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 and 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

1. Project Management

The Analysis Phase: Problem Analysis (Example)

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

Sources

Heavy Air Pollution in Stuttgart

- High particlal emissions of diesel vehicles
- High amount of heavy pollutant diesel vehicles
- Too many heavy goods diesel vehicles in peak times
- No attractive public transport connections to the suburbs
- Free parking in the city
- Heavy motorized traffic on certain routes and times
- Commuters prefer to travel by private cars
- Pollution through fossil heating
- Only two major streets in/out
- Too many heavy goods diesel vehicles in peak times
- No attractive public transport connections to the suburbs
- Free parking in the city
- Heavy motorized traffic on certain routes and times
- Commuters prefer to travel by private cars
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https://www.iqair.com/germany/baden-wuerttemberg/Stuttgart - 26.11.20 14:30

The Problem

Unhealthy For Sensitive Groups

103
1. Project Management

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

“If you know the real cause of a problem, you know the solution.”

Heavy Air Pollution in ....

Sources

- Only two major streets in/out
- High motorized traffic on certain routes and times
- Heavy amount of heavy pollutant diesel vehicles
- Too many heavy goods diesel vehicles in peak times
- No attractive public transport connections to the suburbs
- Free parking in the city
- High particlal emissions of diesel vehicles
- Commuters prefer to travel by private cars
- Pollution through fossil heating

The Problem

- High amount of heavy pollutant diesel vehicles
- Too many heavy goods diesel vehicles in peak times
- Commuters prefer to travel by private cars
- Pollution through fossil heating

Objectives

- Keep nitrogen dioxide NO2 - Limits
- Keep fine dust PM10 - Limits
- Reduce exhaust emissions of car traffic
- Reduce volume of cars
- Reduce other fine dust emissions

Solutions

- Promote environmental friendly engines
- Traffic Limitations and Traffic Management
- Expand Public Transport
- Set and implement air quality regulations for small coal heatings

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
### 1. Project Management

**Stakeholder Analysis (Example)**

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

---
1. Project Management

Stakeholder Analysis (Example)

1. Project Management
The LogFrame Matrix (Example)

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Indicators</th>
<th>Means of Verification</th>
<th>Assumptions</th>
</tr>
</thead>
</table>
| **Overall objective**
To contribute to the improved citizen health | Incidence of air pollution diseases caused by NO2 and particel dust is reduced by 50% | Municipal hospital records | Hospital identify these deseases and keep records |
| **Purpose**
Keep national air quality standards | Maximum 50 μg/m³ fine dust in average per day | 5 control stations at hotspots | May be exceeded maximum 35 times per year |
| | Maximum 40 μg/m³ NO2 in average p. y. | 5 control stations at hotspots | | |
| **Result 1**
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 |
| | | | |
# Project Management

