REVENUE PER KILOMETER DRIVEN: THE FORGOTTEN INDICATOR IN PROFITABILITY MANAGEMENT OF ROAD FREIGHT CARRIERS

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Abstract: Purpose: to examine why cost per kilometer driven (CPK), the dominant indicator in road freight carrier management, is insufficient for pricing, fleet allocation, and contract renegotiation decisions when not paired with revenue per kilometer driven (RPK), and to propose a consistent methodology for calculating RPK linked to the idle-capacity rate (empty kilometers driven). Design/methodology/approach: a systematized literature review, conducted following the PRISMA protocol, on performance measurement, pricing, procurement, and capacity utilization in road freight transportation, with searches covering publications from 2021 to 2025. The final academic corpus (n = 12) was complemented, in a dedicated section, by regulatory and market-institutional sources. Findings: the reviewed literature shows that the financial dimension of performance measurement systems in the sector is dominated by cost metrics, that capacity utilization recurs, but in a scattered, non-standardized way, and that the revenue-per-distance indicator—widely practiced in the market under the name revenue per mile—lacks rigorous methodological treatment in academic research. An illustrative scenario, anchored to price ranges observed in the Brazilian market, shows that two routes with equivalent cost can present a per-kilometer margin more than four times higher under a moderate backhaul rate once analyzed through the RPK lens. Originality/value: the article proposes RPK, formalized and linked to CPK and the idle-capacity rate, as a complementary and inseparable axis of performance measurement systems currently centered on cost, offering both a theoretical synthesis and a research agenda together with a managerial implementation roadmap.

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INTRODUCTION

Ask the head of operations at any trucking company what their fleet's cost per kilometer driven is, and you will most likely get an answer down to the cent. Then ask what that same fleet's revenue per kilometer driven is — not total monthly revenue, not the average list rate, but the revenue actually earned divided by the kilometers actually driven — and the answer tends to be hesitant, approximate, or simply nonexistent. This asymmetry is no accident: the literature on performance measurement in road freight transport shows that the financial dimension of indicator systems has historically been dominated by cost metrics, while the systematic capture of revenue per unit of distance remains poorly standardized (Dadsena et al., 2023).

This academic gap stands in sharp contrast to market practice elsewhere. In the North American truckload sector, revenue per mile (RPM) is routinely reported by carriers, industry associations, and financial data providers as a standard commercial tracking metric. The fact that an indicator so well established in practice lacks rigorous methodological treatment in the academic literature is itself a relevant finding: it suggests that revenue per kilometer driven (RPK, adopted here as the equivalent of RPM, adapted to the metric system and to the Brazilian regulatory context) is not a novel construct, but one the market uses tacitly and that research has yet to formalize.

The central argument of this article is that RPK — and not cost per kilometer driven (CPK) alone — should hold a complementary and inseparable place at the core of any route and fleet optimization strategy for road freight carriers. By construction, CPK tells only half of the profitability story: it reveals how much it costs to move a truck, but says nothing about how much revenue that movement actually generates. Two routes can show virtually identical CPK and still produce very different contribution margins, depending on the freight rate charged, the share of capacity utilized, and the amount of empty mileage on the backhaul.

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Without RPK as a counterweight, CPK alone cannot tell a profitable route from a money-losing one.

This article has four objectives: (i) to systematically review the past five years of academic literature on performance measurement, pricing, procurement, and capacity utilization in road freight transport, situating the problem of a revenue-per-kilometer indicator within that body of knowledge; (ii) to formalize a consistent methodology for calculating RPK that can handle the heterogeneity of routes, distances, and load profiles that characterize a carrier's real-world operations; (iii) to demonstrate, through an illustrative scenario with sensitivity analysis, how cross-referencing RPK with the share of empty mileage guides pricing, fleet allocation, and contract renegotiation decisions more precisely than cost analysis alone; and (iv) to identify the study's limitations and a future research agenda for the empirical validation of the proposed indicator.

