



IV scientific and technical workshop

"COMPUTER SIMULATION IN RAILWAY TRANSPORT: DYNAMICS, STRENGTH, WEAR"



Challenges and Opportunities in ASEAN Railway Modernization

Rattapoohm Parichatprecha and Songsak Suthasupradit

*Center of Excellence for Road and Railway Innovation
Naresuan University, Thailand*

- **Introduction to NU-RRI**
- Brief History and Current Status of Thailand Railway
- Thailand Railway Modernization
- ASEAN Railway Modernization

About Us

Establish Since 2013 Under University Regulation Aims to Enhance NU to be the
“World Class” University.

Vision: “To be a Front Line of **ASEAN** in Developing Research and
Innovation of Road and Railroad”

Missions:

- Develop High Impact Research and Innovation
- Establish International Collaboration for Research and Professional Services
- Publish in High Impact Factor Journals
- Cooperation with World Class Organization in Organizing of International Conference

OUR ALLIANCE



การรถไฟฟ้าขนส่งมวลชนแห่งประเทศไทย
Mass Rapid Transit Authority of Thailand



State Railway of Thailand



OUR PEOPLE



Director: Asst.Prof.Dr. Rattapoohm Parichatprecha

Expertise Areas: Railway Infrastructure, Smart Construction Materials, Railway Track Monitoring, Railway Standardization



Associate Diector: Dr. Songsak Suthasupradit

Expertise Areas: Computational Mechanic, Wheel-Rail Contact Simulation, Train and Track Monitoring, Bridge-Train-Track Interaction, Vehicle Dynamics



Senior Researcher: Dr. Ananchai Ukaew

Expertise Areas: Electric Vehicle System, Vehicle Dynamic, Rolling Stock, Drive-by-Wire, ECU

OUR PEOPLE



Associate Director: Dr. Thammanoon Hengsadeeikul

Expertise Areas: Railway Logistic, TOD



Senior Researcher: Dr. Choopong Chuaiphen

Expertise Areas: Mechatronics, Embedded Sensor, Robotics



Senior Researcher: Dr. Rattapoom Waranusart

Expertise Areas: IOT, Computer Programming, Big Data



Senior Researcher: Asst.Prof.Dr. Tanapon Phenrat

Expertise Areas: Nano Materials, Novel Technology in Environmental Remediation



Senior Researcher: Dr. Pakjira Nakbunreng

Expertise Areas: Macro Economics, Transport Economics

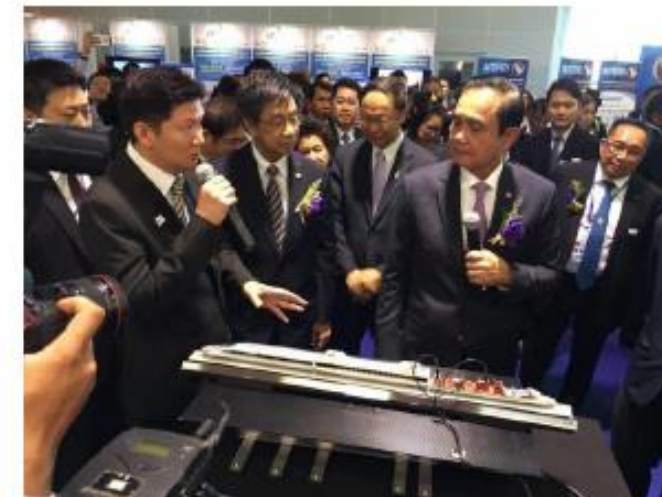
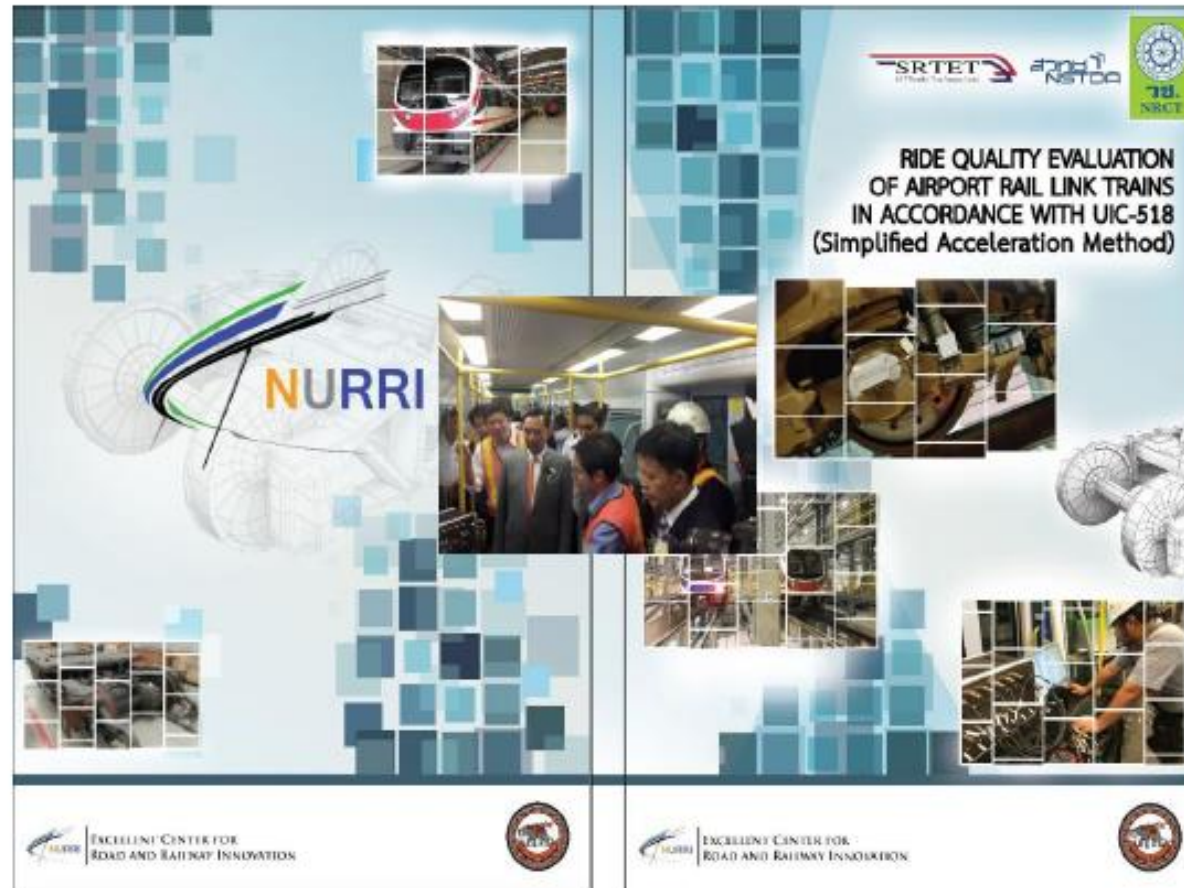
- 4 Full Time Researcher
- 2 Doctoral Students
- 1 Post Doctoral
- 3 Master Students

