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Gatekeeping and Circular Supply Chains: Associations with Perceived Reverse Logistics Performance

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ABSTRACT

Background: Gatekeeping involves assessing return requests against defined criteria and directing them to appropriate pathways. This study examines how operational, strategic and relational aspects of gatekeeping are associated with perceived reverse logistics performance.

Methods: A sequential mixed-methods design combined ten semi-structured interviews with a survey of a non-probability judgement sample of 220 e-commerce logistics professionals. The interview guide addressed operational, strategic and relational practices; the thematic analysis informed the questionnaire. The initial 22-item instrument was reduced to 14 items using an exploratory principal component analysis with varimax rotation. Internal consistency and multiple linear regression were assessed in IBM SPSS Statistics 26.

Results: The reported Cronbach's alpha coefficients ranged from .75 to .84. Operational gatekeeping ($\beta = .413$, $p < .001$) and strategic gatekeeping ($\beta = .296$, $p < .001$) had positive conditional associations with perceived performance. The relational coefficient was positive but not statistically significant ($\beta = .079$, $p = .302$). These estimates describe the reported survey model; incomplete measurement and model-fit reporting limits their interpretation.

Conclusions: The findings connect operational and strategic gatekeeping practices with higher perceived reverse logistics performance in the participating sample. They do not establish causal effects, measured cost or environmental improvements, or indirect effects through customer trust and loyalty. Relational practices remain relevant to the interview accounts and require further study with customer-related measures.

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1. Introduction

Reverse logistics concerns the management of reverse flows of products, materials and related information for recovery or appropriate disposal. These flows include commercial returns as well as products returned after use; they are not limited to post-consumption waste (de Brito & Dekker, 2004; Badenhorst, 2017). Repair, reuse, refurbishment and recycling can support circular supply chains, although their economic and environmental out-

comes depend on the products, recovery processes and transport involved.

Gatekeeping is an early decision process for assessing whether a return meets defined conditions and determining how it should be handled. Badenhorst (2013) discusses gatekeeping among practices for addressing reverse logistics costs, while Lambert et al. (2011) include it within a wider decision framework. Screening may help avoid unnecessary movements, but fewer accepted returns alone do not demonstrate better circular performance. Eligible returns and products requiring recovery still need an appropriate route.

This study examines associations between three aspects of gatekeeping and perceived reverse logistics performance. It considers operational procedures, strategic alignment and customer-facing communication. The aim is to develop an exploratory account of these relationships, rather than measure actual changes in logistics costs, recovery rates or emissions.

The research combines ten semi-structured interviews with a subsequent survey of 220 logistics professionals in e-commerce. The interviews inform the measurement domains, and multiple regression examines their conditional associations with perceived performance. The findings are interpreted within the limits of the sampling, measurement and cross-sectional design.

2. Literature review

2.1. *Gatekeeping in reverse logistics*

Gatekeeping involves checking information such as purchase records, return deadlines, product condition and reasons for return. These checks can inform acceptance, redirection and the choice of recovery pathway. Damage or prior use is not, by itself, evidence that a return is unjustified: the appropriate decision depends on the return conditions and the purpose of recovery. Badenhorst (2013) presents gatekeeping as one possible practice within a broader approach to reverse logistics costs.

The relevant literature addresses different levels of decision-making. De Brito and Dekker (2004) provide a general framework for reverse logistics. Lambert et al. (2011) propose a decision framework covering gatekeeping and other system elements and illustrate it through industrial cases. Badenhorst (2016) examines the perceived importance and implementation difficulty of practices intended to overcome operational barriers. These contributions provide a basis for studying structured return decisions; they do not establish a universal causal reduction in costs from gatekeeping.

Operational arrangements may include standard procedures, information systems and return merchandise authorisation. Badenhorst (2013) discusses authorisation systems alongside gatekeeping. Their practical value depends on how decisions are made and communicated. Badenhorst (2017) identifies strategic planning, staff training and supply chain collaboration among important management practices. That study does not demonstrate that automated filtering itself produces customer trust.

Avoiding unnecessary transport and handling could reduce resource use, but this remains a conditional expectation. Badenhorst's (2013) study combines a literature review with a small South African survey of perceived practice importance and feasibility. It is not a before-and-after evaluation of retailers' carbon emissions. Environmental claims therefore require separate indicators of transport, waste and recovery outcomes.

Stock and Mulki (2009) examine returns-processing practices among manufacturers, wholesalers or distributors, and retailers. Their study provides empirical evidence about responsibilities, processing arrangements and disposition choices. These organisational arrangements are relevant when studying how firms manage reverse flows. Return rates and recovery outcomes also need to be interpreted within their specific sector, period and population.

