

A consideration on the operation of the railway safety management system in Korea.

OCTOBER, 2021

TSA Korea Transportation
Safety Authority



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I. Overview of KOTSA (Railway Safety)

History of Korea Transportation Safety Authority (KOTSA)

1981

- Established the Transportation Safety Promotion Authority

1995

- Renamed Transportation Safety Authority

2005

- Established the Railway Safety Center

2019

- Established the Railway Inspection Department

2014

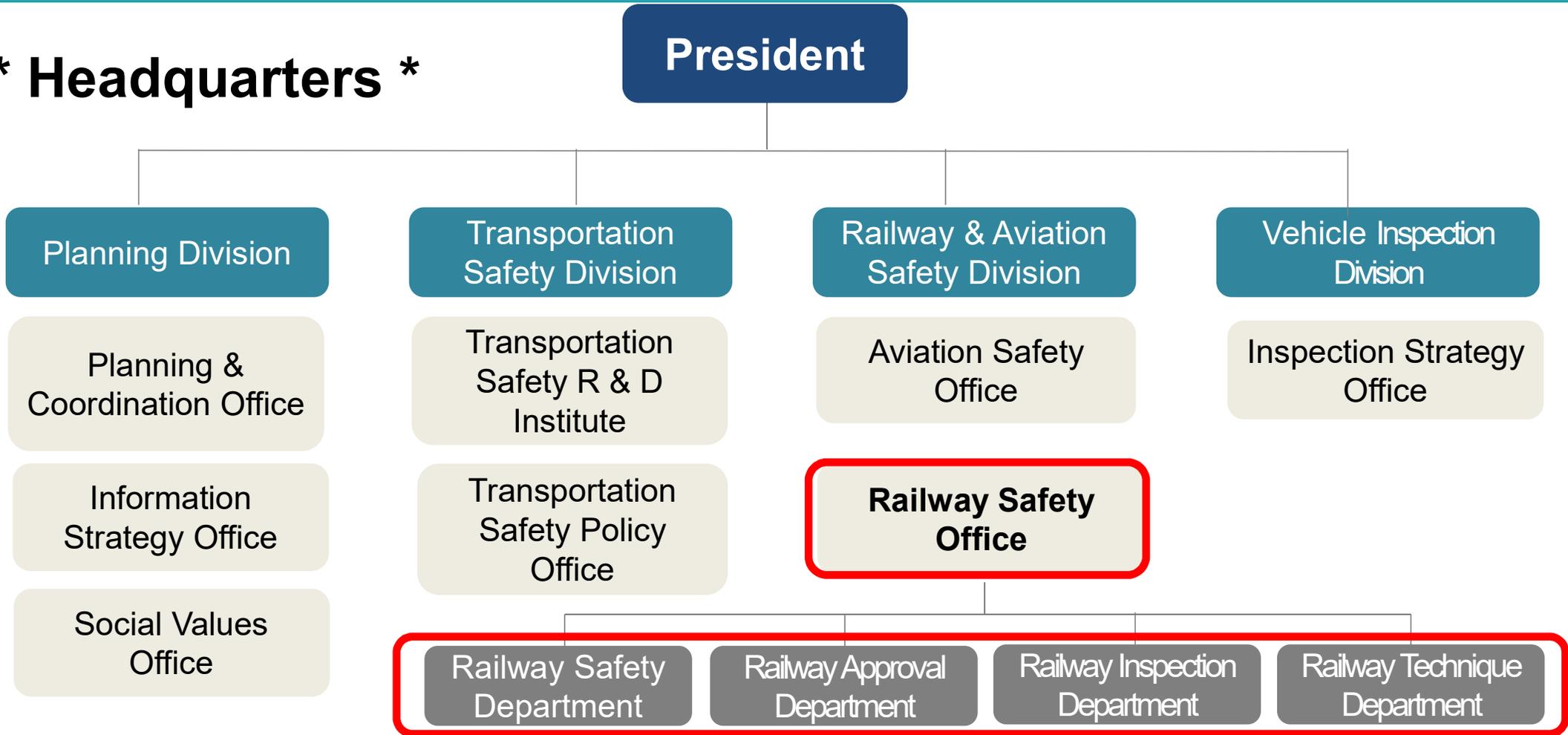
- Implemented the approval inspection of the Railway SMS
- Implemented the result review of the testing and commissioning