Our Capabilities



Research & projects High Light

Ride Quality Evaluation of Airport Rail Link Trains in Accordance With UIC-518

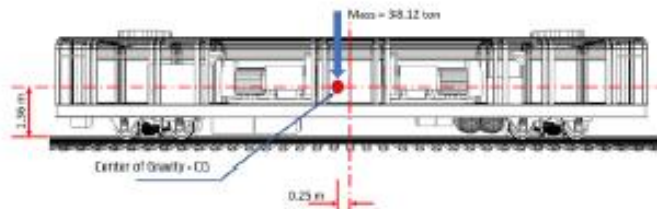
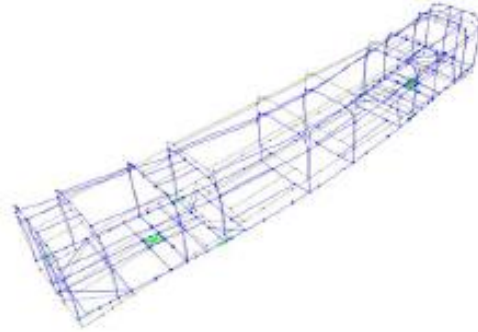


Analytical and Testing for the Performance of Customized Electric Generator Train

Inspection



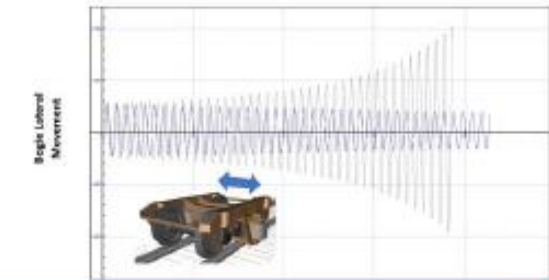
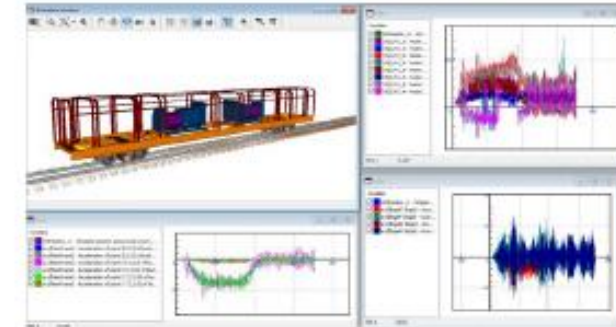
Design



