Reverse supply chain practices in developing countries: the case of Morocco

Jamal El Baz, Regina Frei and Issam Laguir

Purpose – This paper investigates Reverse Supply Chain (RSC) practices and their obstacles using case studies of Moroccan companies. We present the main findings of case studies' analysis along with a discussion of an RSC framework for further directions of research.

Design/methodology/approach – A qualitative approach was adopted and semi-structured interviews with Moroccan companies were conducted using an interview guide.

Findings – We present a RSC model that encompasses remanufacturing, refurbishing and disposal processes. We believe that this model would constitute a promising framework for further research. Our findings show that the successful implementation of RSC depends on many factors, but the company's attitude (proactive or conservative) is one of the most critical determinants in RSC initiatives. Furthermore, the results of the case studies indicate two types of inhibitors: external and internal. These findings confirm the results of previous research on environmental sustainability obstacles in general and RSC obstacles in particular.

Research limitations/implications – This study has some limitations that provide future research opportunities. Because this study is qualitative, further statistical support is needed to justify wider generalization of its findings. Further studies might therefore investigate RSC practices in developing countries other than Morocco to increase the external validity of the results.

Practical implications – Our findings can help firms to gain better understanding of their RSC and particularly the link between forward and reverse supply chains. Consequently, companies can upgrade their business models to better control their RSC activities.

Originality/value – The relevant literature about RSC practices has mainly targeted manufacturing sectors in developed countries, and few studies have been conducted on developing countries. Research on RSC practices in developing countries in general and African countries in particular is sparse. This is one of the first articles written to addresses this gap by investigating RSC practices in Morocco.

Keywords Reverse logistics, reverse supply chains, Moroccan companies, case study.

Paper type Research paper.

1. Introduction

In recent times increasing pressures from both within and beyond organisations have led to a growing interest in evaluating forward (and to a limited degree, also reverse) supply chains in terms of sustainability, which includes economical, ecological and social aspects (Svensson, 2007). Ciliberti et al (2008) define sustainable supply chain management (SSCM) as the "management of supply chains where all the three dimensions of sustainability, namely the economic, environmental, and social ones, are taken into account". SSCM includes specifically green supply chain management (GSCM) that focuses on environmental issues related to supply, design, manufacturing, distribution and transportation (Vachon and Klassen, 2006). GSCM aims to solve problems of product end of life cycle, recycling and recovery through Reverse Logistics (RL) practices (Srivastava, 2008).

RL concerns itself primarily with the transportation and storage of materials (Guide and Van Wassenhove, 2002), whereas Reverse Supply Chain (RSC) management takes a wider and more holistic perspective. Prahinskia and Kocabasoglu (2006) offer a definition of RSC management that implies coordination with customers (of the forward supply chain) and subsequent activities beyond the transportation and storage of materials such as material recovery or recycling. They define it as "the effective and efficient management of the series of activities required to retrieve a product from a customer and either dispose of it or recover value".

The RSC deals with products returning to the manufacturer or third parties. Returns (or diversion to third parties) may be necessary because of a variety of reasons, including:

1. Products 'as new': Too many items were ordered, or wrongly delivered. Stock becoming obsolete.

2. Used or faulty/damaged products: Manufacturing faults, or wear and tear and damage occurring during shipping or product life time, requiring repair or overhaul.

3. Products at their end of life: No longer useful or wanted.

The destination of a product in the RSC depends on several factors, including the remaining value (damage, size, and material), the ease of disassembly or dismantling, the possibilities for reuse or recycling, the number of products at hand, and their nature (Prahinskia and Kocabasoglu, 2006).

RSCs usually include elements of reuse, recycling and second markets (Alvarez-Gil et al, 2007; Shi et al., 2012; Sarkis et al, 2010; Talbot et al., 2007). Both in forward and reverse service supply chains, inputs and outputs can be tangible or intangible (He et al., 2016), hence offering various opportunities for returning resources to circle of usefulness.

Regarding developing countries, several studies have been conducted on RSC management in the context of emerging economies such as India, China and Turkey (Zhu et al., 2007; Zhu and Sarkis, 2006; Zhu et al., 2005; Erol et al., 2010). However, research on how companies in developing countries adopt RSC practices is still emerging (Erol et al., 2010; Drohomeretski et al., 2014). To shed light on this issue, a field research is necessary. Therefore, the aim of this paper is to examine two aspects of RSC practices initiated by the Moroccan companies: (i) the types of RSC initiatives implemented and (ii) the obstacle to RSC practices. Morocco is a suitable field for research due to the reforms undertaken by the government in logistics sector as well as the recent efforts to promote environmental practices in private sector companies. Furthermore, with its geographical position and political stability, Morocco has attracted several foreign investors belonging to multinational industrial companies. Consequently, our purpose is to find out if RSC issues are taken into consideration by companies in Morocco, thus two research questions are addressed:

RQ1) How do companies in Morocco implement RSC practices?

RQ2) What type of obstacles hinder RSC initiatives of the Moroccan companies?

To answer these research questions, a qualitative approach was adopted, based on the analysis of case studies conducted for this purpose.

In doing so, this research makes novel contributions to the field by providing an insight into the realities of implementing RSC initiatives in a developing country in Africa which is often neglected in literature. Furthermore, our research provides a holistic RSC framework that has theoretical and managerial implications.

In the next section, literature on RSC practices is reviewed. Section 3 describes the methodology used for the case study analysis. Next, the main findings of the case study investigation are presented in section 4. Finally, conclusions and implications derived from the study are discussed.

2. Literature review

The following subsections present an overview of RSC practices, obstacles as well as gaps related to their application in developing countries.

2.1 Reverse supply chain practices: a literature review

Difrancesco and Huchzermeier (2016) review decisions models for closed loop supply chains. Their taxonomy classifies RSC models as: (i) location-allocation, (ii) returns collection, (iii) inventory control of returns, (iv) returns grading and (v)   performance

management of closed loop supply chains. A typical RSC may comprise five major processes: product acquisition, tests, inventories, reprocessing and remarketing (Banomyong et al, 2008)., whereas an RL system may include four: gatekeeping (entry), collection, sorting, and disposal (Rogers and Tibben-Lembke, 2001; Stock, 2006; Lambert et al, 2011). Only a few researchers have addressed the issue of development of a general framework for RSC (Sajan and Sridharan, 2015).

Overall, researchers seem to diverge concerning the types of RSC practices (Blackburn et al., 2004; Jayaraman and Luo, 2007; Huang et al., 2013; Mafakheri and Nasiri, 2013; Chuang et al., 2014). Nevertheless, based on extant literature RSC practices can be classified as taking an operational or strategic approach (Wang et al. 2017; Govindan and Soleimani, 2017).

Research on operational topics encompasses processes related to product returns, reuse, recycle, disposal, repair, remanufacturing and resale (Carter and Ellram, 1998; Rogers and Tibben-Lembke, 1999; Stock, 1998). A variety of country-specific and application-specific RSC configurations have been reported: For instance, Gonzalez-Torrea et al. (2004) investigated Spanish and Belgian bottling/packaging firms' practices in relation to their RSC operations involving their suppliers (mainly bottle/jar manufacturers) and their customers (end consumers of the packaged or bottled products). Chan and Chan (2008) analyzed the practices of reverse logistics in the mobile phone industry in Hong Kong. Many organizations and governments use the three R's of Reduce, Reuse and Recycle to encourage end customers change their behaviour and reduce disposal to landfills (Kumar and Yamaoka, 2007).

Research focused on strategic aspects investigate RL value, network design, and RL's interfaces with other management areas (e.g. Kumar et al., 2016; Rubio et al., 2008; Georgiadis and Besiou, 2010; Adenso-Diaz et al., 2012; Carter and Easton, 2011; Mollenkopf et al., 2011). Research in this area adopts a supply chain perspective and highlights endeavours to comply with sustainability requirements (Russo and Cardinali, 2012). Practically, products recovery and materials reuse can mitigate the negative effects on environment, through decreasing waste disposal and different types of emissions related to transportation and raw materials processing. For instance, Zhu et al. (2007) targeted green supply chain management initiatives of several Chinese manufacturers specialized in power generating, chemical/petroleum, electrical/electronic and automobile, investigating the impacts of GSCM initiatives on the performance of companies. Sharuddin et al. (2017) examined the motivations of Malaysian manufacturers to adopt closed-loop supply chain

activities that influence the effectiveness of reverse supply chains, emphasizing the need to increase involvement of manufacturers in product return processes in RSC practices success.

