. (2011). A reverse logistics decisions conceptual framework. *Computers & Industrial Engineering,* 61(3), 561-581.

Maleki, R.A., & Reimche, J., (2011). Managing Returnable Containers Logistics-A Case Study Part I-Physical and Information Flow Analysis. *International Journal of Engineering Business Management* 3(2), 1-8.

Nicolaou, I.E., Evangelinos, K.I., & Allan, S. (2013). A reverse logistics social responsibility evaluation framework based on the triple bottom line approach. *Journal of Cleaner Production* 56, 173-184.

Pallant, J. (2010). *SPSS survival manual: A step by step guide to data analysis using SP*. Open University Press.

Perunovic, Z., Mefford, R., & Christoffersen, M. (2012). Impact of Information Technology on Vendor Objectives, Capabilities, and Competences in Contract Electronic Manufacturing. *International Journal Production Economics* 139(1), 207-219.

Rogers, D. S., & Tibben-Lembke, R.S. (1998). *Going Backwards: Reverse Logistics Trends and Practices*. Reno, NV: Reverse Logistics Executive Council.

Rogers, D.S., & Tibben- Lembke, R. (2001). An examination of reverse logistics practices. *Journal of Business Logistics* 22(2), 129-148.

Reusable Packaging Association (RPA) (2016). What is Reusable Packaging? Retrieved January, 10 2016 from http://reusables.org/choose-reusables/what-is-reusable-packaging.

Saghir, M. (2004). The concept of packaging logistics, *Proceedings of the Fifteenth Annual POM Conference, Cancun, April 30-May 3* 2004.

Sarkis, J., Zhu, Q., & Lai, K.H. (2011). An Organizational Theoretic Review of Green Supply Chain Management Literature. *International Journal of Production Economics* 130(1), 1–15.

Shaharudin, M. R., Zailani, S., & Tan. K.C. (2015). Barriers to Product Returns and Recovery Management in a Developing Country: Investigation Using Multiple Methods. *Journal of Cleaner Production* 96(1), 220–232.

Shaik, M.N., & Adul-Kader, W. (2013). Transportation in Reverse Logistics Enterprise: A Comprehensive Performance Measurement Methodology. *Production Planning & Control* 24 (6), 495–510.

Shamsuzzoha, A., & Helo, P.T. (2011). Real-time tracking and tracing system: Potentials for the logistics network, *Proceedings of the 2011 international conference on industrial engineering and operations management* 2011.

Shi, V.G., Koh, L.SC, Baldwin, J., & Cucchiella, F. (2012). Natural resource based green supply chain management. *Supply Chain Management: an International Journal* 17(1), 54-67.

Silva, D. A.L., Santos, G.W., Sevegnani, T.B., & Truzzi, O.M.S. (2013). Comparison of disposable and returnable packaging: a case study of reverse logistics in Brazil. *Journal of Cleaner Production* 47, 377-387.

Sohrabpour, V., Hellström, D., & Jahre, M. (2012). Packaging in developing countries: identifying supply chain needs. *Journal of Humanitarian Logistics and Supply Chain Management* 2(2), 183-205

Srivastava, P. (1995). Environmental technologies and competitive advantages. *Strategic Management Journal*, 16(summer), 183-200.

Stefansson, G., & Tilanus, B. (2001). Tracking and tracing: principles and practice. *International Journal of Services Technology and Management* 2(3), 187-206.

Tabachnik, B.G., & Fidell, L.S. (2001). *Using multivariate statistics*. Pearson Publications.

Thode, H.C. (2002). *Testing for normality.* CRC Press.

Twede, D., & Clarke, R. (2004). Supply chain issues in reusable packaging. *Journal of Marketing Channels* 12(1), 7-26.

Vachon, S., & Klassen, R.D. (2007). Supply chain management and environmental technologies: the role of integration. International Journal of Production Research, 45(2), 401-423.

Vachon, S., & Klassen, R.D. (2008). Environmental management and manufacturing performance: The role of collaboration in the supply chain. *International Journal of Production Economics* 111(2), 299-315.

Wilson, J., (2014). *Essentials of business research: A guide to doing your research project.* Sage.

Wu, H., & Dunn, S.C. (1995). Environmentally responsible logistics systems. *International Journal of Physical Distribution & Logistics Management,* 25(2), 20-38.