The research questions guiding the review are: (RQ1) How does recent academic literature address the financial dimension of performance measurement systems in road freight transport? (RQ2) To what extent is capacity utilization (empty running) explicitly incorporated into the financial indicators reviewed? (RQ3) What methodological gaps explain the absence of a consistently formalized revenue-per-kilometer indicator in the literature, despite its well-established use in the market?

REVIEW METHODOLOGY

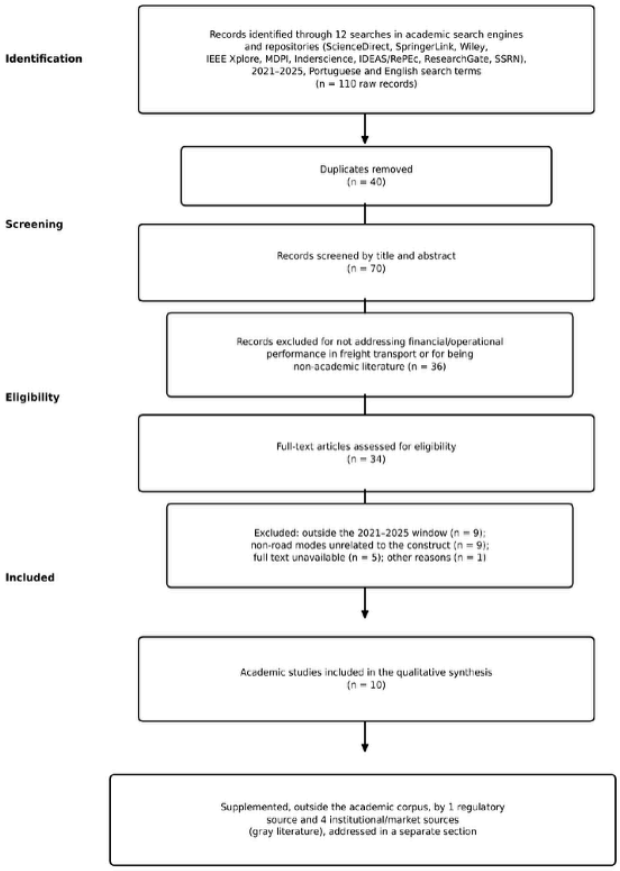
The study was conducted as a systematized literature review following the PRISMA protocol (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) across its four stages — identification, screening, eligibility, and inclusion — focusing on academic literature published between 2021 and 2025, the five years preceding the preparation of this article. For methodological transparency, an access limitation must be noted: the search was carried out using academic search engines and scholarly content aggregators (including indexed pages from ScienceDirect, SpringerLink, Wiley Online Library, IEEE Xplore, MDPI, Inderscience, IDEAS/RePEc, and ResearchGate), rather than through direct, exhaustive

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access to the Scopus or Web of Science databases. This is an explicit limitation of the protocol and is discussed in Section 9.

Twelve searches were run using combinations of Portuguese and English terms, including "performance measurement road freight transportation," "trucking key performance indicators," "truckload procurement pricing review," "capacity utilization freight transport," "empty running deadhead mileage," "revenue per mile trucking," "custo por quilômetro rodado transportadoras" (cost per kilometer, carriers), and "faturamento por quilômetro rodado" (revenue per kilometer driven). The study selection flow is shown in Figure 1.

Figure 1. PRISMA flow diagram of the study selection process.



Inclusion criteria favored studies that addressed, directly or indirectly: (i) financial and operational indicator systems applied to road freight carriers; (ii) pricing and procurement

of truckload transportation capacity; (iii) capacity utilization and fleet idle-capacity indicators; and (iv) sustainability (ESG) frameworks incorporating operational or financial indicators related to cargo space utilization or to the sector's economic and financial performance. Excluded were studies published before 2021, studies focused exclusively on non-road modes with no direct bearing on the construct under study, and non-peer-reviewed content (generic institutional pages, corporate blogs, and commercial market-data tools), the latter being redirected to a dedicated section on supplementary literature (Section 3.5).

