

Keywords: railway suicides; rail logistics; crisis management; crisis psychology; rail transport safety

Robert CZERNIAK^{1*}, Piotr F. BOROWSKI²

LOGISTICAL CHALLENGES OF RAIL TRANSPORT CONCERNING SUICIDAL INCIDENTS ON TRACKS: OPERATIONAL, PSYCHOLOGICAL, AND ECOLOGICAL PERSPECTIVES

Summary. Railway suicides in Poland present a significant challenge, both socially and from a transportation system perspective. As part of a ministerial research grant, the Nicolaus Copernicus Superior School conducted pioneering research on the psychological and legal approach to suicide, which enriched the discussion on prevention and systemic solutions to this problem. This article offers an interdisciplinary analysis of the issue by integrating three key dimensions—psychological, logistical (including crisis management strategies), and the ecological transformation of railways – as factors contributing to a safer and more socially inclusive transport environment. The psychological section presents selected theories and models explaining suicidal behavior, focusing on the characteristics of individuals who choose to end their lives on railways. It discusses the most common risk factors, including depression, affective disorders, crises, addictions, loneliness, and a lack of access to psychological support. The logistical section analyzes the impact of suicide incidents on railway operations, including train delays, infrastructure shutdowns, financial losses, psychological strain on personnel, and existing crisis response and management procedures. The ecological section demonstrates that implementing innovative, low-emission technologies supports environmental goals while enhancing the overall operational safety of the railway system by modernizing rolling stock, infrastructure, and energy management systems. The article also presents current statistical data on the number of incidents, their locations, and the duration of service disruptions. Furthermore, it reviews technical and organizational measures aimed at reducing suicides, such as surveillance systems, fencing, signaling, frontline staff training, and cooperation with police and emergency services. Finally, the article emphasizes the need for a systemic approach that combines mental health prevention efforts with infrastructural and logistical solutions.

1. INTRODUCTION

Contemporary rail transport faces multiple parallel challenges—ranging from the need to respond to crisis events such as suicides on railway tracks, to achieving goals related to climate transformation. In this context, the development of low-emission railways powered by renewable energy sources is becoming increasingly important and aligns with a broader strategy of building a resilient, safe, and sustainable transport system. Modernizing railway infrastructure with sustainability in mind reduces emissions, improves the quality of public spaces, and enhances safety. Such initiatives may indirectly reduce the number of suicides, including those committed on railway tracks, by limiting access to dangerous areas, improving infrastructure surveillance, and creating a more supportive and welcoming

¹ Nicolaus Copernicus Superior School, Faculty of Economics and Management; Nowoursynowska 47a, 00-695 Warsaw, Poland; e-mail: robert.czerniak@sgmk.edu.pl; orcid.org/0009-0008-9448-9527

² Khazar University; Department of Economics and Management; Mahsati 41, AZ1096, Baku, Azerbaijan; e-mail: pborowski@autograf.pl; orcid.org/0000-0002-4900-514X

* Corresponding author. E-mail: pborowski@autograf.pl

social environment. Thus, green rail is a response to climate challenges, a component of social prevention, and a means of caring for the mental well-being of passengers and railway employees.

Suicides on railway tracks represent a serious social and infrastructural problem that remains insufficiently studied despite its consequences. Annually, hundreds of incidents occur in Poland involving individuals who choose to end their lives by entering railway tracks. These events are dramatic – from both a psychological perspective (related to the mental condition of the individual) and a logistical perspective (encompassing rail traffic safety, delays, financial losses, and crisis response procedures).

Due to its openness, accessibility, and the symbolic perception of the “irreversibility” of such an act, rail infrastructure is often a location of choice for individuals experiencing psychological crises. Each incident requires infrastructure managers and rail operators to respond immediately, engage multiple emergency services, and manage significant disruptions to the transport system.

The authors highlight the need for an interdisciplinary approach to this issue that combines preventive mental health measures with technical and procedural solutions in the rail transport sector. The analysis is based on available statistical data, relevant literature, and a review of practices implemented in Poland and other European countries. Examples of crisis management strategies in the text are based on the author’s professional experience and daily work in the field.

2. MATERIALS AND METHODS

This research employed a mixed-methods approach, combining primary and secondary research methods, which enabled an in-depth understanding of the phenomenon under analysis. The use of mixed methods was justified by the complexity of the subject matter, which required the quantitative measurement of attitudes and a qualitative exploration of underlying experiences and perspectives. The primary research was conducted in September and October 2024 as part of the suicidology project and comprised two stages. The first stage involved a survey of 700 professionally active individuals (primarily healthcare professionals, including nurses, physicians, and psychologists) aged 20 to 60. The aim of the study was to explore their attitudes, experiences, and levels of preparedness to respond to crises related to suicidal behavior. The survey provided insights into the respondents’ attitudes, opinions, and experiences concerning suicide, as well as their readiness to intervene in crises.

Based on the survey results, the second stage of the research was carried out. This stage involved in-depth focus group interviews with 105 respondents from the same professional group. The insights gained in the first stage allowed for the structuring of the discussions and for concentrating on the most critical problem areas. A total of seven groups were organized, each comprising 15 participants.

