SOPRONI EGYETEM
LÁMFALUSSY SÁNDOR KÖZGAZDASÁGTUDOMÁNYI KAR

KONFERENCIAKÖTET

Conference Proceedings

Nemzetközi tudományos konferencia
a Magyar Tudomány Ünnepe alkalmából
International Scientific Conference
on the Occasion of the Hungarian Science Festival

Sopron, 2025. november 6.
6 November 2025, Sopron

FEJLŐDÉSI PÁLYÁK ÉS ÚJ TÖRÉSVONALAK A FENNTARTHATÓSÁGI ÁTMENET IDŐSZAKÁBAN

DEVELOPMENT TRAJECTORIES AND NEW DIVIDES IN TIMES OF SUSTAINABILITY TRANSITIONS

Szerkesztők / Editors:
RESPERGER Richárd, SZÉLES Zsuzsanna, TÓTH Balázs István

Nemzetközi tudományos konferencia a Magyar Tudomány Ünnepe alkalmából
International Scientific Conference on the Occasion of the Hungarian Science Festival

Sopron, 2025. november 6. / 6 November 2025, Sopron

FEJLŐDÉSI PÁLYÁK ÉS ÚJ TÖRÉSVONALAK A FENNTARTHATÓSÁGI ÁTMENET IDŐSZAKÁBAN

DEVELOPMENT TRAJECTORIES AND NEW DIVIDES IN TIMES OF SUSTAINABILITY TRANSITIONS

KONFERENCIAKÖTET

CONFERENCE PROCEEDINGS

LEKTORÁLT TANULMÁNYOK / PEER-REVIEWED PAPERS

Szerkesztők / Editors**:**
RESPERGER Richárd – SZÉLES Zsuzsanna – TÓTH Balázs István

SOPRONI EGYETEM KIADÓ

UNIVERSITY OF SOPRON PRESS

SOPRON, 2026

JUBILEUMI TUDOMÁNYÜNNEP 2025 / SCIENCE JUBILEE 2025

Mottó: **„200 év a tudás és a társadalom szolgálatában”**
/ Motto: „200 years to knowledge and service to society”

MAGYAR TUDOMÁNY ÉVE 2025/2026

Felelős kiadó / Executive Publisher**: Prof. Dr. FÁBIÁN Attila**
a Soproni Egyetem rektora / Rector of the University of Sopron

Szerkesztők / Editors:
Dr. RESPERGER Richárd, Prof. Dr. SZÉLES Zsuzsanna, Dr. habil. TÓTH Balázs István

Lektorok / Reviewers:
Dr. BARTÓK István, BAZSÓNÉ Dr. BERTALAN Laura, Dr. BEDNÁRIK Éva,
Dr. CZIRÁKI Gábor, Dr. DIÓSSI Katalin, Dr. habil. BARANYI Aranka,
Dr. habil. JANKÓ Ferenc, Dr. habil. JUHÁSZ Tímea, Dr. habil. PAÁR Dávid,
Dr. habil. PAPP-VÁRY Árpád, Dr. habil. SZABÓ Zoltán, Dr. habil. TÓTH Balázs István,
Dr. HOSCHEK Mónika, Dr. KARNER Cecília, Dr. KERESZTES Gábor,
Dr. habil. KOLOSZÁR László, Dr. KÓPHÁZI Andrea, Dr. MÉSZÁROS Katalin,
Dr. NÉMETH Nikoletta, Prof. Dr. OBÁDOVICS Csilla, Dr. PALANCSA Attila,
PAPPNÉ Dr. VANCSÓ Judit, Dr. RESPERGER Richárd, Prof. Dr. SZÉKELY Csaba,
Prof. Dr. SZÉLES Zsuzsanna, Dr. SZÓKA Károly, Dr. TAKÁTS Alexandra

Tördelőszerkesztő / Layout Editor: Dr. RESPERGER Richárd

ISBN 978-963-334-579-5 (pdf)

DOI: https://doi.org/10.35511/978-963-334-579-5

SZERVEZŐK

Soproni Egyetem Lámfalussy Sándor Közgazdaságtudományi Kar (SOE LKK),
A Soproni Felsőoktatásért Alapítvány

A konferencia elnöke: Prof. Dr. SZÉLES Zsuzsanna PhD egyetemi tanár, dékán (SOE LKK)

A konferencia Tudományos Bizottsága:

- Prof. Dr. FÁBIÁN Attila PhD egyetemi tanár (SOE LKK); a Soproni Egyetem rektora;
- Prof. Dr. KULCSÁR László CSc professzor emeritus (SOE LKK);
- Prof. Dr. OBÁDOVICS Csilla PhD egyetemi tanár, Doktori Iskola-vezető (SOE LKK);
- Prof. Dr. SZALAY László DSc egyetemi tanár (SOE LKK);
- Prof. Dr. SZÉKELY Csaba DSc professzor emeritus (SOE LKK);
- Prof. Dr. SZÉLES Zsuzsanna PhD egyetemi tanár (SOE LKK);
- Prof. Dr. Clemens JÄGER PhD egyetemi tanár, dékán (FOM Közgazdaságtudományi és Menedzsment Egyetem, Essen, Németország), c. egyetemi tanár (SOE);
- Prof. Dr. Alfreda ŠAPKAUSKIENĖ PhD egyetemi tanár (Vilniusi Egyetem, Közgazdaságtudományi Kar, Litvánia);
- Dr. habil. BARANYI Aranka PhD egyetemi docens (SOE LKK);
- Dr. habil. KOLOSZÁR László PhD egyetemi docens (SOE LKK);
- Dr. habil. PAPP-VÁRY Árpád Ferenc tudományos főmunkatárs (SOE LKK);
- Dr. habil. POGÁTSA Zoltán PhD egyetemi docens (SOE LKK);
- Dr. habil. SZABÓ Zoltán PhD egyetemi docens (SOE LKK);
- Dr. habil. TÓTH Balázs István PhD egyetemi docens, a Lámfalussy Kutatóközpont igazgatója (SOE LKK);
- Dr. habil. Eva JANČÍKOVÁ PhD egyetemi docens (Pozsonyi Közgazdaságtudományi Egyetem, Nemzetközi Kapcsolatok Kar, Szlovákia);
- Dr. Rudolf KUCHARČÍK PhD egyetemi docens, dékán (Pozsonyi Közgazdaságtudományi Egyetem, Nemzetközi Kapcsolatok Kar, Szlovákia).

A konferencia Szervező Bizottsága:

- Dr. MÉSZÁROS Katalin PhD egyetemi docens, dékánhelyettes (SOE LKK)
- PAPPNÉ Dr. VANCSÓ Judit PhD egyetemi docens, intézetigazgató, dékánhelyettes (SOE LKK);
- Dr. HOSCHEK Mónika PhD egyetemi docens, intézetigazgató (SOE LKK);
- Dr. NÉMETH Nikoletta PhD egyetemi docens, intézetigazgató (SOE LKK);
- Dr. BARTÓK István János PhD egyetemi docens (SOE LKK);
- Dr. SZÓKA Károly PhD egyetemi docens (SOE LKK);
- Dr. DIÓSSI Katalin PhD adjunktus (SOE LKK);
- Dr. RESPERGER Richárd PhD adjunktus (SOE LKK).

ORGANIZERS

University of Sopron, Alexandre Lamfalussy Faculty of Economics (SOE LKK),
For the Higher Education in Sopron Foundation

Conference Chairperson: Prof. Dr. Zsuzsanna SZÉLES PhD Professor, Dean (SOE LKK)

Scientific Committee:

- Prof. Dr. Attila FÁBIÁN PhD Professor (SOE LKK), Rector of the University of Sopron;
- Prof. Dr. László KULCSÁR CSc Professor Emeritus (SOE LKK);
- Prof. Dr. Csilla OBÁDOVICS PhD Professor, Head of Doctoral School (SOE LKK);
- Prof. Dr. László SZALAY DSc Professor (SOE LKK);
- Prof. Dr. Csaba SZÉKELY DSc Professor Emeritus (SOE LKK);
- Prof. Dr. Zsuzsanna SZÉLES PhD Professor, Dean (SOE LKK);
- Prof. Dr. Clemens JÄGER PhD Professor, Dean (FOM University of Applied Sciences for Economics and Management, Essen, Germany), Honorary Professor (SOE);
- Prof. Dr. Alfreda ŠAPKAUSKIENĖ PhD Professor (Vilnius University, Faculty of Economics and Business Administration, Lithuania);
- Dr. habil. Aranka BARANYI PhD Associate Professor (SOE LKK);
- Dr. habil. Árpád Ferenc PAPP-VÁRY PhD Senior Research Fellow (SOE LKK);
- Dr. habil. Zoltán POGÁTSA PhD Associate Professor (SOE LKK);
- Dr. habil. Zoltán SZABÓ PhD Associate Professor (SOE LKK);
- Dr. habil. Balázs István TÓTH PhD Associate Professor, Director of the Lamfalussy Research Centre (SOE LKK);
- Dr. habil. Eva JANČÍKOVÁ PhD Associate Professor (University of Economics in Bratislava, Faculty of International Relations, Slovakia);
- Dr. Rudolf KUCHARČÍK PhD Associate Professor, Dean (University of Economics in Bratislava, Faculty of International Relations, Slovakia).

Organizing Committee:

- Dr. Judit PAPPNÉ VANCSÓ PhD Associate Professor, Director of Institute, Vice Dean (SOE LKK);
- Dr. Tamás PIRGER PhD Assistant Professor, Vide Dean (SOE LKK);
- Dr. Mónika HOSCHEK PhD Associate Professor, Director of Institute (SOE LKK);
- Dr. Nikoletta NÉMETH PhD Associate Professor, Director of Institute (SOE LKK);
- Dr. István János BARTÓK PhD Associate Professor (SOE LKK);
- Dr. Gábor KERESZTES PhD Associate Professor, Vice Dean (SOE LKK);
- Dr. habil. László KOLOSZÁR PhD Associate Professor (SOE LKK);
- Dr. Károly SZÓKA PhD Associate Professor (SOE LKK);
- Dr. Katalin DIÓSSI PhD Assistant Professor (SOE LKK);
- Dr. Richárd RESPERGER PhD Assistant Professor (SOE LKK).

