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The Effectiveness of Reverse Logistics: The Empirical Test of Its Factors for Product Returns Reduction[1]

*Radoslav ŠKAPA – Alena KLAPALOVÁ**

Abstract

Within the context of reverse logistics (RL), only a few studies have focused on the management characteristics that lead to effectively implementing RL. From the myriad of potential factors of effective RL, the paper focuses on the role of knowledge management, 1st-tier integration and the extent of RL planning, as these factors and their mutual relations have been neglected by empirical research to date. The paper develops a theoretical model to fill this gap and tests it using structural equation modelling on primary data. The findings based on 146 cases support that knowledge management, the extent of RL planning and the level of integration with the 1st-tier supply chain members are the factors related to the effectiveness of RL. The study underpins the importance of long-term RL planning and deeper integration and collaboration with customers and suppliers for effective RL and so to reduce the negative impact of product returns.

Keywords: *reverse logistics, effectiveness, knowledge management, supply chain integration, planning, product returns*

JEL Classification: M10

Introduction

According to the most widely accepted definition, the reverse logistics (RL) is "the process of planning, implementing, and controlling the efficient, cost--effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose

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of recapturing value or proper disposal" (Rogers and Tibben-Lembke, 1999). Since the 1990s, RL and its related disciplines such as reverse/closed-loop supply chain management have received great interest from both the industrial and academic worlds (Prahinski and Kocabasoglu, 2006; Badenhorst and Nel, 2012). Companies have given a substantially higher priority to effective RL operations due to the increasing volume of products returned due to the liberal return policies, growing customer power and quality issues. These trends are reflected in customer relationship management practices, the globalization of sourcing and trade, shortening product life cycles, an increase of resource scarcity and the growth of legislation regulating and providing for the proper disposal of reverse flows as well as the still bigger imperative to search for the ways to reduce costs and to find new business opportunities (Agrawal, Singh and Murtaza, 2015; Govindan et al., 2015; Stock, Speh and Shear, 2002)

In harmony with the above processes, Vogt and de Wit (2005) and several other authors coined a broader conceptualisation of RL encompassing the entire management, financial flow, waste as one type of reverse flows, the potential of sustainable profitability as an outcome and perspective of the whole business. However, such a broadening of understanding also needs a relevant extension and more demands on management, both inside and outside the boundaries of a company, thus creating new challenges for research to discover which managerial factors lead to successful RL management.

Existing empirical research offers strong evidence of the many positive outcomes of effective RL including improved customer and supplier satisfaction and reputation with other stakeholders (Álvarez-Gil et al., 2007; Mollenkopf, Russo and Frankel, 2007), market protection (De Brito, 2004); value retrieval (Mollenkopf and Closs, 2005); legislative compliance and the development of a corporate image as a socially responsible enterprise (Piotrowicz, 2007; Verstrepen et al., 2007); decreased resource investment levels, higher profitability, gaining new business opportunities (Autry, Daugherty and Glenn, 2001); possibility of differentiation (Jayaraman and Luo, 2007); waste and cost reduction (Rogers et al., 2002; Stock, Speh and Shear, 2002); the speed and reliability of flexibility/processes and quality/processes (Verstrepen et al., 2007) being the most obvious effects stated by managers when asked.

The majority of companies recognise the importance of RL and the whole product return process, but only rarely adopt specific practices to manage them more efficiently and effectively (Russo and Cardinali, 2012).

Nevertheless, the research examining various characteristics of company management that support the effectiveness of RL processes is scarce (Mishra and Napier, 2014).

