Management practices to mitigate barriers in reverse logistics

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Abstract

Recently, reverse logistics management has gained popularity in business and research since it can reduce costs and pollution; improve customer service and market share and increase competiveness. Despite these advantages, many organisations are reluctant to deal with reverse logistics because of economic, organisational, operational and supply chain barriers.

The main purpose of this article was to conduct a literature study, in order to identify barriers in reverse logistics and to propose management practices to mitigate these barriers. The research methods included (i) a literature study to identify barriers and mitigating practices to overcome barriers in reverse logistics, (ii) create a conceptual framework based on the literature findings and (iii) a survey to test the findings of the literature in order to determine the importance and difficulty of implementing the practices in South Africa. The literature study findings showed that outsourcing is the most important practice, because it overcomes all the barriers in reverse logistics. In contrast, the survey results indicated that outsourcing is the least important practice because of its contribution and difficulty to implement.

The results also showed that the most important practices included a strategic plan for reverse logistics, training of staff and collaboration with supply chain members. Organisations can use this article to identify important barriers in reverse logistics that could apply to them in order to determine the most important management practices to implement.

1.   INTRODUCTION

The concept "reverse logistics" is becoming increasingly popular (Djikanovic & Vujosević 2016:26). While traditional forward logistics optimises the flow of goods from the manufacturer to a consumer, reverse logistics manages the processes for inverting the flow

of goods to deal with returned parts and materials and products from the consumer back to the retailer or manufacturer (Robinson 2016:40).

In the past few decades, an interest in reverse logistics has attracted the attention of industries as well as researchers (Bouzon, Govindan & Rodriguez 2017:1). Organisations mainly adopt reverse logistics practices because of enforced legislation, increased pollution and unavoidable return of products by customers (Prakash & Barua 2016a:15; Thiyagarajan & Ali 2016:6). Reverse logistics is seen as a tool for business management in that it focusses on economic advantages without disregarding the environmental aspects (De Silva, De Novais, De Araújo, Kyrillos & Sacomano 2016:1; Robinson 2016:40). In addition, effective reverse logistics management offers organisations a number of benefits such as reduced costs (Robinson 2016:40); improved customer service; increased market share; corporate image and reduced pollution (Prakash & Barua 2016a:5; Robinson 2016:40), thereby creating a competitive edge (Mwaura, Letting, Ithinji & Orwa 2015:679).

Despite the drivers and advantages, the implementation of reverse logistics poses a great challenge to top management due to a number of barriers in its implementation that makes it difficult to manage (Thiyagarajan & Ali 2016:6). Barriers in the implementation of reverse logistics include (1) organisational barriers, such as a lack of reverse logistics expertise and low commitment; (2) economic barriers, such as a lack of initial capital and funds for reverse logistics; (3) operational barriers, such as a lack of infrastructure (Abdulrahman, Gunasekaran & Subramanian 2014:461) and (4) supply chain barriers, such as a lack of support from supply chain members (Starostka-Patryk, Zawada, Pabian & Abed 2013:509). These barriers make it difficult to implement reverse logistics practices successfully (Prakash & Barua 2016b:15). Therefore, it is important for organisations to understand and identify these barriers in order to identify appropriate solutions that can improve the implementation of reverse logistics (Bouzon *et al.* 2017:16; Schamne & Nagalli 2016:695; Zailani, Govindan, Shaharudin & Kuan 2017:22).

According to Badenhorst (2016:2), there are not many studies that focus on the practices to overcome barriers or finding solutions in reverse logistics. There is still a lack of academic research aimed at overcoming these barriers and the strategies adopted towards the practical implementation of reverse logistics (Agarwal, Govindan Darbari & Jha 2016:2). Therefore, there is a gap in research and literature on mitigating challenges in reverse logistics (Das & Chowdhury 2012:210). There is specifically a scarcity of reverse logistics studies in developing countries (Bouzon *et al.* 2017:183; Thiyagarajan & Ali 2016:2). There

is thus a need for empirical research to excavate knowledge from the influential forces and implementation of reverse logistics in emerging economies, such as South Africa, and to evaluate and overcome the barriers obstructing the implementation of reverse logistics (Bouzon *et al.* 2017:15).

The purpose of this article is to close the gaps in research and literature in emerging economies and to deal with the need to implement management practices in order to mitigate barriers in reverse logistics.

The main objective of this article is to conduct of a literature study in order to identify the barriers in reverse logistics and possible management practices to overcome these barriers. The secondary objectives of this article are to (i) develop a conceptual framework from the literature study to indicate specific management practices that could be implemented to overcome the barriers, (ii) conduct a survey to determine if the practices identified in literature are important in South Africa and (iii) conduct a gap analysis in order to determine the importance of these practices in relation to the difficulty of implementing them.

The article will start with a definition of reverse logistics to make the concept more understandable. The definition will be followed by an overview of the research methodology; a discussion of the different barriers in reverse logistics and some important management practices that organisations could implement to overcome these barriers. The discussion will be followed by a conceptual framework that is provided based on the literature study; the results will then be presented, followed by a discussion of the results and practical implications. The article will end with a conclusion, which includes some limitations and future research opportunities.

2.   DEFINING REVERSE LOGISTICS

Reverse logistics have been defined in different ways (Agrawal Singh & Murtaza 2015:77). The scope of reverse logistics throughout the 1980s was limited to the movement of material against its primary flow (Bernon, Rossi & Cullen 2011:486). However, even in current literature the definitions of reverse logistics vary with some that are defined in a narrow sense while others are more comprehensive and cover various elements. From a narrower perspective, reverse logistics refers to the movement of products or services from their final destination aiming at recapturing value (Chan, Chan & Jain 2012:1319). According to Gattorna and Ellis (2009:149), comprehensive definitions are more appropriate to reflect the

type of reverse logistics activity that is occurring. For instance, the majority of comprehensive definitions include an overview of the characteristics of reverse logistics, in terms of its: (i) starting point, (ii) processes, (iii) inputs, (iv) end point, and (3) outputs. Although, there are many definitions of reverse logistics, table 1 indicates the most comprehensive ones to date. In addition, the table also included the dates of the definitions in chronological order, to show the development of these definitions over the last few years.