Given the finding, already anticipated in the Introduction, that there is no consolidated body of literature treating revenue per kilometer as a named and empirically tested construct, the synthesis presented in Sections 3 and 4 was built by theoretical inference from adjacent studies — chiefly financial indicator systems (BSC, DEA), truckload procurement and pricing, and sustainability frameworks that touch on capacity utilization — rather than by direct citation of a construct already validated under that exact name in the international literature. This is itself one of the article's contributions: to expose and name a gap, not merely to synthesize an already consolidated body of work.

THE BLIND SPOT OF COST PER KILOMETER IN ISOLATION

FINANCIAL PERFORMANCE MEASUREMENT SYSTEMS IN THE SECTOR: THE DOMINANCE OF COST

Dadsena et al. (2023), published in Transport Policy, integrated the Balanced Scorecard (BSC) with an Imprecise Data Envelopment Analysis (IDEA) model to assess the performance of eighteen road freight carriers in India. One of the study's key findings is that the financial perspective demands special attention precisely because high operating costs, combined with fleet underutilization, are the main drivers of the poorer financial performance of the carriers analyzed — not a lack of cost control per se, which is already widespread in the industry. In other words, the problem is not a lack of cost measurement, but the lack of a counterpart that measures, with the same rigor, the revenue generated by each unit of capacity operated.

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A similar finding appears in Saeedi, Wiegmans, and Behdani (2022), whose critical and systematic review of performance measurement in intermodal freight transport systems, published in the World Review of Intermodal Transportation Research, maps the dominant methodologies (Data Envelopment Analysis, Stochastic Frontier Analysis, among others) applied to the rail, waterway, and port subdomains. The authors identify recurring knowledge and implementation gaps across these subdomains, most notably the difficulty of comparing different efficiency measurement methodologies — a structural problem analogous to the one this article identifies in road transport regarding the lack of a standardized revenue-per-distance indicator. In a related review of sea-rail intermodal transport, Abu-Aisha, Audy, and Ouhimmou (2024), published in the Journal of Shipping and Trade, reinforce this pattern by mapping the literature into five categories — performance evaluation, problem-solving methodologies, planning issues, factors affecting operations, and improvement strategies — showing that performance evaluation is a recurring category but is rarely integrated into a unified financial metric of revenue per operational unit.

PRICING AND PROCUREMENT: A FOCUS ON THE MECHANISM, NOT ON ROUTE-LEVEL RESULTS

This gap is reinforced by evidence from the field of truckload procurement. Acocella and Caplice (2023), in a review published in the Journal of Business Logistics, systematize the literature on shippers' and carriers' strategic and operational decisions regarding the procurement of transportation capacity, noting that much of the academic research concentrates on auction and negotiation mechanisms in the spot market, with comparatively less attention to how operational pricing and capacity allocation decisions affect a carrier's financial performance over time. Hasan, Elomri, and Triki (2023), in an optimization-oriented review published in IEEE Access on combinatorial auctions applied to transportation procurement, corroborate this pattern: the literature on price-formation mechanisms is extensive and technically sophisticated, but rarely connected to post-contract indicators that track actual financial results by route or by trip. This concentration of the literature on

price-formation mechanisms — rather than on how carriers should monitor, route by route, the actual financial outcome of those decisions — helps explain why an indicator such as RPK remains poorly formalized in both management practice and academic research..

CAPACITY UTILIZATION: PRESENT, BUT NEVER CENTRAL

The problem deepens when one looks at the intersection between revenue and capacity utilization. Nkesah's (2023) systematic review, published in Transportation Research Interdisciplinary Perspectives, groups strategies for improving the sustainability of road freight transport into three broad categories — technology-based measures, public policy measures, and logistics and transport process measures — placing route optimization and cargo capacity utilization at the heart of the third group. In a similar vein, Collaço et al. (2022), in a systematic review published in Sustainability, relate the road freight literature to the Sustainable Development Goals (SDGs), reinforcing the observation that efficiency in the sector has been discussed mainly through a sustainability lens rather than in terms of route-level profitability. From a financial standpoint, this same capacity utilization is exactly what determines whether a given cost per kilometer translates into a positive or negative margin: empty kilometers cost practically as much as fully loaded ones, yet generate no revenue at all.