Whether RL management is effective depends on numerous factors, such as competencies of managers to cope with challenges and problems and their capabilities, which are in logistics context defined as "those attributes, abilities, organizational processes, knowledge, and skills that allow a firm to achieve superior performance and sustained competitive advantage over competitors" (Morash, Droge and Vickery, 1996, p. 1). However; studies devoted to RL capabilities specifically are missing, except for a few works on

- IT reverse logistics capabilities (Hazen et al., 2012; Morgan, Richey and Autry, 2016);
- information system capabilities (Hsiao, 2010; Jack, Powers and Sinner, 2010);
- return handling and reprocessing capabilities (Pfohl, Bode and Nguyen, 2012);
- capabilities of logistics information management, closed-loop, supply chain integration and coordination, conformity and institutional incentives (Vlachos, 2016).

Knowledge management assists in improving capabilities and competencies in general. This argument is very vaguely supported by research in logistics: As Krčál (2015) argues based on an intensive literature review, only a few studies exist that concentrate on knowledge management in the context of RL. Also, Lambert et al. (2011) conclude that more studies investigating the relationship between knowledge management processes and organisational effectiveness in RL are necessary.

RL is very information- and knowledge-intensive mainly due to the higher level of uncertainty and complexity (Bai and Sarkis, 2013; Wadhwa and Madaan, 2007). The level of uncertainty and complexity is deepened through different aspects and sometimes even actors within the supply chain in comparison to the forward flows. Thus, information and knowledge should be exchanged and shared with the external partners through the integration and collaboration process. RL can play an important role to integrate knowledge from customers about their experience with products with the knowledge of suppliers to deliver right inputs for the expected value creation for customers (Fugate, Stank and Mentzer, 2009) and thereby to reduce the amount of product returns or to get proper knowledge about the returned product status. Delivering right and expected product to the customer is one of the main contributors of superior effectiveness (Esper et al., 2010). Several experts call for the need to pay attention to the supply chain (1st-tier) integration in reverse supply chain processes and its impact on effectiveness, as this has been largely underexplored as well (Bernon et al., 2013; Mellat-Parast and Spillan, 2014).

Higher complexity and uncertainty as well as requirements for additional investments and involvement of further processes and activities in the case of RL demand not only operational or ad hoc decisions but also strategic planning (Jayaraman and Luo, 2007). The lack of strategic planning and limited forecasting is one of the greatest barriers to effective RL (Ravi and Shankar, 2005; Rogers, Melamed and Lembke, 2012; Ye, Zhao and Prahinski, 2013). Planning and related controlling are reckoned to be key success factors (De Brito, Dekker and Flapper, 2005).

Although the analysis made by De Brito, Dekker and Flapper (2005) is more than ten years old and carried out on the small sample of sources, after reviewing currently available research we can agree with their findings and highlight another shortage in the knowledge, which offers almost no insight into the planning as one of managerial functions connected to RL having some outcome. There is also just the very limited number of empirical findings demonstrating the relationship between the involvement of RL planning and company performance, so the relevance of this managerial factor is not clear enough and insufficiently supported.

Summarizing the gaps mentioned above in current knowledge and for the need for research, this paper aims to answer the following research questions and react to these calls:

RQ 1. How do particular managerial factors, specifically the areas of knowledge management, the extent of organisational planning and the level of integration and collaboration with the 1st-tier partners affect the perceived effectiveness of reverse logistics?

RQ 2. What is the nature of the mutual relationships between these factors?

1. A Literature Review of Selected Effectiveness Factors

1.1. Organizational Planning, Knowledge Management and Effectiveness of Reverse Logistics

RL may be an important "opportunity to build competitive advantage" as an integral part of organisational strategies and strategic planning (Stock, Speh and Shear, 2002, p. 16). Such integration enables a more systemic grasp and engagement of long-term goals that need the investment of specific resources in facilities, human resource training and operating and managerial activities (Ye, Zhao and Prahinski, 2013). Effectiveness is viewed in terms of goal attainment, with the best explanation as "the capacity of an organization to use its resources successfully toward specific ends" (Steers, 1975, p. 555) and as "the

most useful in comparative organizational research" (Georgopoulos and Tannenbaum, 1957, p. 534), because it expresses the success of the organization and thus its competitiveness.