Yun, G.W., & Trumbo, C.W. (2000). Comparative Response to a Survey Executed by Post, E-mail, & Web Form. *Journal of Computer-Mediated Communication,* 6(1), 0-0.

Zhang, T., Chu, J., Wang, X., Liu, X., & Cui, P. (2011). Development Pattern and Enhancing System of Automotive Components Remanufacturing Industry in China. *Resources, Conservation and Recycling* 55(6), 613–622.

APPENDIX : (Questionnaire)

Part A: General company information

1. Name of Company…….
   …….
2. Address of Company…….
   …….
3. Company's telephone number……
   ……

4. Company's email……
……

5. Company's year of establishment……
……

6. Name of respondent (optional)……
……

7. Designation of respondent……
……

8. What is your company's average annual expenditure (kindly tick the closest option that applies)

<R91.5m ☐ R91.5m- R366m ☐ R384.3m- R915m ☐
R933.3m- R1830m ☐ > R1830m ☐

---

9. What is your company's average annual turnover (kindly tick the closest option that applies)

<R91.5m ☐ R91.5m- R366m ☐ R384.3m- R915m ☐
R933.3m- R1830m ☐ > R1830m ☐

---

10. What is the total number of employees in your company?

1-10 ☐ 11-50 ☐ 51-250 ☐ 251-500 ☐
501 and above ☐

---

11. In which of the following channel positions do you operate? Check all that apply.

Channel positions	***Tick***
Manufacturer	☐
Wholesaler	☐
Retailer	☐
Service Provider / Logistics (Please specify :……)	☐

12. What is your company's major line of product? Please tick all that apply

Line of products and activities	***Tick***
Pharmaceutical products and beauty Aids	☐
Perishable and non-perishable foods	☐
Drinks and beverages	☐
Fruits and vegetables	☐
Groceries	☐
Cooking gas	☐
Automobile and automotive assembly, parts, components, accessories	☐
Electrical and electronics equipment and components	☐
Chemical products, allied products	☐
Furniture, home Furnishings and equipment	☐
Construction products and building materials	☐
Hospital, industrial, agricultural equipment and components	☐
Supply and/or rental of equipment	☐
Transport and/or storage	☐

Consulting ☐
Telecommunication ☐
Clothing / apparel ☐
Government ☐
Catering ☐
Aircraft and ship-building assembly, components, accessories, *et cetera.* ☐
Other product line/ business activities (please specify)…… ☐

13. Has your company adopted the usage of Reusable Transport Packaging Items in Reverse Logistics? If yes please go to part C else go to part B

Part B: Single-use Transport Packaging System/ Reusable Transport Packaging Items

14. Please indicate by ticking the type(s) of Transport Packaging system in use in your company

Single-use transport packaging	***Tick***
Corrugated containers	☐
Corrugated cardboard	☐
Expendable packaging	☐
Non-recyclable wax-coated corrugated boxes	☐
Shipping containers with no lids	☐
Bulk bags	☐
Others (please specify)……	☐

15. What are the challenges faced by your organization in replacing the single-use transport packaging with Reusable Transport Packaging Items? Please tick all that apply

Challenges	***Tick***
Capital investment	☐
Cost for Tracking and Accounting	☐
Lack of governmental/law enforcement	☐
Logistics and Warehousing	☐
Transportation vs. Packaging	☐
Others (please specify)……	☐

16. Will your company consider replacing single-use transport packaging with Reusable Transport Packaging Items in the near future?
Absolutely Yes ☐ May be ☐ May be not ☐
Absolutely No ☐

17. If 'MAY BE NOT / ABSOLUTELY NO'; what factors would facilitate your company to consider the replacement of single-use transport packaging with Reusable Transport Packaging?
……
……
……
……
……
…

18. **Part C: Reusable Transport Packaging Items**

Commonly used Reusable Transport Packaging Items:

19. Please indicate by ticking the type(s) of Reusable Transport Packaging Items currently in use in your company

Types of Reusable Transport Packaging Items	***Tick***
Crates	☐
Trolleys	☐
Cases	☐
Plastic pallets collar	☐
Bulk containers	☐
Plastic storage tanks	☐
Carts	☐
Reusable plastic pails	☐
Trolleys	☐
Trays	☐
Barrels	☐
Plastic boxes	☐
Plywood cases	☐
Flight cases	☐
Steel racks	☐
Roll cages	☐
Tote bins	☐
Pallet pooling	☐

Others (please specify)…… ☐

---

20. Have the restraints of single-use transport packaging been concealed by Reusable Transport Packaging Items in your company? YES ☐
NO ☐

21. How did your company get informed about Reusable Transport Packaging Items?

Media	***Tick***
Government	☐
Reusable Transport Packaging Items manufacturer	☐
Trade Union Association (please specify)……	☐
Customers	☐
Consultants	☐
Others (please specify)……	☐

---

22. The usage of Reusable Transport Packaging Items in your company has been influenced by one or more factors. Please tick all appropriate boxes as applicable to your company.

