

**Strengthening Subregional Connectivity in East and North-East  
Asia through Effective Economic Corridor Management  
Training-Workshop Series: Workshop 2**

**Lecture: Project Management  
and Feasibility Studies**

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# Objectives and Content

## **Overall objective:**

To provide an introduction to project management and feasibility studies from the perspective of infrastructure projects.

## **Content:**

1. Project Management
2. Freight Villages as Nodes in Intermodal Networks
3. How to Conduct a Feasibility Study?



# 1. Project Management



## What is a project?

“A project is a series of activities aimed at bringing about clearly specified objectives within a defined time-period and with a defined budget.” (European Commission, 2004, p. 8)

## Every Project is ....

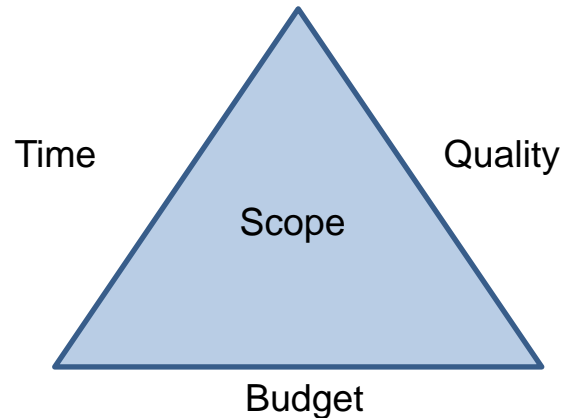
- **Unique** Every project is new and unique. Never two projects are alike. Projects are facing risks and uncertainty. Careful planning is required.
- **Complex** Projects are complex and consist of several different sub-tasks.
- **Time limited** Projects have a start and an end.
- **Interdisciplinary** The tasks require an interdisciplinary approach and involvement of different experts, often out of their regular line function.
- **Well organized** Projects need a special structure and also an activity based planning with milestones and deliverables. Resources must be allocated and managed.
- **A change** Projects cause a change to the past. This creates enthusiasm but also resistance of stakeholders.

# 1. Project Management

## Project Management

“Is the practice of initiating, planning, executing, controlling and closing the work of a team to achieve a specific goal and meet specific success criteria in a specified time. The primary challenge of the project management is to achieve all the project goals within the given constraints.” (Phillips, 2003, p. 1)

Project Management acts within the primary constraints of scope, time, quality and budget.



# 1. Project Management

## Why Projects?

### Because projects

- focus attention and efforts to solve an important problem.
- are an efficient and temporary organization to realize interdisciplinary sets of activities.
- require more time discipline and goal-orientation than other tasks in daily work.



# 1. Project Management

*"Nobody plans to fail,  
but many fail in planning...."*

## The LogFrame Approach

The Logical Framework Approach (LFA) was developed to improve project planning and evaluation systems. It was designed to address three basic problems:

- **Planning** was very vague, without clearly **defined objectives** that could be used to monitor and evaluate the success (or failure) of a project;
- **Management responsibilities** were not clear; and
- **Evaluation** was often an adversarial process, because there was no agreement as to what the project was really trying to achieve.

The **Logical Framework Approach (LFA)** is an **analytical process** and **set of tools** used to support project planning and management. It provides a set of interlocking concepts which are used as part of an iterative process to aid structured and systematic analysis of a project or programme idea.



# 1. Project Management

## The Logical Framework Approach

### ANALYSIS PHASE

- ↓ **Stakeholder analysis** - identifying & characterising potential major stakeholders; assessing their capacity
- ↓ **Problem analysis** - identifying key problems, constraints & opportunities; determining cause & effect relationships
- ↓ **Objective analysis** - developing solutions from the identified problems; identifying means to end relationships
- ↓ **Strategy analysis** - identifying different strategies to achieve solutions; selecting most appropriate strategy.

### PLANNING PHASE

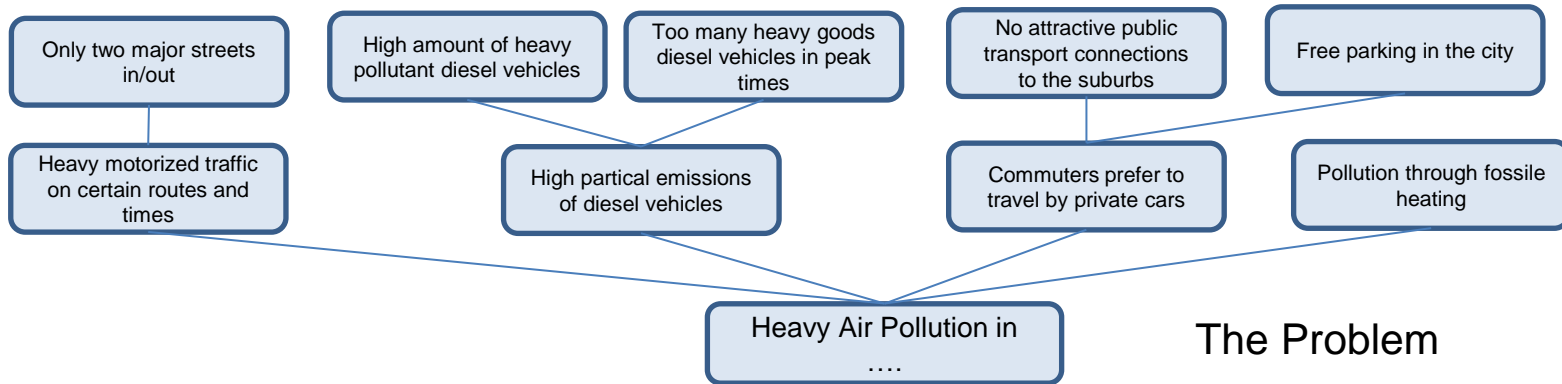
- ↓ **Developing Logical Framework matrix** - defining project structure, testing its internal logic & risks, formulating measurable indicators of success
- ↓ **Activity scheduling** - determining the sequence and dependency of activities; estimating their duration, and assigning responsibility
- ↓ **Resource scheduling** - from the activity schedule, developing input schedules and a budget

Source: European Commission:  
Project Cycle Management, 2004, p.60

# 1. Project Management

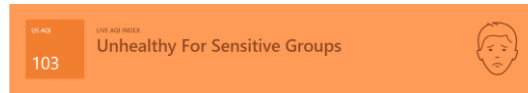
*"If you know the real cause of a problem, you know the solution."*