## The Time Activity Plan (Example)

<table>
<thead>
<tr>
<th>WP</th>
<th>Work Packages</th>
<th>Month after project start</th>
<th>Responsible</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Project Management</td>
<td>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</td>
<td>PM</td>
<td>KMM, BDO</td>
</tr>
<tr>
<td>110</td>
<td>Kick Off Meeting</td>
<td></td>
<td>PM</td>
<td>KMM, BDO</td>
</tr>
<tr>
<td>120</td>
<td>Project Coordination</td>
<td></td>
<td>PM</td>
<td>KMM, BDO</td>
</tr>
<tr>
<td>130</td>
<td>Monitoring Progress</td>
<td></td>
<td>PM</td>
<td>KMM, BDO</td>
</tr>
<tr>
<td>140</td>
<td>Reporting</td>
<td></td>
<td>PM</td>
<td>KMM, BDO</td>
</tr>
<tr>
<td>150</td>
<td>Public Hearings</td>
<td></td>
<td>PM</td>
<td>KMM, BDO</td>
</tr>
<tr>
<td>200</td>
<td>Promotion of environmental friendly engines</td>
<td></td>
<td>TL1</td>
<td></td>
</tr>
<tr>
<td>210</td>
<td>Feasibility Study for public infrastructure for electric vehicles</td>
<td></td>
<td>TL1</td>
<td>LTE</td>
</tr>
<tr>
<td>220</td>
<td>Procurement of services and equipment</td>
<td></td>
<td>TL1</td>
<td>STE</td>
</tr>
<tr>
<td>230</td>
<td>Installation of electric loading points</td>
<td></td>
<td>TL1</td>
<td>STE</td>
</tr>
<tr>
<td>300</td>
<td>Traffic Limitations and Traffic management</td>
<td></td>
<td>TL2</td>
<td></td>
</tr>
<tr>
<td>310</td>
<td>Develop Detailed Concept for Traffic Limitations &amp; Traffic Management</td>
<td></td>
<td>TL2</td>
<td>LTE</td>
</tr>
<tr>
<td>320</td>
<td>Implement Traffic Limitations and Control Points</td>
<td></td>
<td>TL2</td>
<td>STE</td>
</tr>
<tr>
<td>330</td>
<td>Monitor Traffic Limitations</td>
<td></td>
<td>TL2</td>
<td></td>
</tr>
<tr>
<td>340</td>
<td>Review Concept</td>
<td></td>
<td>TL2</td>
<td>LTE</td>
</tr>
<tr>
<td>350</td>
<td>Implement Traffic Management System</td>
<td></td>
<td>TL2</td>
<td>STE</td>
</tr>
<tr>
<td>360</td>
<td>.....</td>
<td></td>
<td>TL2</td>
<td>STE</td>
</tr>
<tr>
<td>400</td>
<td>.....</td>
<td></td>
<td>TL2</td>
<td>STE</td>
</tr>
<tr>
<td>410</td>
<td>.....</td>
<td></td>
<td>TL2</td>
<td>STE</td>
</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th>Role</th>
<th>Responsibilities</th>
</tr>
</thead>
</table>
| **Project Manager**       | - Responsible for achieving objectives  
                            - "Networker", Leader  
                            - Disposes over budget |
| **Project Team Member**   | - Responsible for sub tasks  
                            - Often responsible also in line function  
                            - Expert |
| **Project Steering Committee** | - Decides on objectives and milestones  
                             - Allocates resources |
| **Recipient**             | - Is concerned and should be involved, at least in milestones  
                            - Communication ! |
## 1. Project Management

### Project Management Structure

- **The PAI - MATRIX**

<table>
<thead>
<tr>
<th>Action</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Development of project idea</strong></td>
<td></td>
</tr>
<tr>
<td>? Generation of project idea</td>
<td>P</td>
</tr>
<tr>
<td>? Support of project idea</td>
<td>A P</td>
</tr>
<tr>
<td><strong>Development of project proposal</strong></td>
<td></td>
</tr>
<tr>
<td>? Implementation of proposal team</td>
<td>P I A</td>
</tr>
<tr>
<td>? Information-gathering</td>
<td>P A</td>
</tr>
<tr>
<td>? Draft of project proposal</td>
<td>P A</td>
</tr>
<tr>
<td>? Feedback to project proposal</td>
<td>A P I A</td>
</tr>
<tr>
<td>? Final version of project proposal</td>
<td>P A 1</td>
</tr>
<tr>
<td><strong>Decision making</strong></td>
<td></td>
</tr>
<tr>
<td>? Presentation for decision</td>
<td>A P A A</td>
</tr>
<tr>
<td>? Decision on contents, working form</td>
<td>P</td>
</tr>
<tr>
<td>? Nomination of project owner</td>
<td>P</td>
</tr>
<tr>
<td><strong>Development of project assignment</strong></td>
<td></td>
</tr>
<tr>
<td>? Nomination of project manager, project core team</td>
<td>P I I</td>
</tr>
<tr>
<td>? Formulation of project assignment</td>
<td>P A 2</td>
</tr>
<tr>
<td>? Project assignment</td>
<td></td>
</tr>
</tbody>
</table>

- **P** ... Performance
- **A** ... Assistance
- **I** ... Information
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:
  - **forming**
  - **storming**
  - **norming**
  - **performing**
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

The Rainbow Model

PAST \(\rightarrow\) PRESENT \(\rightarrow\) FUTURE

WAY FORWARD STEPS, ACTIVITIES
1. Project Management

Change Management in Projects

- Leadership Models

<table>
<thead>
<tr>
<th>STRUCTURE ORGANISATION WORKPLAN</th>
<th>COMMUNICATION TEAM SPIRIT CULTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Allignment Model</td>
<td></td>
</tr>
</tbody>
</table>

- Engineer
- Technician
- Manager

- Psychologist
- Leader
- Motivator

Hard Skills

Soft Skills
1. Project Management

Change Management in Projects

- Leadership Models

The Waterfall Model

Bottom Up

Top Management

Energy Guidance Support

Top-Down

Feedback Ideas Solutions

Middle Management

Operation Level
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.