2006

- Commenced the Railway Safety Inspection

Organization of KOTSA

*** Headquarters ***



Major Work

Management of Railway Safety

- **Approval & Inspection of the railway operator's safety management system**
- Review the result of the testing and commissioning for new or revised railway lines
- Review of the railway design(Safety, Convenience)
- Establishment & Operation of the railway safety information system (Railway accident, Operational failure, Rolling stock record..)
- Management & of the Railway driver`s license test

II. Railway Safety Management System in Korea

Railway Safety Management System Introduction

Revised Provision

- **Railway Safety Act(Enforcement 12.12.18, Act 14.3.19)**
 - Mandatory inspection of the railway safety system for railway operators and infrastructure managers

Definition of SMS

- **SMS is the cornerstones of the safety regulatory framework that helps to ensure a high level of railway safety**

Purpose of SMS

- **SMS is to ensure that the organization archives its business objectives in a safe manner and complies with all of the safety obligations**

Approval operational corporation(22 co.)

- **(operational corporation) KORAIL, Seoul metro, . Etc. (include 18 corporation)**
- **(infrastructure manager) Korea national railway, Etc. (include 4 corporation)**

Railway Safety Management System Introduction

○ Background SMS in Korea

- Refer to the EU and UK certification system
- Training and education with ORR's cooperation (6 month)

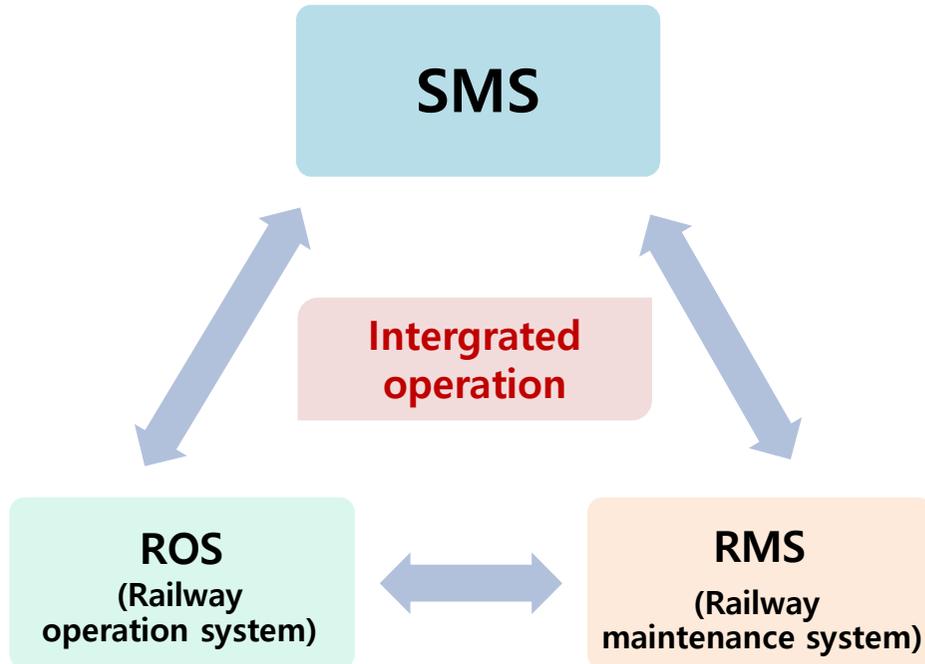
Reference regulations & standards

- EU Directive 2004/49/EC & CSM(Common Safety Method) for assessing Conformity SA & SC
- UK ROGS Regulations 2006 (2006 No.599) & Assessment Criteria
- FR Decree No.2006-1279(2006.10.19) "relative a la securite des circulations ferroviaires et al interoperabilite du systeme ferroviaire"

Category	Standard
Railway Operators	<ul style="list-style-type: none"> • Part A : 19 category(SMS) • Part B : 3 category (specific line operation, employee competition, requirement for rolling stock management)
Infrastructure Managers	<ul style="list-style-type: none"> • SMS 19 category, Railway infrastructure 4 category ※ Infrastructure design, operation, maintenance compliance, control/signal system operation and maintenance
SMS components	Policy, Purpose, Procedure(Risk management, qualification management, information management, accident investigation, audit Etc), Responsibility and right, Emergency action Etc.