At the supply chain level, Linton et al. (2007) discuss sustainability across production, consumption and product disposition. Their contribution supports considering the wider system when evaluating returns management. The present study consequently treats gatekeeping as one part of a wider reverse logistics system, whose outcomes depend on subsequent processing and recovery decisions.

2.2. *Perceived reverse logistics performance*

Reverse logistics performance can be examined through costs, processing time, recovery outcomes and environmental indicators. Customer experience is a related concern, but it is not interchangeable with the full social dimension of sustainability. Clift (2003) distinguishes techno-economic, ecological and social dimensions when considering supply chain sustainability metrics.

Banihashemi et al. (2019) review reverse logistics performance in relation to economic, environmental and social sustainability. Their review identifies an imbalance in attention across these dimensions, including limited treatment of social outcomes. Malindzakova et al. (2022) analyse a deposit and collection system for disposable beverage packaging in Slovakia, including investment requirements. This packaging-specific analysis does not establish that every product-return system improves profitability and environmental performance.

Wang et al. (2017) map the reverse logistics literature through bibliometric analysis. Their work identifies research themes and opportunities; it is not a direct test of whether return fairness, speed or flexibility causes customer loyalty. These customer-related outcomes are possible subjects for a separate study.

Shaik and Abdul-Kader (2013) develop a comprehensive performance measurement methodology for transportation in reverse logistics. This work supports aligning measures with organisational objectives and considering several aspects of performance. A short self-report scale,

however, does not replace a comprehensive operational or environmental assessment.

Kariuki et al. (2022) report a positive relationship between reverse logistics and performance in Kenya's horticultural sector. The sector and study design limit its use as evidence for the present e-commerce setting. Together, these sources motivate an examination of gatekeeping while leaving the direction, magnitude and transferability of its relationships open to empirical assessment.

The present analysis uses professionals' perceptions of reverse logistics performance. It considers whether operational procedures, strategic alignment and relational practices are associated with that perceived outcome. It does not assume that rejecting more returns improves performance or that a favourable perception establishes a measurable sustainability gain.

3. Methodology

A sequential mixed-methods design combined an exploratory qualitative phase with a subsequent quantitative phase. The interviews provided accounts of return-filtering practices and informed the questionnaire. The survey examined associations between the resulting measurement domains and perceived reverse logistics performance.

Ten semi-structured interviews were conducted between March and April 2024. Participants had direct experience in returns management in e-commerce, distribution or transport. They included logistics, quality, operations and after-sales managers, as well as field operational staff. Interviews lasted 30 to 45 minutes, took place in person or remotely, and were recorded with prior participant consent and transcribed.

The interview guide addressed three areas: operational practices, including procedures, validation criteria and tools; strategic considerations, including costs, value recovery and sustainability objectives; and relational practices, including communication, dispute management and perceived fairness. The reported thematic analysis organised recurring practices within these areas and informed the questionnaire. Because the guide already contained the three domains, the analysis is not treated as an independent inductive discovery or confirmation of them.

The quantitative phase surveyed e-commerce logistics professionals. The initial questionnaire contained 22 items covering three gatekeeping domains and perceived reverse logistics performance. All items used a five-point agreement scale, from 1 = strongly disagree to 5 = strongly agree.

The reported item-reduction procedure used principal component analysis (PCA) with varimax rotation. Fourteen items were retained: four operational, three strategic, three relational and four perceived-performance items. PCA is described here as exploratory data reduction, rather than a confirmatory factor analysis or a common-factor extraction method (Field, 2024; Tabachnick & Fidell, 2019). The retained items were used in the reported internal-consistency and regression analyses.

A non-probability judgement sample of 220 professionals was selected for experience in returns management. The reported role distribution was 34% logistics managers, 28% after-sales service managers, 21% quality managers and 17% field operational staff. These percentages describe the sample; they do not establish population representation. The survey's geographical coverage, collection dates, recruitment denominator and response rate are not specified.

IBM SPSS Statistics 26 was used. The analysis included the Kaiser-Meyer-Olkin (KMO) measure, Bartlett's test of sphericity, exploratory PCA and Cronbach's alpha. Item wording, component loadings, communalities, eigenvalues, retention rules and scoring procedures are not reported. The available summaries therefore allow only a limited assessment of the measurement procedure.

Multiple linear regression used perceived reverse logistics performance as the dependent variable and the operational, strategic and relational scores as predictors. The results below present the reported standardised coefficients, t statistics and p values. A consistent overall model-fit summary is unavailable, so explained variance is not interpreted.