RL planning should cover all planning horizons – strategic, tactical and operational because every level represents specific tasks and demands specific resources and results in specific expected and planned attainments (De Brito, Dekker and Flapper, 2005). Planning, and strategic planning specifically, lead to potentially higher effectiveness and competitiveness (Shaik and Abdul-Kadar, 2012), more than sustainable ones (Genchev, Richey and Gabler, 2011). Effective strategic planning is based on knowledge with strategic value (McKeen, Zack and Singh, 2006). Strategic knowledge management is interdependent with strategic planning as it enables the nurturing and deployment of core capabilities and resources across and from the outside of the company (Kruger and Snyman, 2004; McKeen, Zack and Singh, 2009). However, experience has shown that decisions in RL prevalently have an operational character, due to the reactive and not proactive character of decision making related to RL (Rogers et al., 2012).

1.2. Knowledge Management, 1st-tier Integration and Effectiveness of Reverse Logistics

RL need adequate knowledge management to help companies to be efficient and effective in their RL processes (Mihi Ramírez, 2012) due to its higher complexity and uncertainty as well as the specificities of many aspects and activities (Wadhwa and Madaan, 2007). Compared to forward logistics, reverse processes are more information intensive (Stock, Speh and Shear, 2002), especially in the case when organisations are dealing with several recovery options and of the design of the reverse supply chain is more in the form of a network with different actors.

Therefore, the information systems are a crucial actor in the success of RL being the backbone of knowledge management for many (Gunasekaran and Ngai, 2007) and being able to track and measure goal attainment (Hazen et al., 2012) and to assess the effectiveness of RL decisions and activities.

Knowledge management is expected to have a positive effect on performance as well as on relationship building and maintenance with customers and suppliers and the integration and collaboration with these stakeholders in the supply chain (Bernon et al., 2013; Tseng, 2014). One of the biggest barriers for its effective implementation is a lack of support from top management (Robinson et al., 2006) or low or lacking recognition of knowledge management as a strategic asset (Wang, Ahmed and Rafiq, 2008).

1.3. External Integration and Collaboration and Effectiveness of Reverse Logistics

RL as the critical element in supply chain management requires planning and effective execution and intensive interactions throughout the companies in the whole supply chain (Rogers et al., 2002) and often beyond the boundaries of one supply chain. Many successful stories testify to the fact that RL has a significant strategic impact on corporate performance in term of economic, social and environmental issues (Dowlatshahi, 2005; Lambert, Riopel and Abdul-Kader, 2011).

According to Gilmour (1999), customer and supplier integration are key logistics process capabilities, combined with information technology capabilities based on integration. Flynn, Wu and Melnyk (2010) explain the benefits of supplier and customer integration that helps to reduce waste through information sharing and joint planning and a better understanding of customer requirements with the results of minimising the return of products and maximising customer satisfaction. Better insight into supplier capabilities and resources, risk sharing, costs and investments, mutual problem solving, systematic waste reduction and elimination, reducing reverse operations of uncertainty and overcoming planning complexity could be other benefits which can lead to higher RL effectiveness in the supply chain (Liu et al., 2013; Mihi Ramírez, 2012).

2. Hypothesis Formulation and Proposed Model

To address the gaps in current knowledge introduced above, a model of RL effectiveness, the extent of RL planning, knowledge management, and external integration is proposed in Figure 1 for empirical testing. Four types of flexibility exert mediating influences on the strategic planning and performance relationship. The conceptual development of the model and theorised relationships were discussed in the previous part of the paper. The model is composed of four variables and the proposed, and expected relationships are expressed in the following hypotheses:

H1: *The extent of the formal planning of RL is positively linked to RL effectiveness.*

H2: *The extent of integration with 1st-tier supply chain members is positively linked to RL effectiveness.*