TARTALOMJEGYZÉK / CONTENTS

1. szekció: Társadalmi kihívások és társadalmi innovációk
Session 1: Social Challenges and Social Innovations

2. szekció: Turizmus és marketing, fenntartható turizmus
Session 2: Tourism and Marketing, Sustainable Tourism

3. szekció: Fenntarthatósági átmenet és digitális innovációk
Session 3: Sustainability Transition and Digital Innovations

4. szekció: Fenntartható pénzügyek – Fenntartható gazdálkodás
Session 4: Sustainable Finance – Sustainable Management

5. szekció: Global and Regional Aspects of Sustainable Development
Session 5: Global and Regional Aspects of Sustainable Development

6. szekció: Sustainable Economy and Management (személyes)
Session 6: Sustainable Economy and Management (in-person)

7. szekció: Sustainable Economic Decisions
Session 7: Sustainable Economic Decisions

10. szekció: Sustainability Challenges and Innovations
Session 10: Sustainability Challenges and Innovations

11. szekció: Poszter szekció
Session 11: Poster Session

DOI: 10.35511/978-963-334-579-5-s5-5

Intermodal Transport, Sustainability, and Security Challenges in South Africa's Automotive Logistics

Anikó RICHTER[1]
PhD Student
University of Sopron, Alexandre Lamfalussy Faculty of Economics,
István Széchenyi Economics and Management Doctoral School, Hungary

Dr. Csaba I. HENCZ PhD[2]
Assistant Professor
Széchenyi István University, Győr, Hungary

Abstract:
South Africa's automotive industry is growing consistently, with OEMs such as BMW, Ford, Toyota, and Volkswagen expanding production for export markets. This growth brings increasing pressure on logistics systems that continously struggle with port congestion, unreliable rail, and high levels of theft and vandalism. As logistics procurement manager responsible for South Africa region I am facing with challanges and pressure regarding the sustainability goals. This study investigates how these challenges affect sustainability targets and intermodal transport acceleration. Using secondary sources and concluded interviews with logistics professionals from the automotive industry in the region, we analyze cases from Transnet, DP World, DHL, DSV, and Kühne+Nagel. The study is based on four hypotheses: H1: using intermodal solutions is constrained by infrastructure inefficiencies; H2: theft and vandalism weaken cost-efficient and sustainable logistics; H3: OEMs investing in short-distance intermodal solutions with logistics partners to achieve stronger resilience; H4: sustainability initiatives in the South African region remain mostly symbolic rather than a real change. The findings of the study highlights the need of a collaborative approach between OEMs and forwarders which must be driven by investment, stronger security protocols, and systemic infrastructure reforms.

Keywords: automotive logistics, intermodal, OEM practices, South Africa, sustainability, theft
JEL Codes: Q55, L92, L22

1. Introduction

South Africa's automotive sector is one of the largest manufacturing industry in Africa, with the presence of OEMs such as BMW, Ford, Toyota, and Volkswagen. The plants of these OEMs are supplying the products and fulfilling the needs for both domestic and export market. Over the past three decades, the South African government supported the local automotive industry with several actions. The first major support was via the Motor Industry Development Programme since 1995, referred as MIDP (Allardice, 2009; Barnes & Black, 2013). The goal for this iniative was to transform the South African automotive industry into a globally competitive sector, with import-export arrangements and export incentives to encourage the export of vehicles and automotive components (Black & Roberts, 2009). The successor program of MIDP, called the Automotive Production and Development Programme (South African Revenue Service, 2021) was introduced in 2012 with taking into place in 2013, and the goal was the same to make the local industry globally competitive and to integrate it to global supply chains (Bar-

[1] richter.aniko@phd.uni-sopron.hu (Corresponding Author)
[2] hencz@sze.hu

nes & Black, 2013). Within APDP program the government promoted the high-volume productions and in paralell created more employment, and offered rebates and refunds in customs duties for importing vehicles and components. APDP was further extended into APDP Phase 2, with extension of the vision for the industry to 2035. Today, South Africa exports are significant: the geographic position of South Africa makes it an ideal place for vehicle exports to other African countries and markets in Europe and Asia. Exports have accounted for more than 60% of total vehicle production in recent years (Borucki, 2024).

Despite this growth, the logistics system is not supporting this planned expansion of the automotive industry, as it faces serious challenges. There are continous port congestion issues at the Port of Durban and other ports, the rail services which are managed by Transnet are unreliable, and the road infrastructure is deteorating. All of these roadblocks are creating bottlenecks and cost escalations (Havenga et al., 2012). In addition, theft and vandalism creates a persistent risks, with the Durban–Rosslyn corridor frequently highlighted as a hotspot for cargo crime (Freight News, 2024; Tracker South Africa, 2024).

Global sustainability pressures create further complexity on South African's automotive sector. While forwarders such as DHL, DSV, and DP World have introduced initiatives in a range from green warehousing to intermodal solutions, the adoption of green solutions in South Africa has been slow. The sustainability strategies of OEMs remain uneven, with critics arguing that symbolic measures, such as installing solar panels, hide the deeper environmental challenges associated with battery logistics and high-emission road dependency (Rodrigue, 2020).

Against this background, this study investigates how infrastructure limitations, crime risks, and sustainability pressures creates to shape the feasibility of intermodal transport in South Africa's automotive industry.