## The Analysis Phase: Problem Analysis (Example)



Sources

The Problem



<https://www.iqair.com/germany/baden-wuerttemberg/Stuttgart->  
26.11.20 14:30

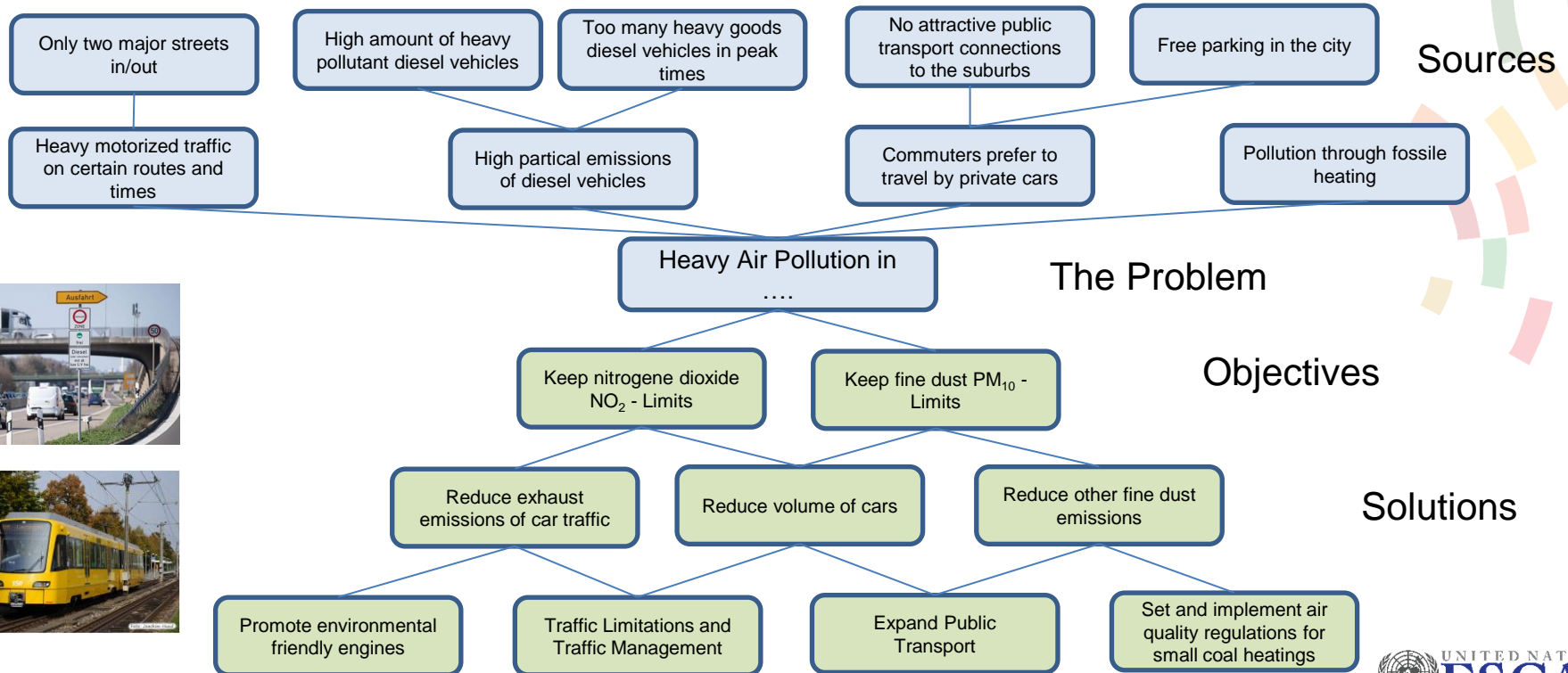




# 1. Project Management

*"If you know the real cause of a problem, you know the solution."*

## The Analysis Phase: Problem – Solution – Net (Example)

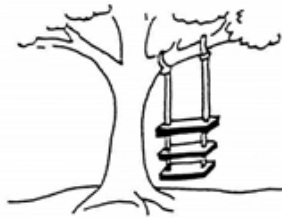


See also Source: Clean Air Plan Stuttgart - Infoflyer

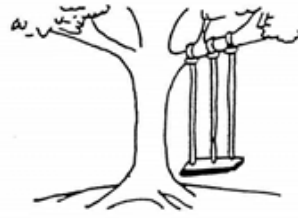
# 1. Project Management

## Project Objectives and Stakeholder Analysis

**“Problem solving is an art form not fully appreciated by some”**



*As proposed by  
the project sponsors*



*As specified in  
the project request*



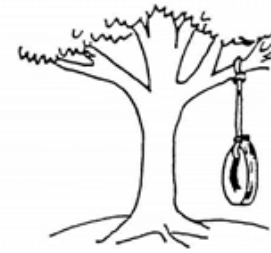
*As designed by  
the senior analyst*



*As produced by  
the programmers*



*As installed at  
the user's site*



*What the user  
wanted*

Tree Swing graphic by S. Hugh 1993 - from [Businessballs.com/treeswing.htm](http://Businessballs.com/treeswing.htm) 2013



# 1. Project Management

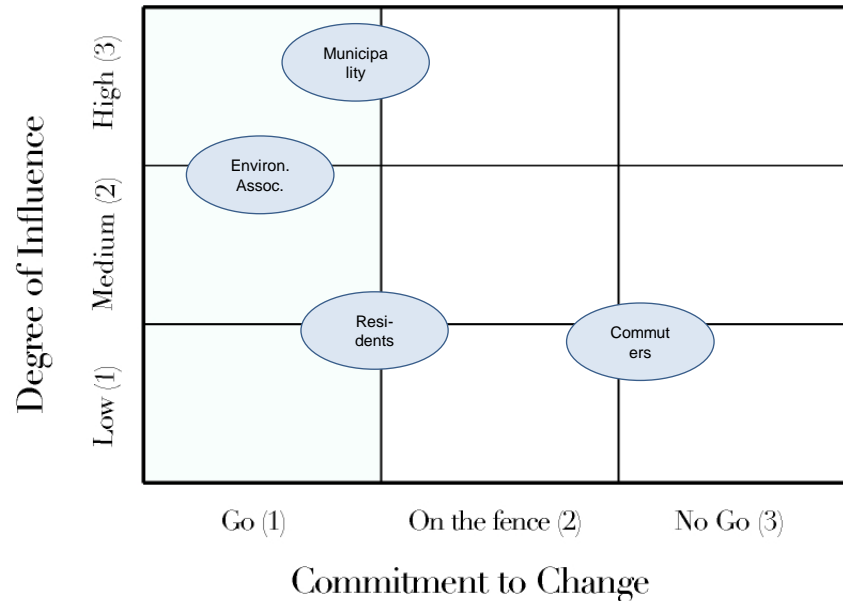
## Stakeholder Analysis (Example)

Stakeholders and basic characteristics	Interest and how affected by the problem(s)	Capacity and motivation and bring about change	Possible actions to involve stakeholders interests
<b>Residents in the city</b> About 500,000 residents	Suffer from poor air quality; illness, especially of children; outdoor activities limited	High diversity, not organized	Information campaign; public hearings; Local project discussions
<b>Commuters</b> About 150,000 every day	interested in fast, convinient and cheap transport	Also high diversity of car drivers and PPT users; majority opposite to further traffic limitations	Information campaign, communicate the benefits for them; participation public hearings, ...
<b>Environmental Association</b> Nationwide active, has good lawyers and experts	Interested in clean air, public attention; new members	High influence through lawsuits and demonstrations	Involve in public hearings; participation as advisors
<b>Municipal government</b> City parliament consists of different parties	Want to improve situation for the citizen and to obey to national standards; but also limited to financial budget	Must show effective action but with limited investment	Top officials in steering comittee; Regular public information about problems and progress
.....	.....	.....	.....



# 1. Project Management

## Stakeholder Analysis (Example)



Source for matrix: [https://ixquick-proxy.com/do/show\\_picture.pl?l=deutsch&rais=1&oiu=http%3A%2F%2Firc.queensu.ca%2Fimg-emails%2Fstakeholder-ap.gif&sp=0753fae561465dbc6319c87c0ed7505d](https://ixquick-proxy.com/do/show_picture.pl?l=deutsch&rais=1&oiu=http%3A%2F%2Firc.queensu.ca%2Fimg-emails%2Fstakeholder-ap.gif&sp=0753fae561465dbc6319c87c0ed7505d) - Found: 22.02.16

# 1. Project Management

## The LogFrame Matrix (Example)

Project Description	Indicators	Means of Verification	Assumptions
<b>Overall objective</b> To contribute to the improved citizen health	Incidence of air pollution diseases caused by NO2 and particulate dust is reduced by 50%	Municipal hospital records	Hospital identify these diseases and keep records
<b>Purpose</b> Keep national air quality standards	Maximum 50 µg/m <sup>3</sup> fine dust in average per day  Maximum 40 µg/m <sup>3</sup> NO2 in average p. y.	5 control stations at hotspots  5 control stations at hotspots	May be exceeded maximum 35 times per year
<b>Result 1</b> No private cars with Euro V or lower on selected streets	Number of cars identified with Euro V and lower per year on selected streets	Traffic police controls or automated number plate recognition	Traffic sign with traffic limitations installed completely
....			



# 1. Project Management

## The Time Activity Plan (Example)

WP	Work Packages	Month after project start																									Responsible	Contribution
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		
100	Project Management																											
110	Kick Off Meeting																										PM	KMM, BDO
120	Project Coordination																										PM	
130	Monitoring Progress																										PM	KMM, BDO
140	Reporting																										PM	
150	Public Hearings																										PM	KMM, BDO
200	Promotion of environmental friendly engines																										TL1	
210	Feasibility Study for public infrastructure for electric vehicles																										TL1	LTE
220	Procurement of services and equipment																										TL1	STE
230	Installation of electric loading points																										TL1	STE
300	Traffic Limitations and Traffic management																										TL2	
310	Develop Detailed Concept for Traffic Limitations & Traffic Management																										TL2	LTE
320	Implement Traffic Limitations and Control Points																										TL2	STE
330	Monitor Traffic Limitations																										TL2	
340	Review Concept																										TL2	LTE
350	Implement Traffic Management System																										TL2	
360	*****																										TL2	STE
400	*****																											
410	*****																											
MS	Milestones																											
MS 1	Project Kick Off Meeting																											
MS 2	Concept Approved																											
MS 3	Interim Report Approved																											
MS 4	Final Report Approved																											

# 1. Project Management

## Project Planning

### Projects which are impossible to be defined

If projects are impossible to be defined accurately the risks shall be limited

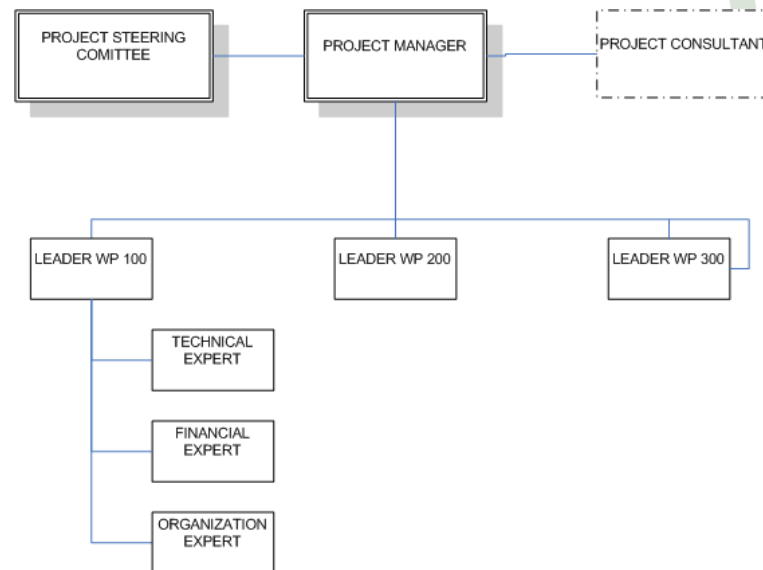
- By a step-by-step approach  
("stage – gating"; each new tranche of investment depends on the satisfactory outcome of the previous deliverable)
- By avoidance of fix price contracts
- By provisional costs in fixed-price contracts
- By feasibility studies to improve early project definition



# 1. Project Management

## Project Management Structure

Project Manager	<ul style="list-style-type: none"><li>• Responsible For Achieving Objectives</li><li>• "Networker", Leader</li><li>• Disposes over Budget</li></ul>
Project Team Member	<ul style="list-style-type: none"><li>• Responsible for Sub Tasks</li><li>• Often responsible also in Line Function</li><li>• Expert</li></ul>
Project Steering Comitee	<ul style="list-style-type: none"><li>• Decides on Objective and Milestones</li><li>• Allocates Ressources</li></ul>
Recipient	<ul style="list-style-type: none"><li>• Is concerned and should be involved, at least in Milestones</li><li>• Communication !</li></ul>