Factors	***Agree Strongly***	***Agree***	***Neutral***	***Disagree***	***Disagree Strongly***
Government regulation	☐	☐	☐	☐	☐
Environmental consideration	☐	☐	☐	☐	☐

Economic benefits ☐ ☐ ☐ ☐ ☐

Environmental benefits ☐ ☐ ☐ ☐ ☐

Operational benefits ☐ ☐ ☐ ☐ ☐

Social benefits ☐ ☐ ☐ ☐ ☐

Competitive advantage ☐ ☐ ☐ ☐ ☐

Advantages over Single-Use Transport Packaging ☐ ☐ ☐ ☐ ☐

---

23. Rank the above factors in order of importance as making a decision to implement Reusable Transport Packaging Items in your company.

Factors	***Very Important***	***Moderately Important***	***Little Important***	***Not Important***
Government regulation	☐	☐	☐	☐ ☐
Environmental consideration	☐	☐	☐	☐ ☐
Economic benefits	☐	☐	☐	☐ ☐
Environmental benefits	☐	☐	☐	☐ ☐
Operational benefits	☐	☐	☐	☐ ☐
Social benefits	☐	☐	☐	☐ ☐

Competitive advantage ☐ ☐ ☐ ☐ ☐

Advantages over Single-use Transport Packaging ☐ ☐ ☐ ☐ ☐

Others (Please specify) ..... ☐ ☐ ☐ ☐ ☐

Cost effectiveness of Reusable Transport Packaging Items:

24. How much has your company invested in Reusable Transport Packaging Items over the years?
<R91,500 ☐ R91,500 – R183,000 ☐ R201,300 – R457,500 ☐ R475,800 – R915,000 ☐ > R915,500 ☐

25. How long did it take your company to recover its investment on Reusable Transport Packaging Items?

Durations	***Tick***
Less than a year	☐
1 year	☐
2 years	☐
3 years	☐
4 years	☐
5 years	☐
Not yet	☐

26. What is your annual loss rate on Reusable Transport Packaging Items?

Annual Loss Rate	***Damaged***	***Never returned***
>R91,500	☐	☐
R73,200 – R91,500	☐	☐

R54,900 – R73,190 ☐

☐

R36,600 – R54,890 ☐

☐

R19,300 – R36,590 ☐

☐

R9,150 – R18,290 ☐

☐

<R9,150 ☐

☐

R0 ☐

☐

---

27. Based on cost, how can you assess the usage of Reusable Transport Packaging Items in your company?
Very effective ☐ Effective ☐ Neutral ☐ Less effective ☐ Ineffective ☐

Potential benefits of Reusable Transport Packaging Items:

28. Below are the measurable benefits of the Reusable Transport Packaging Items that pose as success factors for increasing the usage of Reusable Transport Packaging Items in reverse logistics, please tick the appropriate boxes as applicable to your company.

Factors	***Agree Strongly***	***Agree***	***Neutral***	***Disagree***	***Disagree Strongly***
Cost saving ☐	☐	☐	☐	☐	
Storage efficiency ☐	☐	☐	☐	☐	
Staff (workers) safety ☐	☐	☐	☐	☐	
Less product damage ☐	☐	☐	☐	☐	

Operational efficiency	☐	☐	☐	☐	☐
Improved inventory management	☐	☐	☐	☐	☐
Provided better ergonomic design	☐	☐	☐	☐	☐
Increased handling efficiencies	☐	☐	☐	☐	☐
Avoided waste disposal costs	☐	☐	☐	☐	☐

Factors	***Agree Strongly***	***Agree***	***Neutral***	***Disagree***	***Disagree Strongly***
Longer useful life	☐	☐	☐	☐	☐
Easy to sanitize	☐	☐	☐	☐	☐
Customers' satisfaction	☐	☐	☐	☐	☐
Environmental sustainability	☐	☐	☐	☐	☐

Others (please specify)

i……	☐	☐	☐	☐	☐
ii……	☐	☐	☐	☐	☐
iii……	☐	☐	☐	☐	☐

Managing and controlling Reusable Transport Packaging Items:

29. How does your company manage and control its Reusable Transport Packaging Items?

In-house ☐

Third party such as distribution centres ☐

30. Has your company introduced/ initiated any structured management and control system to acquire an efficient and effective Reusable Transport Packaging Items distribution?