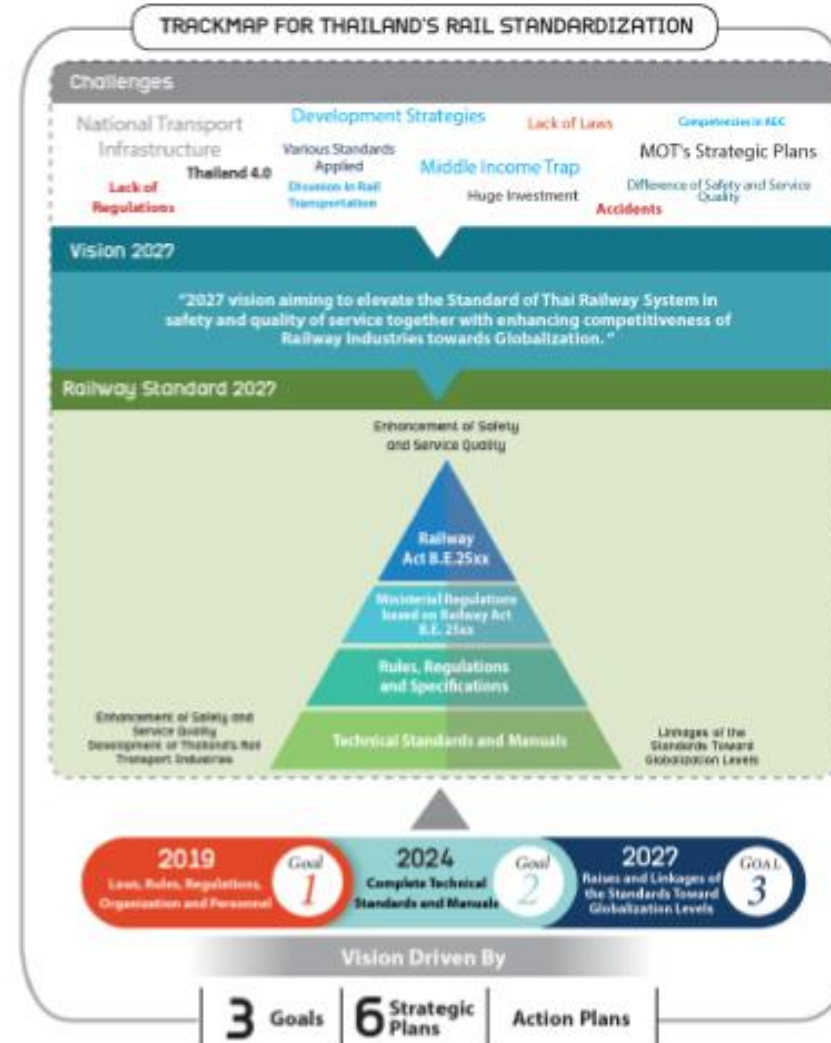
Construct



Evaluation & Investigation




Development of Thailand Railway Standardization Plan



Railway Track Standards and Manuals

Railway Track Standards



มขร S-T 001-25xx	Track Classification
มขร S-T 002-25xx	Structure Gauge and Clearance
มขร S-T 003-25xx	Track Alignment and Layout
มขร S-T 004-25xx	Design of Ballasted Track
มขร S-T 005-25xx	Design of Ballastless Track
มขร S-T 006-25xx	Continuous Welded Rail
มขร S-T 007-25xx	Track Components
มขร S-T 008-25xx	Transition Zone
มขร S-T 009-25xx	Track Safety
มขร S-T 010-25xx	Track Drainage



