Searching for the right operations strategy to manage the repair process across the reverse supply chain[1]

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Ivan Russo - Nicolò Masorgo

Abstract

Purpose of the paper: *The paper aims to study the impact of different repair process strategies on a retailer's product returns management operations by focusing on a make-or-buy analysis for an outsourcing-insourcing decision-making process.*

Methodology*: An action-based research study on a single case study of an Italian small-sized retailer operating in the online commerce was carried out.*

Results*: Results shed light on the determination of the repair process strategies implemented by the retailer, the identification of the returns rate and the cost and benefits of each single strategy, and the definition of the best practice to be selected.*

Research limitations: *The main limitation of this research is the focus on a single case study that provides an insight on a specific industrial sector and on determined products.*

Practical implications: *This study bridges existing gaps in the literature at both theoretical level, by presenting a further case study on the repair process strategies, and at practical level, by determining a fully focused step-by-step analysis of the managerial decision-making process, while choosing the best practice in a make-or-buy framework.*

Originality of the paper: *This paper provides a make-or-buy analysis of the outsourcing-insourcing reverse logistics activities concerning an e-commerce retailer struggling with the best operations strategy to manage the repair process across the reverse supply chain.*

Key words: reverse logistics; repairing strategy; case study

1. Introduction

The returns management process is a core supply chain management process that comprises the activities related to returns avoidance, gatekeeping, reverse logistics and value maximisation in the recovery process of items (Rogers *et al.*, 2002). In 2017, the total merchandise entered in the American retailing reverse logistics was worth approximately US$350 billion (National Retail Federation, 2017), whereas the product returns rate in Europe (2016) was between 6% and 14% (Ecommerce News, 2016), with

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an estimated overall cost for return deliveries of more than US$230 billion (Statista.com, 2015). These costs represent an issue for retailers, who have started to identify the specific costs of items related not only to returns management (Ram, 2016) but also to reverse logistics (Bentz, 2015).

There is a specific call to explore strategies aimed at the managing supply chain backward flow and solve the trade-off between cost minimisation, customer service level and the total value recoverable from products (Dapiran and Kam, 2017). This need has been growing in relevance in online commerce, where the returns rate for e-tailers is reaching even higher rates (Dennis, 2018), causing retailers to re-evaluate the returns policy dimensions (Janakiraman *et al.*, 2016) and define the impact of the policy on the overall profitability (Hjort and Lantz, 2016).

A better returns management process requires specific characteristics that provide the consumer with an accurate consumer service: for instance, the speed at which the parcel travels along the reverse supply chain might influence the consumer's perception of the company's effort in managing returns (Griffis *et al.*, 2012), and an easy-to-return policy is among the first determinants in choosing where to buy (KPMG, 2017).

While product returns policies have been recognised as creating value for customers by improving the effectiveness in the activities related to "the physical flow of returned product and the timeliness and accuracy of the operations group in processing such products..".(Mollenkopf *et al.*, 2011, p. 393), product returns management represents for retailers a cost that is disproportionate compared with the forward logistics (Bernon *et al.*, 2012). Consequently, practitioners are trying to determine the right strategy for managing returns, both to provide consumers with an efficient and effective service and to guarantee a cost minimisation operation for the company by solving the existent trade-off between customers' experience of returning and the best strategy to be implemented by the focus company (Mollenkopf *et al.*, 2007a). Indeed, one of the main issues that managers struggle with is the solution to the cost-benefit analysis concerning the outsourcing-insourcing (i.e. make or buy decision) of returns management activities (Driansky *et al.*, 2016).

Currently, third-party logistics (3PLs) providers play an increasingly important role, not merely in logistics operations but also in returns management activities. The reduced risk in the logistics activities in terms of more resilient shipper-3PL relationships, the maximisation of value for customers realised from the overall network and the capabilities offered are among the main benefits that lead shippers to take advantage of 3PLs providers (Langley and Capgemini, 2018). Thanks to these aspects, recent trends have seen an increase in the use of 3PLs to effectively manage both the product returns and the activities of reverse logistics (Deepen *et al.*, 2008), with the identification of specific drivers that lead to this choice in order to be competitive in the market (Stock *et al.*, 2006). Accordingly, make-or-buy frameworks, which help to solve this dilemma, are important for the management of the reverse logistics (Vaz *et al.*, 2013).