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
- ……

Picture Source: Europlatforms, 2015
2. Freight Villages

Example Nürnberg (Nuremberg)
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

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

Source: DGG, 2020
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)

[References]
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

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:

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

<table>
<thead>
<tr>
<th></th>
<th>Description of the project and reasoning</th>
<th>Definition of the project, scope and background</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Determination of the project’s objectives</td>
<td>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).</td>
</tr>
<tr>
<td>3</td>
<td>Political and Legal Feasibility</td>
<td>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?</td>
</tr>
<tr>
<td>4</td>
<td>Institutional Setup</td>
<td>What is the institutional setup for managing the project and for managing the investment after completion of the project? Business Model?</td>
</tr>
<tr>
<td>5</td>
<td>Market Analysis</td>
<td>What is the demand (present, forecast) for the project? What about achievable prices, fees, willingness to pay by users?</td>
</tr>
<tr>
<td>6</td>
<td>Technical Feasibility &amp; Environmental Sustainability</td>
<td>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?</td>
</tr>
<tr>
<td>7</td>
<td>Detailed description of the preferred option</td>
<td>Detailed description of the preferred option, layout planning, investments into infra- and suprastructure, connectivity, ground exploration etc.</td>
</tr>
<tr>
<td>8</td>
<td>Financial Appraisal</td>
<td>Financing, cost-benefit-assessment from a private investor point of view</td>
</tr>
<tr>
<td>9</td>
<td>Economic Appraisal</td>
<td>Monetization of external effects, cost-benefit-assessment from a society point of view</td>
</tr>
<tr>
<td>10</td>
<td>Risks and Sensitivity Analysis</td>
<td>Which risks exist? Which countermeasures? What are the impacts of a change of input factors on the project’s appraisal?</td>
</tr>
<tr>
<td>11</td>
<td>Implementation</td>
<td>Timetable, activities, resources Are the necessary resources available (e.g. equipment, personnel, time, licenses, knowledge, etc.)?</td>
</tr>
</tbody>
</table>
3. Feasibility Studies

Steps of a Project Appraisal

1. Presentation of the socio-economic, institutional and political context

2. Definition of objectives
   - Needs assessment
   - Projects relevance

3. Project identification
   - Project activities
   - Body responsible for project implementation
   - Who has standing?

4. Technical feasibility & Environmental sustainability
   - Demand analysis
   - Option analysis
   - Environmental considerations, including EIA and climate change
   - Technical design, cost estimates and implementation schedule

5. Financial analysis
   - Cash flows for project costs and revenues, including residual value
   - Tariff and affordability analysis (where relevant)
   - Sources of financing
   - Financial profitability & Sustainability

   FNPV < 0
   - The project does require financial support

   FNPV < 0
   - The project does require financial support

   6. Economic analysis
      - Fiscal corrections
      - From market to shadow prices
      - Evaluation of non-market impacts
      - Economic profitability

   ENPV < 0
   - The society is better off without the project

   ENPV > 0
   - The society is better off with the project

7. Risk assessment
   - Sensitivity analysis
   - Qualitative risk analysis
   - Probabilistic risk analysis

(European Commission, 2014, p. 28)
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.
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.

<table>
<thead>
<tr>
<th>Sector</th>
<th>Reference period (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Railways</td>
<td>30</td>
</tr>
<tr>
<td>Roads</td>
<td>25 - 30</td>
</tr>
<tr>
<td>Ports and airports</td>
<td>25</td>
</tr>
<tr>
<td>Urban transport</td>
<td>25 - 30</td>
</tr>
<tr>
<td>Water supply/sanitation</td>
<td>30</td>
</tr>
<tr>
<td>Waste management</td>
<td>25 - 30</td>
</tr>
<tr>
<td>Energy</td>
<td>15 - 25</td>
</tr>
<tr>
<td>Broadband</td>
<td>15 - 20</td>
</tr>
<tr>
<td>Research and Innovation</td>
<td>15 - 25</td>
</tr>
<tr>
<td>Business infrastructure</td>
<td>10 - 15</td>
</tr>
<tr>
<td>Other sectors</td>
<td>10 - 15</td>
</tr>
</tbody>
</table>

Reference periods by sector  
(European Commission, 2014, p. 42)
3. Feasibility Studies