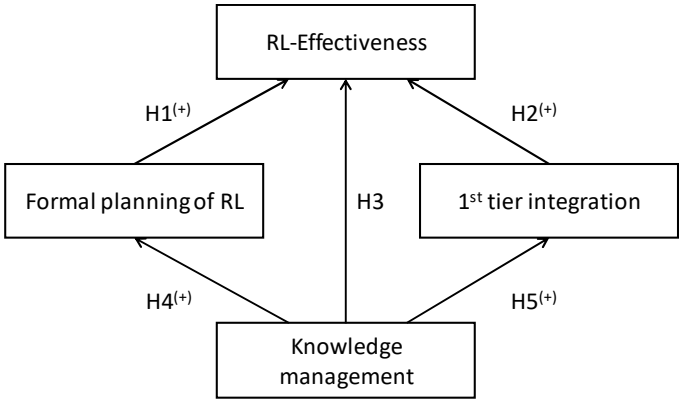
H3: *The extent of knowledge management principles applied is positively linked to RL effectiveness.*

H4: *The extent of knowledge management principles applied is positively linked to the extent of the formal planning of RL.*

H5: *The extent of knowledge management principles applied is positively linked to the extent of integration with 1st-tier supply chain members.*

F i g u r e 1

Theoretical Model



Source: Authors based on literature review.

3. Research Methodology

The proposed model was tested statistically employing the cross-sectional data from 146 companies; more specifically, nominal and ordinal data were collected in personal interviews with company managers. In the interviews, the facts about practices of particular companies were enquired, focusing on RL and its (potential) factors. The paper utilises just a portion of the variables from all interviews: The analysis tested the relationships between the RL effectiveness and three potential factors: the extent of the formal planning of RL, the integration with 1st-tier supply chain members, and knowledge management. Besides the three dependent and one independent variable, the demographical data were used for sample descriptions such as the respondent's identification, company size, and industrial affiliation.

As the proposed hypothesis are interlinked and create a complex model, the covariance-based structural equation modelling (SEM) was chosen for reprocessing statistical data. SEM is not mere statistical technique but rather "an analytical process involving model conceptualization, parameter identification and estimation, data-model fit assessment, and potential model respecification" (Hancock, Mueller and Stapleton, 2010, p. 371), thus the analytical work followed the recommended standards for conducting the SEM and presenting its findings as suggested by Schreiber et al. (2006). The nature of SEM allowed

us also to construct some variables as latent (unobserved), which improved the reliability of measurement of the variables.

Formally, both parts of structural equation model (i.e. the measurement and structural part) can be specified using the Bentler-Weeks (1980) format as follows (for more details about this format and other standard formats developed specifically for SEM see Hoyle, 2012, p. 131).

Measurement model (1)

$$rl\_e1 = 1RL\_Effect + e1$$
$$rl\_e2 = *RL\_Effect + e2$$
$$rl\_int\_c = 1RL\_Ex\_int + e3$$
$$rl\_int\_s = *RL\_Ex\_int + e4$$
$$km1 = *KM + e5$$
$$km2 = *KM + e6$$
$$km3 = 1KM + e7$$

Structural model (2)

$$RL\_plan = *KM + e8$$
$$RL\_Ex\_int = *KM + d2$$
$$RL\_Effect = *RL\_Plan + *KM + *RL\_Ex\_int + d1$$

where

KM	– unobserved, exogenous variable,
RL_Effect , *RL_Ex_int*	– unobserved, endogenous variables,
RL_plan	– observed, endogenous variables,
rl_e1, rl_e2, rl_int_c, rl_int_s, km1, km2, km3	– observed, endogenous items,
d1, d2	– errors associated with unobserved, endogenous variables,
e1 – e8	– errors associated with items.

The content of particular variables and items is further described in Table 1, and a graphical form of the model is depicted in Figure 2. The observed variables/items were constructed as ordinal on a positively defined scale from 1 to 7; higher scores denoted stronger agreement with a given statement, whereas "1" stood for strong disagreement. The calculations were conducted in SPSS v.24 and SPSS AMOS v.23.