Among the returns management activities, the repair process represents a concern for practitioners, first in terms of the service management as a means to differentiate themselves (Amini *et al.*, 2005), and second in terms

of the consumers' perceived quality of the recovered products (Wang and Hazen, 2016). The repair process concerns the return of products that cannot be directly reused: their working order is restored through the reparation or replacement of some components and then they are returned to legitimate customers (Agrawal *et al.*, 2016).

Drawing on the issues discussed above, this study aims at exploring the value of recovery practices in managing returns and examining different strategies in the repair process by determining the best choice among insourcing-outsourcing, thus expanding the current literature with a focus on a real case study. In addition, this research implements a make-or-buy analysis of the strategies by determining the critical factors affecting the various reverse logistics frameworks (Lee *et al.*, 2002; Vaz *et al.*, 2013) and thus uses the perspectives of the transaction costs theory related to the establishment of links with logistics service providers (Rabinovich *et al.*, 2007). In doing so, this research contextualizes the action-base study within a setting of make-or-buy analysis in the reverse supply chain context versus, contributing toward developing a middle-range theory for the operations and supply chain management field (Pellathy *et al.*, 2018).

Indeed, the paper provides a cost-benefit analysis of three different strategies to manage product repairs, answering precise questions regarding the profitability of this process, the impact on consumers' satisfaction and the competitive position of the company in terms of timeliness and control over the process, under the logic of the make-or-buy decision process.

The paper is organised as follows. The next section introduces the literature related to the repair process from an insourcing-outsourcing decision-making perspective, followed by an explanation of the methodology and the data collection process. Findings and results are then presented and subsequently discussed to determine the main theoretical and managerial implications. Finally, concluding remarks are provided, including the limitations of the research and recommendations for future development.

2. Literature review

For the purpose of this study, this section provides two main streams of literature: the first is focused on the outsourcing of returns management processes and, consequently, of the reverse logistics practices. The second aims at explaining the repair process and how the literature has been evolving in researching this topic.

2.1 Outsourcing the returns management activities

The activities of returns management were early identified as returns avoidance, gatekeeping, reverse logistics and disposal (Rogers *et al.*, 2002; Mollenkopf *et al.*, 2007b). This definition has lately been expanded to include other functions, such as returns authorisation, product recovery, processing and crediting (Russo, 2008; Russo and Borghesi, 2008; Mollenkopf *et al.*, 2011; Shaharudin *et al.*, 2015a; Bernon *et al.*, 2016; Huang *et al.*, 2016).

Recently, the environment in which companies operate has evolved into the online market, requiring management to likewise adapt the returns management process to e-commerce requirements (Mollenkopf *et al.*, 2007b; Bernon *et al.*, 2016). Accordingly, literature has focused its attention on the implications of the reverse flow of products becoming higher and higher (Rao *et al.*, 2018), by studying how the product returns policy may lessen these flows (Janakiraman *et al.*, 2016), and by identifying the economic advantage coming from product returns (Shaharudin *et al.*, 2015b). The returns management process has now emerged as one of the main issues within retailers' operations strategies (Griffis *et al.*, 2012) because of the increased effort and resources needed to manage product returns (Wang *et al.*, 2017; Daugherty *et al.*, 2019).

Therefore, relevant contributions uncovered the impact of these returns (online returns) on the retailer's profitability, whereas others have focused on the investment of the company in managing returns. Indeed, Hjort and Lantz (2016) determined that a free returns policy brings short-term benefits for the retailer, such as an increase in sales, but it may negatively affect the profitability, due to the higher costs to manage returns; Xia and Zhang (2017) developed a model to determine whether a manufacturer is incentivised to invest in the service management in order to reduce the chance of product returns.