TABLE 1: COMPREHENSIVE DEFINITIONS IN REVERSE LOGISTICS

Author/scholar (chronologically)	Definition
Rogers and Tibben-Lembke (1998:268)[1]	Reverse logistics is the process of planning, implementing and controlling the efficient, cost-effective flow of raw materials, in process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of capturing value or proper disposal.
Kussing and Pienaar (2012:447)	Reverse logistics is that part of returns management that plans, implements and controls the efficient and effective flow of goods and related information from the point of consumption to the point of recovery in order to recapture value or properly dispose of the goods.
Shi, Li, Yang, Li and Choi (2012:219)	In reverse logistics there are planning, implementation and controlling processes for the efficient and low-cost flow of materials and related information from the point of consumption. The main purpose is to realise the value of re-creation and the proper disposal of materials from the starting point of the supply.
Mahapatra Biswal and Mohanty (2013:51)	Reverse logistics is the process of moving goods from their typical final destination for the purpose of capturing value (through reuse, repair, recycle, refurbish, remanufacture and cannibalise) or proper disposal.
Govindan, Soleimani and Kannan (2015:603)	Reverse logistics, in its general form, starts from end users (consumers) where used products are collected from customers and then attempts to manage the returned products through different decisions are undertaken including recycling, remanufacturing, repairing and disposal.
Rajagopal, Sundram and Naidu (2015:39)	Reverse logistics is the systematic approach that manages the flow of products, parts and information from the point of consumption to the point of origin by extending the traditional life cycle of the product.
Agarwal *et al.* (2016:1)	Reverse logistics refer to the processes of collection, inspection, sorting, repairing, refurbishing, remanufacturing, recycling and disposal so as to take control of the products back from the original source of consumption to the original source.

Source: Compiled by author

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[1] Rogers and Tibben-Lembke are considered as the "fathers" of reverse logistics.

As evident from table 1, definitions of reverse logistics contain some key elements. For instance, reverse logistics can be described as a process; part of returns management; or as a systematic approach. In addition, reverse logistics involves flows, movement, management, planning, controlling, implementing and returns.

All these elements indicate that reverse logistics is an important management activity. The definitions of reverse logistics also contain a number of inputs, such as products/goods, materials and information as well as outputs such as recapturing value, disposal, reuse, repair, refurbishment, remanufacturing, recycling, and extending the product life cycle. It is also evident that the reverse logistics process starts with the end user (point of consumption) or from a customer within the supply chain, such as a retailer.

Finally, it ends at the point of recovery or point of origin. This indicates that the product will move between the various parties in the supply chain. For instance, a customer will return a product to a retailer (point of recovery) and the retailer might return the product to a manufacturer (point of origin).

Reverse logistics consists of a number of key processes and activities including collection, inspection/sorting and disposition (Agrawal *et al.* 2015:77; Lambert, Riopel & Abdul-Kader 2011:561). The *collection* process includes the retrieval of products from the customers, transportation and storage (Lambert *et al.* 2011:568). *Inspection and sorting* entails the evaluation of the overall appearance and state of the returned products (Agrawal *et al.* 2015:78). *Disposition* is the final process in reverse logistics (Agrawal *et al.* 2015:78) and refers to the exit route that the returned product will take (Bernon *et al.* 2011:492).

As reflected in the definitions, there are a number of disposition options including reuse, repair, refurbishment, remanufacturing and recycling; all with different recovery levels. However, if there is no longer value to reuse, upgrade or recover the materials, the product becomes waste (Hazen, Hall & Hanna 2012:249). The option in waste management is disposal, which involves landfilling or incinerating parts or products on condition that other disposition options are no longer available and that the materials are not worthy of recovery and sales at aftermarket (Khor & Udin 2012:7).

Figure 1 provides a basic sketch of reverse logistics to illustrate the processes and elements in the definitions.
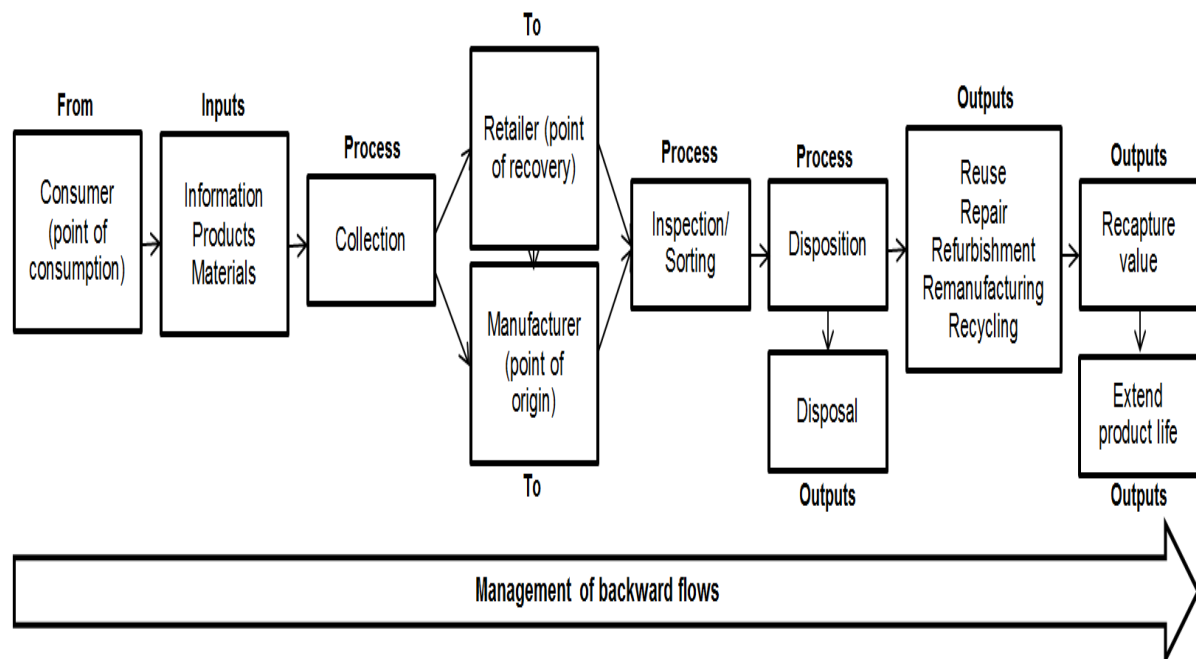
Source: Compiled by author