3.1. Measurement of Endogenous and Exogenous Variables

No exact financial measures from accounting documents could be utilized to measure RL-effectiveness, as 75% of companies stated in a separate open-ended question that they did not monitor the RL effectiveness by any exact mean. It is

interesting that the remaining one fourth of companies in the sample utilized accounting methods in 19 cases (e.g. KPI, maintaining the RL cost limit, process costing, and stocktaking), quality management tools in 7 cases (e.g. quality checklist and Cost of Quality Model) and marketing research in 4 cases (surveys/interviews about customer satisfaction or an analysis of customer claims). Also, the eight respondents stressed the importance of the support of information systems for the above methods and tools.

As most of the companies disposed of no reliable data about the RL effectiveness, the variable labelled as RL_Effect was designed as latent reflecting two statements about perceived effectiveness. The wording of the items for all variables and basic descriptive statistics are presented in Table 1.

T a b l e 1

Description of Variables and Items

Variables and their names	Items (scales)	Median	Mean	Std. dev.	N
RL_Effect *Effectiveness of RL*	(rl_e1) The executive management perceives reverse logistics as useless (reverse coding)	5	5.02	1.59	146
	(rl_e2) The executive management perceives reverse logistics as a competitive advantage	4	4.37	1.57	146
KM *Knowledge management*	(km1) Knowledge is managed as a strategic asset.	5	4.74	1.63	143
	(km2) Knowledge management is planned and integrated into all corporate processes.	5	4.32	1.73	146
	(km3) We have systems and venues for people to share knowledge and learn from each other in the company.	4	3.74	1.84	146
RL_Ex_int *1st-tier integration of RL*	(rl_int_c) The external integration with your direct customers regarding reverse flows is perfect.	3.5	3.55	1.60	146
	(rl_int_s) The external integration with your direct suppliers regarding reverse flows is perfect.	4	3.88	1.56	146
RL_Plan *Extent of RL-planning*	(RL_Plan) RL is part of: strategic planning + functional strategic p. + tactical p. + operative p.	.5	.541	0.36	146

Note: All items vary from 1 to 7, except for planning ranging from 0 to 1.

Source: Authors based on own empirical data.

The integration with 1st-tier supply chain members (RL_Ex_int) and Knowledge Management (KM) was constructed as latent and reflective. The first one merged two scale items: the integration with direct suppliers and direct customers; as such, the RL_Ex_int expresses the level of SCM adoption regarding reverse flows. The measurement of SCM adoption was restricted to the triad of supplier-company in focus-customer, instead of evaluating the whole supply chain/network as the broader SCM cooperation is hardly covered in the research due to related difficulties (Autry and Griffis, 2008; Bellamy and Basole, 2013).

The three items addressed the application of knowledge management in a particular company. The items, which examined organisational memory, knowledge receptivity, and sharing, were adapted from Wang, Ahmed and Rafiq (2008). To keep the respondent load reasonably low, which was imposed by the questionnaire, more complex maturity models for knowledge management were omitted.

Planning RL, or more precisely the level of its planning, was expressed by an index which counted the frequency of the four dichotomous variables reflecting the presence or absence of RL on the following planning levels: on the company-wide strategic plan, the functional strategic plans, and on tactical and operational plans. The companies were awarded a 1/4 point if RL planning was present at any of these levels; the index varied from 0 to 1 in the sum, which indicated the presence of RL plans on all four planning levels. RL planning was the most common at the operative level (67%).

In the analysis, RL planning was modelled as an observed variable, i.e. the variable measured precisely without any error. This decision was made in harmony with a recommendation by Schumacker and Lomax (2010) for two reasons: First, the meaning of the variable – RL planning – is a rather concrete and specific piece of information, compared to the other variables in the model, which are more abstract and complex and as such need to be modelled as latent. We can expect that the planning is measured with sufficient precision. Second, the alternative of constructing RL planning as a latent variable defined by a single item (plus a measurement error) would add more complexity to the statistical model (i.e. the number of estimated parameters would increase) without providing any adequate benefit in return.