Because of the growing complexity resulting from online product returns operations, authors have partially switched their focus to the convenience of outsourcing reverse logistics activities (Ordoobadi, 2009; Cheng and Lee, 2010; Wang *et al.*, 2017). Indeed, potential economic profitability has also been a driver for managing the limited availability of resources, thus determining the outsourcing of the reverse logistics as a preferred strategy (Meade and Sarkis, 2002), due to the competitive advantage that might be achieved with third parties that not only can perform a quicker and more accurate product returns (Stock *et al.*, 2006), but they can also reduce the related total costs (Li *et al.*, 2018). In this context, the make-or-buy analysis determines the right strategy to be implemented and is consistent with the transaction costs theory in determining the costs of participation in a market (Xu *et al.*, 2017). This theory assesses the convenience for a firm to favour market governance rather than opt for internal organisation (Paiola *et al.*, 2013; Enz and Lambert, 2015).

The literature provides several case studies regarding returns management functions that have been externalised to third parties (Karakayali *et al.*, 2007; Lu *et al.*, 2014; Li *et al.*, 2018). These examples help explain how the decision to outsource has brought benefits to companies (McCarthy *et al.*, 2013). However, more empirical results are required to extend the current literature (Li and Olorunniwo, 2008; Guarnieri *et al.*, 2015).

2.2 Repairing customer service and the recovery process

While the early literature defined the repair process as part of the product recovery management by referring to options for products to be returned to a "working order" (Thierry *et al.*, 1995), other authors have

included this process within reverse logistics activities, in particular as a form of reuse (Fleischmann *et al.*, 1997; Stock, 1998).

The link between reverse logistics and repair has also been defined as a service provided within service management, and thus an activity aimed at offering a service to consumers (Blumberg, 1999; Amini *et al.*, 2005). However, the difference between the repair process functioning as a product recovery practice and the repair service issued to consumers has been lately reconciled under the umbrella of reverse logistics processes (Rogers and Tibben-lembke, 2001; Bernon *et al.*, 2011). In fact, the repair service as a service management activity depends heavily on reverse logistics operations (Srivastava, 2008) since the repair service issues peculiar challenges to reverse logistics operations (Blumberg, 1999). The online retailer's dilemma to reconcile cost-efficiency and customer satisfaction (Walsh *et al.*, 2016) reflects the higher customers satisfaction obtained through a time efficient repair service (Amini *et al.*, 2005).

The repair process provides a company with competitive value regarding service management (Amini *et al.*, 2005), which compares different market opportunities in terms of efficiency and effectiveness (Blumberg, 1999; Dowlatshahi, 2010). Further, because the online market has led to a fiercer competition, retailers must accurately design their reverse logistics operations. As a result, companies tend to find a balance between reverse logistics costs and efficiency improvement by outsourcing these activities, thus allowing them to focus on their core business and consumer satisfaction (de Araújo *et al.*, 2018).

Consequently, management should determine the impact of outsourcing the repair process on repair costs, shipping costs and customers (Varadarajan, 2009). Moreover, they should attempt to determine the complexities introduced by reverse logistics activities, thus balancing the company's goals with customer requirements (Pellathy *et al.*, 2018; Russo *et al.*, 2018). This leads to a cost-benefit analysis of reverse logistics activities, which has been described in depth in the literature through both theoretical contributions (Dowlatshahi, 2000; Govindan *et al.*, 2012) and explanations of case studies (Lau and Wang, 2009; Dowlatshahi, 2010).

Nevertheless, the literature currently lacks further case studies able to provide evidence of the convenience of outsourcing or insourcing the repair process (Agrawal *et al.*, 2015). Thus, this study aims to reveal the main benefits and costs when different strategies are applied.

3. Methodology

The purpose of this research was to investigate the impact of an outsourcing-insourcing decision-making strategy concerning the repair process on a retailer's profitability. Because of the exploratory nature of the research questions, a case study approach was implemented, as recommended by Ellram (1996) and is evident in other studies in the existing literature (Falle *et al.*, 2016; Sgarbossa and Russo, 2017; de Araújo *et al.*, 2018).The case study approach has an action-based research context (Falle *et al.*, 2016), in which researchers collaborate with practitioners (Enz and Lambert, 2015) to conduct in-depth investigations into practical

concerns (Stringer, 2007; Näslund *et al.*, 2010). While the action-based context has been recognised as having a relevant and valid role in the discipline of operations management (Coughlan and Coghlan, 2002), it represents a less popular research process in other disciplines (Näslund, 2002; Sachan and Datta, 2005). However, some studies concerning outsourcing operations (Momme and Hvolby, 2002) and the selection of reverse logistics providers (de Boer *et al.*, 2006) have been published illustrating how action-based research might be applied to specific case studies.