2. Hypotheses

Based on gaps in the literature and practitioner insights, the following hypotheses were considered:

- H1: Intermodal adoption in South Africa's automotive logistics is constrained by inefficiencies in rail and port infrastructure.
- H2: Theft and vandalism significantly hinders and complicates the cost-efficiency and sustainability of logistics operations.
- H3: OEMs that invest together with forwarders in secure, short-distance intermodal solutions achieve better and stronger supply chain resilience.
- H4: Current OEM sustainability initiatives in South Africa remain mostly symbolic rather than leading to real decarbonization.

3. Literature Review

The importance of intermodal transport in automotive logistics has been recognized globally as well as in South Africa (Havenga et al., 2011; Muogboh & Ojadi, 2018). In Europe and North America, intermodal solutions support OEMs and Tier-1 suppliers to meet sustainability targets while reducing road congestion (Rodrigue, 2020). In South Africa, the studies emphasize rail inefficiencies and governance issues as critical barriers (Havenga et al., 2012; Kuteyi & Winkler, 2022; Nitsche et al., 2024).

Security risks remain significant in South African logistics (Freight News, 2025; NSA Global, 2025). Previous studies show that cargo theft is more common in this region than in most of the other countries and the trend is mostly stable (*Figure 1*), with organized attacks targeting road and rail shipments (Nel et al., 2018; TT Club, 2020). This supports claims that investments in tracking technologies and active police control in the corridors are necessary but often distracted by systemic corruption.

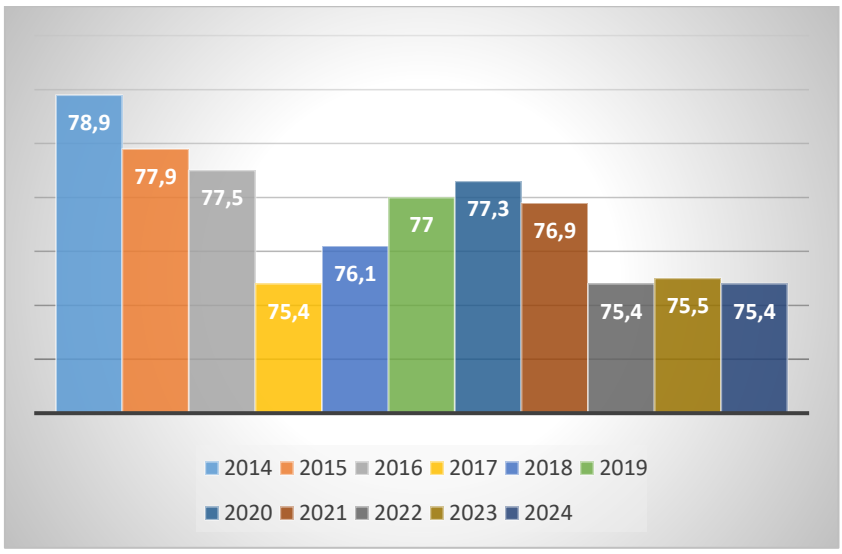

Figure 1: Crime index in South Africa from 2014 to 2024
Source: Own editing based on Satista (n.d.)

Sustainability practices, however increasingly promoted by OEMs, but often with lack of substance. As an example, BMW South Africa has invested in renewable energy at its Rosslyn plant (BMW Group, n.d.), but critics argue that these site-specific measures are insufficient given the high-emission nature of long-haul road transport. Other example for lack of substance, when research shows that lithium-ion battery logistics introduce significant environmental and safety risks that remain under-regulated (Harper et al., 2019).

Unlike in Europe, where the intermodal solutions are increasing (*Figure 2*), and transport optimizations initiatives are ongoing, South Africa weak governance policy are pushing further the green transition and to reach similar efficiency results. While the European initiatives and the global literature highlights the potential of intermodal and green logistics solutions, the South African realities challenge these assumptions, creating a gap that this study aims to discover.

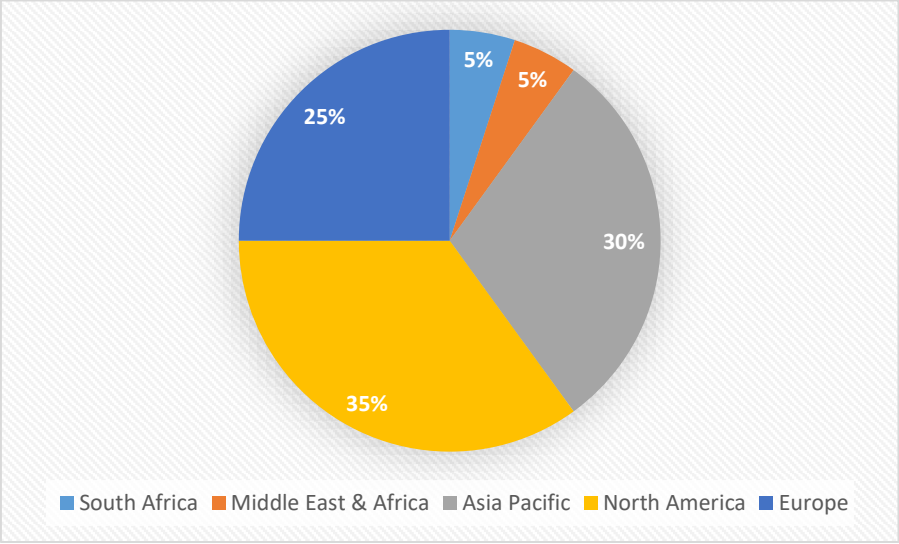

Figure 2: Intermodal segmentation by regions
Source: Own editing based on Data Insights Market (2025)