2.2 Reverse supply chains motivations and obstacles

Literature has targeted the motivations behind RSC operations and strategies implemented by companies in several countries (Murphy and Poist, 2003; Sahay et al., 2006; Zhu and Sarkis, 2006; Zhu et al., 2007; Lee, 2008). There are three main drivers for implementing RSC: economic, corporate citizenship and legislation (Alvarez-Gil et al, 2007). Economic drivers for RSC relate to cost minimization and revenues generated by remanufacturing, reuse of materials, and product refurbishing (Stock et al., 2006; Alvarez-Gil et al, 2007). Companies might be interested in RSC due to their awareness of their corporate citizenship and their will to initiate voluntarily sustainable approaches according to environmental and social principles (de Brito et al., 2004). The legislation drivers refer to the norms and legal obligations of a firm regarding sustainability (Alvarez-Gil et al, 2007). For instance, the manufacturers in Europe are responsible for their products during their entire lifecycle as a consequence of the directive on waste electrical and electronic equipment (WEEE).

Literature on RSC barriers has highlighted the existence of two different types of inhibitors: external barriers and internal (organisational) barriers. Examples of external barriers include inappropriate environmental regulations (Hilary, 2004; Zilahy, 2004), uncertainty regarding obtained results (Ravi and Shankar, 2005; Roy and Venzina, 2001) and lack of partners awareness concerning reverse logistics (Ravi and Shankar, 2005). Internal barriers relate to obstacles that an organization may experience internally such as lack of training and qualification of workers (Hillary, 2004; Ravi and Shankar, 2005), lack of management's commitment (Ravi and Shankar, 2005; Zhu et al. 2008; Zilahy, 2004) and lack of information and technological systems (Ravi and Shankar, 2005).

Barve and Muduli (2013) investigated green supply chain practices (which may include RSC elements) in Indian mining industries. They found 11 barriers: Poor quality of human resources; Inadequate pressure from society; Poor legislation; Lack of direct incentives; Financial constraints; Technical constraints; Resistance to change and adoption; Lack of top management commitment; Lack of employee commitment; Poor environmental awareness; Inappropriate approach to implementation. RSC typically to share most of these problems, and are likely to face further, more particular challenges. To our knowledge, Barve and Muduli (2013) are among the few researches targeting specifically barriers to green supply

chains in developing countries. Those barriers to RSC found as a result of the research we conducted are discussed in section 5.

2.3 Reverse supply chain practices in developed and developing countries

Although several models have been developed to describe RSCs (Fleischmann, 2001; Dekker et al., 2003; Srivastava, 2007), research in the context of developing countries remains sparse (Erol et al., 2010). Most of the studies were carried out in developed and emerging economies (Vijayvargy et al., 2017), while countries in the African continent were largely overlooked (Govindan and Soleimani, 2017). One of the exceptions is Ehie and Muogboh (2016), reporting on manufacturing strategy in Nigeria, where the strong influence of environmental factors of government policies on business practice is confirmed.

Many developing countries have a large and growing market for electrical and electronic equipment, automobiles and other industries (Sajan and Sridharan, 2015). China in particular has legislation driving companies to use greener manufacturing and supply chain practices, but there is also pressure from customers, suppliers and the public (Huang et al., 2015).

Few researches have investigated the factors affecting RSC practices in emerging economies (China, India and Brazil), namely drivers and obstacles to RSC (Lu and Wang, 2009; Erol et al., 2010; Drohomeretski et al., 2014; Sajan and Sridharan, 2015).

That is why several authors call for more research on factors influencing RSC practices in developing countries and emerging economies because conceptual models applied in developed countries (USA, Europe and Japan) are insufficient to illustrate firms' attitudes towards RSC in developing countries (Lu and Wang, 2009; Erol et al., 2010; Sajan and Sridharan, 2015).

Further, it appears that the major barriers to reverse logistics implementation in developing countries are mostly external factors (lack of regulations and directives) and are macro in perspective (e.g. the research of Lu and Wang (2009) on Chinese manufacturers, the survey of Erol et al (2010) on Turkish manufacturers and Drohomeretski et al. (2014) on Brazilian companies). There is currently a lack of generalised conclusions regarding the obstacles to RSC in developing countries, and this article will attempt to provide another perspective.
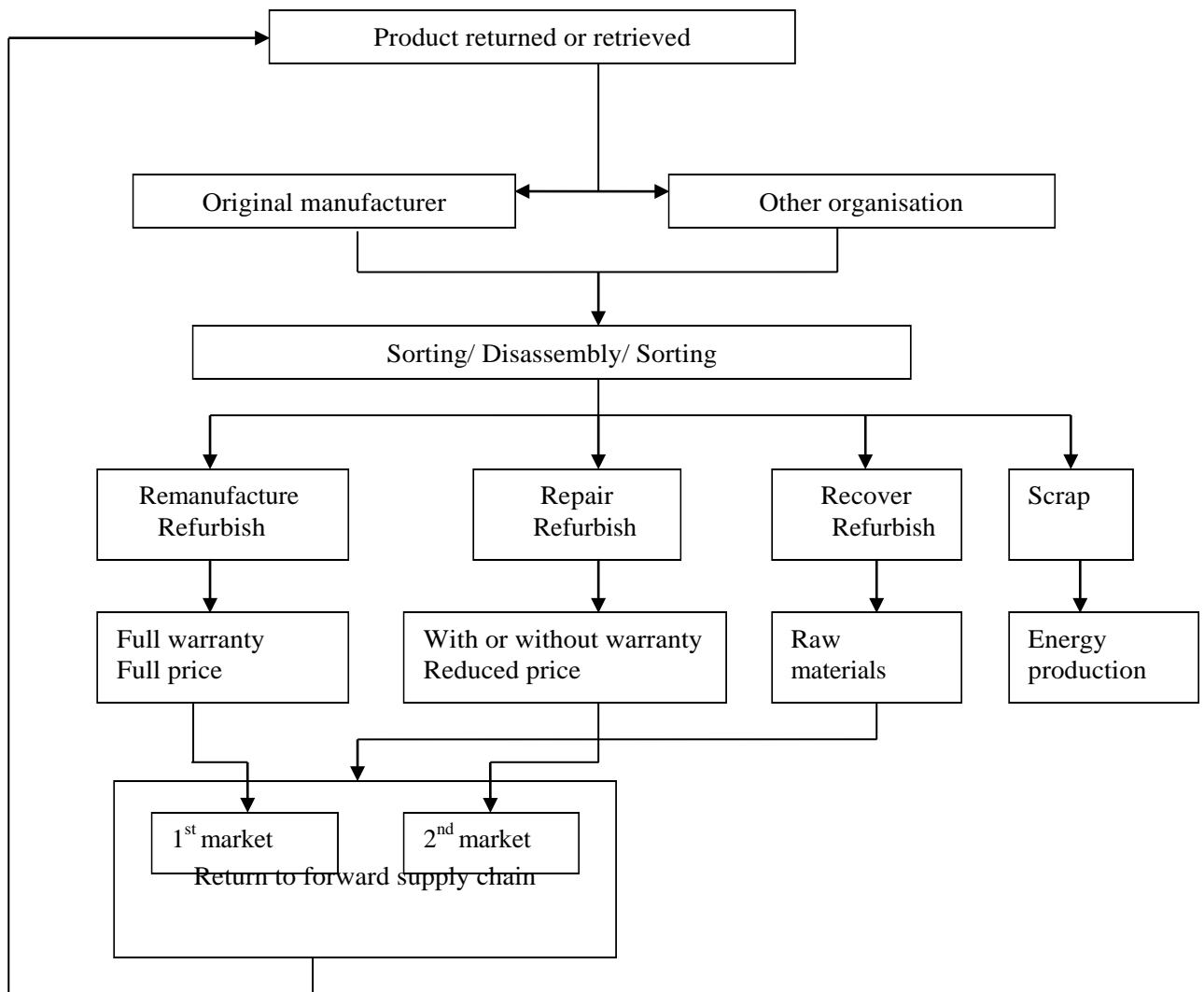
Morocco is particularly interesting because of its central position in the European and African markets and its active involvement in environmental initiatives particularly after the organization of the United Nations climate change conference (COP22) in Marrakech. Since then, Morocco has adopted several environmental initiatives in its jurisdiction and has

encouraged private sector companies to implement environmental practices (Moroccan Ministry of the Environment, 2015). Morocco has also undergone a number of structural reforms that have improved its rank in the Logistics Performance Index (LPI) of the World Bank: from 94th in 2007 to 50th in 2012 (The World Bank, 2007; 2012). Furthermore, Morocco currently receives 33% of its direct investments from the multinational firms that have turned toward North Africa (UNCTAD, 2014) and has concluded free trade agreements with the United States, the European Union, Turkey, and Canada, all of which seems to indicate that this country is increasingly being integrated into global supply chains.