Collaborations for Conference and Seminar



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TIMELINE OF THE EVOLUTIONARY HISTORY OF THAI RAILWAY SYSTEMS

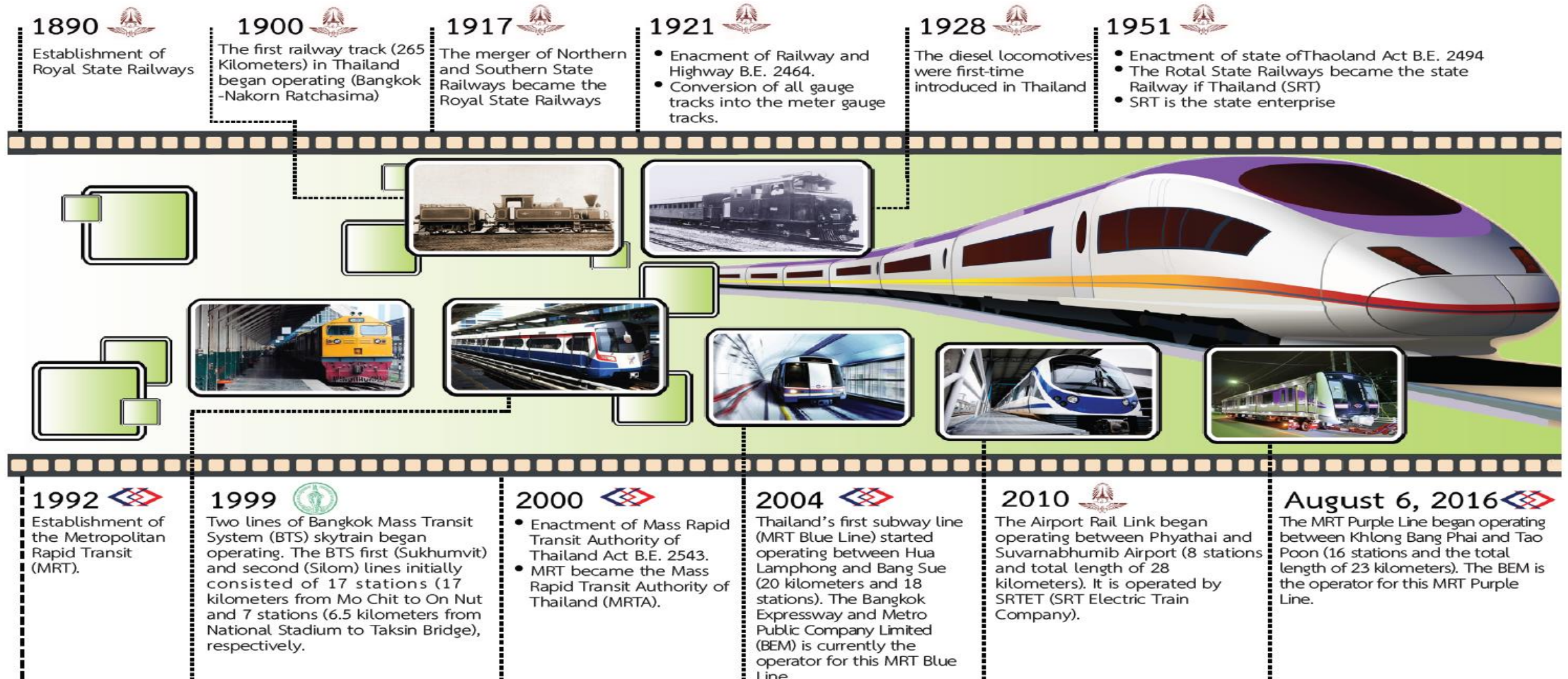


Figure 1-1: Present timeline of the evolutionary history of Thai Railway Systems.

THAILAND RAILWAY BODIES AND THEIR ROLES



Competitiveness in Railway Quality

2017-2018 ASEAN Rail Infrastructure Quality and Competitiveness

ASEAN Countries	Quality Score (Max 7.0)	ASEAN Ranking	World Ranking
Singapore	5.6	1	8
Malaysia	5.0	2	14
Indonesia	4.2	3	30
Vietnam	3.0	4	59
Thailand	2.6	5	72
Philippines	1.9	6	91
Cambodia	1.6	7	94
Lao DPR	-	-	-
Brunei	-	-	-
Myanmar	-	-	-

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- ASEAN Railway Modernization

Thailand Logistic and Transport Challenges



1. Energy Security
2. Logistic cost/ Competitiveness
3. Traffic Congestion / Fatality
4. Crumbling Infrastructure
5. Global Warming/ Pollution
6. Urban Sprawl
7. World's Megatrend

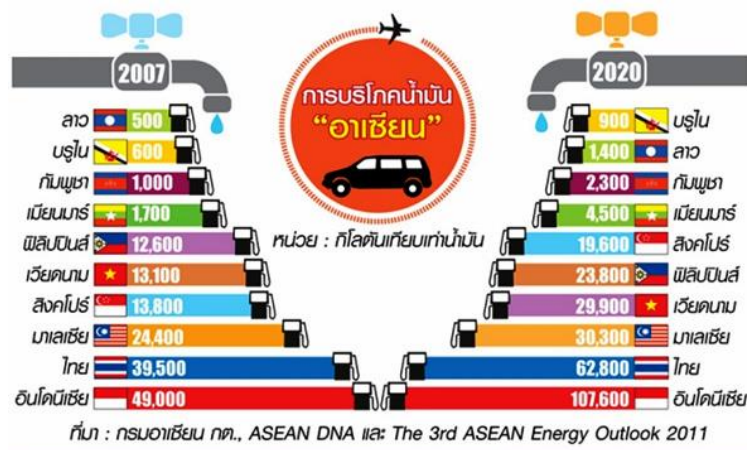
Congestion and Energy Security



- Total ~37,000,000
- 1,100,000 Trucks
- 15,400,000 Cars
- 20,300,000 Motorcycles

Source : Department of Land Transport, 2016

2nd ranking of ASEAN in gasoline
consumed almost close to Indonesia
(Thai's population around 1/3 of
Indonesian)



Logistic Cost and Competitiveness

Improper Transportation Modal Sharing



2%



86%



11%



1%

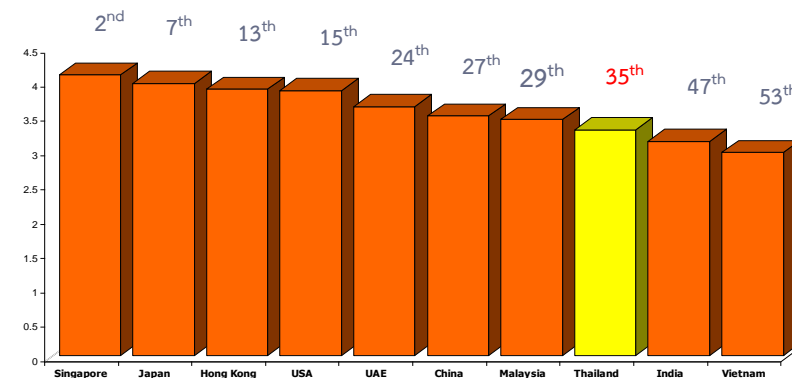
Railway

Road

Maritime

Airway

Logistic cost



Source : OTP, 2011

Traffic Congestion and Accidents

10 monster traffic jams from around the world

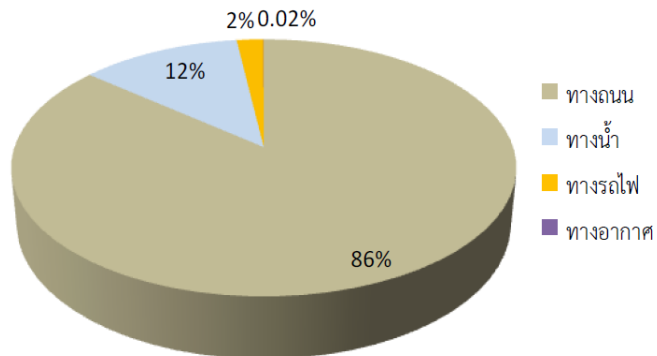


- Only 100,000 KM Highways
- 15,400,000 Cars + Trucks
- 20,300,000 Motorcycles
- Average speed during rush hour of some roads in BKK ~ 10-15 km/hr
- 2014: Thai roads ranked No. 2 for traffic deaths
- 44 deaths per 100,000 population
- Approx. 6,400 M.US.\$ lost due to accident on the road annually