Railway Safety Management System Introduction

○ Features of SMS in Korea



Main features

- Integrated operation of SMS, ROS, RMS
- No expiration date
- When changing SMS(modification), TOC and IM have to obtain approval for modification and the certification of report

Reviewing the criteria for significant change



- Reduction
Significant change
- TOC, IM
expanding autonomy

Significant change that must be approved by the NSA(MOLIT)

* Safety organization change, HR reduction, Rolling stock and facility increase, New and modification line, inspection decrease, M&A etc.



Railway Safety Management System

RSMS Technical Standard

(12 Section, 47 Sub-section, 137 Article : 2021)



10 Section 28 Sub Section 68 Article

- Railway Safety Management
- Documentation
- Risk Management
- Requirement Compliance
- Accident Survey and Report
- Internal Audit
- Emergency Response
- Education & Training
- Safety Information
- Safety Culture



1 Section 10 Sub Section 32 Article

- Railway Operation System
- Railway Business License
- Railway Operation Organization & Manpower
- Railway Operation Method & Procedure
- Railway Operation Plan
- Onboard & Station Service
- Railway Control
- Railway Protection & Maintenance of Order
- Railway Operation Record Management
- Contractor Supervising & Outsourcing Management



1 Section 9 Sub Section 37 Article

- Railway Maintenance System
- Railway Maintenance Organization & Manpower
- Railway Maintenance Method & Procedure
- Railway Maintenance Execution Plan
- Railway Operation Record Management
- Maintenance Facilities & Equipment
- Maintenance Spare parts
- Rolling Stock Manufacturing Supervision
- Contractor Supervising & Outsourcing Management

Type of SMS inspection



New approval Inspection

- Inspection to check whether the SMS approval application documents applied by railway operators, etc. meet safety management standards



Modification Approval Inspection

- In the case railway operator, etc., intends to change the approved SMS, Inspection to confirm whether the **significant change(modification)** meet the SMS standards
 - * **(Significant change)** safety organization change, HR reduction, Rolling stock and facility increase, New and modification line, inspection decrease, M&A, etc.



Regular inspection

- Inspection to check and confirm whether railway operators, etc., maintain the approved SMS continuously



Specific inspection

- Inspection to confirm SMS violations in the event whether railway operators, etc., causes or is likely to cause a railway accident or operation failure

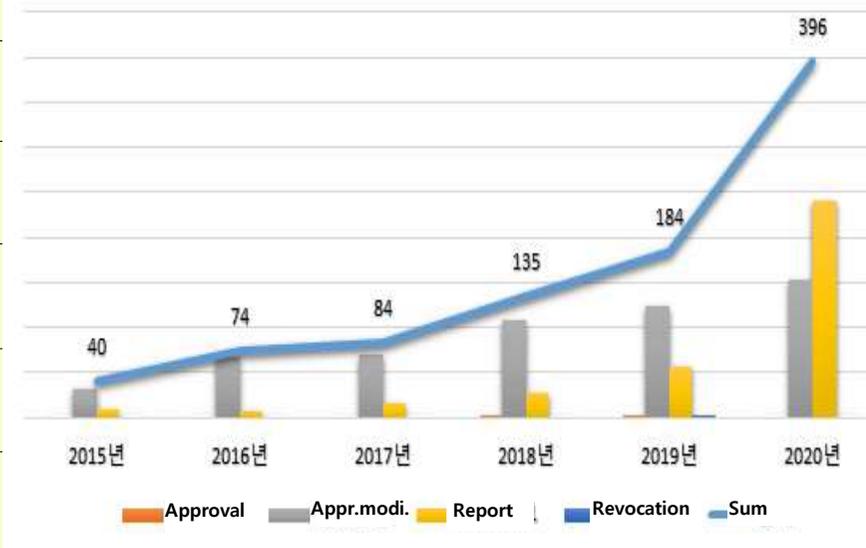
Result in Inspection of railway safety management system

○ Approval and Approval for modification inspection

- ◇ Subject of inspection : KORAIL, KR, etc.. (total 22 corporation)
- ◇ 2020 Approval for modification **396 case** (MOLIT approval-modi.)