Based on the various definitions and elements in the definitions, reverse logistics is defined as follows in this article:

Reverse logistics is the process of collection, inspection/sorting and disposition that manages (planning, implementing and controlling) the backward flow of products/goods, materials and information from the point of consumption to the point of recovery or the point of origin, for the purpose of extending the product life and recovering value through a variety of disposition options which include reuse, repair, refurbishment, remanufacturing and recycling or proper disposal.

3. RESEARCH METHODOLOGY

The research methodology for this study on which the article is based consisted of two phases. In the first phase, a literature study was conducted in order to identify different barriers and management practices in reverse logistics. The majority of sources used for the literature study included journal articles. The findings of the literature study were used to develop a conceptual framework for management practices in order to mitigate barriers in reverse logistics.

In the second phase of the study, empirical research was conducted by means of a survey. The purpose of the survey was to determine if the management practices identified in literature were considered appropriate based on the importance and difficulty of implementation.

A questionnaire was developed from the conceptual framework as the research instrument. Firstly, the respondents were asked to rate the importance of the management practices used to mitigate the barriers in reverse logistics from 1 (lesser extent) to 5 (greater extent). Secondly, respondents were asked to rate the difficulty of implementing the practice. The responses could be (1) very easy, (2) somewhat easy, (3) moderately difficult, (4) quite difficult and (5) extremely difficult.

A non-probability judgemental sampling technique was used to identify appropriate organisations for the survey. Judgemental sampling is a type of purposive sampling, which allows researchers to select cases that will best enable them to achieve their research objectives (Saunders, Lewis & Thornhill 2012:287).

It was necessary to select respondents (managers of organisations) who were involved in reverse logistics or organisations that specialised in reverse logistics as a service. After an initial Google search, it became apparent that there are not many organisations that specialise in reverse logistics in South Africa. The final sample included 21 organisations.

The primary data collection process started with obtaining the contact information of the owners or CEOs of the chosen organisations. Then the managers or owners were contacted by email to explain the purpose of the study and to ask if they are willing to participate.

Thirteen organisations responded and ten respondents were willing to participate. Ten respondents were deemed sufficient, since the nature of the research was to obtain practitioner input in order to determine if the management practices identified in literature are important and how difficult these practices were to implement.

The data of the questionnaire was captured on an Excel spreadsheet and analysed by means of Statistical Package for the Social Sciences (SPSS v17). The study used descriptive statistics and the results were used to conduct a gap analysis by means of a radar graph.

4.   BARRIERS IN REVERSE LOGISTICS

There are a number of barriers among which are economic, organisational, operational and supply chain barriers. Each of these barriers will be discussed in the remainder of this section.

4.1   Economic barriers

One of the most important barriers is to have financial constraints (Ravi & Shankar 2015:17), since the efficient management of reverse logistics requires a heavy economic investment (Ravi & Shankar 2015:15; Ravi & Shankar 2017:43). Therefore, a lack of initial capital and funds for reverse logistics is a major economic barrier to the implementation of reverse logistics (Abdulrahman *et al.* 2014:466).

Financial resources are needed for expenses associated with supporting infrastructure, manpower, efficient information, technological systems, various recovery processes and personnel training for reverse logistics (Ravi & Shankar 2015:15; Starostka-Patryk *et al.* 2013:506; Zailani *et al.* 2017:31).

Many organisations are reluctant to implement reverse logistics because of the belief that the financial constraints would be greater than the economic benefits (Jindal & Sangwan 2011:448). This belief may hamper financial investment into reverse logistics (Starostka-Patryk *et al.* 2013:509).

4.2   Organisational barriers

Organisational barriers are internal (González-Torre, Álvarez, Sarkis & Adenso-Díaz 2010:890). These barriers include (i) a lack of awareness and management inattention, (ii) a lack of commitment by top management; (iii) a lack of strategic planning; (iv) a lack of knowledgeable personnel resources and training; (v) a lack of internal coordination; and (vi) resistance to change. Each of these barriers and problems are briefly discussed below.

4.2.1   Lack of awareness and management inattention

One of the most difficult tasks of reverse logistics management is to develop awareness among senior managers of the importance of reverse logistics (Han & Cueto 2016:169). Therefore, a *lack of awareness* of the benefits of reverse logistics is a major barrier to its

successful implementation (Ravi & Shankar 2015:15; Sharma, Panda, Mahapatra & Sahu 2011:102; Srivastava 2013:66).

A lack of awareness is normally a result of a lack of recognition that the effective management of reverse logistics can create a competitive advantage (Janse, Schuur & De Brito 2010:501). In addition, *management inattention* to reverse logistics normally arises from the belief that reverse logistics must be practiced as a result of government regulation or environmental pressures and not for economic gain. Therefore, management is taking less interest and are under the impression that reverse logistics is a non-profit issue (Sharma *et al.* 2011:102). Managers also do not have enough knowledge about reverse logistics and the kind of benefits that organisations can realise with the successful implementation of reverse logistics processes (Starostka-Patryk *et al.* 2013:508).