The interviews aimed to collect qualitative data on participants’ emotions, reflections, and assessments in the context of suicide prevention, expanding and deepening the conclusions drawn from the previous quantitative analysis. The empirical part was complemented by desk research, including analyses of available domestic and international sources, such as industry reports, strategic documents, scientific articles, and statistical data. Materials published by the Central Statistical Office in Poland (GUS), WHO, Eurostat, UIC, ERA, PKP PLK, and other institutions dealing with public health, transport, and safety were used. Secondary data analysis allowed for situating the research findings in a broader socio-systemic context and supplemented the conclusions drawn from the primary research with an institutional and strategic perspective. Importantly, it also provided a comparative framework, enabling the identification of trends, patterns, and best practices relevant to suicide prevention at national and international levels.

3. THE SCOPE OF SUICIDES IN GENERAL AND ON RAILWAY TRACKS

Suicide is a growing social and health problem and is one of the leading causes of premature death in many countries. Suicides on railway tracks pose a particularly serious challenge both in Poland and in many European countries, as they create significant social, psychological, logistical, and managerial

consequences. Despite the lack of uniform, detailed databases, available statistics in Poland indicate that an average of over 144 suicide attempts and incidents occur on railway tracks each year [1]. Data from the Central Statistical Office and the railways indicate that this number has remained relatively stable, although seasonal and regional variations have been observed [2]. Suicides most often occur in areas with high rail network density and relatively little technical security.

This phenomenon also poses a significant challenge on a European scale. Reports from international organizations such as the European Railway Agency (ERA) indicate that suicides on railway tracks constitute a significant portion of all rail-related fatalities, accounting for 30% to as much as 75% of all fatal accidents in the railway sector [3]. Differences between countries stem from factors such as varying railway network density, social culture, the availability of psychological support services, and the preventive methods used.

Data from Western European countries such as Germany, France, the Netherlands, and the United Kingdom, presented by the International Union of Railways - Union Internationale des Chemins de fer (UIC), indicate that implementing comprehensive preventive strategies encompassing both technical safeguards (e.g., fencing, monitoring) and preventive measures (e.g., social campaigns, psychological support) can effectively reduce the number of such incidents [4]. However, despite growing awareness of the problem in Poland, these actions still require strengthening and better coordination at the national and regional levels [5].

Table 1 presents the scale of suicides and suicide attempts on Polish tracks between 2016 and 2023 based on data collected by the Office of Rail Transport [6].

Table 1

Suicides and suicide attempts on tracks in Poland between 2016 and 2023

	2016	2017	2018	2019	2020	2021	2022	2023
Suicides	114	112	105	156	115	138	170	128
Suicide attempts	10	12	16	15	27	13	13	19
Total	124	124	121	171	142	141	183	147

In recent years, suicide has increasingly been recognized as one of the most pressing public health concerns affecting individuals across different age groups and social backgrounds. Suicide poses a serious health and social challenge, the scale of which remains high in Poland and many other European countries. Suicides committed within the railway infrastructure account for a significant share of these incidents and have prompted various activities aimed at recognizing and addressing this problem. The scale of suicides in Poland by age group between 2010 and 2023 was analyzed as part of the Suicidology – Knowledge Analysis and Educational Campaign project [7] and was presented in a report prepared by the Nicolaus Copernicus University in Warsaw. This research constitutes an important and innovative contribution of the scientific community and practitioners to deepening knowledge about the phenomenon of suicide and to the development of preventive measures. Table 2 presents the results of the analysis of suicides by age group between 2010 and 2023.

As shown by the numerical data presented in Tables 1 and 2, suicides represent a growing social and infrastructural challenge, which is also increasingly evident in the context of railway infrastructure. This phenomenon entails significant emotional and societal costs and affects the safety, punctuality, and efficiency of railway transport operations. Suicides committed on railway tracks constitute a significant portion of the overall number of suicide cases in Poland and across many European countries, as confirmed by national and international data. This highlights the need to perceive the problem not merely as isolated incidents but as a persistent and systemic threat.

Table 2

Number of suicides in Poland in particular age groups from 2019–2023

Age group	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
0–6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7–12	6	5	5	9	14	12	9	28	26	46	29	85	85	85
13–18	267	243	286	348	428	469	466	702	746	905	814	1411	2008	2054
19–24	555	528	607	772	1172	1080	978	1143	1143	1226	1242	1573	1699	1736
Total	828	776	898	1129	1614	1561	1453	1873	1915	2177	2085	3069	3792	3875

The scale of the issue underscores the need for coordinated actions across various domains, including technical aspects such as fencing, monitoring systems, and early detection technologies for unauthorized access to tracks; organizational measures such as training for train drivers and standardized crisis response procedures; and psychological and social interventions, such as awareness campaigns, mental health support programs, and cooperation with organizations specializing in suicide prevention.

Only a comprehensive, interdisciplinary approach combining knowledge from engineering, management, psychology, and social policy has a realistic chance of reducing the frequency of such incidents. In particular, innovative technical and technological solutions, such as AI-powered surveillance systems, predictive analytics for high-risk locations, and automated track intrusion detection, have the potential to significantly enhance early warning and prevention efforts. Advanced fencing designs, smart barriers, and automated alerts can reduce unauthorized access to tracks, while improved lighting, clear signage, and a more welcoming and less intimidating environment along railway infrastructure can help decrease the appeal of these locations for suicidal behavior. The integration of real-time monitoring with railway operations further improves response times and coordination in crises. Effective prevention may lower the number of tragic deaths and minimize the negative consequences for the transportation system, railway personnel, and society [8].