**Financial Analysis - Decision criteria**

- **FNPV Financial Net Present Value** = the discounted value of the cash flow over the project’s lifetime
  \[
  \text{FNPV}(C) = \sum_{t=0}^{n} \frac{S_t}{(1+i)^t} = \frac{S_0}{1+i} + \frac{S_1}{(1+i)^2} + \ldots + \frac{S_n}{(1+i)^n}
  \]
  
  \(S_t\) is the balance of cash flow at time \(t\), \(a_t\) 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)

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

<table>
<thead>
<tr>
<th>Distance [km]</th>
<th>5</th>
<th>15</th>
<th>25</th>
<th>35</th>
<th>45</th>
<th>55</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time value [€ per person-hour]</td>
<td>4.27</td>
<td>4.61</td>
<td>6.41</td>
<td>7.35</td>
<td>8.17</td>
<td>8.70</td>
</tr>
<tr>
<td>Distance [km]</td>
<td>65</td>
<td>75</td>
<td>85</td>
<td>95</td>
<td>112.5</td>
<td>137.5</td>
</tr>
<tr>
<td>Time value [€ per person-hour]</td>
<td>9.18</td>
<td>9.56</td>
<td>9.94</td>
<td>10.20</td>
<td>10.66</td>
<td>11.18</td>
</tr>
<tr>
<td>Distance [km]</td>
<td>162.5</td>
<td>187.5</td>
<td>212.5</td>
<td>275</td>
<td>325</td>
<td>375</td>
</tr>
<tr>
<td>Time value [€ per person-hour]</td>
<td>11.82</td>
<td>12.24</td>
<td>12.53</td>
<td>12.79</td>
<td>13.17</td>
<td>13.71</td>
</tr>
<tr>
<td>Distance [km]</td>
<td>425</td>
<td>475</td>
<td>600</td>
<td>+ 600</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>Time value [€ per person-hour]</td>
<td>14.07</td>
<td>14.42</td>
<td>14.77</td>
<td>15.54</td>
<td>15.54</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Transport segment</th>
<th>Time values in € per hour and tonne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maritime combined transport</td>
<td>0.305</td>
</tr>
<tr>
<td>Continental combined transport</td>
<td>1.180</td>
</tr>
<tr>
<td>Food</td>
<td>1.011</td>
</tr>
<tr>
<td>Stones, earths</td>
<td>0.374</td>
</tr>
<tr>
<td>Mineral oil products</td>
<td>0.746</td>
</tr>
<tr>
<td>Chemical products, fertilizers</td>
<td>0.727</td>
</tr>
<tr>
<td>Metals</td>
<td>0.827</td>
</tr>
<tr>
<td>Vehicles, machinery</td>
<td>1.506</td>
</tr>
<tr>
<td>Other products</td>
<td>0.201</td>
</tr>
</tbody>
</table>
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 (Ulaanbaatar-Ulaanbaatar-Zamiin Uud-Erlian-UlaanTsav-Janchkhuu-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

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Road Transport</th>
<th>Rail Transport</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFI1 Time taken to clear a border-crossing point (hour)</td>
<td>3.2</td>
<td>3.5</td>
</tr>
<tr>
<td>Outbound</td>
<td>2.9</td>
<td>2.9</td>
</tr>
<tr>
<td>Inbound</td>
<td>3.2</td>
<td>3.5</td>
</tr>
<tr>
<td>TFI2 Cost incurred at border-crossing clearance ($)</td>
<td>93</td>
<td>93</td>
</tr>
<tr>
<td>Outbound</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>Inbound</td>
<td>104</td>
<td>104</td>
</tr>
<tr>
<td>TFI3 Cost incurred to travel a corridor section ($, per 500 km, per 20 ton cargo)</td>
<td>1,034</td>
<td>1,512</td>
</tr>
<tr>
<td>TFI4 Speed to travel on CAREC corridors (km/h)</td>
<td>28.5</td>
<td>33.5</td>
</tr>
<tr>
<td>SWOD Speed without delay (km/h)</td>
<td>46.5</td>
<td>50.2</td>
</tr>
</tbody>
</table>

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

Recommendations

(i) 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 CPMH 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.

(ii) Expand cargo handling capacity at Zamyl-Uud. Average border-crossing time at Zamyl-Uud during 2017–2019 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 17 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.

(iii) Address the shortage of railway wagons. Although reported in the CPMH 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.
Discussion - Mongolia Rail Corridors
Thank you for participation!