4.2.2 Lack of top management commitment

Lack of top management commitment is an important barrier in reverse logistics management (Jindal & Sangwan 2011:449; González-Torre *et al.* 2010:890; Ravi & Shankar 2015:15; Starostka-Patryk *et al.* 2013:508). Owing to the high levels of investment and the slow rate of return in reverse logistics, managers tend to prioritise other types of investments that have more rapid and visible economic returns on investment (Jindal & Sangwan 2011:449).

In addition, management regard it as a risky proposition because it requires financial and operational commitment, which may affect the performance of the organisation in the long run (Ravi & Shankar 2015:15). As a consequence, top management would most likely ignore reverse logistics and become less concerned with the resources and capabilities, which eventually leads to the deficiency of the activities and processes in reverse logistics management (Zailani *et al.* 2017:29).

4.2.3 Lack of strategic planning

A lack of strategic planning is also considered as a barrier in the implementation of reverse logistics (Jindal & Sangwan 2011:449; Starostka-Patryk *et al.* 2013:506). Strategic planning in reverse logistics is about identifying goals and achieving those goals in the best way together with long-term management planning (Starostka-Patryk *et al.* 2013:509). Therefore,

strategic planning and the identification of reverse logistics goals are crucial for managing reverse logistics effectively (Jindal & Sangwan 2011:449).

4.2.4   Lack of personnel resources and training

It was found that there is a lack of knowledgeable personnel resources, education and training in reverse logistics (Abdulrahman *et al.* 2014:466; Jindal & Sangwan 2011:450; Kaynak, Koçoğlu & Akgün 2014:441; Starostka-Patryk *et al.* 2013:508; Zailani *et al.* 2017:29). It is essential to have skilled personnel to achieve success in reverse logistics (Jindal & Sangwan 2011:450; Sharma & Singh 2013:34; Sharma *et al.* 2011:102).Therefore, inadequate deployment of personnel resources will hamper the entire process (Srivastava 2013:66).

4.2.5   Lack of internal coordination

A lack of internal coordination in organisations could hinder the successful implementation of reverse logistics, since it requires collaboration between functions. Consequently, poor internal coordination between marketing, procurement and logistics can lead to significant levels of returns and poor reverse logistics management practices (Bernon *et al.* 2011:495; Mai, Chen & Anselmi 2012:49). In addition, the complexity of the supply chains could also contribute to a lack of internal coordination and control in reverse logistics management (Chan *et al.* 2012:1318).

4.2.6   Resistance to change

One common attitude observed in many organisations is resistance to change (Zailani *et al.* 2017:27). Individuals tend to avoid change and reverse logistics actually requires a change in mindset and practice (Jindal & Sangwan 2011:449). Therefore, resistance to change is a fundamental barrier in reverse logistics (Jindal & Sangwan 2011:449; Kaynak *et al.* 2014:441; Srivastava 2013:66; Starostka-Patryk *et al.* 2013:508). Such an attitude is also amplified by fear of the unknown and failure among top management (Zailani *et al.* 2017:27).

4.3   Operational barriers

Operational barriers include problems related to the effective management of reverse

logistics processes and returns. These barriers include disparity in product quality, limited forecasting and visibility, inadequate information and technology systems and developmental barriers.

4.3.1 Disparity in product quality

In reverse logistics the quality of products is not uniform, such as in the case with forward logistics (Sharma *et al.* 2011:102). This also includes the quality of end-of-use or end-of-life returns (Kaynak *et al.* 2014:440). Inconsistent quality of returned products may bring uncertainties to the recovery system, such as difficulties in production and planning control (Bouzon *et al.* 2017:192). Because of the uncertain quality of returned products, organisations find it hard to estimate product value, which leads to the problem of controlling and managing the financial aspects of reverse logistics (Lee & Lam 2012:596).

4.3.2 Limited forecasting and visibility

Many organisations have trouble when forecasting reverse logistics due to the multiplicity of products and flows (Bouzon *et al.* 2017:12). Accurate return forecasts are hardly available, which is a direct barrier to both strategic and operational planning (Janse *et al.* 2010:501; Sharma *et al.* 2011:103). Limited visibility of returns also acts as a barrier in many organisations (Srivastava 2013:65). Reverse logistics is a reactive process because it is less visible, which makes planning and decision-making complex (Rajagopal *et al.* 2015:41). Therefore, there is a lack of knowledge about return volume and an unpredictable demand on recovered materials (Starostka-Patryk *et al.* 2013:507). This brings instability to reverse logistics operations, consequently increasing the costs of reverse logistics (Bouzon *et al.* 2017:13).

4.3.3 Inadequate information and technology systems

Strong information support is a requirement for effective decision-making in reverse logistics (Mai *et al.* 2012:49). Therefore, inadequate information and technology systems is also identified as a barrier (Kaynak *et al.* 2014:440; Starostka-Patryk *et al.* 2013:506; Sharma *et al.* 2011:103). Most organisations have mature information and technology systems to support forward logistics, but reverse logistics still need further improvement (Lee & Lam 2012:596). Given the complexity of reverse logistics and the uncertainty of return flows,

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effective information technology is necessary to support the management of return flows (Kaynak *et al.* 2014:440; Sharma *et al.* 2011:103). Consequently, the lack of appropriate technology hampers the efficiency of reverse logistics processes (Srivastava 2013:66).