<Approval status for 6 years>

Year	Case	Approval	Approval-modi.	Reporting-modi.	Revocation Approval	비 고
'15	40	—	31	9	—	(Approval) KR (6 corporation)
'16	74	—	68	6	—	(Approval) SR (4 corporation)
'17	84	—	69	15	—	(Approval) UI light transit
'18	137	2	108	27	—	(Approval) ERAIL, Western metro cor.
'19	184	2	125	56	1	(Approval) U line Gimpo goldline
'20	396	—	154	242	—	



Result in Inspection of railway safety management system

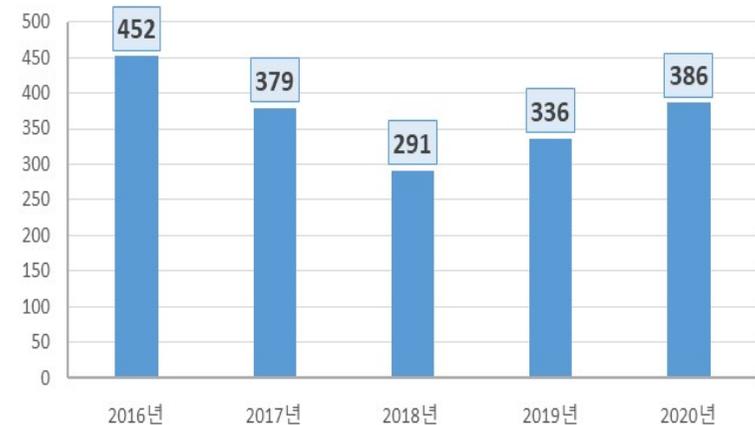
○ Railway Safety Management System Regular Inspection

- ◇ Subject of inspection : KORAIL, KR, etc.. (total 25 corporation, include bankruptcy, M&A)
- ◇ In the event of failure to comply with the Railway Safety Act and the technical standard of SMS, Corrective action is issued
- Corrective action : **1,844 case**

<Corrective action status for 5 years>

Year(yr)	Subject (No. Institution)	Corrective action (Case)
'16	16	452
'17	20	379
'18	20	291
'19	21	336
'20	23	386
Total		1,844

Corrective action(case)



Main Corrective action

- ✓ Non-compliance of Risk management for change in in/external environment
- ✓ Non-compliance of train driver`s qualification
- ✓ Non-compliance of Rolling stock SOP
- ✓ Non-compliance of maintenance standards for railway facilities

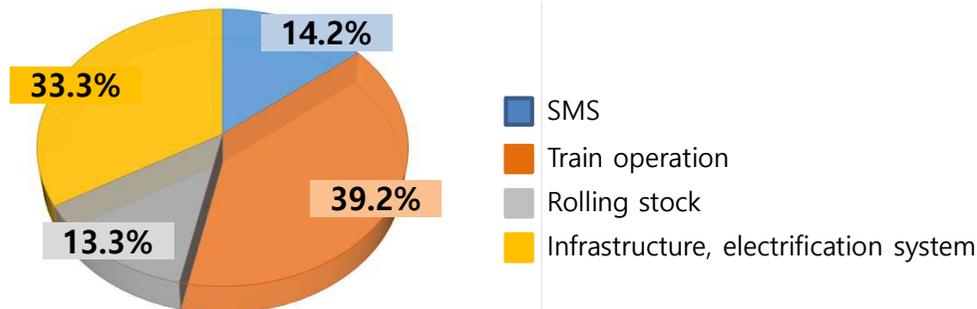
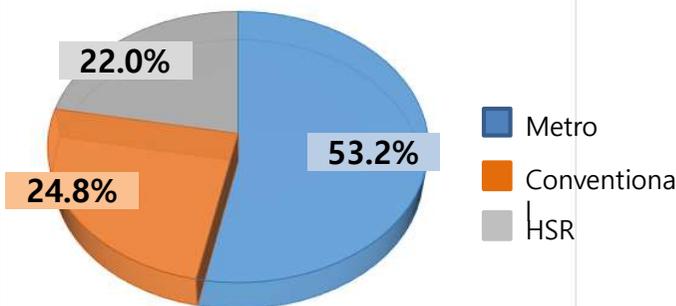
Result in Inspection of railway safety management system