3. Research method and model

Based on the initial model by Frei et al., (2015) as well as direct interaction with industry, we propose an updated generic model for reverse supply chains (Figure 1) that depicts the typical processes involved in RSC. The processes to the left (remanufacturing, refurbishing) have the highest value retention rate and are therefore the most desirable, whereas those to the right retain the least value and should be avoided if possible.

Figure 1: Generic model of reverse supply chains

```
                    ┌──────────────────────────────┐
            ┌──────▶│  Product returned or retrieved │
            │       └──────────────────────────────┘
            │                      │
            │       ┌───────────────────────┐      ┌───────────────────────┐
            │       │  Original manufacturer │◀────▶│   Other organisation   │
            │       └───────────────────────┘      └───────────────────────┘
            │                      │
            │       ┌──────────────────────────────────────┐
            │       │      Sorting/ Disassembly/ Sorting     │
            │       └──────────────────────────────────────┘
            │          │            │            │            │
            │   ┌────────────┐ ┌────────────┐ ┌────────────┐ ┌──────────┐
            │   │Remanufacture│ │  Repair    │ │  Recover   │ │  Scrap   │
            │   │  Refurbish  │ │ Refurbish  │ │ Refurbish  │ │          │
            │   └────────────┘ └────────────┘ └────────────┘ └──────────┘
            │          │            │            │            │
            │   ┌────────────┐ ┌──────────────────┐ ┌────────┐ ┌──────────┐
            │   │Full warranty│ │With or without   │ │ Raw    │ │ Energy   │
            │   │ Full price  │ │warranty Reduced  │ │materials│ │production │
            │   └────────────┘ │  price            │ └────────┘ └──────────┘
            │          │       └──────────────────┘
            │   ┌─────────────────────────────────────┐
            │   │ ┌───────────┐   ┌───────────┐        │
            │   │ │1st market │   │2nd market │        │
            │   │ └───────────┘   └───────────┘        │
            │   │     Return to forward supply chain    │
            │   └─────────────────────────────────────┘
            │                      │
            └──────────────────────┘
```

To answer our two research questions, we adopted a qualitative approach based on case studies analysis. The use of a qualitative methodology in this research is motivated by various factors:

First, qualitative studies can be a source of well-grounded, rich descriptions and explanations of processes occurring in local contexts (Lee and Tan, 2011). Second, the case study method is an effective means of collecting in-depth information (Voss et al, 2002) and appears particularly appropriate for exploring and understanding specific topics (Yin, 2003). Finally, qualitative approach allows researcher access to deeply felt but rarely articulated beliefs through the interviews (Aastrup and Halldórsson, 2008; Seuring, 2008).

Based on the five steps proposed by Stuart et al. (2002), a summary of the empirical work is provided in Table 1.

Table 1. Case study method

Stage 1. Research Question	Stage 2. Instrument Development	Stage 3. Data Gathering	Stage 4. Data Analysis	Stage 5. Dissemination
How do Moroccan companies implement RSC practices? What type of obstacles hinder RSC initiatives of the Moroccan companies?	Case study of companies in Morocco	Semi structured Interviews, company reports, articles in press and websites	Crosscase Analysis	Construct validity, external validity and reliability

The case study analysis was divided into the following four steps: (1) case study selection and classification, (2) interview protocol, (3) data collection, and (4) analysis and interpretation.

3.1 Case study selection

As suggested by Flyvbjerg (2001), to maximise the information potential from small samples, cases need to be selected on the basis of expectations of their information content. Thus, a preliminary sample was formed using a governmental database containing information about Moroccan companies according to sector, size and activities. From a previous research on green practices of Moroccan companies we compiled additional data. Based on this information, we selected companies that had implemented green initiatives including green design, certified environmental management system and green disposal. Most of these companies belong to several key industrial sectors such as automotive industry, aeronautics and chemicals known for their concern about environmental issues and fewer belong to services such as retailing, freight and logistics. We consulted secondary sources such as company websites, company reports, and articles in industry magazines to assess such initiatives.

A preliminary sample of 20 companies was selected as output of this phase. Subsequently, we contacted these firms by phone and email to determine their willingness to participate in the study and to verify some information related to their environmental sustainability initiatives. Finally, 7 companies were found suitable and agreed to be involved in this research.

3.2. Interview protocol

Based on literature review and previous research (Erol et al, 2010; Drohomeretski et al, 2014) a research survey protocol was elaborated (Table 2).

Table 2. Structure of the research protocol

Objective	Main questions	Data collection instrument	Data analysis
General company information	Company name, number of employees, sector, size of plant, average production, sales market	Website, interview, company's annual reports if available, articles in press	Comparison of company information
Identification of respondents	Name, e-mail, position, education, experience	Interview	Evaluating the respondents' relevance and experience.
RSC initiatives	What are the main RSC initiatives implemented by the company?	Interview, articles in press, website	Evaluating the RSC initiatives, recycling, remanufacturing, the presence of performance indicators, earnings from RSC. Comparison between case studies (similarities and differences).
RSC obstacles	What are the main obstacles to RSC implemented by the company?	Interview, articles in press, website	Analyzing the obstacles to RSC by type (costs, lack of stakeholders' involvement, etc.). Comparison between case studies (similarities and differences).

Following the survey the protocol, an interview guide was developed to conduct semi-structured interviews. The data collection guide comprised of open questions on:

(1) General company information,

(2) Description of RSC initiatives adopted, and

(3) Obstacles to RSC initiatives.

3.3. Data collection

To fine tune the interview guide, a pilot test was initially carried out in one of the case companies studied (case company A). This research protocol validation process through the pilot test was necessary to clarify questions and to standardise the interview guide to be used in the other interviews with the case companies.

Interviews were carried out from August 2015 to December 2015. Most of the respondents were interviewed in face-to-face meetings at the company site. Company names would be kept anonymous to encourage openness in responding. Case companies are labelled with letters from A to G in the tables. On average, each interview lasted for about 60 minutes and was recorded and transcribed. All of the records and observations have been added to the information obtained from other sources (e.g., company reports and websites, articles published on industry magazines) and stored in a case study database as suggested by Yin (2003).

3.4. Data analysis

In this phase of the research, a content analysis approach was adopted as recommended by Easterby-Smith et al. (2012). Case-based research is particularly concerned with validity and reliability issues as noted by Yin, (2003) and Ellram, (1996). The suitability for generalizing the results was increased by selecting multiple case studies representing companies with a variety of characteristics and providing various services.

During the interviews, we took the time to explain the research objectives and its focus on RSC practices. We explained the difference between RL and RSC to avoid any misunderstanding and confusion of concepts. Furthermore, case study reports and transcripts were returned to the informants for verification as a way to insure construct validity (Yin, 2003; Bryman and Bell, 2007). The interviewed persons were then given the opportunity to adjust and approve the records. Using diverse data sources (company websites, interviews, press articles) and the verification of the results by the interviewees strengthen construct validity. Therefore, the validity of the research improved as information was triangulated across data sources (Yin, 2003). Reliability is linked directly to the repeatability of the experiment and whether replication by other researches is possible. In our research, reliability is ensured by thoroughly describing the process of data collection and analysis. Also, as suggested by several researchers (Yin, 2003; Easterby-Smith et al. (2012) a case study database was constructed to further uphold the reliability. Thus, the database contained the complete record of the interview guide and transcripts for each case company.

The main characteristics of the companies interviewed are presented in Table 3.