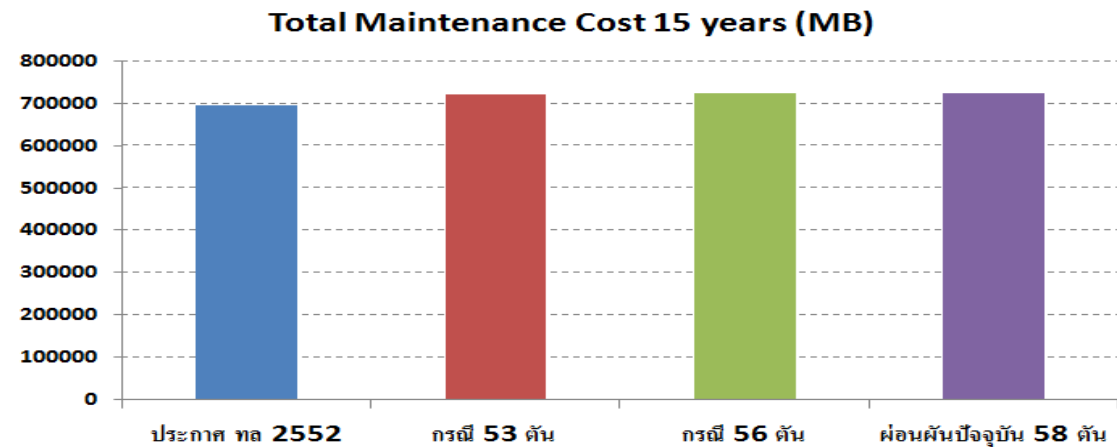
Crumbling Infrastructure



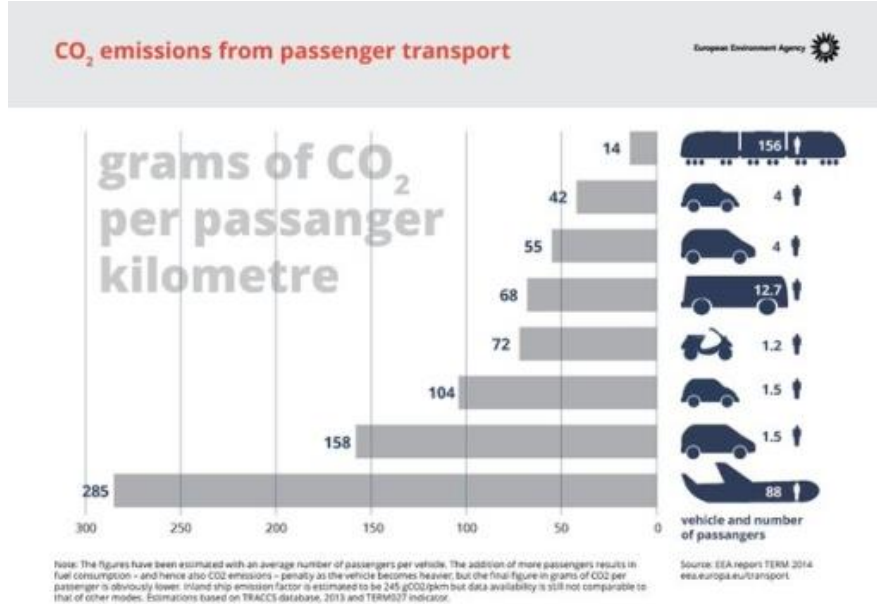
สัดส่วนการขนส่งสินค้าตามรูปแบบขนส่ง ปี 2555



- 85% of Thailand's Logistic Was Done by Road
- 1,000,000 Trucks With Only 100,000 Km Highways
- Maintenance Cost of highways ~1,500 M. US\$ Annually



Railway : Green Transportation



- Low Energy Consumption
- Low Co₂ Emission
- Very Low Risk
- Logistic Competitiveness
- Controllable Crumbling Infrastructure
- Smart Growth and Compact City



Challenges and Opportunities in Development of Thailand's Infrastructure



- Thailand Infrastructure Modernization Plans 2015-2022
- 20 Years Transportation Strategic Plans
- Invest > 90 Billion US\$ Including Rail, Road, Maritime, and Air-Transport

3 Phases Track Doubling and 10 Metro Lines



3,039 KM Double Tracks



464 KM Metro Networks



HSR Bangkok-Chiangmai, 672 KM



HSR BKK-Korat-(Nongkai), 250 (355) KM



HSR BKK-HuaHin, 211 KM



+EEC (3 Airports Rail Links)

