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Risk Management in Cargo Transportation, Theft Mitigation and Security Institutional Interorganizational

Risk Management in Freight Transport, Cargo Theft Mitigation, and Interorganizational Institutional Security

Risk management in the transport of goods, mitigation of cargo robots and inter-organizational institutional security

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Summary

This article investigates the role of risk management, tracking technologies, and inter-organizational institutional coordination in mitigating cargo theft and promoting security in road transport. Based on a theoretical analysis of corporate risk management, environmental criminology, and governance in public and private security networks, the study analyzes how cooperation between transport companies, police forces (Federal Highway Police, Civil Police, Military Police), and regulatory bodies reduces the incidence of accidents and the cost of insurance policies.

The impacts of integrating tracking systems and security sensors on asset protection and ensuring the continuity of logistics businesses are being evaluated.

Keywords: Risk management. Cargo theft. Institutional security. Cargo transportation. Security intelligence.

Abstract

This article investigates the role of risk management, tracking technologies, and interorganizational institutional articulation in mitigating cargo theft and promoting safety in road transport. Drawing upon the theoretical analysis of corporate risk management, environmental criminology, and public-private security network governance, the study analyzes how cooperation among transport companies, police forces (Federal Highway Police, Civil Police, Military Brigade), and regulatory bodies reduces loss rates and insurance policy costs. The paper evaluates the impacts of integrating tracking systems and security sensors on asset protection and business continuity in logistics operations.

Keywords: Risk management. Position theft. Institutional security. Freight transport. Security intelligence.

Introduction

Cargo theft and vehicle theft in road transport constitute one of the bottlenecks.

more severe socioeconomic and operational challenges faced by supply chains in the Americas.

Latin America. As highlighted by Harland, Brenchley, and Walker (2003), organized crime focused on

The interception of high-value goods in transit acts as a destabilizing element of...

economy, imposing substantial additional costs in terms of insurance premiums, systems of

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Security, loss of goods, and disruption of business activities. In the transportation sector.
In the road transport sector, risk mitigation has ceased to be a reactive activity and has become a...
tactical and strategic intelligence function.
The evolution of organized crime has demanded that transport companies and representative entities...
The sector is developing sophisticated Risk Management strategies (RIS). The use
Isolated use of vehicle tracking equipment proved insufficient to contain actions.
highly planned criminal operations that employ radio frequency signal blockers *(jammers)*
and heavy weaponry. The effectiveness of asset protection came to depend on the ability to
combining advanced telemetry technologies with the creation of institutional cooperation networks between
The private sector and state and federal public security agencies.
This article proposes a reflection on the application of corporate risk management theory, of
Environmental criminology and inter-institutional coordination in the prevention of cargo theft.
Anchoring itself in theoretical frameworks of public security, risk management, and governance.
In networks, the study analyzes how the coordination of security committees, the sharing of
Police intelligence and the automation of operational procedures reduce crime rates.
They reduce accident rates and strengthen the resilience of the logistics sector.

Methodology

This study adopts a qualitative and descriptive methodological approach, based on theoretical analysis and
Documentary documentation of corporate risk management models, statistical reports of
accident rates in transportation and guidelines for inter-organizational cooperation between the public and private sectors.
private. The research is based on a literature review of academic reference works in
Risk management, corporate security, and network governance, as defined by ISO 31000.
(2018), Felson and Clarke (1998), Manunta (1999) and Provan and Kenis (2008).
The analysis examines the integration processes between vehicle tracking systems and control centers.
24-hour monitoring, safety actuators (fuel cut-off, electronic trunk locks)
and sirens) and the flow of communication with the police forces (Federal Highway Police, Civil Police).
and Military Police). Accident indicators are evaluated, such as the accident rate per
million kilometers driven, the recovery rate of stolen cargo, the average value of losses
operational costs and the cost of risk management in the total freight.
Analytical triangulation contrasts the operational costs of implementing plans with
rigorous risk management with the resulting efficiency gains from reduced premiums.

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Carrier's Civil Liability Insurance for Cargo Disappearance (RCTC-VI) and
Risk Management (GRIS). This methodological approach allows for the foundation of...
Scientifically, the thesis that preventive intelligence and institutional coordination are the
High-return investments for road transport safety.