Table 3 : Case studies characteristics

Company	Profile	Company size*	Sector	Interviewee
A	A subsidiary of a French group of IT and aeronotics localised in Morocco since 2004. The company plays the role of a facilitator for technological outsourcing projects of the French group's European firms.	Medium	Aeronautics	CSCO
B	A recently created Holding owned by an international high-tech group and leading supplier in the fields of aerospace, defence and security. The Group has presently 8 plants in Morocco with more than 3000 employees, representing approximately 25% of the Moroccan workforce in the aviation industry.	Large	Aeronautics	CSCO
C	A subsidiary of a global automotive industry that started its activity in 2012 in Tangier. The assembly plant in Morocco has assembled 174245 vehicles in 2014 and its annual capacity is of 340000 vehicles.	Medium	Auto industry	CSCO
D	A subsidiary of a Japanese wire cables manufacturer for automobiles which has 3 factories in Morocco. The company has invested 20 million euros in its projects in Morocco.	Large	Auto industry	CEO
E	A Moroccan manufacturer of kit furniture. Launched in 1993, the company has 46 stores localised throughout Morocco. The company is also present in other African countries such as Congo, Angola, Mauritania and Burkina Faso.	Large	Furniture	CSCO
F	A Moroccan retailer founded in 1985 owning 40 supermarkets and 4 hypermarkets in Morocco.	Large	Retailer	CEO
G	A company belonging to a large Moroccan Holding. The company is Morocco's leader in the distribution of petroleum gas, butane and propane. The company holds more than 46% of national market share, with revenues amounting to hundreds of millions of dollars in 2010.	Large	Chemicals	CSCO

*Company size is estimated by turnover and number of employees

Company size was assessed according to the definition of SMEs by the European Commission (2005). Therefore, the sample of interviewed companies includes two medium

companies (employing less than 250 people) and five large firms (employing more than 250 people). The sample is composed of four companies that belong to multinational groups (A, B, C and D), while the three remaining companies (E, F and G) are national firms. The selected companies operate in leading industries in Morocco.

4. Findings

This section provides a summary of case study findings and some initial discussion. It includes a description of RSC practices and their main obstacles.

All interviewees from automotive, aeronautics, furniture and retail stated that they implement reverse supply chain initiatives taking sustainability into consideration. Table 4 summarises the RSCs initiatives (or actions) implemented by each of the case companies investigated (columns from A to G).

Table 4: RSCs initiatives of case studies

Company	RSC initiatives		Measure of RSC performance
A: *Aeronautics*	Reverse logistics processes	Return of defective products to suppliers. Resale of recycled packaging materials. Remanufacturing and repair.	- Stock movement indicators: stock of expired and unsold products, stock of waste and disposable materials -Sale of recycled products * Profit earnings of RSC: approximately tens of thousands of euros annually.
	Disposal Options	Most returned products and components have to be destroyed. Disposal of waste packaging.	
B: *Aeronautics*	Reverse logistics processes	Return of defective products to suppliers.	Inventory ratios, inventory write off, holding costs, average of inventory including waste
	Disposal Options	Disposal of waste packaging.	
C: *Auto industry*	Reverse logistics processes	Return of defective product, repair and maintenance if conditions allow it. Recycling of packaging materials.	Inventory ratios and stock metrics: carrying cost of inventory, inventory ratios...
	Disposal Options	Disposal of waste materials.	
D: *Auto industry*	Reverse logistics processes	Return of defective products to plant for repair.	Inventory and stock metrics: carrying cost of inventory, inventory ratios...
	Disposal Options	Most of defective products and waste are disposed of because of lack of adequate technology.	
E: *Furniture*	Reverse logistics processes	Return of defective product, maintenance recycling, reuse. Returned products by customers have to be repaired and recovered to be resold. Some products in good conditions have to be replaced by incoming new series launched each year. They are returned to the company's headquarters in Casablanca, where they are dismantled, recycled for packaging and remanufactured. They are resold at 100% price without the customer's knowledge.	Inventory and stock metrics: carrying cost of inventory, inventory ratios...
	Disposal Options	Disposal of waste material	
F: *Retail*	Reverse logistics processes	Return of expired products to suppliers. Products returned in good conditions are inspected by suppliers, some are re-used and resold.	No
	Disposal Options	Disposal of waste packaging	
G: *Chemicals*	Reverse logistics processes	Recycling cardboard and packaging materials to be re-used. Product returns for maintenance and repair.	Inventory Turnover , Obsolescence rate *RSC earnings: 1.48% of total profit
	Product recovery	Disposal of expired products (very	

strategy	rare).		

Most of the RSC initiatives seem to focus on processes of reverse logistics. According to the CEO of the aeronautics company A: ''there are two traditional types of reverse logistics process:

(i) return of end of use products and materials that can be remanufactured and resold; and

(ii) return of end of life products/materials to be recycled or for disposal.''

It seems that most companies are not involved in sophisticated RSC activities due to fragmentation of their supply chains. According to several interviewees (C, D, G and F), the cooperation with other members of the supply chain to establish extended RSC practices is limited. There are many issues related to trust, information sharing and cooperation that several interviewees expressed their concern about. Overall, these firms seem inclined to adopt a limited approach to RSC.

According to several companies (A, C, D and E) expired products, packaging and disposable materials were the focus of reverse logistics processes to avoid costs and waste. Some companies (A, G and E) are involved in remanufacturing and reuse of raw materials but the initiatives depicted include only few indicators of performance (mostly about inventory of obsolete or expired products and raw materials). Therefore, the measurable impact of the RSC on performance and profit of companies is limited. Most of interviewees could not cite data on how such practices influence their performance. These results indicate that profitability is an issue when it comes to RSC practices for Moroccan companies. Overall, the findings indicate that the implementation of RSC practices of Moroccan companies is still at an early stage.

Table 5 summarises obstacles to RSC initiatives according to the interviewees.

Table 5: Obstacles to RSCs adoption

Obstacles	A Aeronautics	B Aeronautics	C Auto industry	D Auto industry	E Furniture	F Retail	G Chemical	Sum
Costs (internal)	*			*		*	*	4
Lack of capabilities (internal)				*		*	*	3
Lack of the employees' experience (internal)				*		*	*	3
Difficulty to connect forward and reverse logistics (internal)				*		*		2

Lack of stakeholders' involvement *(external)*	*	*	*	*	*		5
Lack of well defined regulations *(external)*	*		*		*		3

We divided the obstacles to RSC initiatives into two types: internal and external barriers. Regarding internal obstacles, costs represent an important inhibitor to RSC initiatives (mentioned by four cases). This might be due to the fact that sustainable and environmental actions may require high initial investment in necessary resources.

Furthermore, the CSCO of the auto company C stated: "usually the return of used products is done in small quantities, so our vehicle capacity is not fully utilised. This would affect the total cost of transportation. Also the quality variations of the returned products can sometimes hinder remanufacturing and reuse... More advanced operations are required for making the returned product resalable. Ultimately, these factors would increase the total cost of the reverse supply chain."

Lack of proper capabilities has been mentioned by three cases as a major barrier to implement RSC and RL. That means that, without adequate information system, infrastructure and technology, RSC initiatives would be limited as companies cannot generate economies of scale to reduce the cost of product recovery. Regarding this obstacle, the CEO of the auto company D stated that "we try so hard to take into account RL and RSC practices, (…) however, the lack of capabilities hinders us and a lot of other companies. That is why there is no trade channels nor sufficient market demand to encourage companies to implement such practices".

Furthermore, lack of employees' experience is also mentioned as a barrier to RSC initiatives. This was the case for the retailer and the chemical and auto industry companies who stated that the dynamics of reverse processes flows are not easy to grasp by their personnel who lack experience in dealing with these issues.

Our conversations with the managers of the companies highlighted the fact that the inability of the companies to connect forward and reverse supply chains efficiently does not help them to implement more mature RSC practices. This might indicate that an integrated RSC based on a closed-loop supply chain is not taken into consideration and therefore an effective network of RSC can not be established in that case.

Concerning external barriers, RSC initiatives are hindered by lack of stakeholders' involvement. According to the interviewees, this lack of cooperation involves customers and

other partners in the supply chain. Consequently, firms are not motivated enough to initiate RSC actions. From another perspective, RSC management is not publicized enough so customers and public awareness of RL processes and their effects on the environment is relatively limited. Consequently, without pressure from customers and other stakeholders, adoption of RSC in Morocco will remain under-developed and fragmented.