HSR BKK-Rayong, 193 KM

8 Years Railway Modernization Plans: 2015-2022++



Projects and Investment

- Double Tracks Meter Gauge 6 routes 4.3 B USD
- 10 Metro++ Lines 24 B USD
- HSR BKK-Rayong+EEC 9 B USD
- HSR BKK-Huahin 2.79 B USD
- HSR BKK-Chiangmai 13.2 B USD
- HSR BKK-Korat** > 5 B USD

Totally ~ 78 B USD



Benchmarking*

- Increase Intercity Rail Network of 1,300 KM
- Increase Speed : 1) Freight 29=>60 km/hr, 2) Passenger 50=>100 km/hr
- Increase Axle Loaded of 25%
- Enhance rail sharing mode from 1.5% to 5%
- Target Ridership of 5-8 M persons trip daily
- Public transport : Passenger car = 60:40
- Enhance Quality of Services, Safety , and Reliability
- Railway Hub of Asean
- Support new S-curve industries/Thailand 4.0 (EEC)

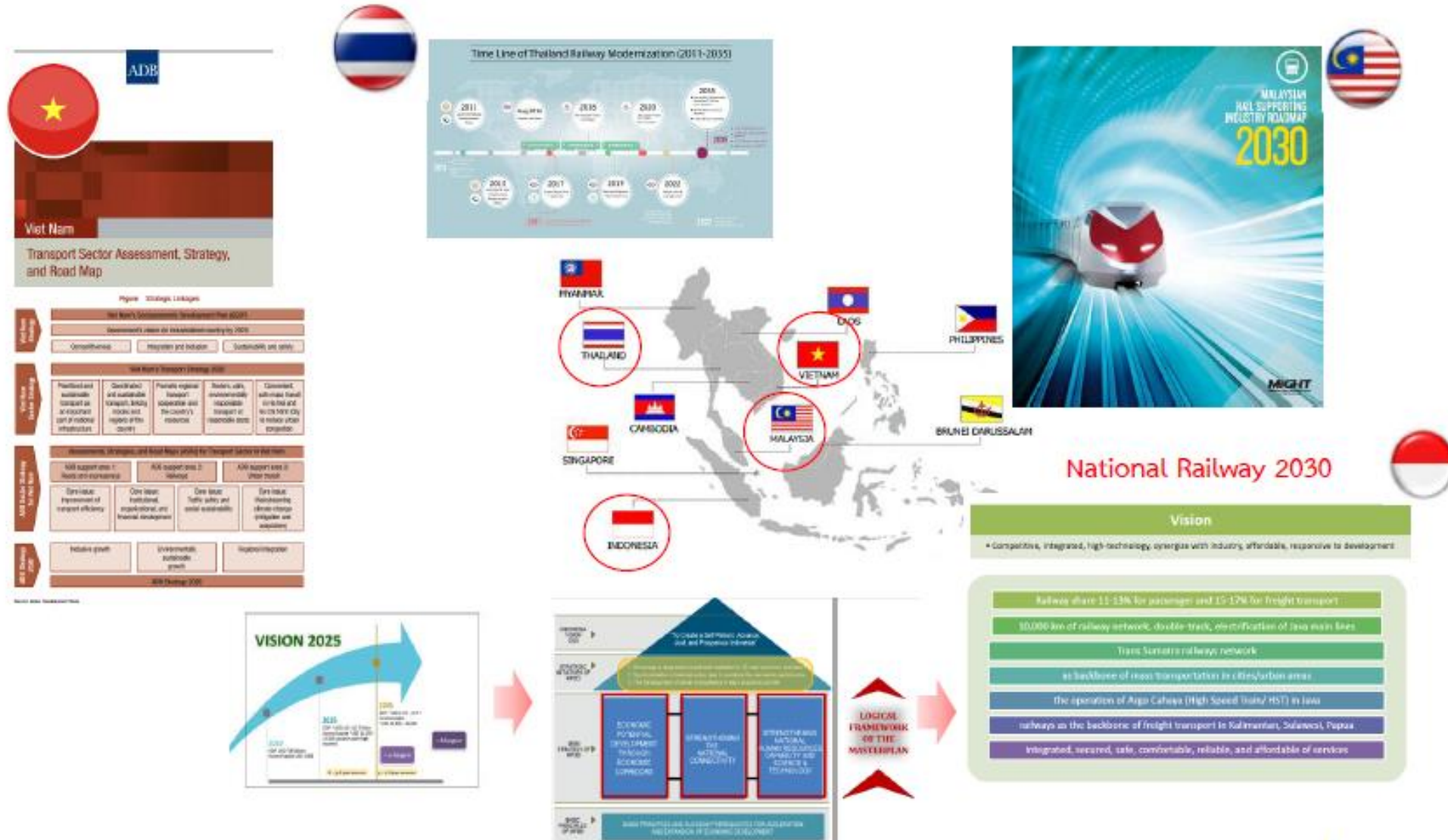
*Benchmarking for 8 years plan

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- **ASEAN Railway Modernization**