4. RESULTS AND DISCUSSION

4.1. Psychological Determinants of Choosing Railway Tracks as a Site for Suicide

From a psychological perspective, people choose railway tracks as the location for suicide attempts [9] because this setting possesses characteristics that may make it seem particularly appealing for taking one's own life. The literature identifies three primary factors that facilitate suicide attempts on railway tracks: the high frequency of train operations, easy access to tracks, and the high lethality of the method, which sometimes ends in disability [10].

Trains run frequently, especially near large urban areas, which minimizes the waiting time and favors impulsive actions. Furthermore, tracks are often easily accessible due to a lack of fencing and the presence of secluded areas along the railway infrastructure. They are also poorly lit, rarely monitored, and located away from buildings. Therefore, these may be perceived by individuals in a psychological crisis as particularly convenient places for a suicide attempt. This is especially true in peripheral, industrial, or sparsely urbanized regions. Individuals in a crisis often select such locations due to their seclusion, which reduces the risk of intervention by third parties [11].

Another significant psychological factor is the high effectiveness of this method. Being hit by a high-speed train offers near certainty of death, which, for many individuals with strong suicidal intent, outweighs concerns about pain or the specifics of the act itself [12].

Analyzing the selection of railway tracks as the location of a suicide highlights the need for preventive actions aimed at restricting physical access to railway infrastructure and reducing impulsivity in suicidal behavior through public education, access to crisis support, and the development of early intervention systems [13].

4.2. The Choice of Railway Tracks in Suicidal Behavior – The Crisis Psychology Perspective

The decision to end one's life is a complex psychological and social process, influenced by a range of individual, situational, and environmental factors. The choice of a specific place and method is not random but rather results from a particular way of perceiving reality by a person in a deep emotional crisis. Railway tracks, as a public space with unique characteristics, are disproportionately chosen in this context.

From a psychological point of view, based on the opinions of specialists and the experiences reported by their patients, the main factors determining the selection of railway tracks include ease of access, high lethality, and the perception of immediacy and irreversibility of the action [20]. Individuals in a state of intense emotional distress, who often act impulsively, seek places that allow for rapid execution without complex planning. Railway tracks—particularly those in non-urban, industrial, or poorly monitored locations—meet these conditions.

Studies indicate that individuals choosing such a site are often motivated by the belief in the near certainty of death. Being struck by a fast-moving train is considered a “certain and irreversible” method, which, for those in a psychological crisis, may be more important than the physical pain or nature of the act itself [13]. Additionally, railway tracks in countries like Poland remain easily accessible due to underdeveloped safety infrastructure, such as fencing, surveillance, or patrol systems.



Fig. 1. A lonely man by the railway tracks as a potential suicide case

The social context also plays a crucial role. Research on suicide locations shows that individuals facing social isolation, marginalization, violence, or identity crises frequently choose anonymous and impersonal spaces. Railway tracks, which are remote, may provide a sense of “disappearing” without the need for confrontation with the social environment. At the same time, their openness and public nature may serve as an expression of despair or a silent cry for help.

Behavioral modeling effects, such as media coverage of suicides at specific locations, are also significant. The literature refers to the Werther effect, which describes a spike in suicide rates following publicized cases, particularly when details about the method and location are disclosed [14]. Therefore,

a lack of responsible media coverage may reinforce the perception of railway tracks as a popular or effective place to end one's life [15].

The complexity of the psychosocial mechanisms involved in selecting railway tracks as a suicide site points to the need for integrated preventive measures. These must encompass physical restrictions on access to infrastructure, psychological support, public education, and media content regulation. Cross-sector collaboration between transport, mental health services, media, and local governments is essential for effectively reducing the incidence of railway suicides.

4.3. Psychological and Social Determinants of Choosing Railway Tracks as a Suicide Location – a Case Study

To illustrate the psychological and social mechanisms underlying the choice of railway tracks as a place of suicide, it is worth referring to a case study involving a 22-year-old student from Silesia, Poland, whose tragic suicide was recorded in railway and medical documentation, as well as reported by local media [16, 17]. The woman died after stepping onto the tracks on the outskirts of a city, near a railway stop where there were no fences or surveillance cameras. Testimonies from witnesses, psychiatric records, and social media activity revealed important psychological and social aspects of her decision.

The analysis shows that the student suffered from depressive episodes, had a history of self-harm, and faced significant difficulties in family and social relationships. In the period preceding her death, clear signs of mental deterioration were visible, including social withdrawal, posting content suggesting suicidal thoughts, and a sudden withdrawal from academic activities. Despite previous psychological consultations, intensive treatment was not implemented, and the available social support proved insufficient.

Her choice of railway tracks as the place for her suicide was related to several factors. The first was accessibility: the woman was familiar with the train schedule, lived near the railway line, and frequently crossed that area. The second factor was impulsivity: an analysis of station camera footage indicates that the decision was made suddenly, without prolonged deliberation. The absence of bystanders and easy access facilitated the escalation of the impulse. The third factor was symbolism: her online posts referred to motifs such as a “quick end,” a “collision with fate,” and an “escape from the silence in her head,” which indicates that she attributed deep, final symbolism to the location.