Chapter 1: Fundamentals of Risk Management in Road Transport (ISO 31000)

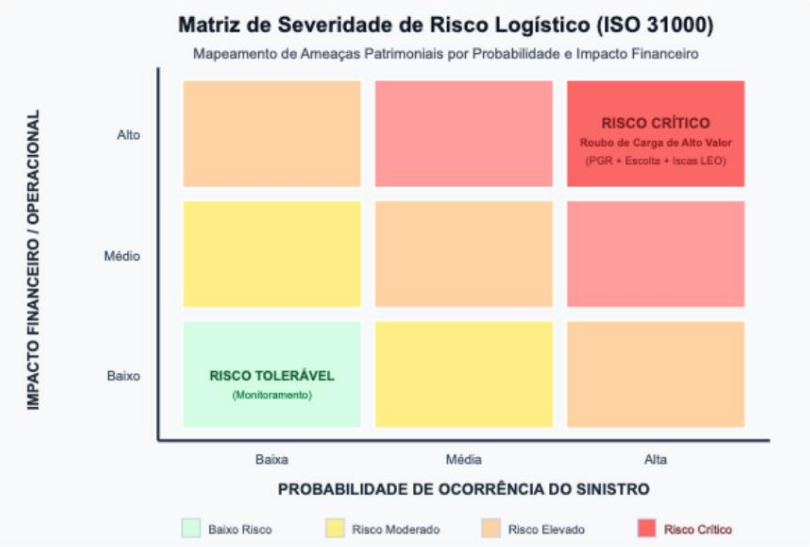
Risk management in road freight transport is a process.
systematic and iterative approach focused on identifying, analyzing, evaluating, and treating risks of
Theft, accidents, and operational losses. As established by the international standard ISO 31000.
(2018), efficient risk management must be integrated into the organization's governance structure,
guiding senior management decision-making and promoting continuous safety improvement.
of the business.

The risk identification phase involves detailed mapping of the most dangerous routes.
the times of day with the highest incidence of criminal activity and the categories of goods most frequently involved.
Attractive items for theft (such as electronics, pharmaceuticals, food, and fuel).
Categorizing road sections by risk levels allows for the advance definition of
Specific security requirements for each trip, such as the mandatory armed escort,
The use of trains or the restriction of night traffic.
Risk assessment is based on the classic relationship between the probability of an event occurring.
damaging and the likely financial and operational impact. High value-added goods with
High liquidity in the informal market presents a critical level of risk, requiring implementation.
highly redundant mitigation measures to reduce the likelihood of an accident and contain the impact.
potential regarding the carrier's assets.

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The risk management plan (RMP) acts as the operational code of conduct that must be followed.
strictly followed by drivers and monitoring centers. Failure to comply with regulations.
from the PGR, such as unauthorized stops in hazardous locations or the lack of signal testing of the equipment.
Failure to track the vehicle before the start of the trip invalidates insurance coverage and exposes the carrier to risk.
irreparable financial losses in the event of an accident.
It is concluded that rigorous application of the ISO 31000 guidelines is the foundation of effective transport management.
Professional. A risk prevention culture reduces the occurrence of accidents and protects the integrity of the professional.
The physical health of the drivers ensures the continuity of the carrier's business operations.

Chapter 2: Environmental Criminology, Crime Situation Prevention and Technologies of Protection

The application of concepts from environmental criminology and crime prevention through design.
Environmental (CPTED - *Crime Prevention Through Environmental Design)* in freight transport
seeks to alter the physical and operational conditions of the route to increase the perception of risk by
criminal and hinder the execution of the crime. According to the theory of criminal opportunity
As formulated by Felson and Clarke (1998), crime occurs when there is convergence in time and space.
of a motivated aggressor, a compensatory target, and the absence of a guardian capable of stopping him.
Vehicle tracking and telemetry technology acts directly as a "capable guardian" in
Road transport structure. The use of hybrid trackers (which combine technology of
GPS/GPRS positioning with satellite and radio frequency communication ensures transmission.
continuous tracking of the truck's location even in areas without cellular network coverage.
or under the influence of signal blockers *(jammers).* The use of hidden secondary trackers.

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(Cargo decoys) inside the goods increases the chances of locating the shipment if the vehicle is decoupled.

The automatic safety actuators installed in vehicles increase the effort required for the Consolidation of the robbery. The activation of sirens, the automatic shut-off of the fuel pump in in case of unauthorized route deviation and electronic locking of the trunk by geofencing (which prevents (Opening the door outside the exact coordinates of the destination) neutralizes the criminals' actions. preventing the rapid removal of the cargo and buying precious time for the intervention of the forces.

police officers.

Safety at driver rest stops is another crucial component of prevention.
Situational. Mapping and approval of fuel stations and parking lots.
that offer 24-hour security, adequate lighting, and access control reduce
This dramatically reduces the vehicle's vulnerability during mandatory driver rest breaks.
Therefore, the combination of advanced tracking technology, vehicle actuators, and rigor
Operational changes alter the cost-benefit ratio for the criminal. The increased risk of capture and the
Technical difficulties imposed by security systems protect the transported assets and
They preserve the lives of drivers on the highways.

Chapter 3: Institutional Articulation and Governance in Interorganizational Networks of Security

The complexity of combating cargo theft operations requires a transition from isolated actions to... private sector towards a governance model in interorganizational networks that integrates Transportation companies, insurance companies, risk management firms, and public safety agencies. According to According to Provan and Kenis (2008), network governance allows for the efficient coordination of multiple autonomous actors who share a common goal, combining resources and information to to solve complex problems that exceed the capacity of a single organization to act.