4. Methodology

The study used a qualitative, case-based research design. The data were collected from three main sources:

- Academic literature and policy documents (2000–2024);
- Industry reports, news portals, and official company statements (e.g., Transnet Annual Reports, DP World Africa updates, Kühne+Nagel market trends, DSV market trends, DHL market insights, Logwin market information, Freight News, Tracker);
- Semi-structured interviews with eight logistics professionals working in South Africa's automotive sector, including forwarders, Tier-1 supplier representatives and OEM (*Table 1*).

Table 1: Participants on interviews

Participant	Age, gender	Business	Title of position
1	female, 55	Tier-1 supplier	customs and logistics manager
2	female, 47	Tier-1 supplier	senior supply chain manager
3	male, 50	OEM	contract logistics expert
4	male, 50	forwarder	managing director
5	male, 48	forwarder	sales manager
6	male, 53	forwarder	key account manager
7	male, 45	Tier-1 supplier	senior procurement manager
8	female, 46	Tier-1 supplier	site procurement manager

Source: Own editing

The interviews focused on four thematic points: logistics reliability, intermodal adoption, security risks, and sustainability practices. The interviews were done via Teams meetings, in the length of 40 minutes to 2 hours long. To systematically interpret the interview data, thematic analysis was applied following standard qualitative methodology. The analysis involved:

- Familiarization: transcribing interview notes and repeatedly reading the material.
- Initial coding: generating codes related to infrastructure failures, crime issues, sustainability contradictions, and organizational responses.
- Theme development: grouping codes into higher-level themes aligned with the research questions.
- Reviewing and refining themes: comparing themes with secondary data sources and the literature to ensure analytical validity.
- Definition and naming of themes: finalizing themes that explain patterns affecting intermodal logistics and sustainability in South Africa.

This structured thematic approach allowed comparison and connections between interview data, industry evidence, and literature, supporting more robust qualitative insights.

5. Results

The interviews conducted with South African professionals from the logistics and automotive industries showed similarities in their statements and experience in regards of the country's supply chain challenges.

Most respondents agreed that while South Africa has a competitive manufacturing base and well-trained employees in the automotive sector, the logistics infrastructure and the governance systems are failing to support the industry growth.

5.1. Insights from the interviews

When I asked one senior supply chain manager from a major automotive OEM about intermodal transport, he replied with a strong opinion:

> *„Intermodal is a beautiful idea on PowerPoint, but not on the ground. Our containers are safer on the road than on the rail."* (Customs and Logistics Manager, Tier 1 Supplier)

This statement summarize the common understanding between the interviewed professionals: mistrust in the rail transport systems. Theft, vandalism, and unreliable transport scheduling were consistently mentioned as the main roadblocks to intermodal adoption. Several respondents described situations where fully loaded containers were vandalized within hours after leaving a port terminal. These operational experiences make it difficult for companies to achieve sustainability through shifting transport mode to intermodal, despite internal company policies are pushing for CO_2 reduction.

Another logistics expert from a tier-one supplier noted:

> *„We've seen cables stolen from the same rail yard three times in a week. Each time, operations stop for days. No one takes responsibility."*(Senior Supply chain manager, Automotive Tier1 Supplier)

5.2. OEM practices and contrasting experiences

The interviews also highlighted significant differences between OEMs' approaches. BMW Rosslyn and Ford Silverton in Pretoria are seen as main players in operational excellence, but both of them still rely mainly on road-based logistics for finished vehicles and components, and solar panel implementation when we talk about sustainability (BMW Group, 2023). Both plants are making efforts to implement more environmentally friendly and sustainable manufacturing processes, but not focusing on intermodal solutions. Toyota Prospecton, near to Durban and Volkswagen (Volkswagen Group South Africa, 2023). Uitenhage face harder geographical and environmental challenges, such as flood exposure and distance from efficient ports. Their focus is to reduce waste, re-engineer their processes, and they have implemented in their procurement sourcing manual to focus on suppliers who have robust sustainability focus. VW achieved significant results in sustainability achievements within certain projects in a range from a wastewater recycling facility and rainwater harvesting, to solar panels on the roof of its Final Assembly building, to a proactive biodiversity roadmap, but no transport related goals are highlighted. Ford's decision (Ford Motor Company of Southern Africa, 2024) to expand its electrification line was widely regarded as a positive signal, but local suppliers pointed out that sustainability progress will remain limited "as long as logistics stays diesel-driven and insecure."

Some interviewees highlighted extending cooperation between OEMs and major forwarders such as DHL, DSV, DP World, Kühne and Nagel, Logwin, and Cargo-Partner. These logistics providers are increasingly offering secured, short-distance intermodal options between OEM hubs and Tier-1 suppliers, usually within a 200–400 km range, in order to reduce the needed kilometers and risks. This progress supports Kreutzberger's (2008) findings that intermodal efficiency increases with these short-distance operations which are more predictable and including less risk due to distance, and provides improved terminal reliability.