From a psychological point of view, the case demonstrates that the choice of place and method of suicide is not accidental, as it combines the need for effectiveness, the intensity of the act, avoidance of suffering, and a form of communication with others through symbolic action. Socially, it reveals gaps in the support system—specifically, a lack of early intervention, weak family support, and limited access to specialized care.

The case study underscores the need for multi-level prevention strategies that limit physical access to tracks, implement surveillance in high-risk areas, and above all, develop systems for early detection of mental health crises and social responses to warning signs. The integration of case analyses into prevention strategies can help explain psychological mechanisms and design targeted actions that save lives [18].

4.4. The Impact of Suicides on Railway Tracks on the Logistics Sector and Transport Operations

Suicides on railway tracks have a significant impact on the functioning of the logistics sector and daily transport operations, causing a range of negative organizational and financial consequences [19]. Each such incident disrupts rail traffic continuity, leading to disturbances in passenger and freight transport, delays, the need to introduce detours, and timetable reorganizations. On main or single-track lines, these incidents can cause stoppages lasting several hours, generating substantial indirect costs, including decreased punctuality, a loss of customer trust, and the need to pay compensation.

From a logistical perspective, a suicide on the tracks triggers crisis procedures, including securing the scene, conducting investigations by the police and prosecutor's office, clearing the tracks, and often interrupting the power supply to the overhead catenary system [20]. These activities burden railway and law enforcement services and reduce infrastructure capacity [21]. For freight transport, the effects are

cascading; the delay of a single train can disrupt the entire delivery schedule, especially in sectors operating on a just-in-time system.

Attention should also be paid to the psychological and professional consequences of such events for railway staff, especially train drivers, traffic controllers, and technical personnel. Many experience trauma after striking a person on the tracks, which can result in a temporary inability to work, the need for psychological therapy, or permanent withdrawal from the profession. This, in turn, affects operational continuity and the availability of qualified personnel.

Therefore, from the perspective of the transport system, suicides on the tracks should be treated as both a social problem and a serious threat to the efficiency and safety of railway logistics [22]. Reducing the scale of this phenomenon requires cooperation between infrastructure managers, carriers, emergency services, and mental health institutions, as well as the implementation of effective preventive procedures and operational responses.

4.5. Ecological Transformation of Railways and Reducing the Number of Suicides

Modern railways face logistical and operational challenges related to suicide incidents on the tracks as well as the need to implement climate policy and sustainable development goals. The ecological transformation of rail transport—including the decarbonization of propulsion, the modernization of rolling stock, and the use of renewable energy sources [23]—brings significant social and infrastructural benefits that can indirectly reduce the number of suicides. Increasing the electrification of railway connections reduces emissions and improves service quality and regularity, strengthening the positive image of railways as a safe and modern mode of transport. Additionally, the use of green energy from sources such as green or blue hydrogen reduces air pollution, improving health conditions around railway infrastructure, and helping to meet long-term climate goals set by EU and national policies [24, 25].

Implementing eco-friendly projects usually involves the extensive modernization of railway infrastructure—stations, stops, and trackside areas—which often means improving the quality of public space through better lighting, surveillance, tidier surroundings, and a greater presence of staff and technical services. Consequently, railway spaces become less anonymous and less accessible to people seeking secluded, uncontrolled places for desperate actions. Reducing the availability of such locations and improving their technical security (e.g., through fencing, the presence detection systems, and monitoring) constitutes a preventive factor.

Moreover, the ecological modernization of railways is often presented as part of a broader initiative to create a “human- and environment-friendly railway system.” This framing can enhance the positive image of railways as a socially responsible institution and foster a greater sense of community—factors which, although difficult to quantify, hold psychological relevance in the context of suicide prevention.

One example of such ecological modernization is the installation of photovoltaic panels directly on railway tracks in Switzerland, designed to form a “solar carpet.” In response to the escalating climate crisis and the urgent need to accelerate Europe’s energy transition, this project represents an innovative approach to utilizing underused infrastructural space. The system allows for the rapid installation and removal of solar panels between the rails, without requiring operational shutdowns. It is the first solution of its kind that can be deployed on active railway lines, offering a substantial advantage over previous attempts to integrate solar energy into rail infrastructure.

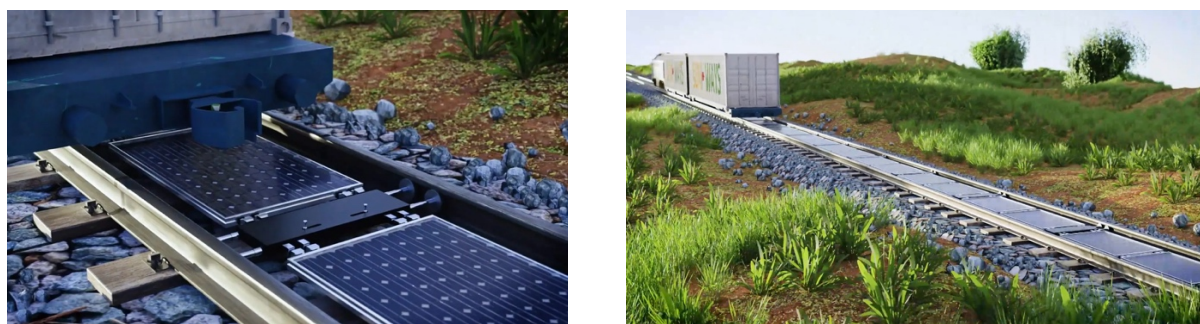


Fig. 2. PV installation on the rail

Furthermore, the physical development and occupation of track space can help limit access to hazardous areas, thereby indirectly reducing suicides on railway tracks.