Regression inference depends on assumptions concerning functional form, residual variance, independence and error distribution, together with adequate control of multicollinearity (Field, 2024; Tabachnick & Fidell, 2019). Diagnostic results are not reported, so compliance with these assumptions cannot be established from the summaries.

4. Findings

4.1. *Qualitative findings and hypotheses*

The ten interview participants described operational, strategic and relational aspects of gatekeeping across the sectors identified in the methods. These accounts concern professional perceptions and experiences. They are not direct measurements of cost savings, emissions or customer responses.

Operational accounts concerned return criteria, preliminary checks and decisions about product condition, deadlines and reasons for return. A logistics manager described the perceived time benefit as follows:

> "We filter from the beginning to avoid non-recoverable products or unjustified requests. This saves us a huge amount of logistical time."

Strategic accounts connected filtering with cost control, recovery potential and sustainability aims. An operations director stated:

> "We cannot talk about sustainable logistics if we accept all returns without distinc-

tion. Sorting is the first step toward circularity."

Relational accounts emphasised explaining decisions and supporting customers when requests were refused or redirected. An after-sales manager explained:

> "We need to explain why some returns are refused. When we are clear, customers understand and frustrations are avoided."

These quotations illustrate participants' views. They do not show that every refusal saves resources, that customer frustration is always avoided, or that product sorting alone produces circularity. The reported benefits depend on appropriate acceptance and recovery decisions.

The interview material informed three survey domains. Operational gatekeeping covered filtering procedures, validation criteria and automation. Strategic gatekeeping concerned alignment with sustainability, profitability and value recovery. Relational gatekeeping covered communication, customer support and perceived fairness. This organisation provided a working conceptual framework, rather than an independent validation of the scales.

Three hypotheses addressed positive associations with perceived reverse logistics performance:

H1: Operational gatekeeping is positively associated with perceived reverse logistics performance.

H2: Strategic gatekeeping is positively associated with perceived reverse logistics performance.

H3: Relational gatekeeping is positively associated with perceived reverse logistics performance.

4.2. *Quantitative findings*

4.2.1. Exploratory measurement assessment and internal consistency

For the initial 22-item instrument, the reported KMO value was .812. Bartlett's test was significant, $\chi^2(231) = 944.62$, $p < .001$. The 231 degrees of freedom are consistent with 22 items. These summaries indicate that the correlation matrix is not an identity matrix and offer a basis for exploratory reduction; they do not confirm a specific construct structure.

The reported PCA with varimax rotation was used to reduce the instrument from 22 to 14 items. The retained items were assigned to the three gatekeeping domains and the performance scale. Without item-level output or an independent validation sample, the distinctness and stability of these constructs cannot be established.

Table 1 Initial, retained and removed items

Construct	Initial items	Retained items	Removed items
Operational gatekeeping	6	4	2
Strategic gatekeeping	5	3	2
Relational gatekeeping	5	3	2
Perceived reverse logistics performance	6	4	2
Total	22	14	8

Source: Item counts reported for the study's SPSS analysis.

Table 2 presents the reported Cronbach's alpha coefficients for the retained scales. The coefficients range from .75 to .84 and provide an indication of internal consistency. Alpha alone does not establish unidimensionality, construct validity or the absence of overlap between predictors and the outcome.

Table 2 Reported internal-consistency coefficients

Dimension	Number of retained items	Cronbach's α
Operational dimension	4	.81
Strategic dimension	3	.77
Relational dimension	3	.75
Perceived reverse logistics performance	4	.84

Source: Scale summaries reported for the study's SPSS analysis.

The 14 retained items preserve the intended domain labels. The interpretation remains exploratory because the item content, selection details and scoring are unavailable. In particular, agreement between operational practices and perceived operational performance may partly reflect overlapping content.

4.2.2. Multiple linear regression

The reported regression includes 220 observations and three predictors, with perceived reverse logistics performance as the outcome. The residual degrees of freedom are 216, consistent with an intercept and three predictors. Table 3 reproduces the coefficient summaries. It does not provide a complete assessment of model fit or predictive accuracy.

Operational gatekeeping has the largest reported standardised point estimate ($\beta = .413$, $t(216) = 6.582$, $p < .001$). Strategic gatekeeping also has a positive coefficient ($\beta = .296$, $t(216) = 4.217$, $p < .001$). Each coefficient describes its conditional association with perceived performance, holding the other two predictors constant. No test of the difference between these coefficients is reported.

The relational coefficient is positive but not statistically significant ($\beta = .079$, $t(216) = 1.034$, $p = .302$). This result does not demonstrate a zero association, establish the absence of organisational value or identify an indirect pathway. Statistical significance depends on uncertainty as well as the estimated coefficient.