3.1 Case study

A single case study approach was chosen because of the existence of certain elements of uniqueness of the case company (Ellram, 1996; Yin, 2013). First, it appeared that the company applied three different strategies to manage the repair process. Second, the data collected during the action-based study refer to a period of three consecutive years (2015-2017), covering the outcomes obtained by each strategy. Third, the possibility of directly accessing primary sources avoided any manipulation of information flow.

Another element to explain the uniqueness of the case study is the industry sector: the analysis regards the returns management of housewares industry, which was recognized as being among the first retail categories of product to be returned (National Retail Federation, 2017; National Retail Federation, 2018). In addition, the online retailing channel in which the company operates provides a further interesting aspect, offering a valuable insight.

The case company was an Italian e-commerce retailer distributing coffee and hot drink capsules, and loaning coffee machines to consumers. The retailer operated in a niche market, where only branded high-quality coffee was distributed to consumers, who counted for a total of 1723 in 2015, 1973 in 2016 and 2000 in 2017.

The supply chain was structured as follows: the retailer directly bought all the items produced by a unique first-tier supplier, then sold the products to final customers through either the online market or agents hired by the company, and finally shipped the parcels through 3PLs providers. While the forward supply chain had been following a well-organised scheme, the reverse supply chain design had changed over time. The focus of the current analysis was on the repair process. More specifically, the research only concerns the reverse logistics of two items corresponding to two models of coffee machine: M4 and M8.

On average, the retailer shipped 600 M4 items per year and 500 M8 items per year to consumers. The retailer sold both new and reconditioned coffee machines to consumers.

3.2 Data collection

The primary data were collected through daily observations conducted by visiting the retailer's warehouse facilities and offices, and examining the available recordings, documents and reports of the company. In addition,

two qualitative semi-structured interviews with the retailer's managers formed part of the research aims: a preliminary interview to define the historical development of the company and its reverse logistics activities, and a final interview to determine the future course of action.

The following specific information was provided by the company: the retailer's employment labour cost per hour and the required time for each reverse logistics activity operated by the retailer. The data were collected between January 2017 and March 2017.

The analysis presents the outcomes concerning two models of coffee machines loaned simultaneously by the retailer. This allowed us to compare the internal outcomes and provide a clearer picture of the retailer's operations. To assess the figures concerned with the forward and reverse logistics activities of these two distinct models, we utilised the only characteristic that marked the unicity of each machine. Each item had a unique serial number, which was used to trace the items; thus, whether the specific item had been returned at least once during the analysed period could be ascertained. Our analysis counted a total number of 2120 for the M4 item serial number and 1126 for the M8 item serial number.

4. Findings

4.1 Three repair process strategies

The preliminary interviews delivered the first finding of this research. The company consecutively applied three different reverse logistics and repair process strategies over three consecutive years, without distinguishing the strategy for the two types of items, because they followed the same reverse logistics process.

The first reverse logistics strategy was the result of an already established framework between the retailer and the first-tier supplier: the producer's know-how and the standard fare paid per unit for the repair process were the determinants of a competitive strategy. The reverse supply chain presented a design based on the collection of a minimum required number of products by the repairing centre, that is, approximately 130 items. The collection process was internally managed in order to control whether the supposed number of items to be returned matched with the actual sent back coffee machines. Indeed, once the single unit entered the company warehouse facility, it was temporarily stocked on a pallet until the achievement of the threshold. Thereafter, the items were submitted to the repair centre of the first-tier supplier, repaired and shipped back to the retailer in a total of two months. The two main drawbacks of this strategy were the lack of agility in the repair process, because of the quantity requirements and the excessive time expenditure, and poor control over the repair process quality. Thus, the quality control on the (re)forwarded coffee machines represented a fundamental activity that was internally operated.