The creation and coordination of Security Committees within unions and organizations.
Representative bodies of the freight transport sector establish the formal channel for coordination between the sector.
Productive and the State. The ongoing dialogue between transport executives and police commands.
The Federal Highway Police (PRF), Civil Police, Military Police, and Fire Departments make it possible.
Alignment of operational strategies, mapping of crime hotspots on highways, and...
Defining priorities in visible patrols.

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The sharing of statistical data and security intelligence between the private sector and law enforcement.
Police increase the efficiency of investigations against criminal organizations specializing in
Cargo reception. Immediate availability of tracking information and characteristics.
from the stolen vehicle, the monitoring centers of the transport companies send the information to the operations centers.
Police officers reduce the response time of field patrol cars, substantially increasing the rates.
recovery of the goods and arrest of the perpetrators in the act.
Standardizing communication and contingency protocols in case of an accident is the critical factor.
For the effectiveness of the security network, the definition of clear activation flows for police forces is crucial.
with the creation of direct communication channels and access keys to real-time tracking data
In reality, it eliminates bureaucracy in times of emergency and speeds up police response in certain areas.
strategic highways.
In short, institutional articulation and governance in interorganizational networks are the pillars of
Modern security in cargo transportation. The union of efforts between operational knowledge.
The private sector and the state's police power build a systemic protection environment in
highways, reducing impunity and strengthening the business environment in the country.

Chapter 4: Financial Impact of Claims Ratio, Insurance Rates (RCTC-VI) and Costs of GREY

Cargo theft produces direct and indirect financial impacts that affect the competitiveness of...
Transportation companies increase the final cost of products for consumers. According to Manunta (1999),
The costs of corporate insecurity encompass not only the value of direct material losses, but also...
the opportunity costs arising from business interruption, the increase in insurance rates and
mandatory investments in protection technologies that reduce the profit margin of
companies.
Pricing of mandatory and optional insurance in cargo transportation, such as insurance for...
Carrier's Civil Liability for Cargo Disappearance (RCTC-VI) is strongly
influenced by the carrier's accident history and the region of operation. Fleets that
They exhibit high theft rates, suffer significant increases in the premium rate, and the imposition of
Higher deductibles charged by insurance companies. Demonstrating good management.
Efficient risk management is the condition for negotiating reduced premiums and maintaining economic viability.
of the transport contract.

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The Risk Management Fee (GRIS), charged as part of the commercial freight charge, is intended for
To cover operational costs with 24-hour monitoring, tracking software, and escort services.
Armada and vehicle actuator systems. Correct pricing of the GRIS rate is fundamental.
to prevent security costs from eating into the carrier's contribution margin.
A balance between the cost of protection technologies and the value of the goods being transported requires...
Constant cost-benefit analyses.

The loss of goods due to theft has a severe impact on the commercial relationship between the carrier and the shipping company.
and its industrial and retail clients. Delays in the delivery of strategic products or the loss of batches.
Exclusive products cause shortages on store shelves, breach of sales contracts and...
Irreversible damage to the carrier's image in the market. The guarantee of safety.
Equity is therefore a central requirement for retaining large business accounts.
It is concluded that controlling claims is imperative for financial health and reputation.
Corporate. Investment in risk management and institutional coordination reduces costs.
Total freight coverage protects the transport company's profit margin and ensures the reliability of services.
services provided to the market.

Chapter 5: Technological Challenges, Neutralizing Jammers, and Cybersecurity in Transport

The rapid evolution of organized crime has introduced sophisticated technological challenges that
They require the continuous updating of the protection tools used by carriers.
As Harland, Brenchley and Walker (2003) point out, the increasing dependence on systems
Electronic and data communication networks expose supply chains to vulnerabilities.
Hybrid threats, which combine physical attacks on highways with electromagnetic interference and other threats.
Cybernetics in management systems.
The proliferation of radio frequency signal blockers *(jammers* or "devils") represents the
The primary technical threat to vehicle tracking operations. These clandestine devices
They emit electromagnetic noise in the GPS and cellular (GPRS/4G) frequencies, disrupting
The vehicle's communication with the monitoring center is disrupted, preventing the sending of alerts.
Emergency automatic systems. Combating *jammers* requires the adoption of trackers with...
Automatic interference detection, which triggers the immediate immobilization of the vehicle as soon as the noise is detected.
RF is identified.

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The transition to tracking systems based on Low Earth Orbit (LEO) satellite networks and Closed-loop radio frequency (RF) communication offers redundancy against the action of terrestrial signal blockers. The use of multiple data transmission channels ensures that, even under electromagnetic attack on cellular frequencies, the vehicle continues transmitting its precise geographic location to the monitoring center via satellite or antenna. RF.