Table 3 Reported multiple-regression coefficients

Independent variable	Standardized β	t(216)	p
Operational dimension	.413	6.582	< .001
Strategic dimension	.296	4.217	< .001
Relational dimension	.079	1.034	.302

Source: Coefficients reported for the study's SPSS analysis.

Within this reported model, the positive operational and strategic coefficients are consistent with H1 and H2. H3 is not supported at the conventional .05 level. These findings concern a cross-sectional perception measure and do not establish causal effects.

Trust, satisfaction, fairness and loyalty were not tested as mediators. Any indirect relational pathway remains a research hypothesis. The present results cannot be used to compare the timing of operational, strategic and relational effects.

5. Discussion

5.1. *Interpretation of the findings*

The study brings together professionals' accounts of gatekeeping and reported associations from an e-commerce survey. The interviews provide context for the operational, strategic and relational domains. The regression summaries connect the first two domains with higher perceived performance in this sample. The evidence does not establish that the three coefficients differ statistically from each other.

Operational gatekeeping

The operational coefficient is consistent with the view that clear criteria and structured procedures matter to professionals' assessments of return handling. De Brito and Dekker (2004) provide a broader framework for reverse logistics, and Lambert et al. (2011) include gatekeeping within a structured decision process. The reported association complements these conceptual accounts without demonstrating the effect of a particular screening intervention.

Preliminary assessment may help determine the appropriate route before transport, inspection or storage resources are committed. The relevant objective is an appropriate decision, including acceptance or recovery where needed. A damaged product may require repair or another recovery route; refusal is not automatically the efficient or sustainable option.

Avoided unnecessary movements could have economic and environmental benefits. These benefits need to be assessed alongside collection, recovery and disposition outcomes. The sustainability review by Banihashemi et al. (2019) and the packaging-system analysis by Malindzakova et al. (2022) support examining such trade-offs, rather than assuming a benefit from every reduction in return volume.

The perceived-performance construct is described as covering operational fluidity, loss reduction, processing speed and sustainability contribution. These topics may overlap with respondents' assessments of operational gatekeeping. Because item wording and discriminant-validity evidence are unavailable, content overlap is an alternative explanation for part of the association.

Strategic gatekeeping

The positive strategic coefficient is consistent with respondents linking return decisions to wider organisational aims. Interview accounts also connected filtering with costs, sustainability and recovery potential. This is an interpretation of perceptions, not evidence that strategic alignment caused a measurable improvement.

Linton et al. (2007) argue for considering sustainability across the supply chain, while Banihashemi et al. (2019) examine reverse logistics performance across sustainability dimensions. These perspectives support evaluating repair, reuse, refurbishment, recycling and other disposition choices within the wider system. The survey does not determine which pathway is best for a particular product.

Relational gatekeeping

The non-significant relational coefficient leaves uncertainty about its association with the outcome used here. Interview participants nevertheless described communication as relevant to managing return decisions. These are different forms of evidence: professional accounts of rel-

evance do not require a statistically significant coefficient in a separate perception model.

The outcome's operational emphasis may be one possible reason why customer-facing practices were not clearly associated with it. Other possibilities include measurement limitations, sampling uncertainty and shared variance among predictors. None is resolved by the available summaries. Customer trust, satisfaction and loyalty require their own measures and cannot be inferred as mediators.

Wang et al. (2017) identify research themes and opportunities through bibliometric mapping. Their article helps situate further enquiry but cannot verify a specific customer-response mechanism in this study. Future work could examine relational pathways using customer data and an appropriate temporal design.

Integration of the two phases

The interviews informed the survey, so the two phases should not be treated as independent confirmations of the same measurement structure. Their integration is interpretive: the interviews explain what professionals meant by the domains, while the survey summaries describe conditional associations with perceived performance.

The combined findings support further study of multidimensional gatekeeping. They also show why operational efficiency, environmental outcomes and customer experience should be measured separately before conclusions are drawn about a complete circular supply chain system.

5.2. *Assessment of the hypotheses*

Table 4 summarises the hypotheses in terms of associations. The decisions refer to the reported coefficient tests; they do not confirm causal mechanisms, validate the entire measurement model or establish out-of-sample prediction.

Table 4 Summary of hypothesis assessment

Hypothesis	Relationship	β	p	Decision
H1	Operational gatekeeping and perceived performance	.413	< .001	Supported
H2	Strategic gatekeeping and perceived performance	.296	< .001	Supported
H3	Relational gatekeeping and perceived performance	.079	.302	Not supported

Source: Hypotheses and coefficient summaries reported in the study. Outcome: perceived reverse logistics performance.