4.3.4 Developmental barriers

Developmental barriers to successful reverse logistics include infrastructural and operational weaknesses (Abdulrahman *et al.* 2014:463; Bai & Sarkis 2013:307; Srivastava 2013:65). The lack of development greatly increases uncertainty in the effective management of reverse logistics (Bai & Sarkis 2013:307). Essentially, a good reverse logistics infrastructure is needed to equip an organisation with the capabilities to handle returns quickly and efficiently (Abdulrahman *et al.* 2014:463).

4.4 Supply chain barriers

Barriers in this group are specific to the uniqueness and susceptibility of reverse logistics to the impact of surroundings (Starostka-Patryk *et al.* 2013:507). One of the major problems in reverse logistics is often less supportive partners in the supply chain (Prakash & Barua 2016b:3; Thiyagarajan & Ali 2016:2). Therefore, a lack of support from supply members is an important barrier (Jindal & Sangwan 2011:450; Sharma *et al.* 2011:103; Starostka-Patryk *et al.* 2013:509). In many instances reverse logistics is poorly managed due to a lack of collaboration between supply chain partners. Therefore, the support of role players in the supply chain is important for the effective management of reverse logistics (Sharma *et al.* 2011:103). In addition, this barrier is complex and connected to many other barriers. For instance, shortage of data exchange and information predictability increases failure to collaborate, which is one of the basic elements of effective supply chain management performance (Starostka-Patryk *et al.* 2013:509).

5. POSSIBLE MITIGATING MANAGEMENT PRACTICES

A number of potential mitigating management practices have been identified in literature to overcome the barriers in reverse logistics. These management practices include the following: a strategic plan for reverse logistics; top management support and commitment; formalise reverse logistics; training and development programmes for staff; cross-functional

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teams; information and technology systems; outsourcing and collaboration and sharing information in the supply chain.

5.1   A strategic plan for reverse logistics

The reverse logistics strategies, processes and capabilities have a major impact on financial, social, and environmental aspects through reverse logistics performance (Shaik & Abdul-Kader 2014:94). It would be valuable for industries to have strategic plans and visions that are associated with the adoption and implementation of reverse logistics practices.

These strategic plans are important to convert strengths into competitive advantages and to improve certain weaknesses related to technology, infrastructure, supply chain coordination and integration and strengths (Mangla, Govindan & Luthra 2016:617). Strategic planning involves identifying reverse logistics goals and specifying long-term plans to achieve the goals (Cheng & Lee 2010:1112). Therefore, a number of organisational and operational barriers can be overcome by implementing a strategic plan for reverse logistics.

5.2   Top management support and commitment

Top management support is crucial for implementing reverse logistics successfully (Agrawal, Singh & Murtaza 2016:20), since it can help with a large proportion of problems faced in reverse logistics (Agarwal *et al.* 2016:2). Top management support involves issues such as organisational buy-in, continuous improvement objectives and management support through resources (Huscroft, Hazen, Hall, Skipper & Hanna 2013:309).

Managerial commitment encompasses tangible organisation and supply chain-wide policies, competences, culture, and strategy (Sharif, Irani, Love & Kamal 2012:2519). Top management support is therefore needed to commit the proper financial and staff resources required to support structural and infrastructural change that is necessary for reverse logistics, such as funding, personnel allocation, employee training, and effective management of relationships with partners (Huscroft *et al.* 2013:315; Ye, Zhao, Prahinski & Li 2013:134). Their commitment should lead to a complete understanding of the importance of reverse logistics to business operation; and help reduce the lack of shared understanding of reverse logistics practices (Abdulrahman *et al.* 2014:468).

5.3   Formalise reverse logistics

The potential for losses from mishandling unwanted products make it imperative for organisations to streamline their reverse logistics operations by formalising their programmes effectively (Genchev, Richey & Gabler 2011:245). Process formalisation is defined as "the agreed upon written rules and procedures regarding a particular business operation" (Genchev *et al.* 2011:246). It involves issues such as establishing clearly defined responsibilities, standardising processes and procedures and adequately providing the knowledge to implement the programme (Huscroft *et al.* 2013:309).

By formalising reverse logistics processes, a number of advantages are provided such as increased visibility into the reverse logistics process, reduction of costs (Genchev *et al.* 2011:258) and the transfer of knowledge (Hazen, Overstreet, Hall, Huscroft & Hanna 2015:163). Reverse logistics will also ensure that expectations are clear to both internal and external stakeholders, which will lead to improved internal and external coordination (Huscroft *et al.* 2013:318).

5.4   Training and development programmes for staff

Employees are the most valuable assets an organisation requires to operate smoothly (Ho, Choy, Lam & Wong 2012:42). An important requirement for achieving success in any organisation is to have trained personnel and experts (Abdulrahman *et al.* 2014:468). There is a need to invest in the development of the appropriate skill levels that are desirable for reverse logistics (Chileshe, Rameezdeen, Hosseini & Lehmann 2015:194).

Therefore, organisations should offer training and development programmes on a regular basis to employees in order to enhance their skills (Agarwal *et al.* 2016:3). These training and development programmes have a number of advantages.

Firstly, they are aimed at sensitising staff members on the benefits of reverse logistics implementation (Chileshe *et al.* 2015:195).

Secondly, enhanced knowledge and skill proficiency leads to better process management, eliminating the lack of internal tracking and coordination related to reverse logistics (Lee & Lam 2012:592; Selvi & Kayar 2016:26).

Finally, such programmes are aimed at maximising management and financial resource commitment to reverse logistics (Sharif *et al.* 2012:2528).

5.5 Establish cross-functional teams for reverse logistics

The activities of reverse logistics overlap with several functional areas such as marketing, operations, logistics, distribution and transportation; and affects other areas such as finance and accounting, customer service, quality and reliability, purchasing and design/engineering (Dowlatshahi 2012:1265; Hazen *et al.* 2015:160). Because of the interdisciplinary and cross-functional nature of reverse logistics (Dowlatshahi 2012:1265), internal collaboration is needed (Agarwal *et al.* 2016:3).