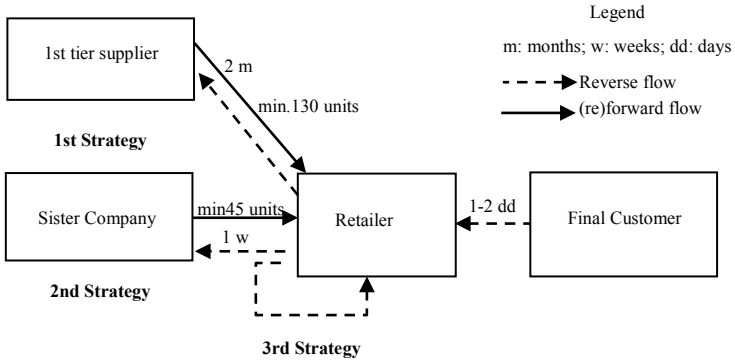
The second reverse logistics strategy was implemented to solve the aforementioned issues: while the collection process was insourced, the

retailer outsourced the repair process to a company pertaining to the same group of companies. The two companies were sharing the warehouse, which also constituted the location of the outsourced repair process. Thus, the repair company could provide the retailer with more control and a cut of the haul costs to the repair centre. In addition, the time and thresholds to repair the items were reduced to one week and 45 units, respectively, allowing the retailer to be more agile. In contrast, the repair costs rose, affecting revenues and thus reducing economic competitive advantage.

The third reverse logistics strategy derived from the benefits encountered in the second strategy. Observing the reduction of the transport cost to the repair centre, the increased control over the repair process quality and the obtained agility, the retailer internalised the entire repair process by hiring staff and procuring the necessary equipment and components.

The three reverse logistics strategies are depicted in Figure 1.

Fig.1: Three reverse logistics strategies



Source: Own elaboration

4.2 Average cost per repaired unit

The cost of the repair process was estimated using a cost function comprehending the direct and indirect operational expenditures pertaining to each strategy. The cost items were summarised into five categories: the reverse logistics cost, the unit's evaluation cost, the repair cost, the quality control cost, the packaging cost and the (re)forward logistics cost. It must be underlined that the comparative analysis among the strategies was conducted by focusing on the average cost per repaired unit, which was estimated by determining the cost of each single operation for each single unit, as shown in Table 1.

Accordingly, different outcomes were obtained for each strategy and for the two types of item (Table 2). While the first strategy presented some cost advantages, such as a standard fare for the repair and the unnecessary unit's evaluation, the reverse logistics and (re)forward logistics costs were relatively higher than in the other two strategies. In contrast, the second strategy showed a progressive increase, not only in the repair cost but also in the packaging cost for both items. Finally, the insourcing strategy brought about a cut in the repair cost but the emergence of the unit's

evaluation cost. Overall, item M4 was slightly more expensive than M8, except for the standard fare of the first strategy.

Tab.1: Cost estimation sources

Cost Activity	Estimation sources
Reverse logistics	Third-party logistics provider invoices
Unit's evaluation	Workforce: Internal accounts (time/unit) in €
Repairing	1st Strategy: Standard fare-first-tier supplier invoices 2nd Strategy: Workforce-sister company invoices; components-first-tier supplier invoices 3rd Strategy: Workforce (time/unit) in €; components-first-tier supplier invoices
Quality control	Workforce: Internal accounts (time/unit) in €
Packaging	1st Strategy: Standard fare- first-tier supplier invoices 2nd Strategy: Workforce-sister company invoices; components-first-tier supplier invoices 3rd Strategy: Workforce-internal accounts (time/unit) in €; components-first-tier supplier invoices
(Re)forward logistics	Third-party logistics provider invoices