# 1. Project Management

## Project Management Structure

- The PAI - MATRIX

P ... Performance

A ... Assistance

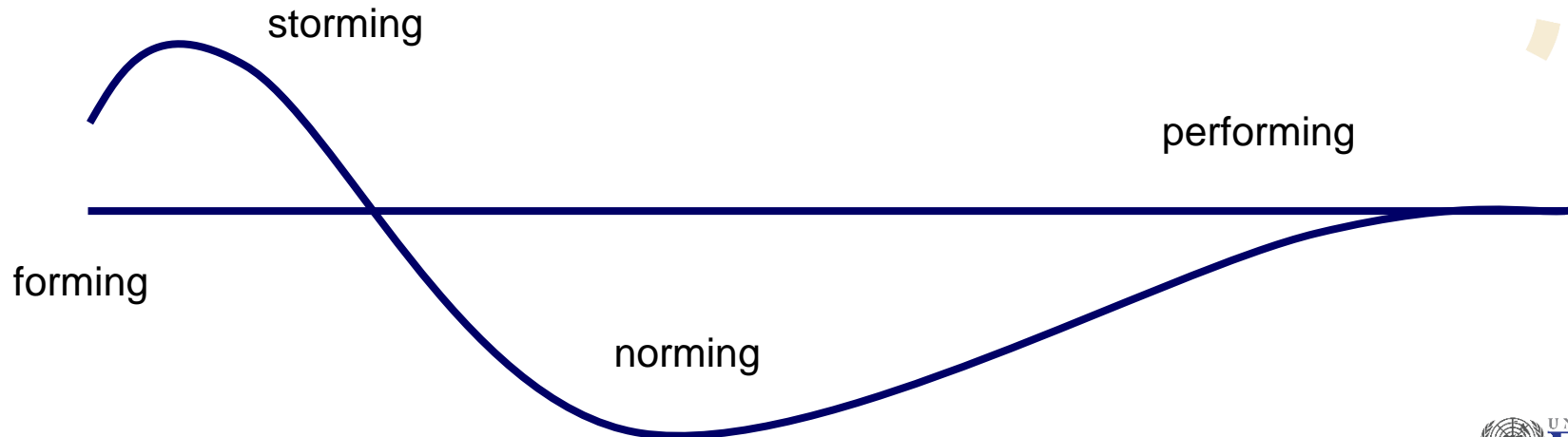
I ... Information

<div> <div>Responsibility</div> <div>Action</div> </div>	Strategic Planning Group	Employee	Promoters	Proposal team	Stakeholders	Controller	Steering Committee of Projects	Project Owner	Project Manager	Project Core team	Documents
<b>Development of project idea</b>											
? Generation of project idea	P										
? Support of project idea	A	P									
<b>Development of project proposal</b>											
? Implementation of proposal team		P	I	A							
? Information-gathering			P		A						
? Draft of project proposal			P		A						
? Feedback to project proposal	A	P	I	A							
? Final version of project proposal			P		A						1)
<b>Decision making</b>											
? Presentation for decision		A	P		A	A					
? Decision on contents, working form						P					
? Nomination of project owner						P					
<b>Development of project assignment</b>											
? Nomination of project manager, project core team								P	I	I	
? Formulation of project assignment								P	A		2)
? Project assignment								P			

# 1. Project Management

## Change Management in Projects

- The Project Manager is not the administrator of the project plan only, he is more a communicator and process manager within the project and a leader for the project team.
- Typical phases of team development within a project



# 1. Project Management

## Change Management in Projects

### ***Success factors***

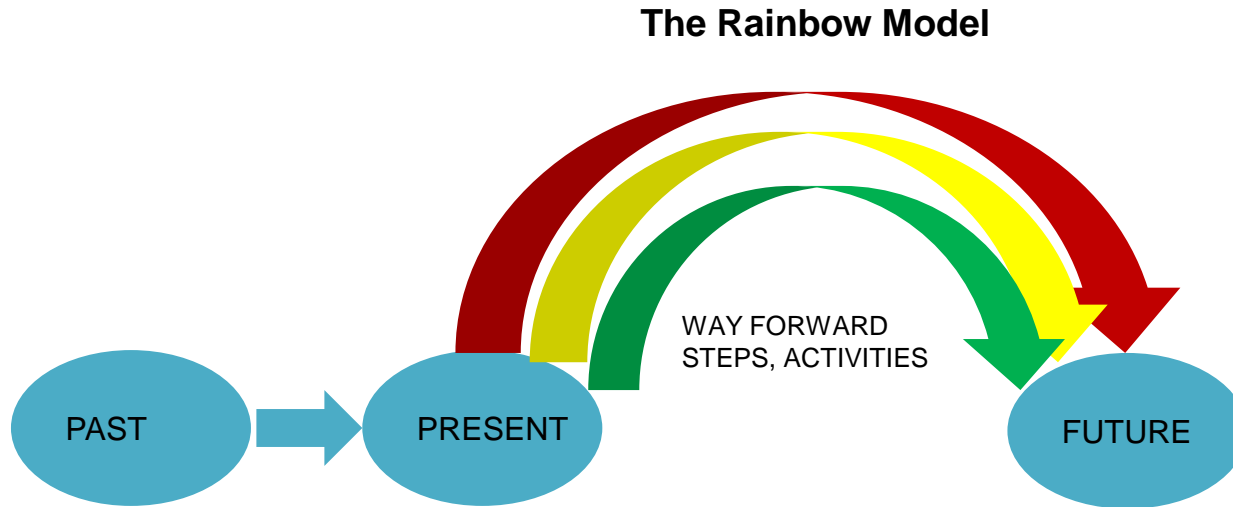
- Energy: Who regards the project as “his cause“?
  - Power: Key-executives and informal opinion leaders
  - Acceptance: Employees and responsible persons develop their own solutions
  - Motivation: Illustrate the pressure for change  
Communicate the benefits  
Point out prospects  
Celebrate success
- 
- What is resistance in a project?
  - How do you recognize resistance?
  - How to deal with it in a project?