Also, legislation regarding RL in general and RSC management in particular is not enforced by authorities and remains vague. This might explain companies' reluctance to initiate advanced RSC in Morocco. During the interviews, managers of aeronautics and automobile industries stated that the lack of clear regulations hinders implementing RSC initiatives. Therefore, we might argue that for RSC management is to be implemented fully and successfully by the companies, regulations should be upgraded in Morocco to take into consideration environmental aspects including RSC. There is some legislation in Morocco related to the environment that has been proposed since 2013, but up until now RSC aspects were largely overlooked. Hence, collaborative efforts of public (government) and private sector (companies) to encourage RSC management initiatives for the industries in Morocco is urgently needed.

A summary of the previous findings is presented in table 6. We note that the manufacturers belonging to aeronautics and auto industry have implemented RSC initiatives varying in terms of performance measure and scope, and the other firms E and G have also developed some RSC initiatives and finally the retailing company F has implemented limited RSC practices with no RSC earnings and no performance indicators.

Obstacles from different sources (internal and external) have influenced firms' RSC practices with a difference between and companies such as the retailer and the chemicals company that seem to struggle mainly with internal obstacles while other companies are hindered more with external obstacles (stakeholders' pressure and regulations). This might indicate that the more firms are advanced in their RSC practices, the more they are inclined to encounter external obstacles.

Table 6: Findings summary

Activity Sector	Companies	RSC initiatives	RSC obstacles
Aeronautics	A	RL, several disposal options, earnings from RSC and performance measure	Mostly external
	B	RL, disposal options for packaging and performance measure	External
Auto	C	RL, disposal options of waste and performance measure	External
	D	RL, disposal options for waste and performance measure	Mostly Internal
Furniture	E	RL, disposal of waste materials, earnings from RSC and performance measure	External
Retail	F	Mostly based on RL processes, disposal of packaging, no performance measure	Internal
Chemicals	G	RL, limited disposal options, earnings from RSC and performance measure	Internal

5. Discussion

As far as RQ1 is concerned, i.e. *how do companies in Morocco implement RSC practices*, the findings show different attitudes of companies towards RSC which might be explained by differences in terms of orientation, organisational structures and capabilities. The successful implementation of RL depends on many factors, but the firm's attitude (proactive or conservative) is one of the most critical determinants in RSC initiative (Alvarez-Gil et al, 2007).

While several studies on RSC practices examine how to effectively manage the reverse flow after it has occurred, research on initiatives related to resale processes or secondary markets is lacking (Wang et al., 2017). Our findings on RSC practices of Moroccan companies offer insights into how these case companies generate earnings from their resale processes. Also, by studying cases from multiple manufacturing sectors as well as the retailing sector we offer a broad scope of RSC practices while most of previous surveys were focusing mainly on manufacturing industries (e.g. Wang et al., 2017; Govindan and Soleimani, 2017).

From another perspective, literature on organizations' attitudes towards environmental sustainability ('going green') can be of great interest for firms willing to adopt RSC. For example, Van Hoek (1999) grouped these attitudes into two major categories: reactive and proactive. For firms with a reactive attitude, green practices are a burden. These firms thus respond only when necessary and in the most basic manner in compliance with legislation. In contrast, firms with a proactive attitude regard going green as a way to add value to the firm. Therefore, they take a step beyond legislation and treat all business associates as partners in creating an advantageous environment for the supply chain. Based on the case study analysis, it seems that the investigated Moroccan firms adopt a reactive attitude to RSC management. Regarding RQ2, i.e. *what type of obstacles hinder RSC initiatives of the Moroccan companies*, the results indicate two types of inhibitors: external and internal. These findings confirm the previous researches on RSC obstacles in general and those on developing countries in particular (Lau and Wang, 2009; Erol et al., 2010). A major inhibitor to RSC initiatives is the lack of stakeholders' involvement (Alvarez-Gil et al, 2007; Sahay et al., 2006; Zhu and Sarkis, 2006; Zhu et al., 2007; Lee, 2008). Our findings also highlight the lack of effective governmental regulations that hinder RSC which several surveys in developing countries have mentioned (Drohomeretski et al., 2014; Lau and Wang, 2009; Erol et al., 2010). All these obstacles are macro in perspective and provide additional confirmation to the institutional theory that postulates a pivotal role of legal system in adopting GSCM and sustainability. Consequently our findings suggest that there are similarities in institutional context regarding RSC implementation in developing countries. Furthermore, our findings suggest that external obstacles are emphasized by companies developing an ambitious RSC practice, which constitutes an addition to the theory on RSC obstacles in developing countries.

External barriers to RSC seem to be shared by companies in developing countries but internal barriers to RSC differ according to extant research. While our case companies mentioned internal obstacles such as lack of employees' experience, lack of capabilities and   difficulties
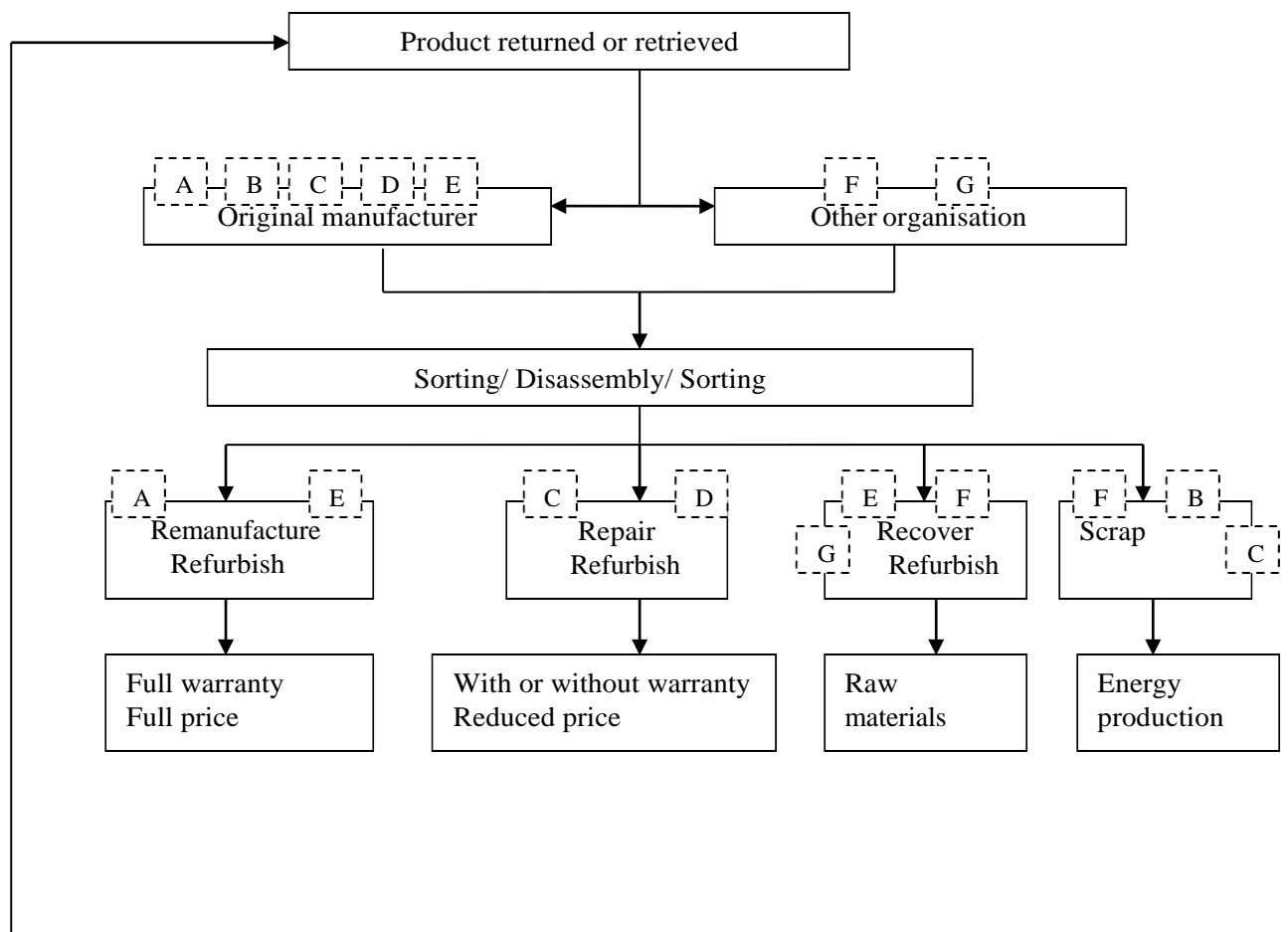
in connecting forward and reverse supply chain, the research of Lau and Wang (2009) on Chinese electronic manufacturers highlighted other obstacles such as strategic significance, financial considerations, management skills and technological requirements. Also, the survey of Drohomeretski et al. (2014) on Brazilian auto makers have found that the main barriers to their GSCM including RL are lack of fiscal incentives, costs and suppliers' lack of preparation.
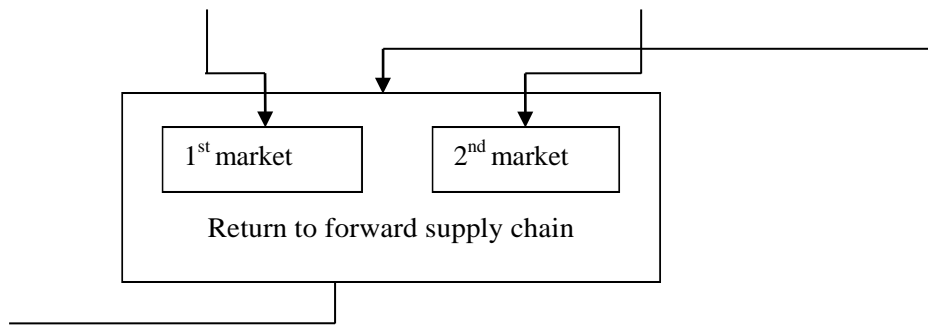
In the final analysis, our findings seem to suggest, that unlike developed countries where RSC practices depend largely on firms' will and initiatives (Lau and Wang, 2009; Erol et al., 2010), external barriers highlighted by studies on RSC in developing countries suggest a need for an adequate nation-wide RSC policy as well as effective stakeholders' involvement (customers, suppliers and employees).