ASEAN Railway Modernization Roadmap to 2030



Current Railway Networks in ASEAN

ประเทศ	Intercity Railway Networks	
	Operator	Length (Km)
Thailand	SRT	4,507
Malaysia	KTMB	1,699
	SSR	134
Vietnam	VNR	2,600
Philippines	PNR	1,060
Indonesia	PT Kereta Api Indonesia	1,348.0 (Sumatra Networks)
		4,807 (Java Networks)
Laos	Department of Railway	~15
Cambodia	Royal Railway	612
Myanmar	MR	5,403
Total		22,185

HSR, Intercity, and Metro Railway Networks Under Planning in ASEAN

Country	Categories	Number of Projects	Length (km)	Budget (Billion US\$)
Thailand	HSR	4	1,784	26.3
	Metro Lines	8	228.7	17.5
	Intercity and Commuter Lines	10	2,421	30
Total		23	4,433.7	73.8
Country	Categories	Number of Projects	Length (km)	Budget (Billion US\$)
Vietnam	HSR* (postponed to 2050)	1	1,137	~ 56
	Metro Lines	19	536.7	43.9
	Intercity and Commuter Lines	-	-	-
Total		20	710.3	43.9*

HSR, Intercity, and Metro Railway Networks Under Planning in ASEAN

Country	Categories	Number of Projects	Length (km)	Budget (Billion US\$)
Indonesia	HSR	1	142.3	5.5
	Metro Lines	4	116.3	3.5
	Intercity and Commuter Lines	6	1,985	18.7
Total		11	2,243.6	27.7
Country	Categories	Number of Projects	Length (km)	Budget (Billion US\$)
Malaysia	HSR	1	335.0	10.5
	Metro Lines	2	88.2	9.3
	Intercity and Commuter Lines	2	662.0	4.6
รวม		5	1,085.2	24.4

Current Status of ASEAN HSR Plans

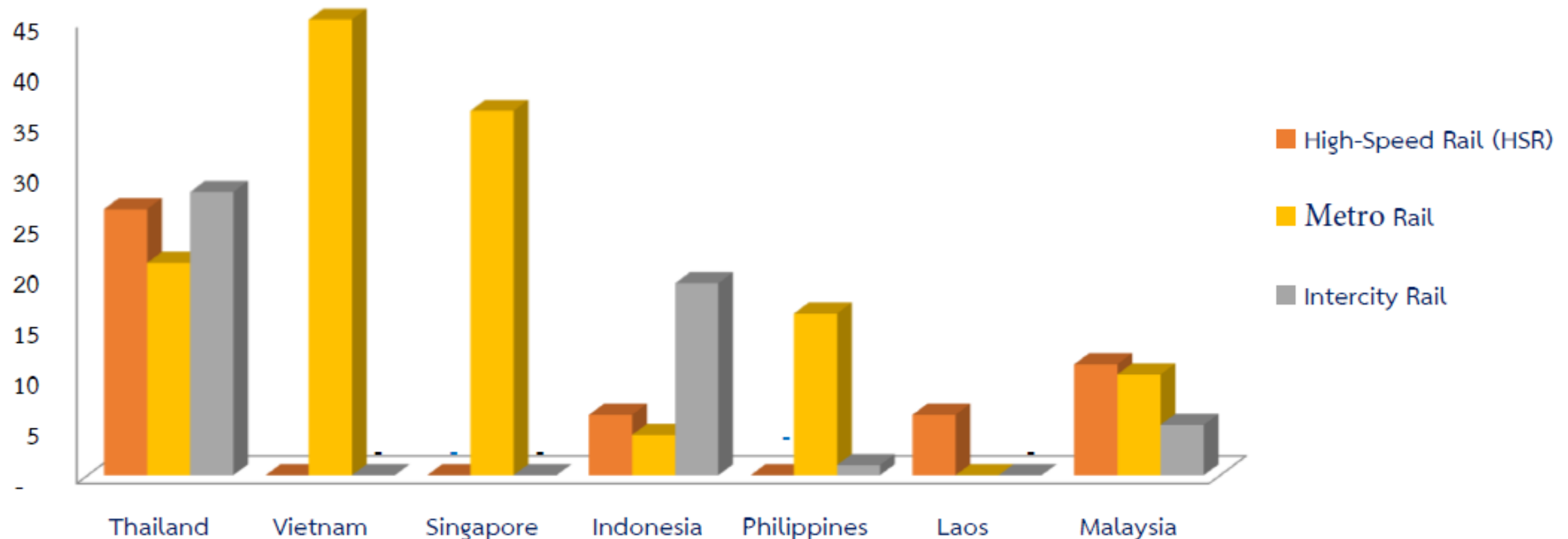
Countries	HSR Plans			Current Status
	Project Name	Length (km)	Billion US \$	
Thailand	BKK-Rayong + 3 Airports inter-connected	260	9.1	Bidding
	BKK-Chiangmai	673	8.6	Finished FS
	BKK-Korat (BKK-Nongkai 1 st Phase)	253	5.6	Construction
	BKK-Huahin	211	3	Planning
	Total	1,397	26.3	
Laos PDR	Kunming-Vientien	417	5.9	Construction
Malaysia-Singapore	Kuala Lumpur- Singapore	335	10.4	Bidding
Vietnam	Ho Chi Minh - Hanoi	1,137	56*	Planning*
Indonesia	Jakarta - Bandung	142.3	5.5	Planning

HSR Market Value in ASEAN > 50 BN USD

The value of investment in the railway networks development in ASEAN countries.