○ Railway Safety Management System Specific Inspection

- ◇ Implement of specific Inspection for accident, operation failure
 - Train derailment, workforce injuries, OLE failure etc..
- ◇ Number of specific inspection for 5 years : 109 case (22 case/yr)
 - In the event of failure to comply with the Railway Safety Act and the technical standard of SMS, Corrective action is issued : 309 case (62 case/yr)

<Train accident, operation failure, Specific inspection status for 5 years>

Category	'16yr	'17yr	'18yr	'19yr	'20yr	Total	Ave.
Train accident(case)	124	105	98	72	55	454	90.8
Operation failure(case)	246	257	233	349	250	1,335	267
Specific inspection (No.)	9	25	17	30	28	109	22
Corrective action(No.)	14	70	67	88	70	309	62

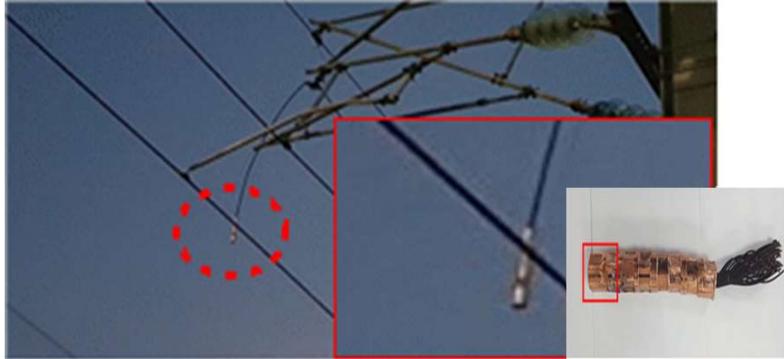


<Type of railway of specific inspection for 5 year>

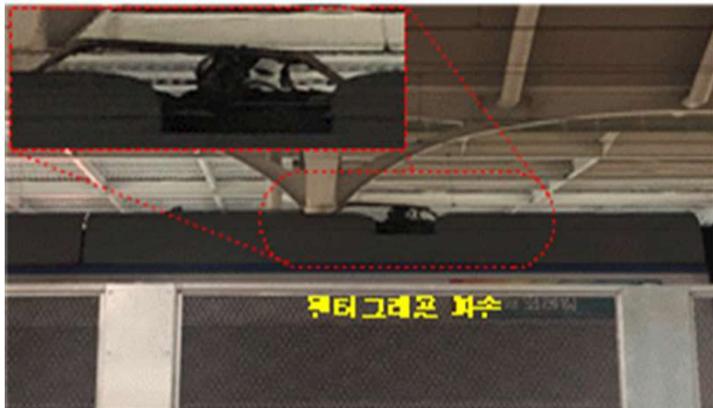
<Corrective action status on specific inspection for each field>

Result in Inspection of railway safety management system

○ Case of the specific inspection



< Suspension wire is damaged by poor construction >



< Damage to Pantograph >

◆ Property damage : \$ 2.2 million

◆ Operating failure : 4.5 hour

◆ Standard of violation

SMS

- (1) Insufficient initial response and operation of the emergency command system (in case of train stops for a long time)
- (2) Non-participation facility staff(initial response training)

ROS

- (1) Non-compliance of HSR operator`s duty (OLE outage)
- (2) Insufficient step to evacuate passengers

MOS

- (1) Non-compliance of IM R&R
- (2) Non-compliance of the safety inspection cycle in the railway protection zone

Evaluation of safety management level(ESML)

Background and Purpose

- ◆ Encouraging the autonomous safety management for TOC and IM
- ◆ Spreading railway safety culture (include CEO, workforces, 3rd-parties)
- ◆ Establishing high-level safety management system



Increase Safety management level

Evaluation of safety management level(ESML)