Along the same lines, the review by Kharrat et al. (2023), published in the Euro-Mediterranean Journal for Environmental Integration, which proposes sustainability and resilience indicators for freight transport, reinforces a recurring diagnosis in the literature: the multitude of indicators proposed over nearly two decades of research has not converged on a standardized set widely adopted by the industry. The fact that capacity utilization appears recurrently, but never centrally, and is never tied to a specific financial indicator supports the argument of this article: the academic community intuitively recognizes the importance of capacity utilization, but rarely connects it explicitly and systematically to the financial indicator it drives — revenue per kilometer driven.

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AGGREGATE FINANCIAL PERFORMANCE (ESG) AND THE ABSENCE OF OPERATIONAL REVENUE METRICS

A fourth body of evidence comes from the literature on ESG (Environmental, Social, and Governance) in the logistics industry. Nenavani et al. (2024), in a panel-data study published in Letters in Spatial and Resource Sciences, test the relationship between ESG practices and the financial performance of logistics companies, but operationalize financial performance through aggregate accounting indicators (return on assets, return on equity), with no breakdown by route, trip, or operational unit of distance. Choi, Kim, and Na (2025), in a study published in Sustainability on the mediating mechanisms of stakeholder pressure in the financial performance of logistics firms, follow the same pattern of accounting aggregation. This finding matters for the argument of this article: even when academic research moves toward linking sustainability to financial performance in logistics, it does so through corporate-level accounting indicators — never through disaggregated operational indicators such as RPK, which would be needed to guide day-to-day pricing and fleet allocation decisions.

SUPPLEMENTARY LITERATURE: REGULATORY, INSTITUTIONAL, AND MARKET SOURCES

Outside the peer-reviewed academic corpus, and treated separately here because they do not constitute scientific literature, one regulatory source and four institutional/market sources were used to contextualize and empirically ground the discussion in Sections 5 and 6: Brazil's National Minimum Freight Rate Policy for Road Freight Transport (PNPM-TRC), established by Law No. 13,703/2018; the 2025 CNT Highway Survey; the historical series of the Repom/Edenred Freight Index; and data on empty running (deadhead mileage) released by the European Commission and the American Transportation Research Institute, as reported by trade media. This methodological separation between academic and supplementary literature is deliberate, and is intended to avoid presenting sources of different natures with the same epistemological weight.

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BUILDING THE INDICATOR: FORMALIZATION, DATA SOURCES, AND CALCULATION CONSIDERATIONS

FORMAL NOTATION

Let r be a specific route operated in period t, R the net freight revenue earned on that route in that period (net of cancellations, chargebacks, and contractual adjustments), Dc the loaded distance driven, and Dv the empty distance driven in the same trip cycle, both indexed to route r and period t. The revenue per kilometer driven of route r in period t is defined as:

$$RPKr,t = Rr,t / (Dcr,t + Dvr,t)$$

Similarly, letting C be the total operating cost incurred on the route (fuel, tolls, maintenance, depreciation, labor, and allocated overhead), cost per kilometer driven is defined as:

$$CPKr,t = Cr,t / (Dcr,t + Dvr,t)$$

And the contribution margin per kilometer driven, proposed as a summary indicator linking the two previous ones, as:

$$MPKr,t = RPKr,t − CPKr,t$$

This notation, deliberately symmetrical between RPK and CPK, allows the two indicators to be compared on the same basis and leads directly to margin per kilometer, which is the most relevant decision metric for the actions discussed in Section 7. Using total distance in the denominator — not just loaded distance — is what distinguishes RPK from a simple average rate per loaded kilometer, and it is precisely this choice of denominator that exposes the opportunity cost of empty miles.