# 1. Project Management

## Change Management in Projects

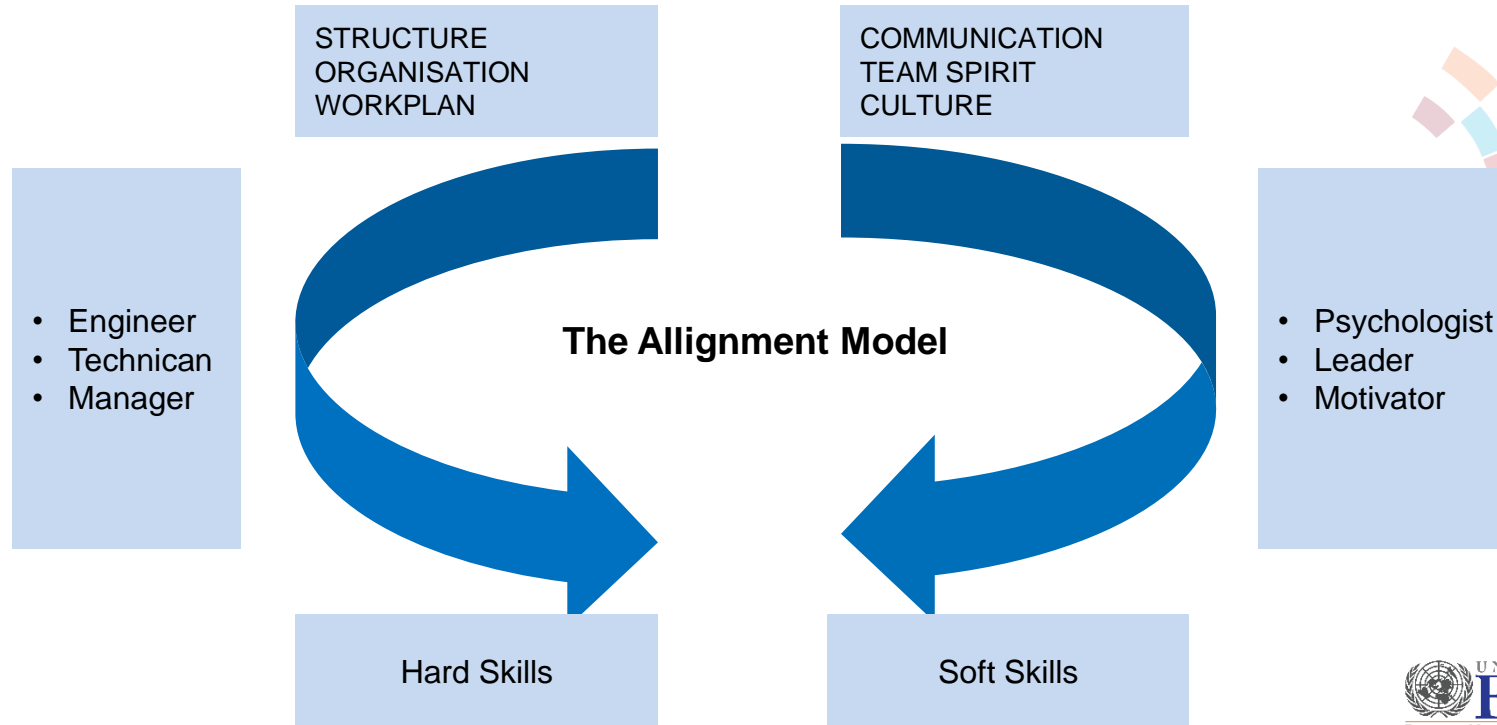
- Leadership Models



# 1. Project Management

## Change Management in Projects

- Leadership Models



# 1. Project Management

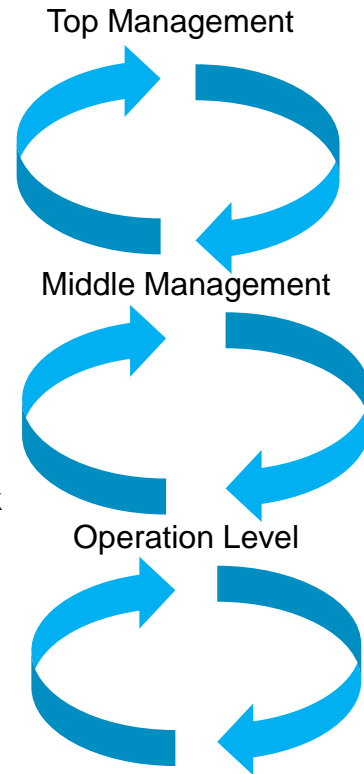
## Change Management in Projects

- Leadership Models

### The Waterfall Model

Bottom Up

Feedback  
Ideas  
Solutions



Energy  
Guidance  
Support

Top-Down



# Content

## Content:

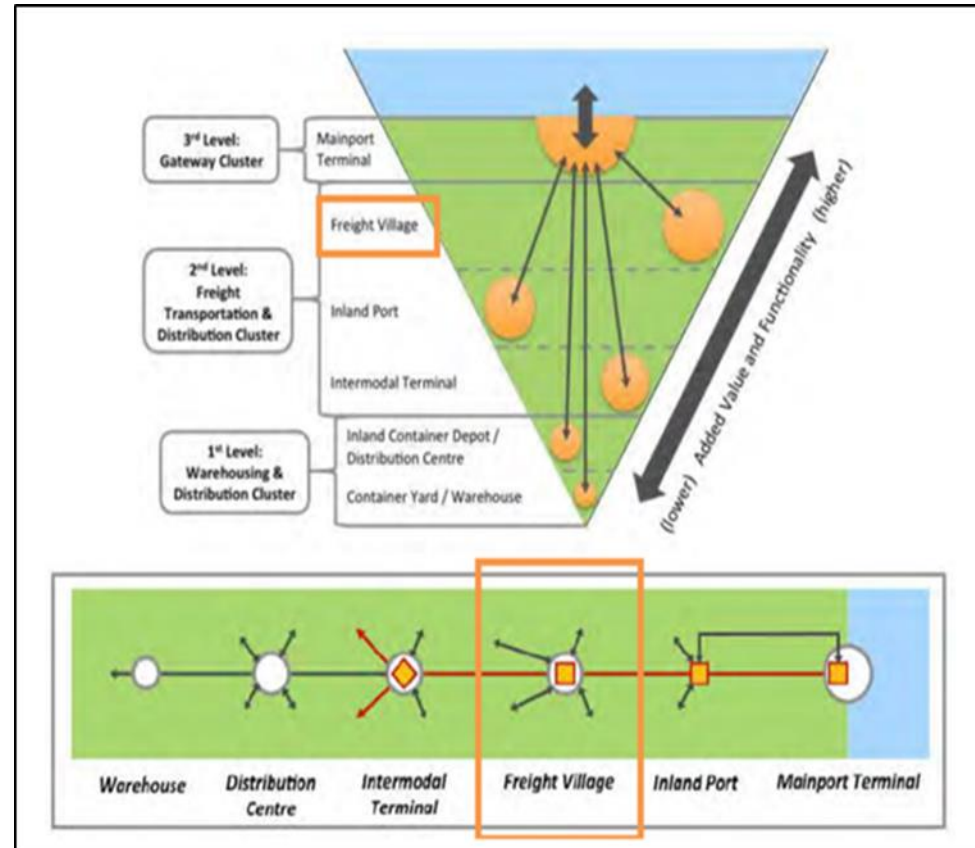
1. Project Management
2. Freight Villages as Nodes in Intermodal Networks
3. How to Conduct a Feasibility Study?



## 2. Freight Villages

### What is a Freight Village?

- Designated area where fully developed land plots are made available for the settlement of private logistics companies working in freight transport, trade logistics and supplementing services.
- Intermodal terminal enables change between transport modes
- Joint development by public (infrastructure) and private (suprastructure) investors.
- It is open and public.
- Companies collaborate in value adding chains within “productive neighborhood”.
- A development and management company acts as “site and service architect”
- FV serves as a platform for innovation and co-operation projects. (city logistics, green FV, telematics etc.)



Source: Higgins, 2012, p.14



## 2. Freight Villages

### Functionalities of a Freight Village

Freight Villages offer a variety of logistics services and auxiliary services.

→ The type of services differ according to the functionalities and clusters the FV has.

#### GENERAL APPEARANCE

Some of its key “hard” elements usually are:

- 1 Access control
  - 2 Service area
  - 3 Business centre
  - 4 Transport & Logistics warehouses
  - 5 Intermodal warehouses
  - 6 Intermodal terminal
- Others:
- Inner roads
  - Green areas
  - Water and waste treatment facilities
  - Custom area
  - .....



Public Weigh Bridge

Documents & Processes  
Customs and Inspection

Custom related Activities

Non-Custom inspection services

Industry Processing  
Plants, Assembly

Packaging, Labeling

Banking & Insurance  
for the Logistics Industry

Truck Repair

Shops

Export and Import  
Processes  
International Trade

Truck park

Police

Hotel  
Restaurant

Gas Filling  
station

Quality control  
Surveys

Bunkering

Cleaning  
Restroom

Education

Public Transport

Reefer  
Facilities

## 2. Freight Villages

### Example Nürnberg (Nuremberg)

Railway  
Connectivity

FV Internal  
Railway System

Truck & Rail related  
Logistics Service  
Providers

Internal Road  
System

Road / Highway  
Connectivity



Road / Highway  
Connectivity

Development &  
Managing Company

Bulk & Break Bulk  
Terminals and  
Port Related  
Industries

Buffer Storages

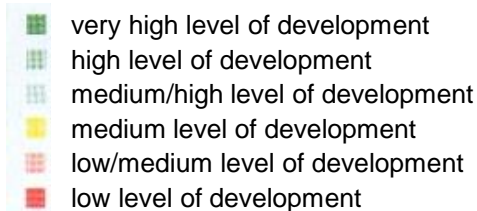
Trimodal Container  
Terminal

Heavy Lift Terminal

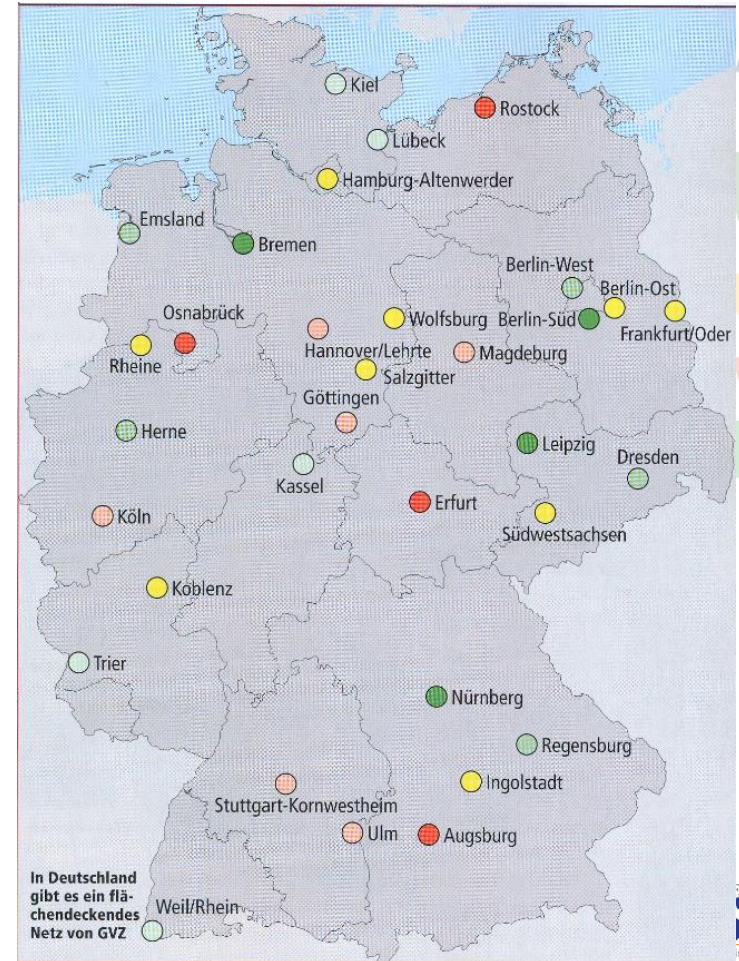
## 2. Freight Villages

### 35 Freight Villages in Germany (2016)

- Average total area 140 ha
- Average utilization 50%
- Average land costs 60 €/m (between 10 € and 200 €/m)
- 1,400 enterprises in freight villages
- With 60,000 employees



Source: DGG



## 2. Freight Villages

### Benefits of a Freight Village

#### Private

- Land available, ready for construction
- Profit through moving from expensive inner city locations to the city border
- Intermodal interface between long distance transport (motorway, rail, water) and short distance transport  
→ short reaction and delivery times; consolidation and economy of scale
- 24 / 7 round the clock operation possible without disturbing neighbors
- Synergies and cost savings through co-operation
- Wide service spectrum (truck service, customs clearance, etc.)