Information of ESML

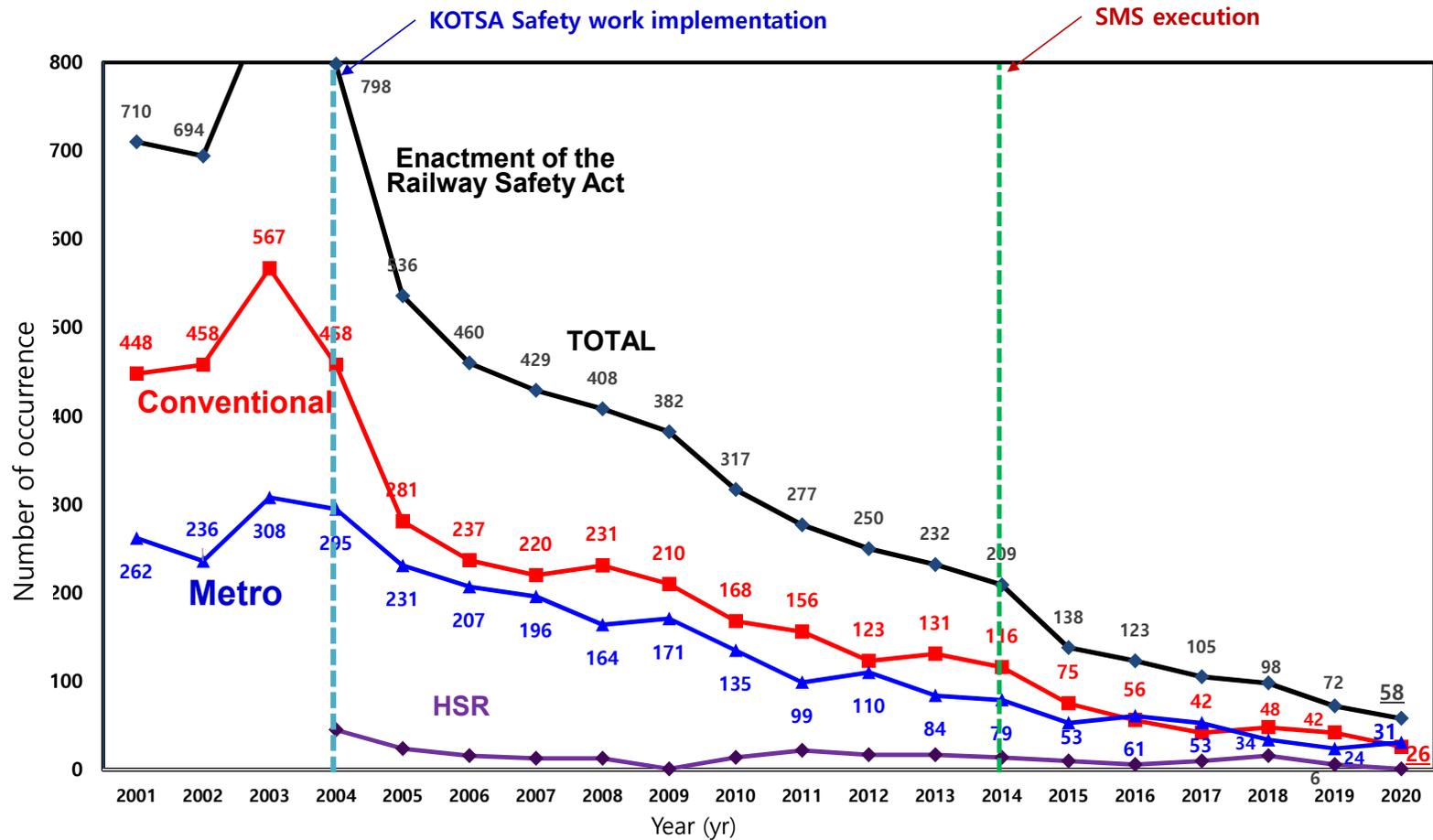
- **(Object)** Certification of approval TOCs and IMs (22 Corporations)
- **(Category)**