Certainly ☐ Somehow ☐ Not really ☐ Not yet ☐

31. Please identify which of the three main types of Reusable Transport Packaging Items control strategies is use by your company. Please tick where applicable.

Control strategy	***Tick***
Switch-pool system	☐
Transfer system	☐
Depot system	☐

32. Does your company include any form of visibility system in its Reusable Transport Packaging Items control strategy?

Yes ☐ No ☐

If YES, please state the visibility system use for controlling and monitoring Reusable Transport Packaging Items in your company

……

……

33. How long is the life cycle of a typical Reusable Transport Packaging Item in your company? Please tick that which apply to your company

Durations	***Tick***
Less than a year	☐
1 year	☐

2 years
☐

3 years
☐

4 years
☐

5 years
☐

More than 5 years ☐

---

34. What other measures has your company established for an efficient and effective management of Returnable Transport Packaging Items?
.....
.....
.....
.....
.....

35. Have these measures been effective? Yes ☐ Somehow ☐ No ☐

36. If no, why?
.....
.....

Possible challenges of Reusable Transport Packaging Items:

37. Some challenges encountered in managing and controlling Reusable Transport Packaging Items are listed below, please tick the appropriate boxes as applicable to your company

Factors	***Agree***	***Strongly Agree***	***Neutral***	***Disagree***	***Disagree Strongly***
High transportation cost of Reusable Transport Packaging Items	☐	☐	☐	☐	☐
Loss of Reusable Transport Packaging					

Items in transit ☐ ☐ ☐ ☐ ☐

Unavailability of sufficient storage space ☐ ☐ ☐ ☐ ☐

Costly sophisticated equipment ☐ ☐ ☐ ☐ ☐

Delay of other deliveries as a result of same time schedule of various packaging pick-ups ☐ ☐ ☐ ☐ ☐

Delay in Reusable Transport Packaging Items pick-up by suppliers ☐ ☐ ☐ ☐ ☐

Sorting and cleaning of used Reusable Transport Packaging Items ☐ ☐ ☐ ☐ ☐

Mix-ups during Reusable Transport Packaging Items' allocation and return (in case of multiple suppliers) ☐ ☐ ☐ ☐ ☐

Cost of tracing and tracking of Reusable Transport Packaging Items ☐ ☐ ☐ ☐ ☐

Difficulties in managing/controlling Reusable Transport Packaging Items ☐ ☐ ☐ ☐ ☐

Additional cost required for managing and controlling Reusable Transport Packaging Items ☐ ☐ ☐ ☐ ☐

Assessing the usage of Reusable Transport Packaging Items:

38. How has the usage of Reusable Transport Packaging Items impacted on the following performance measures in your company?

Measures	***Very Negative Impact***	***Some Negative Impact***	***No Impact***	***Some Positive Impact***	***Very Positive Impact***
Quality of service/products	☐	☐	☐	☐	☐
Speed	☐	☐	☐	☐	☐
Low cost	☐	☐	☐	☐	☐
Sales turnover	☐	☐	☐	☐	☐
Net profit	☐	☐	☐	☐	☐
Market share	☐	☐	☐	☐	☐
Customer loyalty	☐	☐	☐	☐	☐
Competitive advantage	☐	☐	☐	☐	☐
Customer satisfaction	☐	☐	☐	☐	☐
Innovation	☐	☐	☐	☐	☐
Technology	☐	☐	☐	☐	☐
Internal rate of return	☐	☐	☐	☐	☐
Others, please specify					
i.	☐	☐	☐	☐	☐
ii.	☐	☐	☐	☐	☐
iii.	☐	☐	☐	☐	☐

39. Do you think additional investments on Reusable Transport Packaging Items will boost your company's performance?

Definitely No ☐ Maybe not ☐ Not sure ☐ Maybe yes ☐ Definitely yes ☐

39. In general, what are your comments on the usage of Reusable Transport Packaging Items in reverse logistics

.....
.....
.....
.....
.....
.....

.....
.....
.....