#### Public

- Congestion in city is reduced
- Reduction of emissions
- Creation of jobs
- Taxes for municipality
- Economic growth and competitiveness of the region





## 2. Freight Villages

### Ranking of Freight Villages in Europe



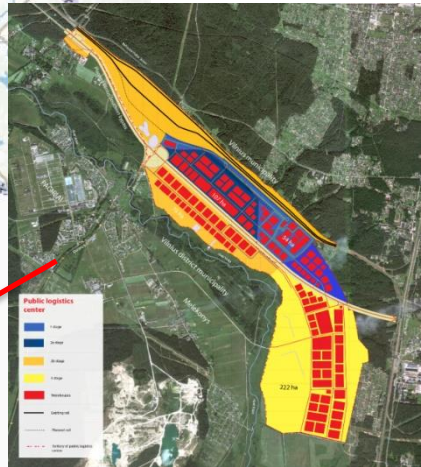
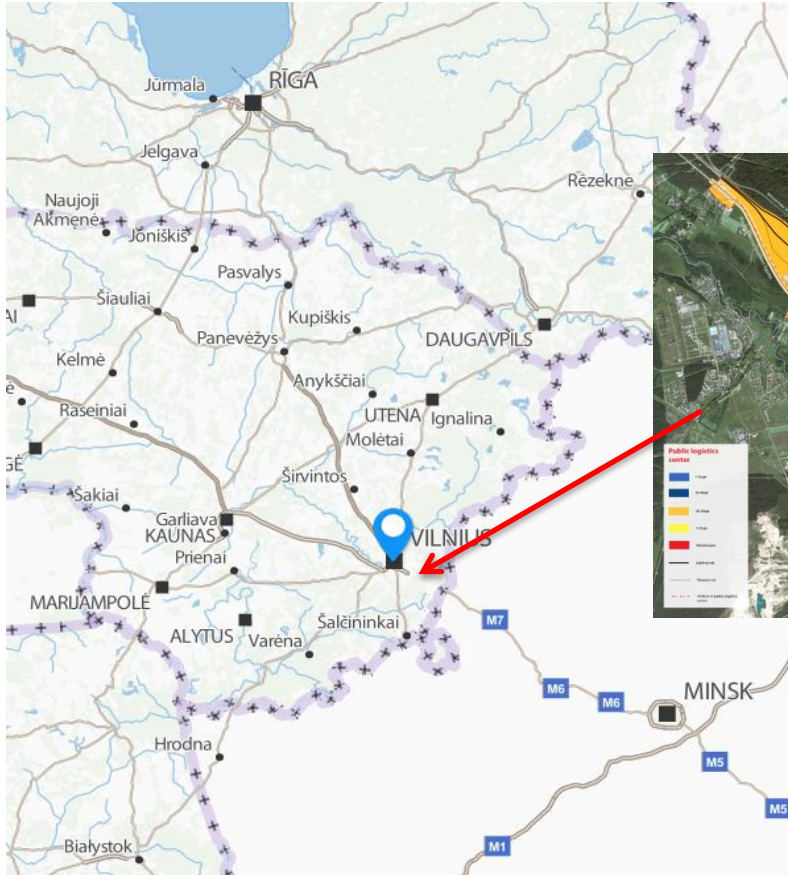
Source: DGG, 2020

1		D - Bremen
2		IT - Quadrante Europa Verona
3		D - Nürnberg
4		ES - Zaragoza (Plaza)
5		D - Berlin Süd Großbeeren
6		PL - CLIP Logistics
7		IT - Parma
8		IT - Bologna
9		A - Cargo Center Graz
10		IT - Padova
11		IT - Nola
12		D - Berlin West Wustermark
13		FIN - RRT Kouvola
14		IT - Torino
15		D - Leipzig
16		D - GVZ JadeWeserPort
17		A - Ennshafen
18		H - BILK
19		D - Erfurt
20		ES - ZAL Barcelona



## 2. Freight Villages

### Example: Vilnius Public Logistics Centre



The Vilnius FV is located on the southern side of the capital of Lithuania, directly on the road and rail Trans-European network corridor IX North Sea-Baltic, next to border of European Union and Belarus.

#### Goals:

- To reduce road usage and transfer cargo transportation to railways
- Distribution to Vilnius city
- Dry port for Klaipeda seaport (consolidation of cargo and customs clearance)

2016\_Flyer\_VFV\_Vilnius

<http://www.think-railways.com/intermodal-terminal-projects-vilnius-kaunas-start-operate-end-2014>

## 2. Freight Villages

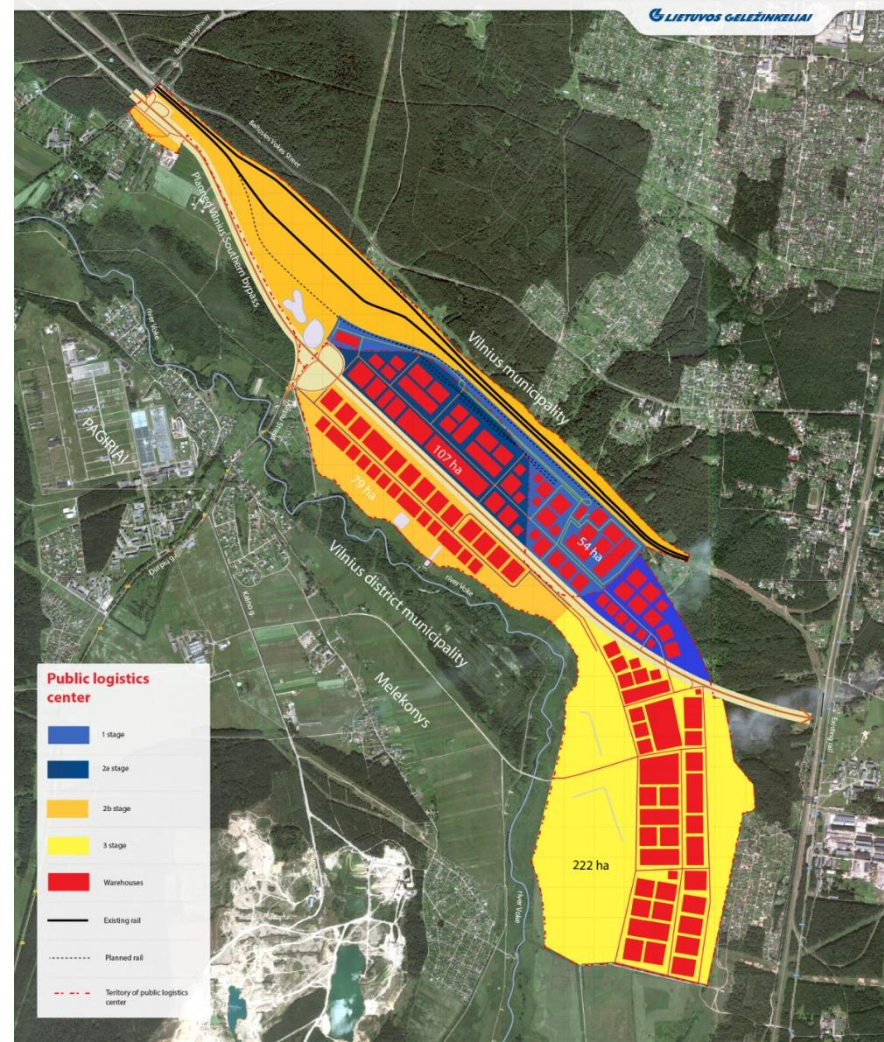
### Example: Vilnius Public Logistics Centre Stages of Development

**Stage I (2014)** – inland intermodal container terminal with all necessary infrastructure is built in area of 9 hectares in Vilnius city, near to Vaidotai railway station. Companies generating cargo flow are being established in the territory.

**Stage II** – An area of 104 hectares of the Public Logistics Centre (PLC) is developed up to the southern Vilnius ring road.

**Stage III** – An area of 300 hectares of the Public Logistics Centre (PLC) is developed beyond (below) the Vilnius ring road.

Source: <http://cargo.litrail.lt/en/vilniaus-vlc>



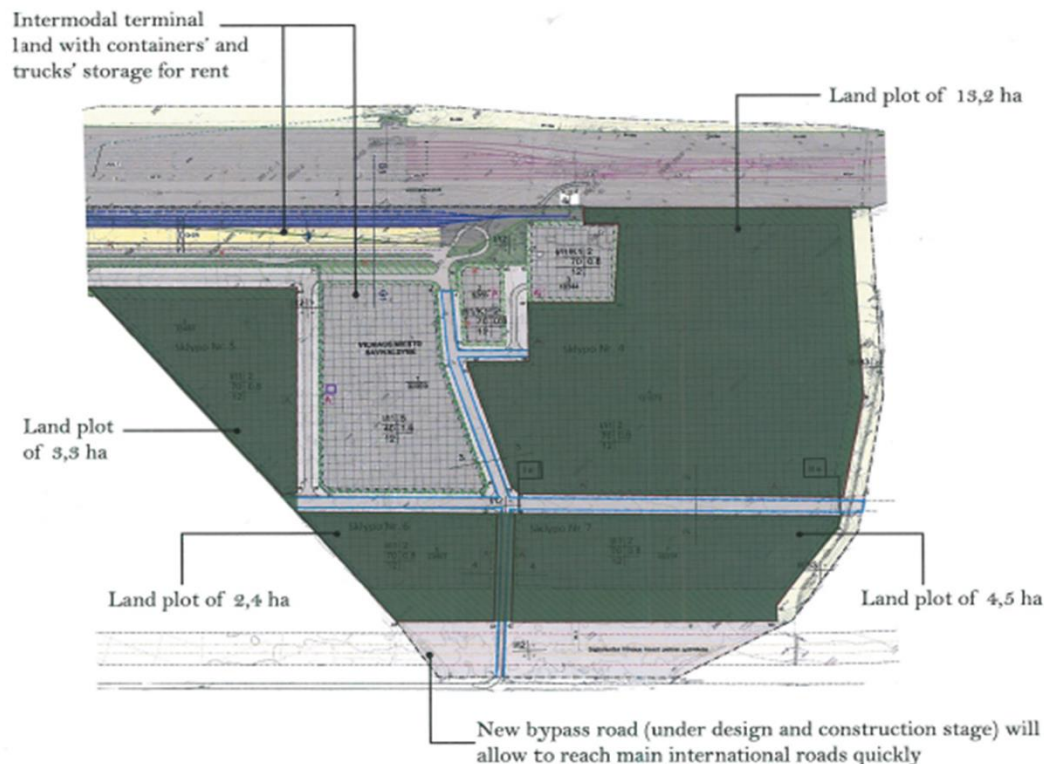


## 2. Freight Villages

### Example: Vilnius Public Logistics Centre

#### For investors:

- Currently 26 ha available (6 sites)
- Tender for tenant applications is launched (Selection end of 2016)
- Each client is offered a levelled plot of land with all necessary engineering infrastructure (water supply, sewage system, electricity, natural gas), installed up to the border of the plot of land;
- Plots of land can be leased for a period of 99 years
- Plots of land are to be occupied with the buildings necessary in order to carry out transport and logistics operations within a period of three years without any opportunity to sub-let the plots of land at a higher price