Thus, the ecological transformation of railways for obvious environmental benefits can also support efforts to reduce suicides by transforming infrastructure into a safer, more accessible, and socially friendly space. These measures should be seen as complementary to technical safety systems, informational campaigns, and crisis response procedures.

4.6. Operational Consequences of Suicides on Railway Tracks for Carriers and Railway Infrastructure Managers

Suicides on railway tracks pose a serious challenge to the functioning of the transport system in Poland. Each such event generates significant disruptions in logistical operations, causing delays, downtime, the need to redirect traffic, and the reorganization of connection networks. The most severe effects are observed on main and single-track lines, where incidents can halt traffic for several hours (two hours on average), resulting in financial losses as well as declines in punctuality and customer satisfaction [26].

When a suicide incident occurs, the coordinating role is performed by the traffic control center of PKP Polskie Linie Kolejowe S.A., which manages train traffic on the railway network. Together with carriers (dispatch centers of individual rail operators), decisions are made regarding the suspension of train services, the introduction of replacement transport, or the rerouting of trains onto alternative routes. Alongside logistical actions, intervention procedures are initiated: the scene is secured, and police and prosecutor's units are called to conduct investigative and forensic activities [27]. Only after inspections are completed can the tracks be cleared, infrastructure assessed, and train traffic resumed.

For passenger carriers, such incidents require timetable reorganization, customer service adjustments, and crisis communication. Trains may be delayed or canceled, which negatively affects operators' reputations and generates compensation costs. Freight carriers—especially those operating on a just-in-time delivery model—experience a domino effect by which the delay of one shipment disrupts the entire delivery schedule. A loss of punctuality in freight transport can lead to contractual penalties, a loss of orders, or production stoppages on the clients' side.

The psychological effects on railway personnel must also not be overlooked. Train drivers involved in striking a person on the tracks (who are automatically replaced by other traction staff after the event) are exposed to severe post-traumatic stress, and many require psychological support afterward. In extreme cases, the incident results in a temporary incapacity to work or resignation from the profession. This translates into reduced availability of qualified personnel and additional staffing problems for carriers.

Therefore, suicides on railway tracks should be treated as a social and health issue and as a serious disruption to the stability of the logistics system. Reducing their impact requires coordinated actions, from implementing monitoring and infrastructure security systems to developing preventive campaigns to designing rapid crisis response procedures involving carriers, infrastructure managers, and law enforcement agencies.

4.7. Crisis Response System in Passenger and Freight Rail Transport to Suicidal Incidents

Suicides and suicide attempts on railway tracks are among the most dramatic and simultaneously unpredictable crises in the rail transport sector. Their nature requires immediate, multi-stage responses from operational services, infrastructure managers, carriers, as well as law enforcement and rescue institutions. The effectiveness of managing such incidents is a key component not only of railway safety but also of operational logistics, since each event causes serious train traffic disruptions, reduced punctuality, and increased operating costs.

The railway infrastructure manager in Poland is PKP Polskie Linie Kolejowe S.A., which has developed a set of emergency instructions and procedures (including the Ir-1 and Ir-3 instructions) regulating the response to extraordinary events, including those of a suicidal nature [27]. Upon detecting an incident (e.g., by the driver, monitoring systems, or third-party reports), the traffic controller immediately halts train traffic on the affected section and notifies the appropriate services—namely, the police, fire brigade, carrier dispatchers, and PKP PLK safety specialists.

In cases of fatalities resulting from collisions, the site becomes a formal location for police and prosecutor investigations, often involving the closure of the track section for many hours. During this time, transport operators must reorganize their work by rerouting trains onto detour routes, launching replacement transport, and redirecting freight and passengers. Carriers such as PKP Intercity, Polregio, and cargo operators implement internal crisis procedures covering logistics and support for drivers and employees psychologically burdened by the situation.

In special cases, such as unsuccessful suicide attempts, procedures are even more complex. Emergency medical services, intervention by law enforcement, and often the shutdown of traction power are required to safely conduct rescue operations. PKP PLK uses IT and monitoring systems (CCTV, SCADA systems) to support rapid incident detection; however, the effectiveness of these tools depends on the monitoring network density and the operational efficiency of dispatch personnel [2].

Managing suicide risk on railways is an increasingly important aspect of prevention. PKP PLK, together with the Office of Rail Transport, implements educational programs and infrastructure projects (e.g., building fences, improving lighting, increasing monitoring) aimed at reducing access to tracks and decreasing suicide attempts. The energy powering these systems may come from photovoltaic installations [28]. Additionally, psychological support is provided to drivers and other operational staff following traumatic incidents, which often lead to post-traumatic stress disorder (PTSD).

An important aspect of managing suicide incidents is post-incident review. This involves assessing the effectiveness of interventions and identifying weaknesses in infrastructure or operational procedures. The conclusions from such analyses form the basis for creating new guidelines and conducting simulation exercises involving railway services, police, fire brigades, and medical rescue teams [29].