5.3. Systemic failures and the cost of crime

All interviewees ranked security as the most critical risk toward sustainable logistics. Theft and vandalism issues were described not only as operational obstacles but as signs of lack of strong governance control. In many cases, respondents reported informal networks and local corruption that supports organized theft cases. One respondent summarized the mood in the industry clearly:

> *„We are paying sustainability consultants to write green reports, but what we really need are police and working railways."* (Senior Procurement Manager, Automotive Tier1 Supplier)

This opinion aligns with (Havenga et al., 2012) experience of the „domestic intermodal imperative" which remains unfulfilled mainly because security and governance systems fail to support a modal shift towards green solutions.

6. Discussion

The findings support H1, H2, and H4 while partially supporting H3. OEM and forwarder collaboration may improve resilience in short distance trips, but systematic risks slower broader adoption (*Table 2*).

The results confirm all four hypotheses but shows a much more personal and structural crisis than what literature alone would suggest.

Table 2: Hypothesis justification

Hypothesis	Result
H1: Intermodal adoption in South Africa's automotive logistics is constrained by inefficiencies in rail and port infrastructure.	result is supporting
H2: Theft and vandalism significantly hinders and complicates the cost-efficiency and sustainability of logistics operations.	result is supporting
H3: OEMs that invest together with forwarders in secure, short-distance intermodal solutions achieve better and stronger supply chain resilience.	result is partially supporting
H4: Current OEM sustainability initiatives in South Africa remain mostly symbolic rather than leading to real decarbonization.	result is supporting

Source: Own editing

The findings point to a disconnect between company sustainability targets and operational challanges in South Africa. The goals are ambitious but the infrastructure readiness and government actions lags behind.

6.1. Infrastructure and lack of trust

The first hypothesis (H1), that intermodal adoption is constrained by inefficiencies has been validated. Respondents expressed that they would prefer to use intermodal transport if rail were „predictable, safe, and time-competitive", but without having these conditions they do not see any benefit to switch.

As Vida et al. (2023) state, logistics 4.0 systems and digital visibility tools cannot compensate for the absence of physical reliability, and the delays in rail transport are still obviously longer than the road transport. OEMs and forwarders have invested in visibility platforms and online tools, but when trains are late or attacked, data transparency cannot fix the system.

6.2. Security and sustainability paradox

The second and fourth hypotheses (H2 and H4) shows a paradox: companies are forced to choose between sustainability and security, and companies are chosing to have the goods than to have more sustainable solutions. Better to have the goods on a less sustainable way, than to do not have it at the end. Even when road transport is less sustainable, it is considered as safer and faster solution, and basically as only considerable option in the region. This contradicts the "lean and green" concept of Colicchia et al. (2017), who found that companies can achieve environmental benefits only when operational stability exists. In South Africa, sustainability remains as ambitious goal but to reach this government and companies needs to improve the physical protection of goods and make the transport systems more reliable and stronger.

6.3. OEM pragmatism and emerging adaptations

OEMs shows a pragmatic situation, as BMW and Ford started already using suppliers near their production facilities, minimizing logistics exposure, using shuttle, short-distance transports which are less risky due to the less time, less distance fact. This approach aligns with Kreutzberger's (2008) findings that short distance intermodal transport and localized supplier base can compensate for the weak long-haul infrastructure. Toyota and VW are also piloting "green micro-corridors" in collaboration with DHL and DP World, using hybrid trucks and semi-automated security gates. Following these information, we can state that actions are promising, but such projects are too localized to accelerate a broader green transition.

6.4. Corruption, governance, and institutional failure

Several interviewees argued that the root problem is not infrastructure, but accountability and reliability. This is in line with Havenga et al. (2012) and Rodrigue (2020), who both identify governance failures as the primary disadvantage of sustainability and transport integration. Respondents openly criticized state-owned Transnet for being „over-managed and under-delivering," stating endless maintenance delays and risking procurement tasks. Without a comprehensive government reform, sustainability in logistics will remain a corporate slogan rather than a measurable outcome.

6.5. Personal reflections and reform imperative

Reflecting on these interviews, I found a consistent emotional tone: frustration is mixed with resilience. Professionals on the ground are not against reform, they support it, they need it. Their comments are forcing the urgency for a more courageous and results-driven sustainability agenda in South African logistics. As one of my interviewees concluded:

> *„We don't need another carbon-neutral vision statement. We need trains that arrive and trucks that are not attacked."* (Customs and Logistics Manager, Automotive Tier1 Supplier)

This realism should not be interpreted as cynicism but as a baseline and need for an overall government and industry reform. For future progress, South Africa must align its logistics transformation not only with the European Green Deal benchmarks but also with social stability and anti-corruption enforcement. Overall, the results confirm the literature on inefficiencies in South African intermodal systems but highlight more severe operational and governance failures than suggested by previous studies (Aritua et al., 2025; Havenga et al., 2011, 2012).