Therefore, a cross-functional team could be established in order to make crucial and ongoing decisions on opportunities for reverse logistics (Dowlatshahi 2010:1376). In addition, cross-functional collaboration helps to overcome the problems associated with the quality and visibility of returns (Lee & Lam 2012:596). This suggests that managers should ensure frequent communication, cooperation and collaboration among logistics, production and marketing to improve the efficiency of reverse logistics (Huang & Yang 2014:635).

5.6 Invest in information and technology systems for reverse logistics

Information and technology systems are needed to support the activities of reverse logistics during the different stages of the product life cycle. For example, information on the arrival time of products to be returned, product quality characteristics (Ravi & Shankar 2015:877) and data capturing and handling (Shaik & Abdul-Kader 2014:96). Therefore, there are a number of benefits associated with appropriate technology systems for reverse logistics. For instance, information systems can help organisations to deal with the problem of uncertainty of incoming returns (Lhafiane, Elbyed & Bouchoum 2015:396).

Therefore, it would increase the visibility of the movement of the products (Subhashini 2016:10), which will help managers to achieve operational efficiency in reverse logistics (Agrawal *et al.* 2016:20).

In addition, information technology and systems will have a positive effect on service quality and economic performance, leading to higher customer service levels (Lee & Lam 2012:595; Shi *et al.* 2012:222). These information systems can also facilitate coordination; internally and externally (Huscroft *et al.* 2013:317). It therefore helps the organisation to diffuse product information effectively across all relevant functional areas (Shaik & Abdul-Kader 2014:98). Consequently, it is a necessary infrastructure for the organisation and its supply chain partners (Olorunniwo & Li 2010:455).

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5.7   Outsource reverse logistics to third party logistics providers (3PL)

Outsourcing to 3PL providers has been identified as one of the most important management practices for reverse logistics networks in the recent years (Govindan & Murugesan 2011:150). A 3PL provider is a supplier of a logistics service to an organisation (Bai & Sarkis 2013:310). Outsourcing reverse logistics to 3PL providers can attend to a number of barriers. Firstly, they provide financial benefits such as reduction of reverse logistics costs, economies of scale and improved profit margins (Badenhorst & Van Zyl 2015:158; Prakash & Barua 2016b:64). Secondly, they have a state-of-the-art infrastructure, resources and technologies (Prakash & Barua 2016b:67).

Therefore, organisations will have access to information systems and technology, which can assist with problems with product returns (Badenhorst & Van Zyl 2015:153). Thirdly, 3PL providers improve collaboration, relations and efficiencies in the supply chain (Badenhorst & Van Zyl 2015:158). Finally, outsourcing will lead to improvement in the performance, operational efficiency and competitiveness of reverse logistics (Badenhorst & Van Zyl 2015:158; Prakash & Barua 2016b:64).

5.8   Collaborate and share information with supply chain partners

Collaboration between various stakeholders is an imperative tool for successful reverse logistics (Agarwal *et al.* 2016:8). The ability to collaborate with various players in the reverse chain is just as important as in the forward chain, since it is necessary for the visibility and trust of various entities in the chain (Olorunniwo & Li 2010:455).

Collaboration can be defined as the way in which all organisations in a supply chain are actively working together towards common objectives; and are characterised by sharing information, knowledge, risks and profits (Hernández, Poler, Mula & Lario 2011:82). Collaboration with supply chain partners has a number of advantages. For instance, it helps to avoid unnecessary product returns (Patrida 2011:63), reduces uncertainty (Vlachos 2016:4), achieves efficient information management, cost savings (Hernández *et al.* 2011:109), enhanced performance and increased competitiveness (Sheu & Gao 2014:324) which ultimately leads to improved profitability (Patrida 2011:63; Sheu & Gao 2014:324). In addition, collaboration can also enhance information sharing between partners. Such information exchange enhances operational efficiency in reverse logistics and provides greater supply chain visibility (Olorunniwo & Li 2010:456).

6. CONCEPTUAL FRAMEWORK OF MITIGATING MANAGEMENT PRACTICES IN REVERSE LOGISTICS

Based on the literature study, table 2 provides a conceptual framework, which indicates the possible management practices an organisation could implement to overcome barriers in reverse logistics.

From table 2 it would appear that top management commitment and outsourcing overcome the majority of barriers in reverse logistics while cross-functional teams can overcome the least number of barriers.

Economic barriers can be overcome by top management commitment and support; training and development programmes for staff; outsourcing and collaboration and sharing information with partners. O*rganisational barriers* can mostly be overcome by a strategic plan for reverse logistics; top management commitment and support; formalisation of reverse logistics; training and development programmes for staff; cross-functional teams; investment in information technology and systems for reverse logistics and outsourcing.

Operational barriers can be overcome by a strategic plan for reverse logistics; top management commitment and support; formalisation of reverse logistics; cross-functional teams; investment in information technology and systems for reverse logistics; outsourcing and collaboration and sharing of information with partners. Finally, *supply chain barriers* can be overcome by a strategic plan for reverse logistics; top management commitment and support; formalisation of reverse logistics; investment in information technology and systems for reverse logistics; outsourcing and collaboration and sharing of information with partners.