In conclusion, the effective management of crises involving suicides on railways requires an integrated approach based on the cooperation of many entities. Protecting human life, limiting the risk of secondary logistical damages, and supporting personnel exposed to stress are pillars of a modern crisis management system in the rail sector.

4.8. Cross-Sector Cooperation in Operational Management and Risk: Carriers, Police and Prosecution, and Infrastructure Managers

Suicides and suicide attempts on railway tracks represent a special category of crises, whose effective management requires an integrated and multi-sectoral approach. These situations are characterized by a high level of unpredictability, a strong emotional impact, and significant logistical and legal consequences. Effective responses are only possible through close cooperation among three key entities: railway carriers, infrastructure managers, and state authorities (primarily the police and prosecution).

When a suicide attempt is reported or observed, the train driver immediately informs the carrier's dispatcher, who initiates traffic-suspension procedures and passes information to the PKP PLK headquarters. If a person is hit on the tracks, emergency procedures are expanded. PKP PLK dispatchers halt traffic on the affected section, reroute trains via alternative routes (if available), and organize

substitute transport [30]. Simultaneously, technical teams, rescue services, and law enforcement are dispatched to the scene. The timing of these actions is crucial to minimizing logistical and social impacts.

Further actions proceed under procedural investigation. The police inspect the scene and identify the victim, while the prosecution oversees evidential actions and decides when the track section can be reopened for use [31]. In cases of suicide attempts resulting in survival, the individual is handed over to medical services, and both the carrier and PKP PLK are obligated to fully document the event and report the incident to the national safety database.

Infrastructure managers are responsible for technical actions, logistical coordination, and implementing preventive measures such as video monitoring, physical barriers (e.g., fencing, anti-intrusion access gates), and signage at locations particularly vulnerable to such incidents [32]. Cooperation with police and social services is indispensable, especially for rapid intervention in cases of reports of individuals potentially threatening themselves near railway infrastructure.

Railway carriers also play a key role in managing the psychological consequences of such events. Special attention is given to supporting train drivers and onboard staff (traction and conductors), many of whom experience severe post-traumatic stress after collisions, leading to temporary work incapacity or the need for therapeutic support. It is the carrier's duty to provide psychological assistance and conduct internal incident analyses to minimize the risk of recurrence.

Effective cross-sector coordination requires the prior development of cooperation procedures, including real-time communication mechanisms, standardized information transfer, unified reporting forms, and joint training and simulation exercises. Experience shows that the most effective response to suicide incidents occurs in regions with regional crisis management teams, including representatives of all the mentioned entities.

Suicides and suicide attempts on tracks should not be viewed as a mere external disruption to transport but must be permanently integrated into railway safety and operational risk management systems. Proper and quick decision-making is also crucial to ensuring effective responses and minimizing the effects of incidents.

5. CONCLUSIONS

Suicides on railway tracks in Poland represent a significant social and operational problem requiring multidimensional analysis and coordinated action. The current analysis considers both psychological determinants of the phenomenon and its consequences for the functioning of the railway transport system. Several psychological factors influencing the choice of railway tracks as a site for suicide were identified, including intense emotional tension, impulsivity, feelings of hopelessness, and perceived effectiveness of this method. Insufficient recognition of mental health crises in public spaces and a lack of comprehensive prevention programs were also noted.

From a logistical and organizational perspective, suicides and suicide attempts cause severe disruptions in rail traffic, generating delays, timetable reorganizations, emergency procedures activation, and psychological and occupational burdens for railway staff. The system's response, although partially structured, is insufficiently coordinated between operators, infrastructure managers, police, and prosecution.

The findings indicate a need to recognize railway suicides as an interdisciplinary issue that cannot be treated solely as a social phenomenon or a transport incident. The scale of events and their impact on the railway system require an approach that integrates psychological, organizational, and technical aspects. The current crisis management system is fragmented, and preventive actions are inconsistent and inadequately implemented at the national level.

Recommendations primarily include the implementation of a nationwide railway suicide prevention strategy encompassing educational, psychological, and infrastructural components. It is essential to increase access to crisis support and develop early intervention networks. Technically, strengthening infrastructure access controls (fencing, monitoring, and detection systems) and training frontline staff to recognize and respond to crises are advised. It is also necessary to formalize and standardize cooperation between carriers (dispatch centers), infrastructure managers, emergency

services, and law enforcement (police and prosecution), as well as to emphasize rapid information flow, clear procedures, and integrated risk management.

An important aspect of infrastructure is the need to develop modern technologies supporting the railway's energy transition, including renewable energy sources like photovoltaics, to power safety and lighting systems. The shift toward green energy contributes to independence from traditional power sources, reduces greenhouse gas emissions, and improves air quality, directly benefiting residents near railway infrastructure.

Only through coordinated cross-sector actions can the number of suicide incidents and their negative impacts on society and the rail transport sector be reduced. Collaboration between railway operators, emergency services, local authorities, and organizations supporting individuals in psychological crises is crucial for the effective implementation of preventive measures.