Category		Score	Content
Accident Indicator	Acc. Sum	35	Achievement of the object,
	Railway traffic Acc.	15	Achievement, and Improvement of Railway traffic Acc. Object
	Railway safety Acc.	5	Achievement, and Improvement of Railway safety Acc. Object
	Operation failure	5	Achievement, and Improvement of operation failure object
	Injuries	10	Achievement, and Improvement of injuries object
Safety Investment	Safety Investment Sum	20	Achievement, and Improvement of Safety investment
Safety Maturity	Maturity, Inspection Sum	45	Result of Safety maturity and Inspection
	SMS Sum	30	railway workforce maturity
	SMS	10	SMS workers (10 article)
	ROS	6	ROS workers (11.1~11.9 article)
	MOS	6	MOS workers(12.1~12.9 article)
	CEO	8	Safety management, Risk Management, Acc. Reporting, Emergency action, edu. And training, safety culture, etc.
	Inspection result	15	compliance of corrective action
Best Practice Policy	Best Practice	+2	Best Practice of Railway safety policy
	Preferential Policy	+2	Preferential Policy for safety workers

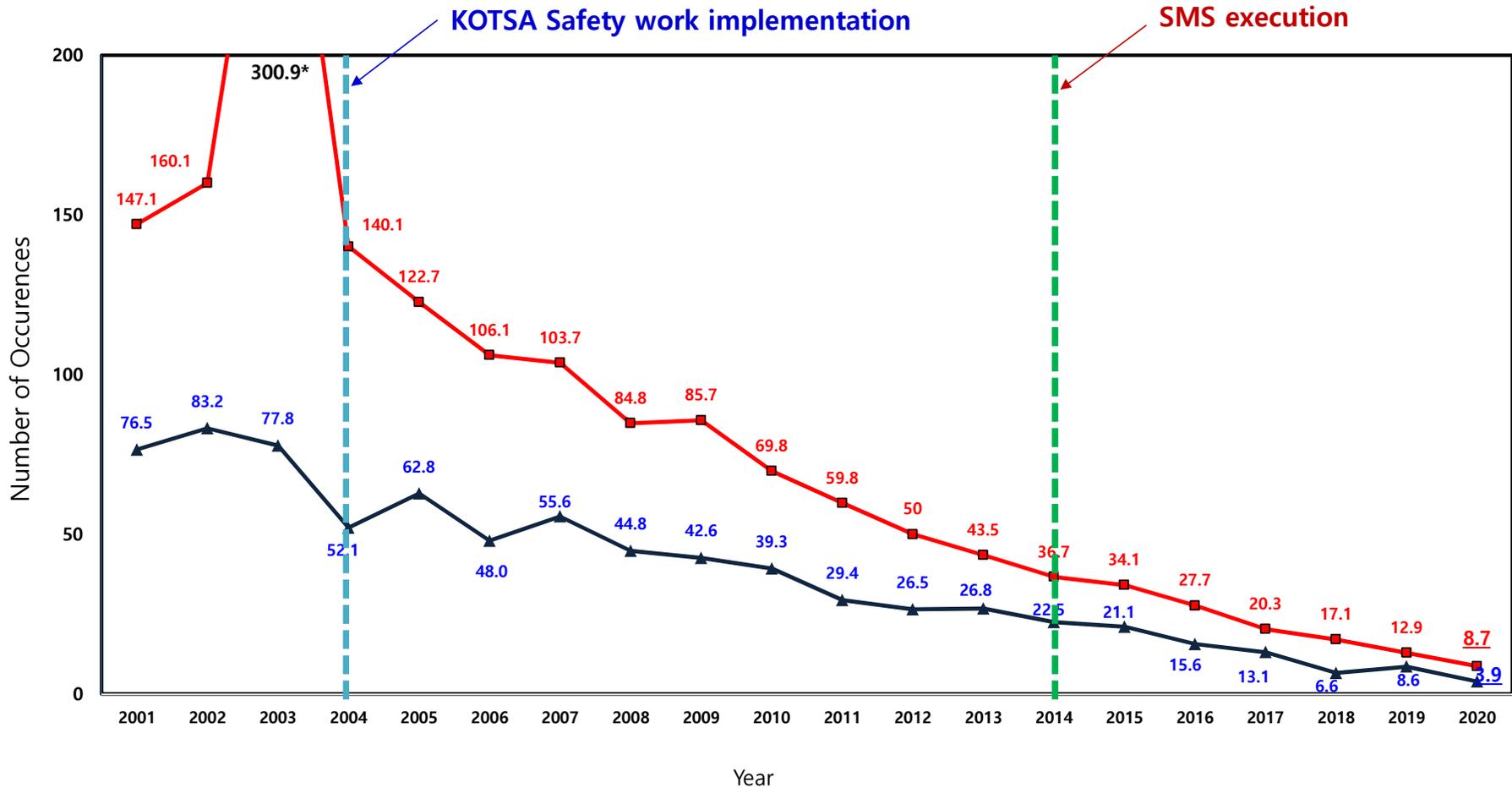
III. Railway Safety Performance in Korea