At the firms' level, to implement RL and RSC, practical managerial tools that support the integration of forward and reverse flows should be developed. This would enable companies to improve their operational performance and SC managers would be less reluctant to adopt closed-loop supply chains models.

Based on the case studies, we represent the Moroccan firms' RSC practices according to our proposed generic model (Figure 2).

Figure 2: Case companies reverse supply chains

```
┌─────────────────────────────────────────┐
│  ┌──────────────┐    ┌──────────────┐    │
│  │  1ˢᵗ market  │    │  2ⁿᵈ market  │    │
│  └──────────────┘    └──────────────┘    │
│         Return to forward supply chain   │
└─────────────────────────────────────────┘
```

We discussed with each interviewee our generic RSC model to assess their RSC practices. The position of each company in the figure is determined by its focus on which RSC process it deems important as well as the actual priority it gives to such operations.

According to our findings, we can distinguish two groups of companies: In the first group, we note several case companies located on the right side of the figure where processes have the lowest value creation (scrap and recover). This group is composed mostly of local companies. Whereas in the second group, we find companies like A, C, D and E that are more interested in remanufacturing and repair processes that can generate revenues if the returned products are sold or reused. Company E operates in the furniture industry where RL practices are increasingly becoming more prevalent to optimize operating costs and to deal efficiently with returned products. The aeronautics firm A as well as the auto industry firms C and D belong to multinational groups which might indicate a difference between national and international companies regarding RSC practices. Our findings seem to suggest that the multinational companies tend to have more ambitious and more extensive approach to RSC practices. While local Moroccan firms focus only on few basic RSC processes, companies from multinational groups are interested in processes that generate revenues and diminish undesirable environmental effects. This might be explained by an inclination of these companies to follow the lead of their headquarters abroad as the CSCO of the aeronautics company B stated: "when we opened our assembly plant in Morocco, we were aware of differences in context and practices, but we tried to implement what we could do in terms of environmental practices knowing fully that we can not emulate entirely European initiatives here in Morocco … in our group we do have a standard practices that all of us in other countries would try to follow and this includes environmental initiatives".

Overall, developing RSC management is linked to developing remanufacturing, as companies would exploit benefits of recovery operations (Hauser and Lund, 2008). Among others, one of the main reasons why Moroccan companies are not inclined to have RSC management initiatives is the cost and profitability issue. Therefore, Moroccan companies need to become

more aware of the positive potential that RSC management represents, including their impacts on the performance.

6. Conclusion and implications

This article provides insights into RSC initiatives of Moroccan companies and the main obstacles to them. Several researchers state that literature on RSC could benefit from developing frameworks for theoretical models (Daugherty et al., 2002; Guide and Van Wassenhove, 2002; Lambert et al., 2011). Accordingly, our research has generated theoretical implications that deserve to be investigated further.

We developed a conceptual model to investigate further RSC initiatives of companies and the main obstacles to such initiatives. The contribution of the study to existing literature is twofold: First, we respond to call for more research on RSC in the context of developing countries and we shed light on obstacles hindering them. Our findings suggest somehow a similarity in obstacles to RSC developing countries such as China, Turkey and Brazil.

Second, we present a RSC model that encompasses remanufacturing, refurbishing and disposal processes. We think that this model constitutes a useful basis for further research. Third, we suggest that companies in developing countries with basic RSC practices struggle more with internal obstacles, whereas those companies developing an ambitious RSC practice are more hindered by external obstacles. This observation deserves to be analyzed further through additional research in developing countries.

It would be interesting to extend the line of research involving stakeholders' roles and influences on RSC actions. Also, further research should explore how firms might use their RSC initiatives as a source of competitive advantage. Our findings extend on the extant literature investigating RSC practices in developing countries by demonstrating that resale processes generate earnings and that firms belonging to other sectors (furniture and retailing) are interested in RSC practices.

The results of this article could be helpful to companies in Morocco and elsewhere, as sustainability will soon become part of more competitive requirements that only the most efficient players will be able to comply to.

Regarding managerial implications of our research, the findings can constitute an incentive for other firms belonging to manufacturing sectors to implement RSC in Morocco and elsewhere as the results demonstrate that there is potential for firms to generate earnings from their RSC practices while demonstrating their compliance with sustainability requirements from their stakeholders and regulations.

Furthermore, our findings show that not only the aeronautics and electronics industries are concerned with RSC but firms belonging to other sectors of activity as well. Other companies might also be interested in RSC practices if they are convinced of its profitability. Our generic RSC model can be used to help companies evaluate their RSC activities and to define their orientation. Manufacturers who want to benefit from their RSC practices should focus on value creation processes that generate revenues (remanufacture and repair). Also, the findings can help firms to detect shortcoming in their RSC and to propose measures to enhance their processes and their conformity to stakeholders' demands.

We argue that instead of adopting a reactive attitude to RSC, companies in the auto industry, aeronautics and other sectors should consider environmental practices as a source of value creation. Firms should not remain passive when managing returns; they should try to predict their reverse flows and act proactively. Therefore, firms need to develop processes that integrate remanufacturing and refurbishing including product design for disassembly, dismantling and recovery. This implies close cooperation with stakeholders to define the requirements for dismantling and reuse, because those dealing with RSC rarely have any say in product design (Frei et al., 2015).

We argue that the service business model is the proper solution to overcome RSC obstacles for manufacturers. Firms might be able to initiate efficient RSC actions when they provide a service rather than a product. Thus, companies should sell a service including maintenance, repair and periodic replacement. Companies would be actively involved in disassembly and refurbishment which might ultimately contributes to reducing waste.

Furthermore, to correctly implement RL practices, practical managerial tools that support the integration of forward and reverse flows would have to be used (Stock et al., 2006) including metrics and KPI for RSC management.

This study has some limitations that provide future research opportunities. To determine whether and how far these findings can be generalized, statistical support is needed to complete our qualitative data. Also, the RSC that we explored may change across countries because RSC activities may be bound by cultural contingencies. We therefore encourage research in other countries to test this hypothesis. Indeed, studies in developing countries other than Morocco would increase the external validity of the results.