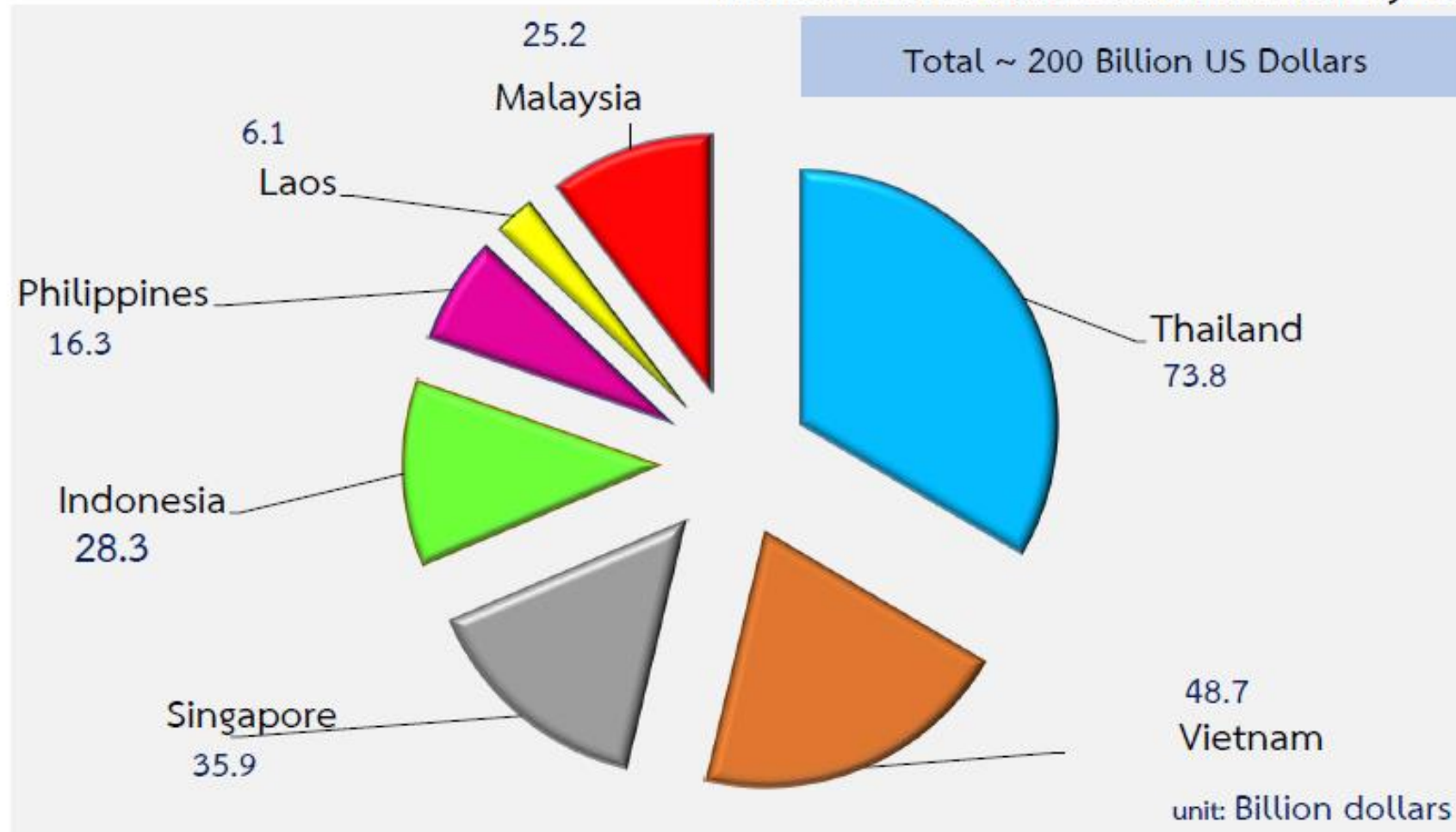
unit: Billion dollars

Investment value classification by country in ASEAN



The value of investment in the railway networks development in ASEAN countries.

Investment value classification by country in ASEAN



1st Seminar and Workshop on ASEAN Railway Standardization (October, 2016)



“One Community, Many Opportunities”

- Huge Investment (120 BN USD): **ASEAN Specification for Industrial Opportunities**
- Interoperability in ASEAN Railway Networks: **ASEAN Rail Standardization for Interoperability**
- 12,700 KM Meter Gauge: **ASEAN Meter Gauge Standardization**
- ASEAN Rail Market Capability: **ASEAN Cooperation for Power of Negotiation**
- Research and Development: **ASEAN Rail Research Network**

ASEAN RAIL STANDARDIZATION IS A KEY OF OPPORTUNITY

What? : Carry out “The Suitable” not “The Best” standards for our community

How? : Harmonization and Consolidation are key processes in development of ASEAN railway Standards

Who and When? : Establish the WG which members will coming from all ASEAN countries at the first stage and spin to **ARA (ASEAN Railway Agency)** in the future



One Community with Many Opportunities

"The 2nd ASEAN Rail Standardization Symposium and Workshop, November 2018, Thailand"

"If you want to walk fast walk alone, if you want to walk far, walk together"

African Proverb