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METHODOLOGICAL CONSIDERATIONS FOR THE CALCULATION

Calculating the indicator consistently across heterogeneous routes requires four methodological safeguards. The first is defining the time and space boundaries of the measurement period: RPK should be calculated over the full trip cycle — including the loaded outbound leg, any repositioning legs, and the return leg, with or without a backhaul — and not just over the billed leg in isolation. Calculating RPK only over the loaded distance artificially inflates the indicator and masks exactly the problem it is supposed to expose: the opportunity cost of empty miles.

The second safeguard is clearly defining what makes up freight revenue in the numerator (R): the recommendation is to use net revenue actually received, rather than the list rate or gross billed amount, which may differ significantly from net revenue in operations with frequent commercial discounts or with rates indexed to regulatory floors, such as Brazil's National Minimum Freight Rate Policy for Road Freight Transport (PNPM-TRC), established by Law No. 13,703/2018, which sets minimum compensation per loaded axle and per kilometer driven in domestic road freight transport.

The third safeguard concerns the source of mileage data (Dc + Dv). Transportation management systems (TMS) and vehicle telematics tend to be the most reliable source, since they record the actual mileage driven by each vehicle, as opposed to estimates based on planned or standard origin-destination distances, which frequently underestimate route deviations, returns, and repositioning moves between markets. In practice, the lack of integration between billing and vehicle tracking systems is the main operational reason why many carriers can calculate CPK precisely but cannot do the same for RPK.

The fourth safeguard is to segment the calculation by route, customer, or type of operation, rather than reporting only an aggregate fleet-wide average RPK — the average hides exactly the most valuable management information: which specific routes destroy value and should be renegotiated, scaled back, or discontinued.

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PRACTICAL COMPLICATIONS: ALLOCATING SHARED COSTS AND REVENUES, AND INTRA-ROUTE VARIANCE

Two additional complications deserve explicit mention, as they are not trivially handled by the formula presented. The first is the allocation of costs and revenues in less-than-truckload (LTL) operations, multi-customer consolidation on a single trip, or milk-run operations, in which revenue R does not correspond to a single contract but to the sum of several partial freight charges over the same physical distance driven. In these cases, calculating RPK requires an explicit and consistent allocation rule (for example, proportional to the weight, volume, or declared value of each shipment), and the absence of such a rule is a common source of distortion when comparing RPK between full-truckload (FTL) and LTL operations.

The second complication is intra-route variance: the RPK of a single route can vary substantially from trip to trip, depending on the seasonality of backhaul availability, spot market swings, and changes in the customer mix served. Treating RPK as a deterministic, stable figure per route — as the illustrative exercise in Section 6 does, out of didactic necessity — is a simplification. In the managerial application recommended in Section 8, tracking should rely on moving averages and measures of dispersion (standard deviation, interquartile range) of RPK per route across multiple trips, rather than on its most recent point value alone

CROSS-REFERENCING THE INDICATOR WITH IDLE CAPACITY

RPK reaches its full analytical power when cross-referenced with the share of kilometers driven empty — known internationally as empty running or deadhead mileage. Data released by the European Commission and reported by trade media indicate that heavy goods vehicles in the European Union drove about 34 billion kilometers empty in 2021, and that the share of empty miles in the United States ranged from 14.8% to 20.6% in the early 2020s, according to surveys by the American Transportation Research Institute. Although

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these figures refer to markets other than Brazil, and should be read with due methodological caution — they come from institutional and journalistic sources, not peer-reviewed academic literature — they illustrate the magnitude of the phenomenon: a significant and persistent share of installed road freight capacity runs without generating any revenue, while still consuming virtually all of the variable operating costs.

In Brazil, the 2025 CNT Highway Survey indicates that fuel accounts for roughly 30% to 35% of road freight operating costs — a share that, added to the fixed costs of insurance, depreciation, and administrative payroll, makes an idle or empty truck one of the most expensive line items in a fleet's cost sheet, even while generating no revenue at all. From the cost side, this data point corroborates exactly the argument that RPK makes from the revenue side: an empty kilometer costs almost as much as a loaded one, but its RPK is, by definition, zero.