Source: Own elaboration

Tab. 2: Average cost per repaired unit for each strategy

	1st Strategy		2nd Strategy		3rd Strategy	
	M4	M8	M4	M8	M4	M8
Reverse logistics	€ 9.48	€ 9.48	€ 7.98	€ 7.98	€ 7.98	€ 7.98
Unit's evaluation	€ -	€ -	€ -	€ -	€ 1.40	€ 1.40
Repairing	€ 18.00	€ 18.00	€ 21.76	€ 18.80	€ 15.71	€ 11.69
Quality control	€ 0.28	€ 0.28	€ 0.28	€ 0.28	€ -	€ -
Packaging	€ 3.00	€ 3.00	€ 5.32	€ 5.60	€ 5.32	€ 5.60
(Re)forward logistics	€ 8.50	€ 8.50	€ 7.00	€ 7.00	€ 7.00	€ 7.00
Average cost per repair	€ 39.26	€ 39.26	€ 42.34	€ 39.66	€ 37.41	€ 33.67

Source: Own elaboration

4.3 Return rate

Once the three strategies had been defined, the analysis proceeded by determining the return rate and consequently the number of units that were repaired in the specific period. First, we distinguished two types of product returns: items that the final customer wanted repaired and those that constituted returns owing to consumers' remorse or dissatisfaction.

The return rate was determined by analysing the serial number of each item to obtain the exact number of items returned over a specific time, distinguishing the reason behind the return (repair, remorse). The following formulas were then implemented:
where $r(t)_{REP}$ is the return rate at time t for the repaired items, $r(t)_{REM}$ is the return rate at time t for returned units for remorse, $Q(t)_{REP}$ represents the total returned units to be repaired at time t, $Q(t)_{REM}$ represents the total returned units for remorse at time t, $Q(t)_S$ is the total units shipped at time t and $Q(t)_C$ is the total units already by consumers at time t.

$$r(t)_{REP} = \frac{Q(t)_{REP}}{Q(t)_S + Q(t)_C}$$

$$r(t)_{REM} = \frac{Q(t)_{REM}}{Q(t)_S + Q(t)_C}$$

Tab. 3: Return rate

		1st Strategy	2nd Strategy	3rd Strategy
M4	$r(t)_{REP}$	12%	17%	14%
	$r(t)_{REM}$	3%	3%	2%
M8	$r(t)_{REP}$	5%	11%	12%
	$r(t)_{REM}$	1%	1%	2%

Source: Own elaboration

The return rate regarding the items to be repaired increased over the implementations of the second and third strategies, although the third brought a benefit compared with the second strategy. Moreover, these findings suggest that the returns for repairing were the real concern of this company. Indeed, the return rate for remorse or consumer dissatisfaction represented only a residual percentage.

5. Discussion

Our study emphasises the difficulties in managing e-commerce returns and reverse logistics practices, supporting the previous literature (Griffis *et al.*, 2012; Rao *et al.*, 2018), by showing how the repair process strategies have evolved in a small-sized e-commerce retailer who sought a solution for this issue. The research also identifies the cost items that might be associated with insourcing or outsourcing the reverse logistics activities, thus introducing in the literature a study also comprehending expert opinions as well (Ordoobadi, 2009). In addition, the cost-benefit analysis presents further evidence concerning the advantages and disadvantages that the single strategy brought, thus attempting to bridge the current gap in the literature.

First, the research extends the literature with a unique case study of an e-commerce retailer, which presents some peculiarities that justify the choice to opt for a unique case study analysis. More precisely, the description of the three different strategies and the outcomes obtained satisfy the need to provide more insights, not only into the outsourcing of reverse logistics activities (Li and Olorunniwo, 2008; Cheng and Lee, 2010; de Araújo *et al.*, 2018), but also on which cost items the retailer considered for the evaluation process (Ordoobadi, 2009).

Second, the repair service, seen as a reverse logistics activity, has increasingly played a competitive role for the case study company. Thus, an implication of the research concerns the choice, based on actual outcomes, between internalising or externalising the process, which helps to expand the literature by determining the possible disposition strategies that can

be implemented (Agrawal *et al.*, 2016) and considering the critical factors of a make-or-buy decision for reverse logistics activities (Vaz *et al.*, 2013). Comparatively, the analysis has highlighted the two main drivers that were relevant for the case company: the possibility for the retailer to control the repair procedures and the time and quantity constraints represent the main determinants that led the company to switch from one strategy to another. In addition, the costs of each operation have likely influenced the decision to outsource or insource the repairing within a specific period.