In light of growing challenges related to railway suicide incidents, initiating a long-term national strategy integrating transport, health, and educational policies to prevent self-destructive behavior is necessary. Support for these actions could include an interdisciplinary team coordinating cooperation among railway entities, state services, mental health institutions, and social organizations. This team could develop a national railway suicide prevention plan based on empirical data, trend analysis, and best international practices.

References

1. Główny Urząd Statystyczny. *Wypadki przy pracy oraz zdarzenia o charakterze samobójczym w sektorze transportu – raporty roczne, Warszawa, lata 2019-2023*. [In Polish: Central Statistical Office. *Accidents at work and suicides in the transport sector – annual reports, Warsaw, 2019-2023*].
2. Urząd Transportu Kolejowego (2023). *Raport w sprawie bezpieczeństwa*. Warszawa. [In Polish: Office of Rail Transport (2023). *Safety Report*. Warsaw].
3. *Report on Railway Safety and Interoperability in the EU 2024*. Available at: <https://www.era.europa.eu/content/report-railway-safety-and-interoperability-eu-2024>.
4. *ERA Railway Factsheets*. Available at: <https://www.era.europa.eu/library/era-railway-factsheets>.
5. Urząd Transportu Kolejowego. *Sprawozdanie ze stanu bezpieczeństwa*. Available at: <https://dane.utk.gov.pl/sts/sprawozdania-roczne/sprawozdania-ze-stanu-b/21640,Sprawozdanie-ze-stanu-bezpieczenstwa-ruchu-kolejowego-2023-r.html>. [In Polish: Office of Rail Transport. *Safety Report*].
6. Urząd Transportu Kolejowego. *Zdarzenia kolejowe*. Available at: <https://dane.utk.gov.pl/sts/zdarzenia-kolejowe/zdarzenia-kolejowe/21740,Zdarzenia-kolejowe.html#Rodzaje%20wypadk%C3%B3w> [In Polish: Office of Rail Transport. *Railway incidents*].
7. Nicolaus Copernicus Superior School. *Summary of the 1st phase of “Suicidology” project*. Available at: <https://www.sgmk.edu.pl/summary-of-the-1st-phase-of-suicidology-project/>.
8. Read, G.J. & Naweed, A. & Salmon, P.M. Complexity on the rails: A systems-based approach to understanding safety management in rail transport. *Reliability Engineering & System Safety*. 2019. Vol. 188. P. 352-365. DOI: 10.1016/j.ress.2019.03.038
9. Díaz-Oliván, I. & Porras-Segovia, A. & Barrigón, M.L. et al. Theoretical models of suicidal behaviour: A systematic review and narrative synthesis. *The European Journal of Psychiatry*. 2021. Vol. 35(3). P. 181-192. DOI: 10.1016/j.ejpsy.2021.02.002
10. Rodziński, P. & Rutkowski, K. & Ostachowska, A. Progresja myśli samobójczych do zachowań samobójczych w świetle wybranych modeli suicydologicznych. *Psychiatria Polska*. 2017. Vol. 51(3). No. 524. DOI: 10.12740/PP/63984 [In Polish: Progression of suicidal ideation to suicidal behavior from a perspective of selected suicidological models].
11. Kubacka-Jasiecka, D. & Kuleta-Krzyszowski, M. *Od psychologii kryzysu do interwencji kryzysowej i środowiskowej*. Wydawnictwo Adam Marszałek. 2022. 41 p. [In Polish: *From Crisis Psychology to Crisis and Environmental Intervention*. Adam Marszałek Publishing House].