The relationship between the two indicators can be expressed simply: letting ω be the route's empty-running rate — defined as $\omega = Dv / (Dc + Dv)$, that is, the percentage of total kilometers driven empty — a route's average RPK tends to fall proportionally as ω increases, even if the rate charged for the loaded leg stays constant. This means that two routes with identical freight rates per loaded kilometer can show very different RPKs, depending solely on ω — that is, on how easy or hard it is to secure a backhaul. This is precisely the dimension that CPK alone, lacking any revenue information, could never reveal.

ILLUSTRATIVE SCENARIO WITH SENSITIVITY ANALYSIS

To make the argument concrete, consider a hypothetical, didactic scenario, built solely for methodological illustration — and not as empirical data from any real operation — involving two highway routes with the same total round-trip distance (1,000 kilometers) and virtually identical total operating cost (CPK of R$ 2.40 per kilometer on both).

On Route A, the truck drives 500 kilometers loaded on the outbound leg, at a rate of R$ 6.00 per kilometer, and returns empty for the remaining 500 kilometers ($\omega_{A} = 0.50$), since no backhaul is available at the destination market. Total trip revenue is R$ 3,000.00,

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spread over the 1,000 total kilometers driven: RPK_{A} = R$ 3.00/km and MPK_{A} = R$ 0.60/km.

On Route B, the truck also drives 500 kilometers loaded on the outbound leg, at the same rate of R$ 6.00 per kilometer, but secures a backhaul for the 500-kilometer return leg (ω_{B} = 0). To anchor this backhaul rate in plausible values for the Brazilian market, rather than in arbitrary numbers, the reference used is the range of rates per kilometer driven set by the 2025 PNPM-TRC table, which runs from roughly R$ 2.74 to R$ 10.40 per kilometer, depending on the number of loaded axles and the type of operation.

Taking the bottom of this range (R$ 2.74/km) as a conservative backhaul rate, total trip revenue becomes R$ 4,370.00 (R$ 3,000.00 outbound plus R$ 1,370.00 on the return), yielding RPK_{B} = R$ 4.37/km and MPK_{B} = R$ 1.97/km — more than three times Route A's margin. Taking a mid-range value (R$ 4.00/km) as a moderate backhaul rate, total revenue rises to R$ 5,000.00, with RPK_{B} = R$ 5.00/km and MPK_{B} = R$ 2.60/km — more than four times Route A's margin. And taking the top of the range (R$ 10.40/km), an optimistic backhaul scenario with higher-value freight, total revenue reaches R$ 8,200.00, with RPK_{B} = R$ 8.20/km and MPK_{B} = R$ 5.80/km.

The sensitivity analysis shows that, even in the most conservative scenario within the range of rates considered, Route B beats Route A in margin per kilometer by more than 3 to 1; in the most optimistic scenario, the gap exceeds 9 to 1. The key point of this exercise is that, judged by CPK alone, the two routes would be rated as equivalent: both have the same operating cost per kilometer, the same total distance and, quite possibly, the same equipment and risk profile. Only when RPK is introduced — and, with it, information on backhaul utilization — does the difference in profitability between the two routes become visible, at any reasonable point in the range of rates considered. It bears repeating that this exercise is illustrative, built for didactic purposes and anchored to market price ranges only to avoid arbitrary numbers — it is no substitute for empirical validation with real operating data, which is identified as a research agenda item in Section 9.

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FROM INDICATOR TO ACTION: WHAT TO DO WHEN THE NUMBER IS BAD

A low RPK — or a reduced or negative margin per kilometer (MPK) on certain routes — is not, in itself, a management conclusion; it is a starting point for investigation. The literature reviewed suggests at least four courses of action, consistent with the findings of Dadsena et al. (2023) on the financial perspective of carrier performance, of Acocella and Caplice (2023) and Hasan, Elomri, and Triki (2023) on strategic and operational decisions in pricing and capacity procurement, and of Nkesah (2023) on logistics process measures aimed at improving road freight efficiency.