Furthermore, drawing on the results of this research, other surveys carried out on similar countries should be considered to draw similarities and parallels between different contexts of RSC management-related items. Also, a field study on a larger sample of   Moroccan

companies to investigate recovery and reverse logistics processes and how they affect the organisations' performance would bring additional insights to our research.

References

- Aastrup, J., Halldórsson, Á, (2008), "Epistemological role of case studies in logistics: A critical realist perspective", *International Journal of Physical Distribution & Logistics Management*, Vol. 38(10), 746–763.

- Adenso-Diaz, B., Moreno, P., Gutiérrez, E. and Lozano, S, (2012), "An analysis of the main factors affecting bullwhip in reverse supply chains", *International Journal of Production Economics*, Vol. 135, pp. 917-928.

- Alvarez-Gil, MJ., Perrone, B., Husillos, J., Lado, N., (2007), "Reverse logistics, stakeholder's influence, organizational slack, and manager's posture", *Journal of business research*, Vol. 60 (5), pp. 463-473.

- Banomyong, R., Veerakachen, V., Supatn, N., (2008), "Implementing leagility in reverse logistics channels", *International Journal of Logistics Research and Applications*, Vol. 11 (1), pp. 31-47.

- Barve, A. and Muduli, K. (2013) "Modelling the challenges of green supply chain management practices in Indian mining industries", Journal of Manufacturing Technology Management, Vol. 24(8), pp.1102-1122.

- Biehl, M., E. Prater, and M. J. Realff., (2007), "Assessing Performance and Uncertainty in Developing Carpet Reverse Logistics Systems", *Computers & Operations Research,* Vol.34 (2): 443–463.

- Blackburn, J. D., Guide, V. D. R., Souza, G. C. and Van Wassenhove, L. N., (2004), "Reverse supply chains for commercial returns", *California Management Review,* Vol. 46 (2), pp. 6–22.

- Bryman A, Bell E, (2007), *Business research methods*, Oxford University Press.

- Callado, AAC and Jack, L, (2015), "Balanced scorecard metrics and specific supply chain roles", *International Journal of Productivity and Performance Management*, Vol 64, (2), pp. 288-300.

- Carter, C. and Easton, P, (2011), "Sustainable supply chain management: evolution and future directions", *International Journal of Physical Distribution & Logistics Management*, Vol. 41, (1), pp. 46-62.

- Chan, F.T.S. and Chan, S.K, (2008), "A survey on reverse logistics system of mobile phone industry in Hong Kong", *Management Decision*, Vol. 46 (5), pp. 702-8.

- Chuang, C.-H., Wang, C. X. and Zhao, Y, (2014), "Closed-loop supply chain models for a high-tech product under alternative reverse channel and collection cost structures", *International Journal of Production Economics,* Vol. 156, pp. 108–23.

- Ciliberti F, P Pontrandolfo, B Scozzi, (2008), "Investigating corporate social responsibility in supply chains: a SME perspective", *Journal of cleaner production*, Vol 16, pp. 1579-1588.

- De Brito MP, Dekker R. (2004), A framework for reverse logistics. In: Dekker R, Fleischmann M, Inderfurth K, VanWassenhove L, editors. *Reverse logistics. quantitative models for closed loop supply chains*. Berlin: Springer.

- Dekker, R., Fleischmann, M., Inderfurth, K. Van Wassenhove, L.N. (Eds), (2004), *Reverse Logistics: Quantitative Models for Closed-Loop Supply Chains*. Springer Verlag, Berlin.

- Difrancesco, R., Huchzermeier, A, (2016), "Closed-loop supply chains: a guide to theory and practice", *International Journal of Logistics Research and Applications*, DOI: 10.1080/13675567.2015.1116503

- Drohomeretski, E, Da Costa, S., De Lima, E., (2014), "Green supply chain management: Drivers, barriers and practices within the Brazilian automotive industry", *Journal of Manufacturing Technology Management*, Vol. 25 (8), pp. 1105-1134

- Easterby-Smith, M., Thorpe, R., Jackson, P., (2012), *Management research* (4th ed.). London (UK): Sage Publications Ltd.

- Ehie, I. and Muogboh, O. (2016) "Analysis of manufacturing strategy in developing countries: A sample survey of Nigerian manufacturers", Journal of Manufacturing Technology Management, Vol. 27(2), pp.234-260.

- Ellram, L.M, (1996), "The use of case study method in logistics research", *Journal of Business Logistics*, Vol. 17(2), pp. 93–138.

- Erol, İ., Velioğlu, N., Şerifoğlu, F., Büyüközkan, G., Aras, N., Çakar, N., Korugan, A, (2010), "Exploring reverse supply chain management practices in Turkey", *Supply Chain Management: An International Journal*, Vol.15 (1), pp.43-54.

- European Commission, (2005), *The New SME Definition. User Guide and Model Declaration*. Bruxelles: European Commission, DG Enterprise & Industry.

- Ferretti, I., S. Zanoni, L. Zavanella, and A. Diana., (2007), "Greening the Aluminium Supply Chain", *International Journal of Production Economics,* Vol. 108 (1–2): 236–245.

- Fleischmann, M., (2001), *Quantitative Models for Reverse Logistics*. Springer Verlag, Berlin.

- Fleischmann, M., and R. Kuik., (2003), "On Optimal Inventory Control with Independent Stochastic Item Returns", *European Journal of Operational Research,* Vol. 151, 25–37.

- Flyvbjerg, B., (2001), *Making social science matter*. Cambridge (UK): Cambridge University Press.

- Frei, R., Lothian, I., Bines, A., Butar Butar, M., Da Gama, L., (2015), "Performance in Reverse Supply Chains", *Logistics Research Network Annual Conference (LRN)*, Derby, UK.

- Georgiadis, P., Besiou, M., (2010), "Environmental and economical sustainability of WEEE closed-loop supply chains with recycling: a system dynamics analysis", *International Journal of Advanced Manufacturing Technology*, Vol. 47, pp. 475-493.

- González-Torre, P., Álvarez, M., Sarkis, J. and Adenso-Díaz, B., (2010), "Barriers to the Implementation of Environmentally Oriented Reverse Logistics: Evidence from the Automotive Industry Sector", *British Journal of Management*, Vol.21: pp.889–904.

- Gonzalez-Torrea, P.L., Adenso-Diaz, B. and Artiba, H., (2004), "Environmental and reverse logistics policies in European bottling and packaging firms", *International Journal of Production Economics*, Vol. 88, pp. 95-104.

- Govindan, K., Soleimani, H., (2017),"A review of reverse logistics and closed-loop supply chains: a journal of cleaner production focus", *Journal of Cleaner Production*, Vol. 142, pp. 371-384.

- Guide, V. D. R., G. C. Souza, L. N. Van Wassenhove, and J. D. Blackburn., (2006), "Time Value of Commercial Product Returns", *Management Science,* Vol. 52 (8): 1200–1214.

- Guide, VD, Van Wassenhove, L., (2002), "The Reverse Supply Chain", *Harvard Business Review,* Vol.80 (2), pp.25-26.

- Hauser, W., Lund, R., (2008), *Remanufacturing: Operating Practices and Strategies*. Boston University, Boston, MA.

- He, Q, Ghobadian, A, Gallear, D, Beh, LS and O'Regan, N., (2016), "Towards conceptualizing reverse service supply chains", *Supply Chain Management: An International Journal*, Vol 21, (2), (preprint).

- Hillary, R., (2004), "Environmental management systems and the smaller enterprise", *Journal of Cleaner Production*, Vol.12, pp. 561–569.

- Huang, M., Song, M., Lee, L. H. and Ching, W. K., (2013), "Analysis for strategy of closed-loop supply chain with dual recycling channel", *International Journal of Production Economics,* Vol. 144, (2), pp. 510–20.

- Huang, X., Tan, B.L. and Ding, X. (2015) "An exploratory survey of green supply chain management in Chinese manufacturing small and medium-sized enterprises: Pressures and drivers", Journal of Manufacturing Technology Management, Vol. 26(1), pp. 80-103.