12. ERA (European Union Agency for Railways). *Railway Safety Performance Report*. Brussels, 2022. Available at: https://www.era.europa.eu/content/railway-safety-and-interoperability-2022-report_en?utm_source=chatgpt.com
13. UIC (2021). *Trespass and suicide prevention*. Available at: <https://www.uic.org/safety/trespass-and-suicide-prevention>.
14. Pirkis, J. & Blood, R.W. Suicide and the media: Part I. Reportage in nonfictional media. *Crisis*. 2010. Vol. 31(3). P. 141-149. DOI: 10.1027//0227-5910.22.4.146
15. Benson, R. & McTernan, N. & Ryan, F. & Arensman, E. En Suicide clustering and contagion: The role of the media. *Suicidologi*. 2021. Vol. 26(2). DOI: 10.5617/suicidologi.9306
16. Domaradzki, J. Efekt Wertera, efekt Papagena czy brak efektu? Przegląd badań nad wpływem przekazów medialnych na zachowania samobójcze. *Hygeia Public Health*. 2021. Vol. 56(2). P. 230-236. [In Polish: The werther effect, the papageno effect, or no effect? A review of research on the impact of media messages on suicidal behavior].
17. *Materiał Biura Dyspozytury i Realizacji Przewozów PKP Intercity S.A.* 2016. [In Polish: *Materiał from the Dispatch and Transport Implementation Office of PKP Intercity S.A.*]
18. Makara-Studzińska, M. & Załuski, M. & Jagielski, P. et al. Dynamika zmian częstotliwości samobójstw na kolei w Polsce (2007-2018). *Psychiatria Polska*. 2022. Vol. 56(2). P. 373-389. DOI: 10.12740/PP/OnlineFirst/125782. Available at: <https://www.psychiatriapolska.pl/online-first-nr218.html>. [In Polish: Dynamics of changes in the frequency of suicides on the railways in Poland (2007-2018). *Polish Psychiatry*].
19. Wronka, J. *Wpływ zdarzeń nadzwyczajnych na efektywność systemu transportowego*. Instytut Kolejnictwa. Warszawa, 2020. Available at: <https://ikolej.pl/wydawnictwa/prace-instytutu-kolejnictwa/>. [In Polish: *The Impact of Extraordinary Events on the Efficiency of the Transport System*. Railway Institute. Warsaw, 2020].
20. PKP Polskie Linie Kolejowe S.A. *Procedury postępowania w przypadku wypadków i incydentów na sieci kolejowej*. 2021. Available at: https://www.plk-sa.pl/files/public/user_upload/pdf/Akty_prawne_i_przepisy/Instrukcje/Wydruk/Ir/Instrukcja_Ir-8_-_obowiazuje_od_dnia_7_marca_2020_r._-_WCAG.PDF. [In Polish: PKP Polskie Linie Kolejowe S.A. *Procedures for dealing with accidents and incidents on the railway network*. 2021].
21. Wiśniewski, M. *Zarządzanie sytuacyjne bezpieczeństwem infrastruktury krytycznej państwa*. Wydawnictwo Politechniki Warszawskiej. 2019. P. 25-27. Available at: https://bcpw.bg.pw.edu.pl/Content/8992/WISNIEWSKI_Zarządzanie_sytuacyjne.pdf. [In Polish: *Situational Management of Critical Infrastructure Security in the State*. Warsaw University of Technology Publishing House].
22. Stukan, J. & Staszak, A. Samobójstwo rozszerzone i poagresyjne – próba uporządkowania pojęć. *Problemy Kryminalistyki*. 2018. Vol. 301(3). P. 35-43. [In Polish: Extended and post-aggressive suicide – an attempt to organize the concepts. *Problems of Forensic Science*].
23. Borowski, P.F. Innovation management in transport – an economic Perspective in the era of climate transformation. *Transport Problems*. 2025. Vol. 20(2). P. 161-170. DOI: 10.20858/tp.2025.20.2.13.
24. Borowski, P.F. Efforts of the transport and energy sectors toward renewable energy for climate neutrality. *Transport Problems*. 2024. Vol. 19(2). P. 177-190. DOI: 10.20858/tp.2023.19.2.14.
25. Panchuk, A. & Panchuk, M. & Śladowski, A. et al. Methanol potential as an environmentally friendly fuel for ships. *Nasze more*. 2024. Vol. 71. No. 2. P. 75-83. DOI: 10.17818/NM/2024/2.5
26. Urząd Transportu Kolejowego. *Raport o stanie bezpieczeństwa ruchu kolejowego w Polsce w 2023 roku*. Available at: <https://utk.gov.pl/pl/dokumenty-i-formularze/opracowania-urzedu-tran/21723%2CRaport-w-sprawie-bezpieczenstwa-transportu-kolejowego-w-Polsce-w-2023-r.html>. [In Polish: Office of Rail Transport. *Report on the state of rail traffic safety in Poland in 2023*].
27. PKP Polskie Linie Kolejowe S.A. *Instrukcja Ir-1: Ruch pociągów i manewrów na liniach kolejowych*. Warszawa 2023. Available at: https://www.plk-sa.pl/files/public/user_upload/pdf/Akty_prawne_i_przepisy/Instrukcje/Wydruk/Ir/Instrukcja_Ir-1

- 1 - _obowiazuje_od_01.08.2023_r.pdf. [In Polish: PKP Polskie Linie Kolejowe S.A. *Instruction Ir-1: Train Movement and Shunting on Railway Lines*. Warsaw 2023].
28. Czepło, F. & Borowski, P.F. Innovation solution in photovoltaic sector. *Energies*. 2024. Vol. 17(1). No. 265. DOI: 10.3390/en17010265
29. Najwyższa Izba Kontroli. 2022. *Bezpieczeństwo przewozów kolejowych. Raport o wynikach kontroli*. Available at: <https://www.nik.gov.pl/najnowsze-informacje-o-wynikach-kontroli/nik-o-bezpieczenstwie-przewozow-kolejowych.html>. [In Polish: Supreme Audit Office. 2022. *Rail Transport Safety. Report on Audit Results*].
30. *Ustawa z dnia 28 marca 2003 r. o transporcie kolejowym*. Dz.U. 2023 poz. 1280 ze zm., art. 14 i 15. [In Polish: *Act of 28 March 2003 on rail transport*. Journal of Laws 2023, item 1280, as amended, Articles 14 and 15].
31. Urząd Transportu Kolejowego. *Raport Nr PKBWK 04/2021 – Analiza działań służb ratunkowych w przypadku poważnego wypadku kolejowego*. 2021. Available at: <https://utk.gov.pl/download/1/65262/RaportNrPKBWK042021.pdf>. [In Polish: Office of Rail Transport. *Report No. PKBWK 04/2021 – Analysis of emergency services' actions in the event of a serious rail accident*].
32. Belur, P. & Sherry, P. & Rodriguez, I. et al. Strategies for reducing suicide at railroads: A scoping review of evidence and gaps. *International Journal of Environmental Research and Public Health*. 2024. Vol. 22(1). No. 18. DOI: 10.3390/ijerph22010018

Received 15.03.2024; accepted in revised form 05.11.2025