• Renegotiating the route's rate, especially when a low RPK stems from an outbound rate that has historically been underpriced relative to the actual cost of operation — a situation particularly relevant in regulatory settings such as Brazil's, where the PNPM-TRC sets minimum compensation levels but does not prevent commercial negotiations from setting rates above the floor when the cost structure of a specific route warrants it.

• Actively building backhaul freight, through commercial partnerships, load-board platforms, or reciprocity agreements with shippers located at the destination market, in order to systematically reduce the empty-running rate (ω) identified by cross-referencing RPK and CPK.

• Reallocating the fleet, moving trucks from routes with chronically low RPK to lanes with higher demand density and better capacity utilization — a decision that, to be made with confidence, depends on having an RPK calculated consistently and comparably across routes, as formalized in Section 4.

• Selectively discontinuing routes or contracts whose margin per kilometer (MPK) remains persistently negative even after attempts at renegotiation and backhaul development — a decision that, while counterintuitive for managers used to treating volume and gross revenue as synonyms for commercial success, is exactly the kind of decision that an indicator system centered solely on CPK would never make clear.

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MANAGERIAL IMPLICATIONS AND A CALL TO ACTION

As a practical follow-through — and not as a substitute for the research agenda presented in Section 9 — operations managers are invited to try an immediate exercise: calculate their own fleet's RPK over the next two weeks, segmented by route, following the methodological safeguards described in Section 4 — measurement over the full trip cycle, use of net revenue actually received, actual mileage data from telematics or a TMS, and segmentation by route rather than an aggregate average. Comparing RPK across the routes in their operation will very likely bring to light patterns that were invisible through a cost-only lens — and that is exactly the point at which route and fleet optimization stops being a generic cost-cutting exercise and becomes a data-driven decision about where, specifically, the operation creates or destroys value.

STUDY LIMITATIONS AND FUTURE RESEARCH AGENDA

LIMITATIONS

- Small corpus and non-exhaustive search: the final academic corpus (n = 10) is modest for a full-fledged systematic review, reflecting both the scarcity of literature directly addressing the RPK construct and an access limitation — the search was conducted through search engines and scholarly content aggregators, not through direct and exhaustive access to the Scopus and Web of Science databases, which may have left out relevant studies indexed exclusively on those platforms.
- No formal assessment of the methodological quality of the included studies (for example, using instruments such as the Mixed Methods Appraisal Tool), which limits the ability to weight the findings by methodological robustness.
- Language bias: the search favored literature in Portuguese and English and may have missed relevant contributions published in other languages, especially European studies on empty running in French, German, or Spanish.
- The proposed indicator has not been empirically validated: RPK as formalized in

Section 4 and the scenario in Section 6 are theoretical and illustrative constructs, respectively, not tested against real carrier operating data — empirical validation is identified as a future research agenda item, not as a result already demonstrated by this article.

FUTURE RESEARCH AGENDA

• Empirical validation of RPK using real longitudinal TMS data from one or more carriers, testing its incremental explanatory power for route profitability relative to CPK alone and to adjacent capacity utilization indicators, such as the truck space utilization rate.

• Development of a statistically validated instrument (for example, through expert-panel validation) that assigns relative weights to RPK within broader performance measurement systems, such as the BSC applied by Dadsena et al. (2023).

• Comparative studies between the revenue per mile used in the North American market and the RPK proposed in this article, examining whether the conceptual equivalence proposed in the Introduction holds up given regulatory differences, such as the existence of a minimum freight rate in Brazil (PNPM-TRC) and its absence in the U.S. market.

• Extending the systematic review, with direct access to the Scopus and Web of Science databases and the application of a formal methodological quality appraisal instrument, to test the robustness of the findings reported here against a broader corpus.