3.2. Research Sample and Its Description

For practical reasons, convenience sampling was chosen as an acceptable way for research of an exploratory nature. The structured personal interviews were conducted in 2015 and 2016 among representatives of companies operating on the Czech market. The Czech Republic itself, as a member state of the EU, adopted EU legislation and policy (including RL-related issues such as waste management and consumer rights). Taken together with the fact that the Czech Republic has been the member of OECD for more than two decades, the business environment here can generally be regarded as similar to other European/ EU countries.

The sample comprised of 149 cases, out of which three cases were removed due to missing data in the variables/items. The final sample consisted of 146 companies, of which 64% of them are the services according to their respective

core business activity as declared by respondents. Small companies operating in the hospitality industry forms the majority of this group. The remaining 36% of the final sample is represented by manufacturing companies that operate in mechanical engineering, and the chemical, food, and construction industries. The structure of the sample regarding industry affiliation and size, as measured by a number of employees is presented in Table 2.

T a b l e 2

Sample Structure (in %)

Affiliation	**Size of the companies***			Total
	Small	Medium-sized	Large	
Manufacturing	12.4	17.9	5.5	35.9
Services	57.2	6.9	0	64.1
Total	69.7	24.8	5.5	100.0

Note: * Small companies are defined by less than or equal to 50 employees and 250 for medium-sized comp.

Source: Authors based on own empirical data.

The companies in the sample perceive their RL as being effective, as the mean for both respective items is through the cut-point of the scale (i.e. above 4; see Table 1). The conclusion is supported by an estimated percentage of the RL impact on corporate profitability, which was also investigated in the interviews, but not utilised in the further analysis. The answers about the impact ranged from 3% to 80%, with a mean value of 3.8%. The positive mean value suggests that RL improves the economic performance of companies in general.

The respondents agreed more often that knowledge management was applied in their companies than the external integration (SCM), which is apparent from higher mean values for the knowledge management items. The latest study on this topic revealed that knowledge management is not applied systematically in 85% of Czech companies (Maresova, 2010). Due to the lack of empirical studies on SCM, the only available number comes from the Czech Statistical Office – in the research on ICT adoption, one fifth of companies disposed of any information technology for data interchange with 1st-tier supply chain members; however, specific SCM software was implemented only 2% of the time (CZSO, 2016).

4. Results

The statistical analysis is presented in two steps - first, the measurement model is evaluated using confirmatory factor analysis, followed by an analysis of the structural model using structural equations modelling with an estimation method of maximum likelihood.

4.1. Test of the Measurement Model

The convergence validity of latent variables was tested by three different measures as presented in Table 3: For each variable, Cronbach's Alpha is above the recommended cut point of 0.7. Similarly, two other indicators, Average Variance Extracted and Jöreskog rho, are higher than their recommended cut points of 0.7 and 0.5 respectively (Hair et al., 2009). Thus, the convergence validity of the three latent variables was accepted to be sufficient for conducting further analysis.

T a b l e 3

Measures of Convergence Validity

Indicators' names	KM	RL_Ex_int	RL_Effect
Cronbach alpha	0.769	0.715	0.742
Construct reliability (CR) Joreskog rho	0.807	0.731	0.775
Average Variance Extracted	0.598	0.581	0.642

Source: Authors based on own empirical data.

Confirmatory factor analysis was employed to test the measurement model, which consisted of the three latent variables loaded by seven observed variables (two for external integration, two for RL effectiveness, and three for knowledge management). Confirmatory factor analysis is a part of SEM for testing the system of variables; it checks the relationships between (observed) items and latent variables or "factors", which are reflected in the items (Hoyle, 2012, p. 361).