Third, the study aimed at measuring the impact of the various strategies on both the retailer's profitability, thus enriching the literature with this new analysis (Hjort and Lantz, 2016), and the customers' service perspective using the middle range theory (Pellathy *et al.*, 2018), that is, the company's ability to match the consumers' requirements through an appropriate strategy. Although the retailer had opted for different solutions to manage the repair process, which should theoretically have left the customer service unvaried, the evidence supports an impact on customer satisfaction concerning the items. More precisely, the fact that changing strategies implies a change in the returns rate demonstrates the direct effect of the different repair process on the final customers' evaluation of the repaired item.

Finally, the research develops a make-or-buy analysis in an action-base study, thus contributing toward the literature at theoretical level by presenting a valuable insight for the middle-range theory applied to the supply chain management.

6. Managerial implications

Our study reveals the impact that different strategies for the repair process had on the reverse logistics design; moreover, a cost-benefit analysis provides a base for the strategies' comparison. In detail, the research determines, through an exploratory study, the implications that an outsourcing-insourcing decision-making process brings to returns management processes carried out by a small-sized e-commerce retailer.

First, it appeared that the repair process was a concern for this firm, which attempted to solve it by applying three strategies. This analysis presents a pattern that practitioners might follow to determine costs and benefits of their reverse logistics practices. Indeed, the current study has revealed to the host company the main advantages and disadvantages of each strategy under an economic and operational point of view.

Second, the cost analysis displays an analytical estimation of relevant cost items that practitioners can implement to obtain a holistic view of the expenditure of their reverse logistics processes. In addition, other variables that might be unlikely evaluated together were considered to provide a comprehensive cost-benefit analysis.

Third, we developed a method to compare different repairing strategies under both an economic and the best practice point of view, which provides a full insight into a unique single case study of a small-sized Italian e-commerce retailer struggling with the reverse logistics process. The make-or-buy framework allowed the company to determine which

of the three strategies was the most feasible and convenient. In detail, the middle-range theory can help scholars to improve their relevance and interactions with managers when disseminating knowledge and improving practices (Lambert and Enz, 2017)

Finally, an appropriate best practice in the product returns management is to determine the more suitable strategy by considering the trade-off between different drivers, such as: efficiency, level of control and final customers satisfaction, as suggested by Sajjanit and Rompho (2019).

7. Limitations and future research

Despite its contributions, this study has certain limitations. Although it has been recommended in the literature to employ a single case study when it presents unique characteristics (Ellram, 1996; Yin, 2013), the research focuses on two products sold by a single company operating as an online retailer in the household appliance industry sector, limiting the scope of application of the strategies to other case studies. In addition, the analysis was carried out covering a certain period of three consecutive years, limiting the outcomes and the analysis. Nevertheless, the purpose to study and determine the best operations practice to manage the repair process was achieved. Future research should expand the case study to a greater number of companies, to an increased time framework and eventually to other industry sectors. Moreover, the evolving e-commerce scenario requires new capabilities to manage product returns and reverse logistics activities (Daugherty *et al.*, 2019).

Further, the research does not directly consider the impact that the strategies had on the final consumers, thus further studies might define the consequences for the consumers of the outsourcing or insourcing repair process in a reverse logistics context. Indeed, as recommended by Russo *et al.* (2019), different alternatives in managing returns might be implemented to increase the customers' satisfaction.

Finally, the company did not operate any form of returns avoidance, that is, the opportunity to avoid unwanted returns (Lambert and Enz, 2017), thus allowing consumers to complain liberally and return the item at any time. Future research could determine the implications that the implementation of this returns management activity has on consumers and on the rate of return, both in the case of repairs and in the case of remorse or dissatisfaction.

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Academic or professional position and contacts

Ivan Russo
Associate Professor of Management
University of Verona - Italy
e-mail: ivan.russo@univr.it

Nicolò Masorgo
Ph.D. Candidate
University of Arkansas - USA
e-mail: nmasorgo@uark.edu

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