6. Limitations, implications and future research

6.1. *Limitations*

The quantitative phase concerns e-commerce professionals, whereas the interviews also include distribution and transport. These scopes should be considered separately. The results cannot be assumed to apply to other sectors. Geographical coverage, the survey period, the number of organisations represented and possible clustering of respondents within organisations are not documented, further limiting interpretation.

The non-probability judgement sample captures the perceptions of selected professionals with returns-management experience. It does not support population estimates. Recruitment counts, non-response information and a response rate are unavailable.

All survey constructs were measured from the same respondents at one point in time. Common-method variance may contribute to the associations. The possible overlap between operational gatekeeping and perceived-performance content is an additional measurement concern. Item wording, coding, scoring and respondent-level records would be needed for a fuller assessment.

The cross-sectional design does not establish temporal order or causality. No intervention was evaluated, and the observed associations may reflect omitted organisational characteristics or other unmeasured factors.

Performance is perceived rather than independently observed. The study does not measure actual changes in costs, processing times, recovery rates, transport distance, waste or emissions. The incomplete PCA output, unavailable regression diagnostics and lack of a consistent model-fit summary limit statistical evaluation. The aggregate results presented here do not permit reproduction of the statistical analyses. Consent for interview recording is reported; the survey consent procedure is not described.

6.2. *Managerial implications and contribution*

The findings suggest that organisations could evaluate gatekeeping as a structured decision process. Clear criteria and staff guidance may support consistent handling, but their effects should be assessed through operational records and customer outcomes.

Eligibility checks can consider deadlines, purchase information, product condition and reasons for return. Decisions should distinguish an ineligible request from a product that needs repair, recovery or appropriate disposal. The purpose is to direct returns correctly, rather than simply reduce their number.

Digital authorisation and preliminary checks are possible ways to organise the process. This study does not test their effectiveness. Implementation would need to consider decision accuracy, clear explanations and a way to review disputed outcomes. Strategic planning, training and coordination are also relevant to the management-practice discussion in Badenhorst (2016, 2017).

Organisations could compare the costs and recovery opportunities associated with repair, reuse, refurbishment, resale and recycling. Environmental evaluation should include the consequences of both accepting and refusing a return, rather than count avoided transport alone. These are proposed management considerations, not measured benefits of the present survey.

The interview accounts also support attention to customer communication. The non-significant survey coefficient is not a reason to discard transparency or support. Whether an explanation improves fairness, trust or loyalty remains a question for customer-focused evaluation.

The study's contribution is an exploratory framework linking three gatekeeping domains with perceived performance. It combines interview accounts with survey coefficient summaries. It does not establish that all three scales are distinct, that the framework is the first of its kind, or that relational effects are indirect.

6.3. *Future research*

Replication across sectors and geographical settings could assess whether the reported associations recur. Probability-based recruitment, documented response rates and information about the number of participating organisations would improve the basis for generalisation.

Longitudinal studies or evaluated changes in return procedures could help establish temporal order. Combining professional perceptions with processing time, return costs, recovery rates, transport and emissions records would permit a clearer assessment of operational and environmental outcomes.

Future models could test customer satisfaction, trust, fairness or loyalty as possible mediators. Such models would require measures of these constructs and a design appropriate to the proposed pathway. A non-significant coefficient in the present model is not sufficient evidence for mediation.

Further work could examine digital authorisation, predictive tools and information-system integration as potential moderators or interventions. Item-level reporting, independent measurement validation, regression diagnostics and complete, internally consistent model summaries would strengthen statistical assessment.

Using several data sources, including professional assessments, customer responses and organisational records, could reduce reliance on a single questionnaire. Future measurement work should also examine whether operational practices and performance items are sufficiently distinct.

7. Conclusion

This sequential mixed-methods study examined operational, strategic and relational aspects of gatekeeping in relation to perceived reverse logistics performance. Ten interviews informed a survey of a non-probability sample of 220 e-commerce logistics professionals.

The reported operational and strategic coefficients were positive and statistically significant, while the relational coefficient was not statistically significant. These findings concern conditional associations within the reported model. They do not establish causal improvements, quantify explained variance reliably, or demonstrate an indirect customer-related mechanism.

The framework offers a basis for further investigation of how return decisions relate to professional assessments of performance. Evaluation of circular supply chains also requires objective recovery and environmental indicators, customer measures and fuller statistical reporting. Gatekeeping should be assessed by the appropriateness and consequences of its decisions, rather than the number of returns refused.

Declarations

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