REFERÊNCIAS

ABU-AISHA, T.; AUDY, J.-F.; OUHIMMOU, M. Toward an efficient sea-rail intermodal transportation system: a systematic literature review. Journal of Shipping and Trade, v. 9, n. 1, p. 1–27, 2024. DOI: 10.1186/s41072-024-00182-z.

ACOCELLA, A.; CAPLICE, C. Research on truckload transportation procurement: a review, framework, and future research agenda. Journal of Business Logistics, v. 44, n. 2, p. 228–256,

2023. DOI: 10.1111/jbl.12333.

CHOI, A. Y.; KIM, D.; NA, J. Disaggregating ESG mechanisms: the mediating role of stakeholder pressure in the financial performance of logistics firms. Sustainability, v. 17, n. 19, art. 8840, 2025. DOI: 10.3390/su17198840.

COLLAÇO, F. M. de A.; TEIXEIRA, A. C. R.; MACHADO, P. G.; BORGES, R. R.; BRITO, T. L. F.; MOUETTE, D. Road freight transport literature and the achievements of the Sustainable Development Goals — a systematic review. Sustainability, v. 14, n. 6, p. 3425, 2022. DOI: 10.3390/su14063425.

DADSENA, K. K.; SARMAH, S. P.; NAIKAN, V. N. A.; MATHIYAZHAGAN, K.; RODRIGUES, V. S. Performance measurement of road freight transportation: a case of trucking industry. Transport Policy, v. 137, p. 125–140, 2023. DOI: 10.1016/j.tranpol.2023.04.015.

HASAN, M. R.; ELOMRI, A.; TRIKI, C. Combinatorial-based auction for the transportation procurement: an optimization-oriented review. IEEE Access, v. 11, p. 60191–60210, 2023. DOI: 10.1109/ACCESS.2023.3286189.

KHARRAT, N.; BENAISSA, M.; HAMANI, N. et al. A proposal of indicators assessing freight transport sustainability and resilience. Euro-Mediterranean Journal for Environmental Integration, v. 8, p. 1035–1056, 2023. DOI: 10.1007/s41207-023-00415-w.

NENAVANI, J.; PRASUNA, A.; SIVA KUMAR, S. N. V.; KASTURI, A. ESG measures and financial performance of logistics companies. Letters in Spatial and Resource Sciences, v. 17, n. 1, art. 5, 2024. DOI: 10.1007/s12076-023-00358-4.

NKESAH, S. K. Making road freight transport more sustainable: insights from a systematic literature review. Transportation Research Interdisciplinary Perspectives, v. 22, art. 100967, 2023.

SAEEDI, H.; WIEGMANS, B.; BEHDANI, B. Performance measurement in intermodal freight transport systems: literature review and research agenda. World Review of Intermodal Transportation Research, v. 11, n. 1, p. 1–52, 2022.

BRASIL. Lei nº 13.703, de 8 de agosto de 2018. Institui a Política Nacional de Pisos Mínimos do Transporte Rodoviário de Cargas (PNPM-TRC) [Law No. 13,703 of August 8, 2018, establishing the National Minimum Freight Rate Policy for Road Freight Transport]. Diário

Oficial da União, Brasília, DF, 2018.

CONFEDERAÇÃO NACIONAL DO TRANSPORTE (CNT). Pesquisa CNT de Rodovias 2025 [2025 CNT Highway Survey]. Brasília: CNT, 2025.

EDENRED REPOM. Índice de Frete Repom (IFR) [Repom Freight Index] — historical series of average road freight prices per kilometer driven in Brazil, 2023–2025.

EUROPEAN COMMISSION as cited in CNBC. Delivery trucks are driving billions of miles completely empty. CNBC, Sept. 12, 2022.

AMERICAN TRANSPORTATION RESEARCH INSTITUTE as cited in CNBC. Delivery trucks are driving billions of miles completely empty. CNBC, Sept. 12, 2022.

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