Source: <http://cargo.litrail.lt/en/vilniaus-vlc>



## 2. Freight Villages

### Example: Vilnius Public Logistics Centre

Lithuanian Railways started to develop intermodal terminal and land plots

Later “Vilnius Logistics Park JSC” was established for further development and marketing:

Vilnius City municipality 51% and  
JSC “Lithuanian railways” 49%

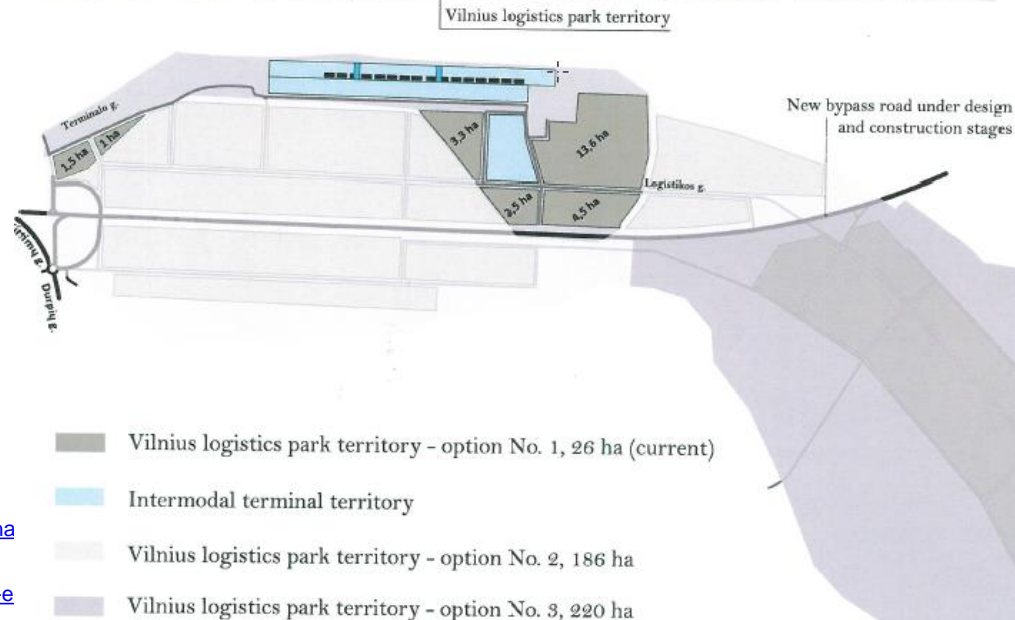
Costs Estimation for Phase 1:

EUR 31 mio., with an aid of  
EUR 26 mill. from EU Cohesion Fund (85%  
financed through the European Union Cohesion  
Fund) for levelling land, infrastructure and  
intermodal terminal

<http://www.railjournal.com/index.php/freight/lithuanian-intermodal-rail-freight-terminals-in-a>

<http://www.logisticspark.lt/files/5262660.pdf>

<http://www.think-railways.com/intermodal-terminal-projects-vilnius-kaunas-start-operate-e>



## 2. Freight Villages

### Lessons learnt

- Active role of the state
- Master planning is required
- Selecting the right location
- Land availability
- Business and financing model
- Feasibility study and zoning



Freight Village Berlin South (Großbeeren)

# Content

## Content:

1. Project Management
2. Freight Villages as Nodes in Intermodal Networks
3. How to Conduct a Feasibility Study?

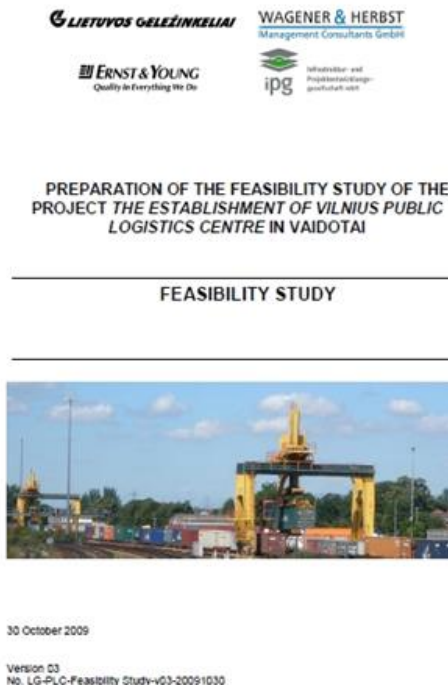
# 3. Feasibility Studies

## What is a Feasibility Study?

- A Feasibility Study is an investigation or review that serves to decide whether the implementation of a project which should lead to a specific goal under the given conditions can be realized or not.
- The study assess the technical and economic feasibility of a project and serves as a basis for investment and financing decisions.

### TABLE OF CONTENTS (Example)

- 1 TERMS AND ABBREVIATIONS
- 2 INTRODUCTION
- 3 OVERVIEW OF THE CURRENT SITUATION
- 4 MARKET ANALYSIS
- 5 ANALYSIS OF THE POTENTIAL PLC MANAGEMENT MODELS
- 6 DESCRIPTION OF POSSIBLE ALTERNATIVES FOR DEVELOPMENT OF PLC
- 7 DETAILED DESCRIPTION OF DEVELOPMENT OF VILNIUS PLC  
(ON THE BASIS OF CHOSEN ALTERNATIVE)
- 8 COST BENEFIT ANALYSIS
- 9 ANALYSIS OF ASSUMPTIONS AND RISKS FOR DEVELOPMENT OF PLC



# 3. Feasibility Studies

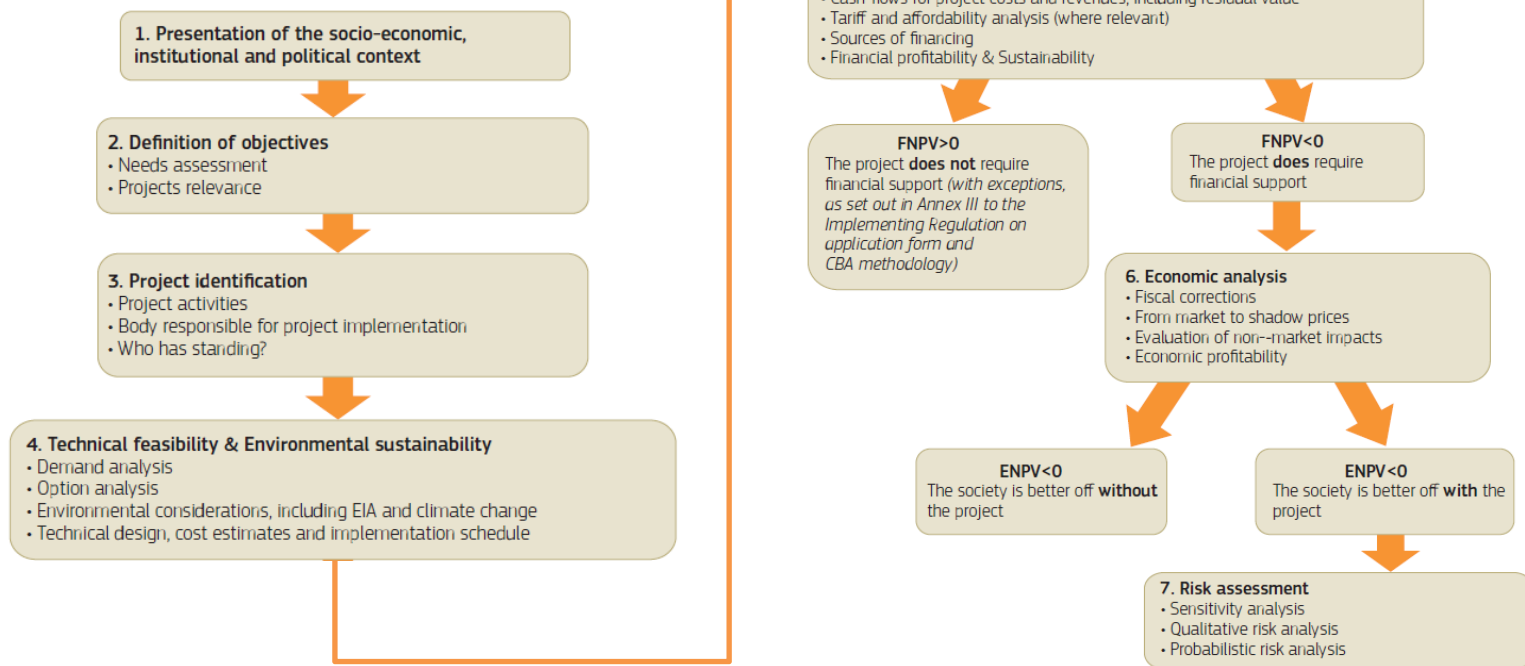
## Contents of a feasibility study

1	Description of the project and reasoning	Definition of the project, scope and background
2	Determination of the project's objectives	Objectives should be defined according to expected results (needs). To the extent possible, project objectives should be quantified through indicators and means of verification. (see LogFrame).
3	Political and Legal Feasibility	Does the project serve political objectives? Which stakeholders have which interests and how to address these interests? Which legal and regulatory requirements are active in the project's environment?
4	Institutional Setup	What is the institutional setup for managing the project and for managing the investment after completion of the project? Business Model?
5	Market Analysis	What is the demand (present, forecast) for the project? What about achievable prices, fees, willingness to pay by users?
6	Technical Feasibility & Environmental Sustainability	What is the required technical capacity for the investment? (E.g. size of an area, throughput of a railway line) Which technical options exist? What are decision criteria? What are the investment costs for each option? Which is the preferred option? What is the project's impact on the use of natural resources? Is this acceptable?
7	Detailed description of the preferred option	Detailed description of the preferred option, layout planning, investments into infra- and suprastructure, connectivity, ground exploration etc.
8	Financial Appraisal	Financing, cost-benefit-assessment from a private investor point of view
9	Economic Appraisal	Monetization of external effects, cost-benefit-assessment from a society point of view
10	Risks and Sensitivity Analysis	Which risks exist? Which countermeasures? What are the impacts of a change of input factors on the project's appraisal?
11	Implementation	Timetable, activities, resources Are the necessary resources available (e.g equipment, personnel, time, licenses, knowledge, etc.)?