While global research emphasizes intermodal as a cost-efficient and sustainable solution (Havenga et al., 2011; Rodrigue, 2020), the South African case demonstrates the opposite: rail

increases costs and risks. Security concerns align with studies on cargo theft in emerging markets (Freight News, 2025; TT Club, 2020; NSA Global, 2025), but industry professionals feedback suggests that the scale of theft and attacks are even higher than documented. This challenges optimistic assumptions in international comparisons. On sustainability, the findings align with (Harper et al., 2019), who note the environmental and safety challenges of lithium-ion logistics. OEM practices in South Africa appear closer to symbolic gestures than systemic solutions, confirming H4.

7. Conclusion

South Africa's automotive logistics sector faces a paradox: global competitiveness in manufacturing is targeted but the reality is a systematic issue in logistics. Intermodal adoption is nice to have, but in real life it is undermined by corruption, inefficiency, and theft. Road remains the dominant mode in the region, but the condition of the infrastructure and the congestion issues are increasing the risks. Sustainability initiatives are disconnected and seems more symbolic, than the real situation, and they offer only small progress toward decarbonization.

8. Research Outlook

8.1. Policy Implications

The findings of the study indicate that South Africa's automotive logistics sector requires coordinated, multilevel policy interventions. Key implications include such as, structural reform of state-owned companies focusing on the fact that rail and port operations need at least partial privatization or public-private operational partnerships to eliminate corruption and improve accountability. Besides the structural reform, it is highly recommended to create a national cargo security framework, which is initiated by a dedicated, cross-industry security task force, including law enforcement, OEMs, insurers, and forwarders which is essential to reduce theft and vandalism. Which is also a supporting factor in other regions, incentives for intermodal investment are essential, means the government policy should include targeted subsidies or tax incentives for OEMs and for logistics providers that invest in short-distance intermodal pilot corridors, without incentive support from government the market players are left alone. Besides the above recommendations, a transparent performance monitoring system is suggested to be build, as introducing mandatory KPIs for port performance, rail reliability, and infrastructure maintenance would increase transparency and reduce stakeholder mistrust and could accelerate the green transition.
Overall, an integrated sustainability approaches are a must to work on, including policy frameworks which must require measurable decarbonization outcomes in logistics, not just facility-level green initiatives. Without these interventions, intermodal transport will remain marginal and sustainability improvements superficial.

8.2. Research Outlook

The future academic research should focus on the following areas:

- Quantitative assessment of crime-related logistics costs, making a systematic estimation of the economic burden of cargo theft on automotive supply chains in South Africa region.
- Model development for short-distance intermodal corridors, within simulation models we could evaluate the potential efficiency gains of 200-400 km intermodal so called micro-corridors.

- Performance studies to be made within a comparative analysis of Transnet support within the market players and government to reach successful logistics reforms in emerging markets.
- Decarbonization pathways for emerging-market logistics, research should examine realistic CO_2 reduction strategies related to the regions with unstable infrastructure.
- Hybrid security–sustainability frameworks, focusing on interdisciplinary frameworks to reconcile security interventions with sustainability goals in high-risk logistics environments.

These research directions could support more evidence-based policy and industry decision-making. If these steps are not taken, OEMs may relocate production to more stable hubs in North Africa or Eastern Europe. For South Africa, the choice is clear: confront corruption and invest in resilience, or face industrial decline.

Declarations

Author Contributions: Conceptualization, A.R., CS.I.H; methodology, A.R.; validation, CS.I.H; formal analysis, A.R.; writing-original draft preparation, A.R.; writing-review and editing, CS.I.H. All authors have read and agreed to the published version of the manuscript.
Funding: This research is expected to receive no funding.
Data Availability Statement: Not applicable.
Conflicts of Interest: The authors declare no conflicts of interest.

References

Allardice, J. (2009). *The impact of the MIDP on the South African automotive industry* (Master's thesis, University of KwaZulu-Natal). https://researchspace.ukzn.ac.za/server/api/core/bitstreams/456a7f2b-ba4e-4ec1-a1c6-b5a5663f5f82/content

Aritua, B., Havenga, J. H., Simpson, Z. P., Swarts, S., Neethling, H., & de Bod, A. (2025). The pathway to integrated surface transport and regulation of logistics in South Africa. In *Challenges in transport regulation in Europe and beyond* (pp. 275–312). Edward Elgar Publishing. https://doi.org/10.4337/9781035369164.00018

Barnes, J., & Black, A. (2013, May). *The Motor Industry Development Programme 1995–2012: What have we learned?* Trade & Industrial Policy Strategies (TIPS). https://www.tips.org.za/files/the_midp_-_15_april_2014_barnes_and_black.pdf

Black, A., & Roberts, S. (2009). The evolution and impact of industrial and competition policies. In J. Aron, B. Kahn, & G. Kingdon (Eds.), *South African economic policy under democracy* (pp. 211–243). Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199551460.003.0008

BMW Group. (2023, June 29). *BMW Group announces R4.2 billion investment in electrification of South Africa's Rosslyn plant as 50th anniversary celebrations roll on*. https://www.press.bmwgroup.com/south-africa/article/detail/T0422167EN/bmw-group-announces-r4-2-billion-investment-in-electrification-of-south-africa's-rosslyn-plant-as-50th-anniversary-celebrations-roll-on

BMW Group. (n.d.). *BMW Group Plant Rosslyn*. https://www.bmwgroup-werke.com/rosslyn/en.html

Borucki, M. (2024, July 12). *Is South Africa ready to embrace electric vehicle production?* Just Auto. https://www.just-auto.com/analyst-comment/is-south-africa-ready-to-embrace-electric-vehicle-production/