TABLE 2: CONCEPTUAL FRAMEWORK OF MITIGATING MANAGEMENT PRACTICES TO OVERCOME BARRIERS IN REVERSE LOGISTICS

MITIGATING MANAGEMENT PRACTICES	BARRIERS TO REVERSE LOGISTICS
Strategic plan for reverse logistics	**Organisational barriers:** • Lack of awareness and management inattention • Lack of top management commitment • Lack of strategic planning **Operational barriers:** • Inadequate information technology and systems • Developmental barriers **Supply chain barriers**

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MITIGATING MANAGEMENT PRACTICES	BARRIERS TO REVERSE LOGISTICS
Top management commitment and support	**Economic barriers** **Organisational barriers:** • Lack of awareness and management inattention • Lack of strategic planning • Lack of top management commitment • Resistance to change • Lack of personnel resources and training **Operational barriers:** • Inadequate information technology and systems • Developmental barriers **Supply chain barriers**
Formalise reverse logistics	**Organisational barriers:** • Lack of awareness and management inattention • Resistance to change • Lack of internal coordination **Operational barriers:** • Limited forecasting and visibility **Supply chain barrier**
Training and development programmes for staff	**Economic barriers** **Organisational barriers:** • Lack of awareness and management inattention • Resistance to change • Lack of personnel resources and training • Lack of internal coordination
Establish cross-functional teams for reverse logistics	**Organisational barriers:** • Lack of internal coordination **Operational barriers:** • Disparity in product quality • Limited forecasting and visibility
Invest in information and technology systems for reverse logistics	**Organisational barriers:** • Lack of internal coordination **Operational barriers:** • Disparity in product quality • Limited forecasting and visibility • Inadequate information technology and systems • Developmental barriers **Supply chain barriers**
Outsource reverse logistics to 3PL	**Economic barriers** **Organisational barriers:** • Lack of awareness and management inattention

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MITIGATING MANAGEMENT PRACTICES	BARRIERS TO REVERSE LOGISTICS
	• Lack of strategic planning • Lack of top management commitment • Resistance to change • Lack of personnel resources and training • Lack of internal coordination **Operational barriers:** • Disparity in product quality • Limited forecasting and visibility • Inadequate information technology and systems • Developmental barriers **Supply chain barriers**
Collaborate and share information with partners	**Economic barriers** **Operational barriers:** • Problems with product quality • Limited forecasting and visibility • Inadequate information technology and systems • Developmental barriers **Supply chain barriers**

Source: Compiled by author

Although the framework provides a good direction for organisations, it is still necessary to determine if these management practices are important to South African organisations and how difficult these practices are to implement.

In the next section, the results of the survey are presented and discussed.

7.   RESULTS OF SURVEY

In the questionnaire, the respondents were asked to indicate the importance of the management practices and how difficult these practices are to implement.

Table 3 shows the mean values of the results. These results were used to conduct a gap analysis in order to determine the importance and difficulty of implementing the management practice.

TABLE 3: MEAN VALUES OF SURVEY RESULTS

Number	Management practice	Mean value: importance	Mean value: difficulty
1	Create a comprehensive strategic plan for reverse logistics	4.02	2.05
2	Develop a formalised reverse logistics programme	4.02	3.03
3	Top management that demonstrate commitment to reverse logistics	4.01	2.08
4	Conduct formal training of employees involved in the reverse logistics process	4.22	2.44
5	Establish cross-functional teams for reverse logistics	4.01	2.05
6	Invest in technology and information systems for reverse logistics	3.90	2.90
7	Outsource reverse logistics to third party logistics (3PL) providers	3.56	3.22
8	Collaborate and share information with supply chain partners	4.02	2.07

Source: Based on survey results

With reference to the management practices, a mean value of above 3 indicates that the practice is important to a moderate extent.

It is evident from table 3 that all the management practices can overcome barriers to a moderate extent, which indicates that they are all important. With reference to the difficulty of implementing a practice, a mean value above 3 indicates that the practices might be too costly and difficult to implement.

The radar graph in figure 2 indicates the mean level of (1) the importance of the management practice and (2) the difficulty of implementing each practice.
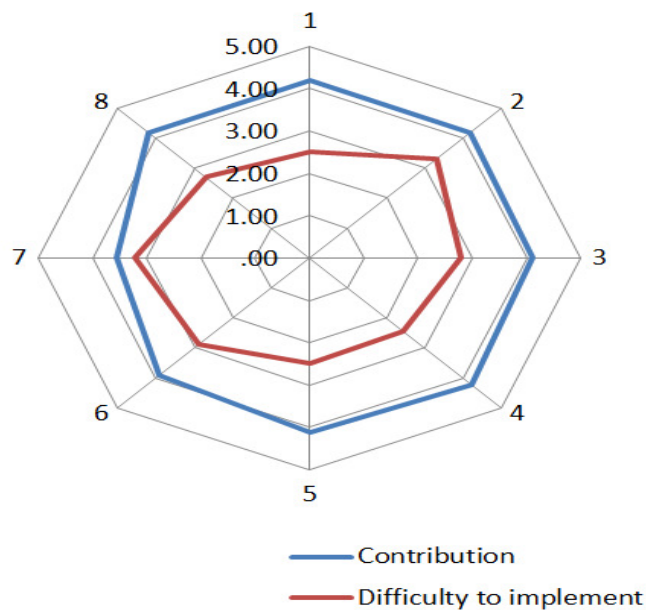
FIGURE 2: CONTRIBUTION/DIFFICULTY OF IMPLEMENTING MANAGEMENT PRACTICES

Source: Created from survey results

From the graph, the following observations can be made regarding the management practices:

▪ The practice, "create a comprehensive strategic plan for reverse logistics" (number 1), has a high mean level of 4.2 in terms of its contribution and a relatively low mean level of 2.5 in terms of the difficulty of implementing it. Therefore, it is an important management practice and relatively easy to implement.

▪ The practice, "conduct formal training of employees involved in the reverse logistics process" (number 4), has the highest mean level of 4.22 in terms of its contribution and a low mean level of 2.44 in terms of the difficulty of implementing it. This management practice is therefore important and not difficult to implement.

▪ Similarly, the practice, "collaborate and share information with supply chain partners" (number 9), has a high mean level of 4.2 in terms of its contribution and a moderately low mean level of 2.7 for implementing it. This management practice was therefore deemed important and not too difficult to implement.