The validity of the measurement model was supported by chi-square test $\chi^2(11, 146) = 13.960$, $p = .235$ – its non-significance indicated similarity between the measurement model and the empirical data. As the Chi-square test is not very reliable in some cases, additional model-fit tests were supplemented. The test values of the Comparative Fit Index (CFI = 0.991), Incremental Fit Index (IFI = .991) and Root Mean Square Error of Approximation (RMSEA = 0.043) speak in favour of the model as their values exceeded the recommended cut points of 0.95 for CFI and IFI, and were less than 0.06 for RMSEA (Hair et al., 2009; Schreiber et al., 2006).

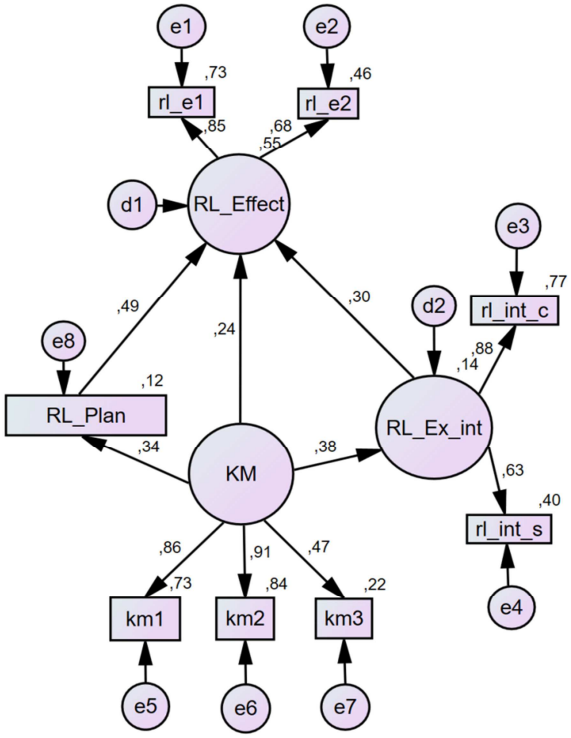
4.2. Test of the Structural Model

The structural model tested all the five hypotheses as presented in Figure 2. The observed variables (in boxes) and unobserved variables (in circles; including estimated errors) are connected with arrows representing the regression paths. The associated numbers are the standardised regression weights (placed near the arrows) and squared multiple correlations (in the upper right-hand corner of

the boxes). The model-fit was evaluated according to the same criteria: The insignificance of the Chi-square test χ^2 (16, 146) = 23.247, p = .107 supported the idea that the model corresponds to the structure of empirical data. Additionally, CFI = .981, IFI = .982 and RMSEA = .056 are in harmony with the recommended values as specified above, which means that the whole model can be accepted, and it is sensible to analyse its elements in detail.

F i g u r e 2

The Structural Model and the Standardised Regression Weights



Source: Authors based on own empirical data.

All structural relationships in the model were statistically significant (see Table 4) and positive, as expected (see the p-value and standardised regression weights that are positive). In other words, the hypothesis H1 – H5 were supported: The planning of RL was the strongest factor of the RL effectiveness according to its standardised regression weight (H1: $\beta = 0.489$, $p < 0.000$). The other two factors had a lower impact (external integration of RL – H2: $\beta = 0.297$, $p < 0.01$; knowledge management – H3: $\beta = 0.235$, $p < 0.05$), but were still statistically significant. The low regression weight in knowledge management only reflected its direct effect. As implicated by the theoretical model, the KM impact is

mediated through both planning (H4: $\beta = 0.344$, $p < 0.000$) and external integration (H5: $\beta = 0.377$, $p < 0.000$). When taking direct and indirect effects together, the model documents the high significance of KM for RL. In statistical terms, the model explains 55.2% of the variance in RL effectiveness and as such the explanatory power of the model is satisfactory.

