



Improving personal safety on commuter trains at stations in the Republic of South Africa: A study of Platform Train Interface incident solutions

Sethunya Matsie

Introduction

- PTI incidents in the South African railway industry are a regular occurrence.
- State of Safety report describes PTI occurrences as a “weekday, peak hour phenomenon”.
- 99% of the PTI occurrences recorded in the Gauteng, KwaZulu-Natal, and Western Cape provinces
- 97% of PTI occurrences resulted in injuries & 9 fatalities per year from 2011 to 2019 and have increased by 30% since 2010/11
- **Aim:** analyse the contributory factors associated with PTI occurrences and to recommend solutions to reduce these risks.

Literature Review

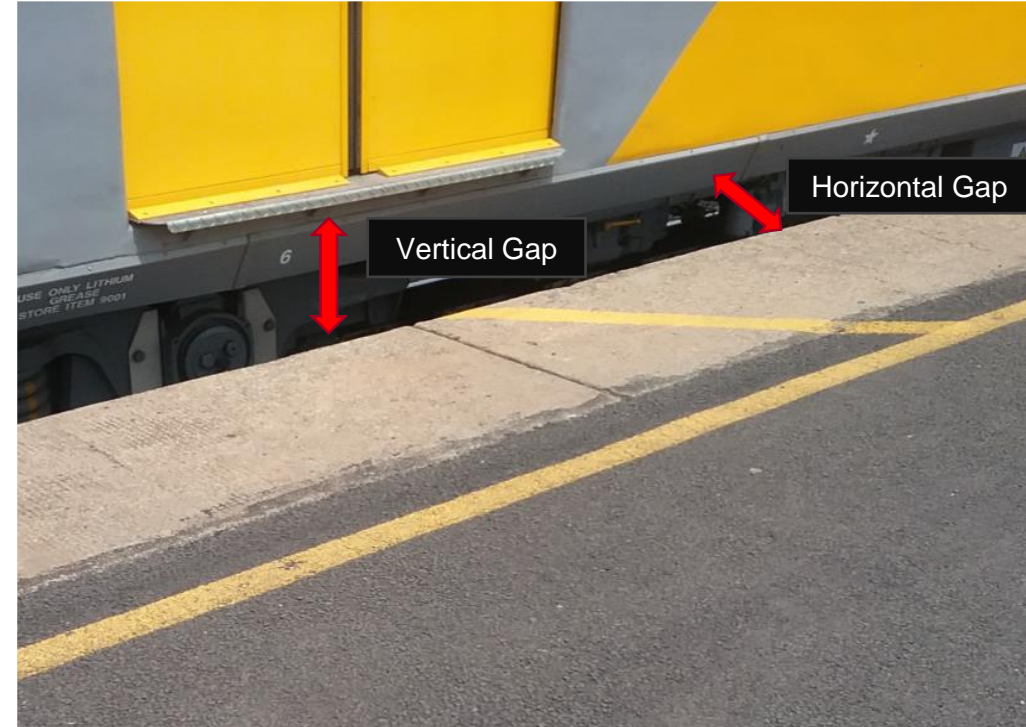
- The PTI = interaction between the surface height of the station platform & the floor height of the train with the floor height of the train ideally meeting the platform surface with no vertical and horizontal gaps.
- PTI possibly among one of the most unsafe spaces for passengers boarding and alighting trains at stations.
- PTI is a complex space presenting diverse risks and hazards for passengers.
- Accidents can occur during entraining and detraining or merely at the platform edge even when there is no entraining and detraining.

Literature Review

- Not always possible to have no gaps between the train and platform because:
 - gap-clearances are a necessity,
 - gap-clearances minimise the risk of trains striking the platform,
 - gaps permit for different forms of rolling stock to pass through the stations
 - gap sizes are influenced by the movement of the track, the platform construction, and the types of trains passing through the station
 - gaps ensure that trains can operate safely at authorised speeds.
- A balance in the size of the gaps is essential as gaps that are too wide lead to passenger's difficulties boarding or alighting the train at the platform.

Literature Review

- The horizontal gap between platform and train on straight (tangent) track should remain constant.
- Gaps are usually slightly increased on horizontal curves.
- Changes in the size of the vertical and horizontal gap is at times a result of the shifting of platforms and tracks due to resurfacing, maintenance, weather, etc



Methodology

- International benchmarking study focused on railway safety and the strategies used internationally.
- Analysis of 20 investigation reports noting station design, security, PTI measurements, signage, and commuter behaviour challenges.
- A risk assessment was carried out from analysis to produce a risk identification and mitigation worksheet.

Results & Discussion

- Security personnel were always reactive, hardly able to prevent an injury or a death from occurring.
- Consequence of having an inadequate number of security personnel deployed at the stations was that it intensifies the likelihood of commuters disregarding safety procedures at the stations.