- Jack, EP, Powers, TL and Skinner, L., (2010), "Reverse logistics capabilities: antecedents and cost savings", *International Journal of Physical Distribution and Logistics Management*, Vol 40, (3), pp. 228-246.

- Jayaraman, V. Luo, Y., (2007), "Creating competitive advantages through new value creation: a reverse logistics perspective", *Academy of Management Perspectives,* Vol. 21, (2), pp. 56–73.

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

- Kleindorfer, P., Singhal, K. and Van Wassenhove, L., (2005), "Sustainable operations management", *Production and Operations Management*, Vol. 14 (4), pp. 482-492.

- Kumar, V., Amorim, M., Bhattacharya, A., and Garza-Reyes, J.A., (2016), "Managing reverse exchanges in service supply chains", *Supply Chain Management: An International Journal*, Vol 21 (2), (preprint).

- Kumar, S., Yamaoka, T., (2007), "System dynamics study of the Japanese automotive industry closed loop supply chain", *Journal of Manufacturing Technology Management*, Vol. 18 (2), pp. 115-138.

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

- Lau, K., Wang, Y., (2009), "Reverse logistics in the electronic industry of China: a case study", *Supply Chain Management: An International Journal*, Vol. 14(6), pp. 447-465.

- Lee, J., Tan, F., (2011), "Growth of Chinese family enterprises in Singapore", *Family Business Review*, Vol. 14(1), pp. 49–74.

- Lee, S., (2008), "Drivers for the participation of small and medium-sized suppliers in green supply chain initiatives", *Supply Chain Management*, Vol.13 (3), pp.185-198.

- Li, X., Olorunniwo, F., (2008), "An Exploration of Reverse Logistics Practice in Three Companies", *Supply Chain Management: An International Journal*, Vol.13 (5), pp. 381-386.

- Mafakheri, F., and Nasiri, F., (2013), "Revenue sharing coordination in reverse logistics", *Journal of Cleaner Production,* Vol. 59, pp. 185–96.

- Moroccan Ministry of Environment: Ministère de l'énergie, des mines, de l'eau et de l'environnement, (2015), *Rapport sur l'état de l'environnement au Maroc*, Royaume du Maroc, Rabat.

- Mollenkopf, D., Frankel, R. and Russo, I., (2011), "Creating value through returns management: exploring the marketing-operations interface", *Journal of Operations Management*, Vol. 29, pp. 391-403.

- Murphy, P. R., Poist, R. F., (2003), "Green perspectives and practices: A "comparative logistics" study", *Supply Chain Management: An International Journal,* Vol. 8(2), pp. 122-131.

- Prahinskia, C., and Kocabasoglu, C., (2006), "Empirical research opportunities in reverse supply chains", *The International Journal of Management Science,* Vol.34, pp.519-532.

- Ravi, V., Shankar, R., (2005), "Analysis of interactions among the barriers of reverse logistics", *Technological Forecasting and Social Change*, Vol.72, pp. 1011–1029.

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

- Roy, M. J., Vézina, R., (2001), "Environmental performance as a basis of competitive strategy: opportunities and threats", *Corporate Environmental Strategy*, Vol.8, pp. 339–347.

- Rubio, S., Chamorro, A. and Miranda, F.J, (2008), "Characteristics of the research on reverse logistics (1995-2005)", *International Journal of Production Research*, Vol. 46 (4), pp. 1099-1120.

- Russo, I. and Cardinali, S., (2012), *Product returns and customer value: a footware industry case*. In Jodlbauer, H., Olhager, J. and Schonberger, R.J. (Eds), *Modelling Value, Contributions to Management Science*, Part 2, Springer, Berlin, pp. 79-97.

- Sahay, B.S., Jatinder N.D. Gupta, Mohan, R., (2006), "Managing supply chains for competitiveness: the Indian scenario", *Supply Chain Management: An International Journal,* Vol. 11 (1), pp.15-24.

- Sajan, J., Sridharan, R., (2015), "Modelling and analysis of network design for a reverse supply chain", *Journal of Manufacturing Technology Management*, Vol. 26 (6), pp. 853-867.

- Shaharudin, M., Govindan, K., Zailani, S., Tan, K., Iranmanesh, M., (2017), "Product return management: Linking product returns, closed-loop supply chain activities and the effectiveness of the reverse supply chains", *Journal of Cleaner Production*, Vol. 149, 1144-1156.

- Sarkis, J., Helms, M., Hervani, A., (2010), "Reverse logistics and social sustainability", *Corporate Social Responsibility and Environmental Management*, Vol.17, pp.337-354.

- Seuring, A.S., (2008), "Assessing the rigor of case study research in supply chain management", *Supply Chain Management: An International Journal*, Vol. 13(2), pp. 128–137.

- Shi, X., Li, L. X., Yang, L., Li, Z., Choi, J. Y., (2012), "Information flow in reverse logistics: An industrial information integration study", *Information Technology and Management*, Vol. 13(4), pp. 217–232.

- Srivastava, S.K., (2007), "Green supply-chain management: a state-of-the-art literature review", *International Journal of Management Reviews*, Vol. 9 (1), pp.53-80.

- Srivastava, S.K., (2008), "Network design for reverse logistics", *Omega*, n° 36, pp 535-548.

- Stock, J., Speh, T. and Shear, H., (2006), Managing product returns for competitive advantage. *MIT Sloan Management Review*, Vol. 48 (1), pp. 57-62.

- Stuart, I., Mccutcheon, D., Handfield, R., Mclachlin, R. and Samson, D. (2002), "Effective case research in operations management: a process perspective", *Journal of Operations Management*, Vol. 20 (5), pp. 419-33.

- Svensson, G., (2007), "Aspects of sustainable supply chain management (SSCM): conceptual framework and empirical example", *Supply Chain Management: An International Journal,* Vol.12 (4), pp.262-266.

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

- Van Hoek, R., (1999), "From reversed logistics to green supply chains", *Supply Chain Management: An International*, Vol. 4 (3), pp. 129-135.

- Voss, C., Tsikriktsis, N. and Frohlich, M., (2002), "Case research in operations management", *International Journal of Operations & Production Management*, Vol. 22 (2), pp. 195-219.

- Talbot, S., Lefebvre, E., and Lefebvre, L., (2007), "Closed-loop supply chain activities and derived benefits in manufacturing SMEs", *Journal of Manufacturing Technology Management*, Vol. 18 (6), pp. 627-658.

- Vijayvargy, L., Thakkar, J. and Agarwal, G. (2017) "Green supply chain management practices and performance: The role of firm-size for emerging economies", Journal of Manufacturing Technology Management, Vol. 28(3), pp. 299-323.

- Walton, S.V., Handfield, R.B. and Melnyk, S.A., (1998), "The green supply chain: integrating suppliers into environmental management processes", *International Journal of Purchasing & Materials Management*, Vol. 34 (2), pp. 2-11.

- Wang, J., Chen, H., Rogers, D., Ellram, L., Grawe, S., (2017), "A bibliometric analysis of reverse logistics research (1992-2015) and opportunities for future research", *International Journal of Physical Distribution & Logistics Management*, Vol. 47 (8), pp.666-687.

- Yin, R., (2003), *Case Study Research: Design and Methods*, 3rd ed., Sage, Beverly Hills, CA.

- Zhang, J., Liu, X., Tu, Y.L., (2011), "A capacitated production planning problem for closed-loop supply chain with remanufacturing", *The International Journal of Advanced Manufacturing Technology*, Vol. 54 (5–8), pp. 757–766.

- Zhu, Q., Sarkis, J. and Geng, Y., (2005), "Green supply chain management in China: pressures, practices and performance", *International Journal of Operations & Production Management*, Vol. 25 (5/6), pp. 449-468.

- Zhu, Q., Sarkis, J. and Lai, K-H., (2007), "Initiatives and outcomes of green supply chain management implementation by Chinese manufacturers", *Journal of Environmental Management*, Vol. 85 (1), pp. 179-89.

- Zhu, QA and Sarkis, J., (2006), "An inter-sectoral comparison of green supply chain management in China: Drivers and practices", *Journal of Cleaner Production,* Vol.14, pp.472-486.
- Zilahy, G., (2004), "Organizational factors determining the implementation of cleaner production measures in the corporate sector", *Journal of Cleaner Production*, Vol.12, pp. 311–319.