Status of Railway Accidents



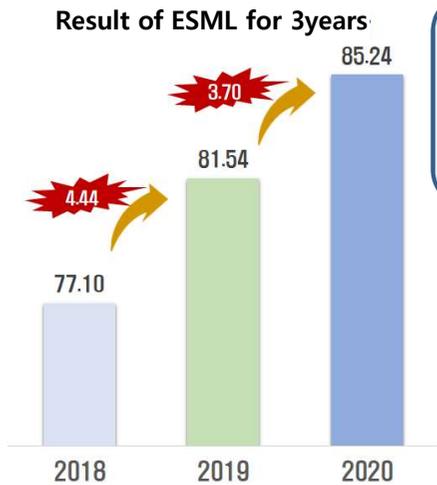
Performance of Railway safety management

Status of Fatality due to Railway Accidents



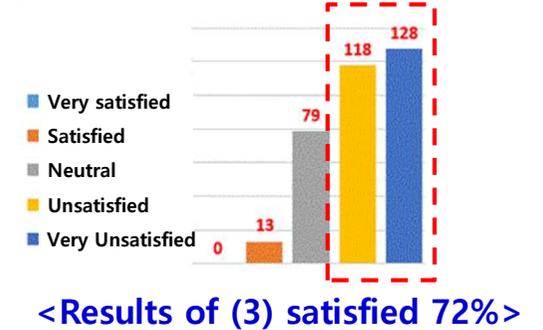
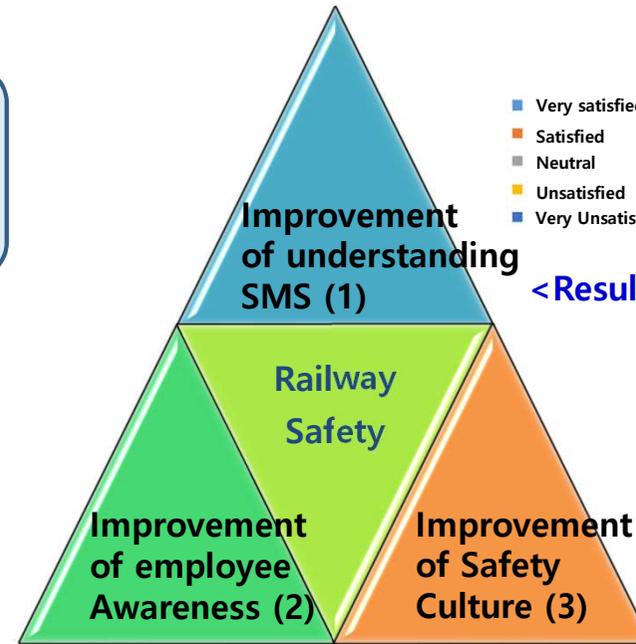
Performance of SMS and Evaluation of Safety level

Increase Safety culture and Safety level



◇ After implementing the ESML, TOC and IM Safety level is continuous increase

- Improvement Accident indicator
- Safety culture increase (CEO, Employees)
- Increase public safety index and reliability



Forward plan for improving the railway safety performance

SMS

- Expanding the autonomous SMS, Activating the SMS consulting group(TOCs, IMs)
- Development of the advanced Risk management system suitable for TOCs, IMs

Safety Service

- Improving the statistical reliability through accident analysis and intelligent accident management system (include rolling stock record system)
- Development of the railway information analysis method and safety service (review of the railway design, voluntary reporting, evaluation of railway station)

Safety Culture

- Spreading safety culture and strengthening human factors management through the use of ESML (international cooperation)

R&D

- The first Tram in Korea to be put into practical use in 2023
 - SMS for operating Tram
 - Tram driver`s license issue, Training and education system development

**We will provide the world's best
Railway Safety Service**



Thank You For Your Attention