Cybersecurity of monitoring centers and Transportation Management systems (TMS) has become a critical asset protection priority. Data kidnapping *(ransomware)* Or, the hacking of tracking systems by criminals can expose confidential information. regarding routes, schedules, and values of high-value cargo, facilitating the planning of approaches. Armed forces. The implementation of data encryption, two-factor authentication, and IT audits. It prevents the leakage of operational intelligence.

Therefore, protection against technological threats requires constant innovation and investment in Information security. Technological upgrades to tracking tools and security measures. Cybersecurity systems ensure effective risk management and protect operations. Transportation against the new tactics of organized crime.

Chapter 6: Security Intelligence, Predictive Analytics, and the Future of Risk Management

The future of risk management in freight transport is moving towards a transition from one model to another. From a reactive vehicle monitoring model to a predictive model based on artificial intelligence, *Big Data* processing and behavioral analysis. According to

According to ISO 31000 (2018), maturity in risk management is achieved when the organization develops the The ability to anticipate threat scenarios, making preventative decisions before the risk materializes. materialize in the operation.

The use of machine learning algorithms *integrated* into systems Vehicle telemetry enables the automated identification of deviations from standard behavior. of the driver or the vehicle. The system is capable of identifying unscheduled stops in locations suspicious, atypical changes in speed pattern or attempts to tamper with the trunk's sensors, generating instant high-risk alerts for the monitoring center and triggering actuators. preventive safety measures.

Predictive crime mapping analysis cross-references historical cargo theft data with information Real-time information on traffic, weather conditions, and police presence on highways. This

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Analytical cross-referencing allows for the dynamic redefinition of routes and departure times, directing...
Vehicles are being used for safer routes, avoiding exposure at critical points during peak hours.
with the highest incidence of crime.

Strengthening community security intelligence centers, formed by the union of
Transport companies, public agencies, and insurance companies, it consolidates the ethical sharing of data in
cloud. The creation of unified databases on claims profiles, receivers of
Stolen goods and emerging criminal techniques strengthen the preventive capacity of the entire...
Logistics ecosystem, reducing theft rates regionally and nationally.
It can be concluded that predictive intelligence is the great frontier of safety in road transport.
Convergence between data science, cutting-edge vehicle technology, and institutional cooperation builds
An intelligent and dynamic protection system, capable of neutralizing criminal actions and protecting life.
of the drivers and ensure the efficiency of the national supply.

Final Considerations

The research conducted throughout this article shows that mitigating cargo theft and...
Promoting safety in road transport requires the harmonious integration of technology.
Advanced telemetry, rigorous risk management processes, and institutional coordination.
Interorganizational. Research shows that the isolated use of tracking equipment...
It is insufficient to contain organized criminal activity, making the use of systems indispensable.
Redundant and automatic vehicle actuators.

The study proves that the application of the principles of the ISO 31000 standard and environmental criminology...
(CPTED) alters the cost-benefit ratio for the criminal, increasing the perception of risk and
making it difficult to consolidate crime on highways. Prior mapping of dangerous routes.
and the certification of safe rest stops prove to be fundamental strategies for the protection of
physical integrity of drivers and of the transported goods.
The institutional coordination promoted by Security Commissions and entities in the transportation sector.
Network governance is consolidating itself as the differentiating element in the fight against cargo theft.
interorganizational relations between transport companies and public security forces (Federal Highway Police, Civil Police and Police)
Military) enables the sharing of police intelligence, speeds up response time in
emergencies and substantially increases the rates of recovery of goods and arrests.
executors.

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Quantitative analysis of the financial impact of claims experience demonstrates that controlling losses

Operational costs are a basic requirement for the economic viability of the transport company. Reducing these costs is essential.

RCTC-VI insurance premiums and efficient GRIS rate management protect the financial margin.

from the company, guaranteeing competitive rates for customers and maintaining the carrier's reputation.

in the market.

Furthermore, addressing new technological challenges, such as signal jammers, is a significant challenge.

(jammers) and cyber threats to Transportation Management Systems (TMS) require

Continuous investments in innovation, data encryption, and LEO satellite tracking.

Transition to predictive risk management through artificial intelligence and Big Data analytics.

Data represents the future of asset protection in the logistics sector.

Given the complexity of the public safety scenario on highways, continuous cooperation between the productive sector and the State ceases to be an operational option and becomes a strategic imperative for economic development.

We have concluded that the union of cutting-edge technology, predictive intelligence, and institutional coordination is the force capable of transforming security in cargo transportation. The ongoing commitment of industry leaders to protecting life, preventing accidents, and fostering inter-organizational cooperation ensures the continuity of logistics businesses, preserves company assets, and drives the country's economic growth efficiently and safely.

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