T a b l e 4

Regression Weights

			Estimate	S.E.	C.R.	P	Stand. reg. weights	Hypothesis
RL_Effect	<---	RL_Plan	1.809	.294	6.149	***	.489	H1
RL_Effect	<---	RL_Ex_int	.289	.107	2.710	.007	.297	H2
RL_Effect	<---	KM	.363	.155	2.343	.019	.235	H3
RL_Plan	<---	KM	.144	.042	3.435	***	.344	H4
RL_Ex_int	<---	KM	.598	.178	3.358	***	.377	H5
km1	<---	KM	1.607	.283	5.687	***	.856	
km2	<---	KM	1.821	.323	5.643	***	.915	
km3	<---	KM	1.000				.472	
rl_int_s	<---	RL_Ex_int	.736	.176	4.175	***	.633	
rl_int_c	<---	RL_Ex_int	1.000				.880	
rl_e1	<---	RL_Effect	1.000				.852	
rl_e2	<---	RL_Effect	.795	.112	7.079	***	.682	

Source: Authors based on own empirical data.

Conclusions

Our research reacts to the appeal of Hazen et al. (2012) and shows some managerial factors that should be evaluated from a strategic perspective to be pursued for the higher effectiveness of RL decision making.

The contribution of our research and consequent implications is manifold. First, we present a theoretical model that simultaneously captures several managerial factors and links them with the important outcome of RL management, specifically concerning effectiveness (the perceived impact of RL management on competitiveness). Second, the paper provides empirical support for the linkages and roles of the factors tested from the model, so it can serve as a springboard for considering existing practices in companies related to the investigated factors. It also supports and expounds on the findings from several existing research that call for verifying their findings, e.g. Bernon et al. (2013) and the linkage between supply chain integration and performance; (Mihi Ramírez, 2012) and the impact of knowledge management and performance in the context of RL; or Liu et al. (2013, p. 2126), who claimed that there is little research devoted to knowledge management tools "that can efficiently allow knowledge sharing and re-use to support integrated supply chain waste elimination decisions").

Third, the research enriches current knowledge in the area of utilising knowledge management, the role of planning and the role of the external integration with supply chain partners for effective RL management and so responds to the numerous calls for needed insight. Findings bring insights into several Supply Chain Management processes (specifically Customer and Supplier Relationship Management and Returns Management) within Supply Chain Management Framework developed by Lambert and Cooper in 2000. Research reacts to Lambert and Enz (2017) review of the progress related to this framework within 16 years and their impetus for new research streams and demonstrates the importance of knowledge, returns and RL management, as well as supply chain integration and strategic management capabilities for organisational performance and sustainable competitive advantage. Fourth, evidence from a European perspective is presented since the sample is composed of Czech companies and the European Union has been traditionally more active on RL, especially from the aspects of legislative, environmental and consumer protection.

Results confirm the interdependencies between the planning and especially strategic planning of RL processes, knowledge management, 1st-tier integration and RL effectiveness. Companies that are aware of the potential of RL management regarding the reduction of negative impact of product returns and of positive impact on competitiveness, incorporate RL into planning on the higher hierarchical level. These companies also consciously and strategically manage their knowledge – again in terms of planning on the strategic level and in terms of dealing with knowledge in all processes and taking care of sharing knowledge and supporting the proper environment for continuous learning. Finally, companies, which are aware of the positive effect of RL on performance utilise more the benefits of the integration with customers and suppliers. Such integration enables more effective information flow and knowledge sharing which can lead to product returns decrease. It means that knowledge of the positive effect of RL is connected with other processes of management in an organization, which are also associated with profitability and competitiveness.

There are two main limitations of the findings presented: Due to funding restrictions, a non-random sampling procedure, or convenience sampling, was accepted, as the purpose of the study was largely explorative. Naturally, the limited external validity of the results is the downside of this decision. The single informant approach is the second limitation of the study: the reprocessed data are biased by the subjectivity of the respondents, because several questions in the interview asked for data that companies do not measure, collect and reprocess thoroughly. Thus, the answers of the respondents reflect their perceptions and estimations.

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