▪ The practice "outsource reverse logistics to 3PL partners" (number 7) is the least favourable management practice, with a relatively low mean level of 3.56 in terms of its contribution and a moderately high mean level of 3.22 in terms of the difficulty of

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implementing it. This indicates that outsourcing is considered not too important and could possibly be difficult to implement.

Based on the results, the mitigating management practices create a strategic plan for reverse logistics; conduct formal training of staff; and collaborate and share information with partners will all contribute a great deal to overcome the barriers in reverse logistics. While the practices of outsourcing and developing formalised reverse logistics programmes might be too difficult to implement; therefore, organisations should carefully consider these practices in terms of the value delivered to the organisation.

8.   DISCUSSION AND PRACTICAL IMPLICATIONS

Based on the findings of the literature review, the practice "*outsource reverse logistics to 3PL partners*" was considered the practice that can mitigate all the barriers in reverse logistics. However, based on the survey, outsourcing was considered the least favourable practice, indicating that it might be difficult to implement. This also indicates that South African organisations do not view outsourcing as the best management practice to overcome barriers in reverse logistics. However, organisations should identify the barriers that mostly cause inefficiencies in their reverse logistics processes. The following are some important practical implications:

▪   If organisations experience financial barriers in reverse logistics, they should firstly consider training and development programmes for staff. Alternatively, organisations can also collaborate and share information with partners. If these practices do not overcome the economic barriers, organisations can further consider gaining top management support and commitment. As a last alternative organisations should consider outsourcing.

▪   If organisations experience a variety of organisational barriers, they should also start with training and development programmes for staff and/or develop a strategic plan for reverse logistics. Organisations should also attempt to gain top management commitment and support, since this practice can overcome all the organisational barriers in reverse logistics. Once again, if all these practices fail to improve the management of reverse logistics, organisations should consider outsourcing.

▪   If organisations experience operational barriers, such as problems with quality and limited forecasting and visibility, they should first consider collaborating and sharing

information with partners. Alternatively, organisations should establish cross-functional teams. If these practices fail to overcome operational barriers, they should consider investing in information technology and systems for reverse logistics.

▪ If organisations experience operational barriers related to infrastructure and inadequate information systems for reverse logistics, they should first consider creating a strategic plan for reverse logistics as well as collaborating and sharing information with supply chain partners. If these practices do not overcome operational barriers, they should first consider gaining top management commitment and support and then investing in information technology and systems. If all these practices fail to overcome the operational barriers, organisations should consider outsourcing.

▪ If organisations experience supply chain barriers, they should firstly consider creating a strategic plan for reverse logistics as well as collaborating and sharing information with supply chain partners. In addition, they could also consider gaining top management support and commitment. If these management practices fail to overcome the supply chain barriers, organisations should consider investing in information technology and systems for reverse logistics.

Essentially, organisations should carefully identify some barriers that cause inefficiencies in reverse logistics management. Then based on the results of this study, they should consider implementing the easier management practice first, before the more challenging ones.

9.   CONCLUSION

Although the efficient management of reverse logistics can bring significant advantages to organisations, there are a number of barriers that make it difficult to manage. The aim of this article was to identify the most appropriate mitigating management practices to implement in order to overcome the barriers in reverse logistics.

Based on the literature study, there are four main barriers in reverse logistics, namely economic, organisational, operational and supply chain barriers. The economic barriers are related to the high costs associated with reverse logistics, which make organisations reluctant to invest in reverse logistics. The organisational barriers are internal to the organisation and include a lack of awareness and management inattention; a lack of top management commitment; a lack of strategic planning; resistance to change; a lack of personnel resources and training and a lack of internal coordination. Operational barriers are

associated with problems with product quality, limited forecasting and visibility, inadequate information technology and systems for reverse logistics and developmental barriers. Supply chain barriers are the result of a lack of support from supply chain partners.

A number of mitigating management practices were identified in literature and a conceptual framework was developed to show how these practices can overcome certain barriers in reverse logistics. For instance, organisational, operational and supply chain barriers can be overcome by developing a strategic plan. In addition, both top management commitment and outsourcing can overcome economic, organisational, operational and supply chain barriers. Training and development programmes for staff can overcome all the organisational barriers. Organisational, operational and supply chain barriers can be overcome by investing in information technology and systems and formalising the reverse logistics process. Finally, economic, operational and supply chain barriers can be overcome by collaborating and sharing information with supply chain partners.

It was however necessary to determine if these practices are important to South African organisations and if they are considered difficult to implement. Results of the survey indicated that all the practices are indeed perceived to be important to at least a moderate extent; however, some are more difficult to implement. The practices that were deemed the most important included, develop a strategic plan for reverse logistics; conduct formal training of staff in reverse logistics; and collaborate and share information with partners. This indicates that organisations should consider implementing these practices first. Based on the literature findings, outsourcing reverse logistics to 3PL parties was considered the most important management practice, since it can overcome all the barriers. However, based on the results of the survey, outsourcing was considered the least favourable practice. Therefore, organisations should consider implementing the other management practices first. Outsourcing should therefore be the last resort and should only be implemented if none of the other management practices can overcome the barriers.

This article can provide important guidelines to managers that have to deal with reverse logistics. Organisations can use the findings and results to identify important barriers in reverse logistics that might apply to them in order to determine the most important mitigating management practices they could implement to overcome these barriers. In other words, identifying the right barriers is the key for organisations to take corrective actions to ensure effective reverse logistics management (Zailani *et al.* 2017:27).

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One limitation to the article was the small sample size, since there are not many organisations that specialise in or have formal structures for reverse logistics in South Africa. It might therefore be valuable to conduct a qualitative study in order to gain an in-depth understanding of the reverse logistics issues and practices in South Africa. The article was also not industry-specific, and a similar study can be conducted focussing on a specific industry.

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