Colicchia, C., Creazza, A., & Dallari, F. (2017). Lean and green supply chain management through intermodal transport: Insights from the fast moving consumer goods industry. *Production Planning & Control, 28*(4), 321–334. https://doi.org/10.1080/09537287.2017.1282642

Data Insights Market. (2025, April 11). *Intermodal transportation service market disruption: Competitor insights and trends 2025–2033*. https://www.datainsightsmarket.com/reports/intermodal-transportation-service-139064

Ford Motor Company of Southern Africa. (2024, October 29). *South Africans keen on electrified vehicles despite infrastructure concerns, according to Ford's latest study*. https://www.ford.co.za/about-ford/newsroom/2024/south-africans-keen-on-electrified-vehicles-despite-infrastructure-concerns-according-to-ford-latest-study/

Freight News. (2024, April 4). *Cargo crime weighs heavily on transport sector*. https://www.freightnews.co.za/article/cargo-crime-weighs-heavily-on-transport-sector

Freight News. (2025, September 5). *Security remains rail freight's biggest challenge – Transnet.* https://www.freightnews.co.za/article/security-remains-rail-freights-biggest-challenge-transnet

Harper, G., Sommerville, R., Kendrick, E., Driscoll, L., Slater, P., Stolkin, R., Walton, A., Christensen, P., Heidrich, O., Lambert, S., Abbott, A., Ryder, K., Gaines, L., & Anderson, P. (2019). Recycling lithium-ion batteries from electric vehicles. *Nature, 575*(7781), 75–86. https://doi.org/10.1038/s41586-019-1682-5

Havenga, J. H., de Bod, A., Simpson, Z. P., Swarts, S., & Witthöft, I. E. (2011). *A proposed freight and passenger road-to-rail strategy for South Africa*.

Havenga, J., Simpson, Z., & de Bod, A. (2012). South Africa's domestic intermodal imperative. *Research in Transportation Business & Management, 5*, 38–47. https://doi.org/10.1016/j.rtbm.2012.11.006

Kreutzberger, E. D. (2008). Distance and time in intermodal goods transport networks in Europe: A generic approach. *Transportation Research Part A: Policy and Practice, 42*(7), 973–993. https://doi.org/10.1016/j.tra.2008.01.012

Kuteyi, D., & Winkler, H. (2022). Logistics challenges in Sub-Saharan Africa and opportunities for digitalization. *Sustainability, 14*(4), 2399. https://doi.org/10.3390/su14042399

Muogboh, O. S., & Ojadi, F. (2018). Indigenous logistics and supply chain management practice in Africa. In U. Uzo & A. K. Meru (Eds.), *Advanced series in management* (Vol. 20, pp. 47–70). Emerald Publishing Limited. https://doi.org/10.1108/S1877-636120180000020004

Nel, J., de Goede, E., & Niemann, W. (2018). Supply chain disruptions: Insights from South African third-party logistics service providers and clients. *Journal of Transport and Supply Chain Management, 12*, 77. https://doi.org/10.4102/jtscm.v12i0.377

Nitsche, B., Coll, A., Straube, F., Atiye, D. S., Mensah, H. K., Gershome, A. G., Barayandema, J., Kleineidam, J., Alazzeh, M., Lengeling, J. C., Kreie, A., & Straube, F. (Ed.). (2024, July). *The future of logistics networks with sub-Saharan Africa: Embracing the potential*. Technische Universität Berlin. https://doi.org/10.14279/depositonce-20374

NSA Global. (2025, July 2). *Understanding the threat of organised crime in South Africa's supply chain: Logistics risk and corporate exposure*. https://nsa-global.com/understanding-the-threat-of-organised-crime-in-south-africas-supply-chain-logistics-risk-and-corporate-exposure/

Rodrigue, J.-P. (2020). *The geography of transport systems* (5th ed.). Routledge. https://doi.org/10.4324/9780429346323

South African Revenue Service. (2021, February 5). *Automotive Production and Development Programme (APDP)*. https://www.sars.gov.za/customs-and-excise/registration-licensing-and-accreditation/automotive-production-and-development-programme-apdp/

Statista. (n.d.). *South Africa: Crime index 2024*. Retrieved December 1, 2025, from https://www.statista.com/statistics/1399476/crime-index-south-africa/

Tracker South Africa. (2024, May 6). *Fleet crime overview in South Africa*. https://www.tracker.co.za/news/news-room/fleet-crime-overview-in-south-africa

TT Club. (2020, October 13). *South Africa remains a top hotspot for cargo crime*. https://www.ttclub.com/news-and-resources/news/article/south-africa-remains-a-top-hotspot-for-cargo-crime/

Vida, L., Illés, B., & Bányainé-Tóth, Á. (2023). Logistics 4.0 in intermodal freight transport. *Procedia Computer Science, 217*, 31–40. https://doi.org/10.1016/j.procs.2022.12.199

Volkswagen Group South Africa. (2023, October 20). *VWSA honoured with Lean & Green Management Award*. https://www.vw.co.za/en/volkswagen-experience/newsroom/vwsa-honoured-with-Lean-and-green-management-award.html

Web resources were last accessed on 31 March 2026.