Challenges	Observations & Findings
Passenger Behavioural	Passengers observed: <ul style="list-style-type: none">• walking past the exit gate after detraining and exiting the station illegally.• jumping on the railway lines to move between platforms.• accessing station from railway line at platform ends .• not using the access gate.• embarking or disembarking trains that are in motion.• having difficulties in entraining and detraining due to the height of the train.
Planning	<ul style="list-style-type: none">• Trains overcrowded, delayed &/or cancelled• Shortage of trainsets.
Training & Awareness	<ul style="list-style-type: none">• No info boards at Stations or announcement guide. Security personnel have no skills and training to control the crowd
Design & Maintenance	<ul style="list-style-type: none">• No scheduled maintenance that takes place.• The vertical and horizontal platform clearance out of specification• No PTI clearance measurements.• Stations did not have access for people who are differently abled.• Poorly maintained public announcement (PA) systems
Safety & Risk Management	<ul style="list-style-type: none">• Risk assessments frequently not conducted.• Risk assessments are either generic with no consideration for PTI related risks or include action plans were identified risks are not mitigated.• The platforms at a significant number of stations were vertically and horizontally misaligned.• The fencing at certain stations is frequently vandalised• There is a shortage of security personnel

Results & Discussion

- Overcrowding on trains and at stations was a major issue that was influenced by several factors
 - area where all the minor failures from the different departments merge to create a hazardous situation.
 - worse when there were service disruptions such as train delays and/or cancellations
 - disruptions are often exasperated by a shortage of trainsets.
 - Trainsets are frequently reported to be in short supply after other trainsets become defective.
- It was noted that most stations did not have a train schedule and those that did had an outdated one.



Results & Discussion

- Communication that would inform passengers of delays, breakdowns, repairs and expected wait times was sometimes unavailable.
- Increases likelihood that passengers will rush to board a train all to ensure that they get on the train at the station in case it is the last one available.
- Some passengers got on the train after a long wait time.
- Other stations had no one at the ticket office so access control was not always present.
- Other stations had an access control challenge due in part to an inherited system that is not enclosed or fenced.

Results & Discussion

- Technological, communicative, training focused, risk management, and resource enhancement methods to tackle PTI challenges.
- Strategies employed included conducting scheduled inspections to proactively ensure efficiency of processes, systems, and assets.
- Not using reactive risk mitigation methods.

Organisation	Strategy to Manage PTI Occurrences
Office of Rail & Road (ORR)	<ul style="list-style-type: none"> • Proactive inspections on risk management of PTI and other related activities such as emergency planning, crowd management at stations, driver competence training and conductor competence. • Ensure Operators and train/locomotive designers and manufacturers are aware of infrastructure challenges to integrate solutions in all the trains/locomotives designs.
Railway Safety & Standards Board (RSSB)	<ul style="list-style-type: none"> • Creation and utilisation of the PTI Risk Assessment Tool for use as a primary approach to assess PTI risk at station platforms. • Prioritisation of redesign as a solution where PTI misalignment resulting in large gaps was recorded. • Accounting for passenger characteristics in managing PTI accidents.
Bangkok Mass Transit	<ul style="list-style-type: none"> • Mandated platform redesign to reduce the train and platform gap. • Fitting of Platform Screen Doors (PSDs). • Installing safety barriers with automatic doors on platforms including safety zones and fenced danger zones. • Passenger awareness through safety campaigns. • Assigning more station conductors (station marshals).
University of Addis Ababa	<ul style="list-style-type: none"> • Platforms redesign • Consideration for PTI risk during the design of trains. • Visible signage at the platforms. • Barrier installation • Assigning more station conductors/marshals especially during peak periods. • Installation of safety barriers or fences at stations. • Education of the public on PTI risks.

Results & Discussion

- Carrying out risk assessments with the risks identified being mitigated & solutions implemented.
- The main strategies make use of:
 1. Platform redesign to minimise PTI risks.
 2. Increasing the presence of station marshals.
 3. Installation of safety barriers that physically reduce the risk of falling or tripping at the gap.
 4. Passenger awareness interventions.
 5. Proactive risk assessments and inspections.
- Systemic & risk-based approach to manage safety risks & PTI risks.

Results & Discussion

- From an analysis of PTI occurrences and investigation reports, the main hazards identified at the platform train interfaces were:
 1. The platform/train gap,
 2. Overcrowding,
 3. Passenger behaviour,
 4. Poor lighting at station platforms and in the trains,
 5. Trains running late,
 6. Cancelled trains,
 7. Inadequate security and platform marshal deployment at stations, and
 8. Ineffective passenger communication.
- The platform/train gap is of major concern as most of the platforms did not conform to the platform standard.

Conclusions

- PTI incidents tended to occur due to failures in technological, risk management, safety management, training and awareness, design, as well as maintenance strategies.
- Failures in these different areas, emanating from different departments point to a possible catastrophic failure of the safety management system related to PTIs.
- Some of the control methods that were in place were not implemented across all the stations and having an inadequate number of resources was often a contributing factor.

Recommendations

- Reduce the large vertical and horizontal vertical gap
- Utilise platform gap fillers
- Install “watch the gap” stencils
- Develop policies & procedures
- Install visible signage at the platforms
- Conduct maintenance as planned
- Assign more marshals/security personnel at the stations
- Train station personnel/employees on managing PTI risks
- Install safety barriers, materials or fences at stations and
- Educate the public & passengers on platform train interface risks.

Thank you for your attention

Sethunya Matsie

Human Factors Specialist

sethunya.matsie@rsr.org.za

Railway Safety Regulator