# 3. Feasibility Studies

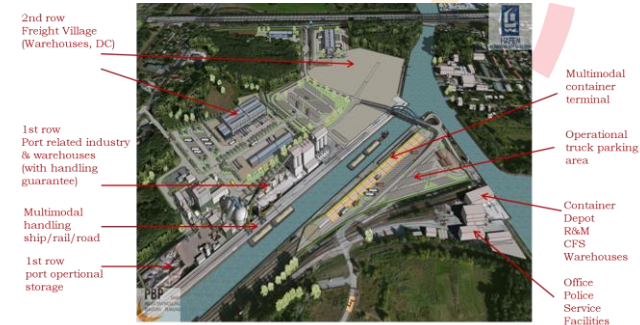
## Steps of a Project Appraisal



# 3. Feasibility Studies

## Technical Feasibility and Environmental Sustainability

- Demand analysis - both through desk research (secondary data) and through on field studies and surveys (primary data) (e.g. traffic counts, interviews). The demand analysis not only provides forecast data on the quantitative demand but also on achievable prices and revenues.
- Capacity Planning - determination of the required future capacities which is of significant influence to the required technical solution (e.g. two lane or four lane road).
- Technical solutions - Very common is to assess three options:
  - “do nothing” (Business as usual “BAU”)
  - “do minimum”
  - “do something”
- Environmental impact assessment (EIA) should be carried out to identify risks and countermeasures concerning environmental issues ( e.g. the routing of a railway line should consider nature protected areas).
- A simplified cost-benefit-analysis should be carried out to identify the best solution which should be detailed further.



Freight Village Berlin Schoenefelder Kreuz

# 3. Feasibility Studies

## Financial Analysis

- To assess the project's profitability, a Financial Analysis is carried out from the project owner's point of view.
- The objective is to assess the project financial sustainability and to calculate the project cashflow.
- At the beginning, it is important to define the lifetime of the project which determines the number of years for which the cashflow is calculated and which also determines the residual value of the investment after the project lifetime (see figure right).
- The determination of a financial discount rate is also important at this stage. This discount rate reflects the interest rate for capital investments in comparable situations. In state funded projects, this discount rate is usually fixed for a certain period to ensure comparability of different "competing" projects (e.g. 4 %).
- The annual cashflow includes all inflows of money (as construction costs, operating costs and financing costs) as well as outflows (such as revenues and the residual value) of the project.

Sector	Reference period (years)
Railways	30
Roads	25-30
Ports and airports	25
Urban transport	25-30
Water supply/sanitation	30
Waste management	25-30
Energy	15-25
Broadband	15-20
Research and Innovation	15-25
Business Infrastructure	10-15
Other sectors	10-15

**Reference periods by sector**  
(European Commission, 2014, p. 42)



# 3. Feasibility Studies

## Financial Analysis - Decision criteria

- NPV Financial Net Present Value** = the discounted value of the cash flow over the project's lifetime

$$FNPV(C) = \sum_{t=0}^n a_t S_t = \frac{S_0}{(1+i)^0} + \frac{S_1}{(1+i)^1} + \dots + \frac{S_n}{(1+i)^n}$$

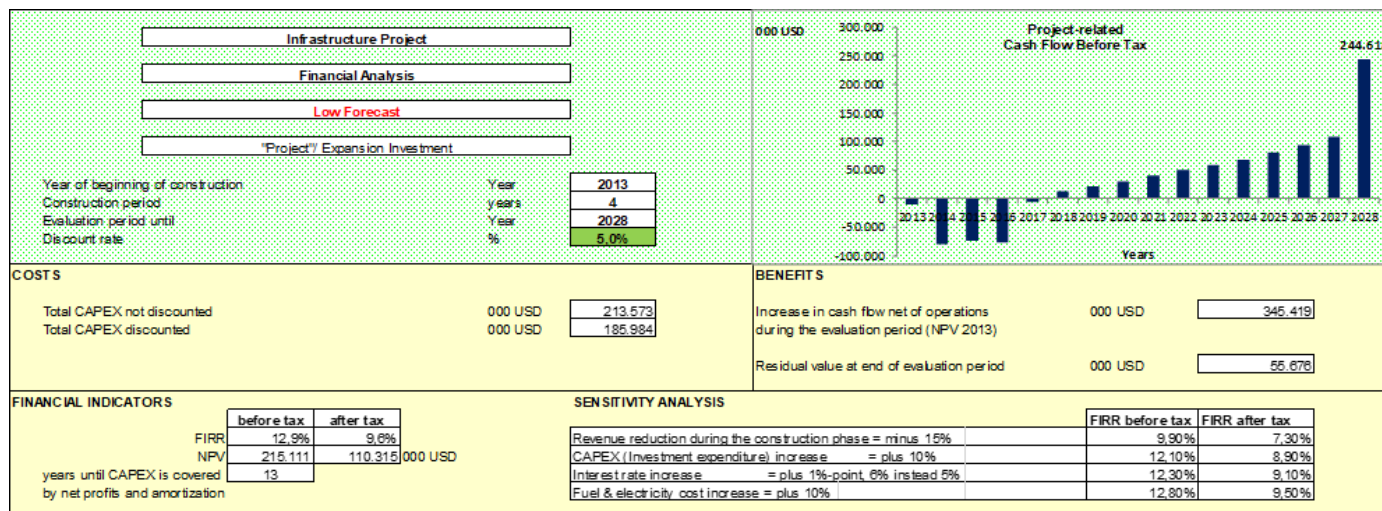
$S_t$  is the balance of cash flow at time  $t$ , at is the financial discount factor chosen for discounting at time  $t$  and  $i$  is the financial discount rate.

- FRR Financial Rate of Return** = the discount rate that produces a zero FNPV

$$0 = \sum \frac{S_t}{(1+FRR)^t}$$

The higher the FRR, the higher the return of the project and the shorter the payback period. If the FRR is lower than the applied discount rate or is below zero, then the project will not cover the costs and a private investor would not carry out this investment.

- BCR Benefit Cost Ratio** = the ratio of the benefits of a project expressed in monetary values, relative to its costs, also expressed in monetary values. All benefits and costs should be discounted present values. The higher the BCR the more profitable the project.



# 3. Feasibility Studies

## Economic Analysis

- The Economic Analysis assesses to what extent a project contributes to the welfare of a society.
- Key concept is the use of shadow prices to reflect the social opportunity costs of goods and services instead of market prices, which may be distorted. Such distortions are manifold, for instance:
  - Some prices include fiscal requirements (VAT, import duties, other indirect taxes)
  - Non-efficient markets (state subsidies, monopolistic prices)
  - For some external effects, no prices are available (air pollution, time savings)

Table 23: Distance-dependent time values for non-business travel according to distances classes

Distance [km]	Time value [€ per person-hour]	Distance [km]	Time value [€ per person-hour]	Distance [km]	Time value [€ per person-hour]	Distance [km]	Time value [€ per person-hour]
5	4.27	65	9.18	162.5	11.82	425	14.07
15	4.81	75	9.56	187.5	12.24	475	14.42
25	6.41	85	9.94	212.5	12.53	600	14.77
35	7.35	95	10.20	275	12.79	> 600	15.54
45	8.17	112.5	10.66	325	13.17		
55	8.70	137.5	11.18	375	13.71		
55	8.70	137.5	11.18	375	13.71		

- The EU Handbook on external costs in transport from 2019 contains shadow prices for the following effects:

- accident costs,
- air pollution costs,
- climate change costs,
- noise costs,
- congestion costs,
- costs of well to tank emissions,
- cost of habitat damage, other external costs.

- The "Methodology Manual for the Federal Transport Infrastructure Plan 2030" in FR Germany contains shadow prices for different modes and among others for:

- time savings
- noise pollution
- exhaust emissions
- change in operation costs etc.

Table 24: Mean time values of freight according to transport segments

Transport segment	Time values in € per hour and tonne
Maritime combined transport	0.305
Continental combined transport	1.180
Food	1.011
Stones, earths	0.374
Mineral oil products	0.746
Chemical products, fertilizers	0.727
Metals	0.827
Vehicles, machinery	1.506
Other products	0.201

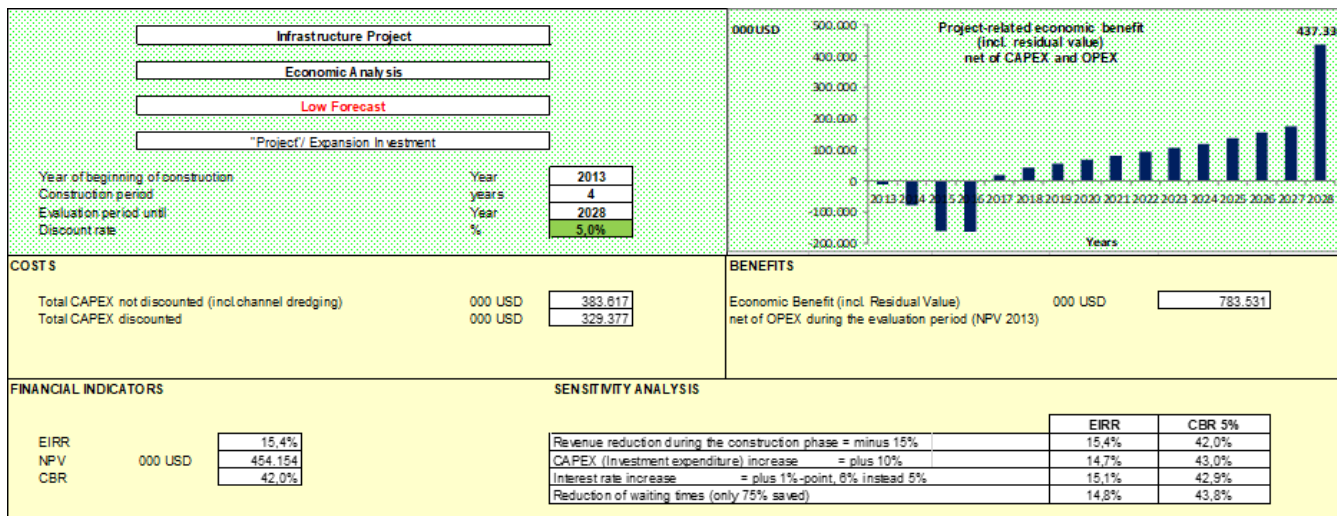
Time is money!  
But how much?

# 3. Feasibility Studies

## Economic Analysis - Decision criteria

- Economic Net Present Value (ENPV) = the discounted value of total social benefits and costs
- Economic Rate of Return (ERR) = the rate that produces a zero value for the ENPV
- B/C ratio = the ratio between discounted economic benefits and costs

➤ Because externalities and shadow prices are considered, some projects with low or negative FNPV(C) may show positive ENPV.”



# 3. Feasibility Studies

## Risks and Sensitivity Analysis

- Every investment may face uncertainties, especially infrastructure projects with relatively long project periods. Therefore, a risk assessment including a sensitivity analysis should be carried out as part of a cost-benefit appraisal.
- The sensitivity analysis helps to identify the 'critical' variables of the project. Such variables are those whose variations, either positive or negative, have the largest impact on the project's financial and/or economic performance. (European Commission, 2014, p. 67)
- In transport projects, the following variables usually are under risk to change during the project implementation:
  - Value of time (often with 70% of all benefits the most important variable)
  - Rate of increase of traffic over time
  - Investment costs
  - Fares / tolls etc.
  - Costs of accidents
- Variations of the relevant variables are assessed concerning their impact on the Financial and on the Economic Appraisal.



# Discussion - Mongolia Rail Corridors

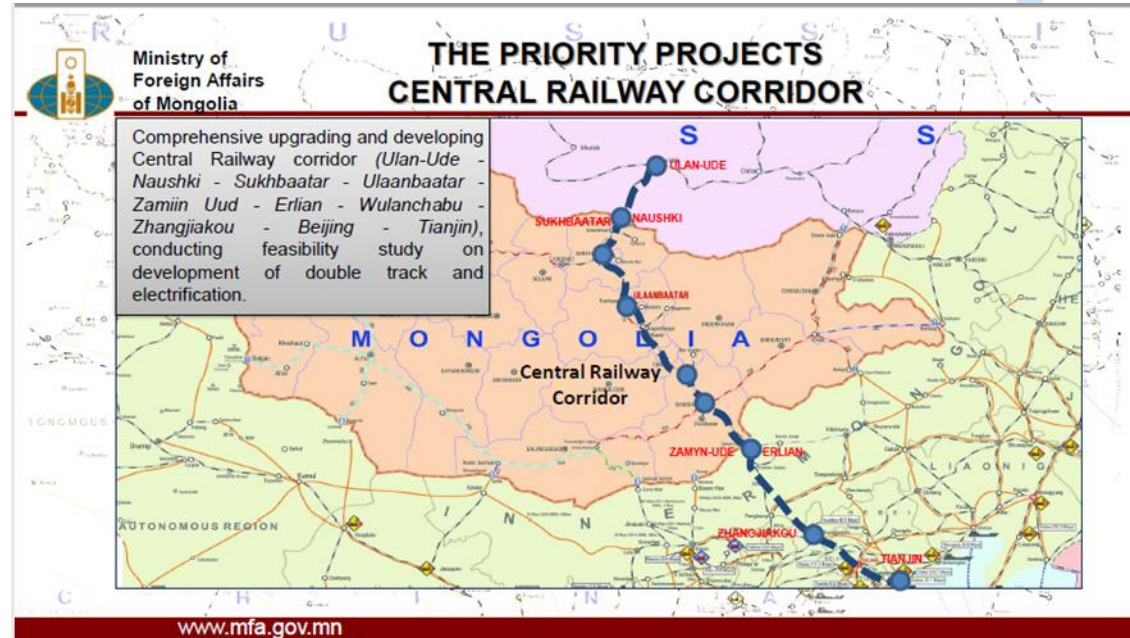
The list of projects under the framework of establishing the economic corridor Mongolia-Russia-China contains:

**“Conduct feasibility study of complex renovation and development of Central railway corridor (Ulaan Ude-Naushki-Sukhbaatar-Ulaanbaatar-Zamiin Uud-Erlian-UlaanTsav-Janchkhoo-Beijing-Tianjin), install building double-track railway line, and electrification.”**

There is about 1.5–2.0 million tonnes of transit traffic moving to the PRC through this corridor. The main track is 900 km long, with the entire length single-tracked and non-electrified. Capacity expansion for this rail corridor is planned by the operator. (Asian Development Bank, 2017, pp. 33-35)

The second track should more than double throughput capacity of this mainline—a necessary move as 2019 freight tonnage has already exceeded the rail capacity limit of this trunk line (25 million tons). (Carec Report 2019, p.64)

- what are the objectives of the project?
- which stakeholders should be involved?
- which costs and benefits should be considered from the project owner's point of view (Financial Appraisal) and from society's point of view (Economic Appraisal)?
- what environmental impacts the project offer?
- what are the risks to consider?



Source (S.Gankhuyag, 2019)

# Discussion - Mongolia Rail Corridors

## Trade Facilitation for Mongolia – Indicators, Trends, Recommendations

Table 6.13: Trade Facilitation Indicators for Mongolia

		Road Transport			Rail Transport		
		2017	2018	2019	2017	2018	2019
TFI1	Time taken to clear a border-crossing point (hour)	3.2	3.5	3.7	13.3	18.1	19.0
	Outbound	2.9	2.9	2.9	7.6	11.7	8.7
	Inbound	3.2	3.5	3.7	16.6	20.4	21.4
TFI7	Cost incurred at border-crossing clearance (\$)	93	93	97	48	49	52
	Outbound	12	13	12	-	27	11
	Inbound	104	104	109	48	49	54
TFI3	Cost incurred to travel a corridor section (\$, per 500 km, per 20 ton cargo)	1,034	1,512	1,373	827	1,030	720
TFI4	Speed to travel on CAREC corridors (km/h)	28.5	33.5	26.2	13.6	14.1	19.1
SWOD	Speed without delay (km/h)	46.5	50.2	40.8	22.7	20.9	24.1

Legend: ● Improved by at least 3% ● Deteriorated by at least 3%

- = no data, CAREC = Central Asia Regional Economic Cooperation, km = kilometer, km/h = kilometer per hour, SWOD = speed without delay, TFI = trade facilitation indicator.  
Source: Asian Development Bank.

Figure 6.1: Freight Carried by Different Transport Modes in Mongolia, 2015–2019



Source: Mongolian Statistical Information Service. <http://www.1212.mn/>.

## Recommendations

- Expand freight capacity of the rail trunk line (corridor 4b).** Total freight tonnage in 2019 transported by rail exceeded 28 million tons, which was beyond the capacity of the infrastructure designed at 25 million tons. This could affect the average speed of the trains on corridor 4b if the infrastructure is not upgraded. According to CPMM estimates, 2016–2018 SWOD was 33.2 km/h (2016), 22.7 km/h (2017), and 20.9 km/h (2018), which confirms a slowing overall average train movement despite the increase to 24.1 km/h in 2019.
- Expand cargo handling capacity at Zamiin-Uud.** Average border-crossing time at Zamiin-Uud during 2017–2019 for inbound cargo was 18.9 hours (2017), 22.9 hours (2018), and 24.2 hours (2019). Inbound time was consistently more than double that of outbound time. While gauge change operations (a normal cause for delay) took only 1.7 hours in 2019, the reason for delay in this case was restriction on entry and waiting for priority trains to pass, reasons normally tied to the handling capacity of the rail terminal. Equipment upgrade, more sidings, and an expanded shunting system could improve the situation.
- Address the shortage of railway wagons.** Although reported in the CPMM 2018 Annual Report, the situation did not improve in 2019 when the shortage of wagons contributed to average delay times of up to 25 hours.

Source CAREC Corridor Performance Measurement and Monitoring Annual Report 2019, p.62, 63, 64



# Discussion - Mongolia Rail Corridors



Thank you for participation!

