

ROAD AND TRANSPORTATION MASTERPLAN

PALESTINE

TA 2012013 PS 00 F10

XI Preliminary Economic and Financial Benefits Assessment

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1 Introduction

Conventionally, transport projects' or programs' economic benefits are estimated and projects evaluated in terms of their Net Present Value (NPV) or economic Internal Rate of Return (IRR). Palestine National Transportation Master Plan projects do not lend themselves, in the current state, to conventional economic analysis, due mainly to the difficulty in reliably estimating and quantifying economic benefits under prevailing constrained conditions; current transport patterns may vary significantly compared to a normal (unconstrained) condition, as transport costs may result artificially high for political constraints and traffic flows are low or non-existent for the same reasons. While this bears true for the immediate and for projects included in Priority and Phase 1 programs, it will be possible, for future Phases and under a sufficiently long period of normalized conditions, to measure benefits as the difference between all transport costs incurred 'with' and 'without' the project as well as evaluate projects in terms of their NPV or economic IRR.

Based on the above considerations, the Palestine NTMP has followed two consistent but differing approaches, in order to justify and verify validity and reasons for the implementation of projects, under different Phases and scenarios:

- a) for projects included in Phase 1 programs, including its subset 2-year investment plan, the leading rationale is the estimation of tangible and intangible aspects, that would represent or produce substantial improvements to social as well as economic conditions, such as:
 - increased freedom of movement
 - reduced traffic congestions
 - improved rural and urban development conditions
 - improved security and safety
 - new and increased productivity and employment
 - higher level of utilization of local resources
 - generated GDP growth
 - social and environmental improved conditions; etc.

- a) for projects included in further Phase programs, Phases 2, 3 and 4, the conventional rationale would apply:
 - generated GDP growth
 - current and historical macroeconomic data analysis
 - reference to GDP growth estimates
 - 'with' and 'without' project benefits measurement
 - net present value and internal rate of return calculations
 - dynamic modelling verifications, etc.

In addition to the above rational separation into Phases, transport projects need also to be analyzed and evaluated within their mode or sub sector context (e.g. roads, rails, ports, airports, public transport, border crossing, logistics). This is in view also of their evaluation in terms of public and/or private investment, financing, sponsorship or donation.



2 Benefits

The net benefits, offered by NTMP implementation will be considerably contributing, directly and indirectly, to every sector of the national economy and social wellbeing.

Benefits of the Master Plan can be direct, indirect, induced, shadow, etc. and are manifested into economic, financial, material, cultural, social, environmental, political and others aspects. Direct, indirect, induced and shadow benefits are concurrently analyzed, for each Phase and Transportation Sub Sector, and bankable values have been construed, so that Project Public Funding and Private Financing hypotheses could be separately examined or jointly PPP proposed.

Three levels of consideration are appropriate, when analyzing benefits to be generated by the programmed implementation of NTMP:

- immediate benefits, freed by a normalized state of total independence and sovereignty
- medium term benefits, generated by the Projects' implementation
- long lasting benefits, from local and National scale quality of life, economic, environmental and socio-political improvements

As will be argued in this chapter, immediate benefits are principally related to the results and effects of normalizing constrained productive and mobility conditions. While said benefits were argued and quantified in a number of other studies as well, the subject NTMP reveals a calculated overall cost saving on journey times estimated to reach around €100m a year; this was achieved through the sophisticated modelling tool utilized in this Master Plan that include the modelling of random conditions and interruptions, hence reconstructing the *abnormal* mobility conditions. As regards the medium-term benefits, this is mainly revealed mainly in employment increase, attraction of investments in new infrastructure projects, return on investments in major and strategic projects, etc. While increase in employment is addressed and calculated in this chapter, a dedicated chapter on Key Projects is shown in the following chapter where the most significant and strategic projects from each sector are selected and analyzed in detail from a financial and bankable point of view, calculating principally the Net Present Value and Internal Rate of Return based on estimated design, construction, operation and maintenance costs as well as potential revenues generated from the services provided. *For more details, refer to XI–Key-Projects Financial Analysis.*

2.1 Immediate Benefits

A normalized state of total independence and sovereignty for Palestine, would trigger, in synergy with other National Development actions, such as the startup Phases of the National Transportation Master Plan, considerable benefits, at both, National and Regional levels. This first set of Benefits has been recently evaluated by Rand Corporation and conclusions were published under the title *Calculating the Cost of Israeli Palestinian Conflict*. Their conclusion, relevant also to matters directly related to the transportation and mobility conditions in West Bank and Gaza Strip are quoted below:

“Freedom of Movement: Israeli restrictions on movement, within the West Bank, increase Transportation Costs, currently causing a GDP loss of 0,08B\$”.

A simply normalized and basically efficient freedom of movement, could hence, alone, justify Roads Expenditure Program in first years of the Master Plan implementation.

“Trade is constrained by non-tariff barriers (e.g. quotas, levies, embargoes, inspection procedures, etc.), and dual-use restrictions (e.g. restrictions on products and technologies,



normally used for civilian purposes, that may also have military applications. A reduction of 50% on current such barriers, would benefit Palestine GDP by 4,3B\$"

This due and easily achievable level of reduced barriers would alone (public administration costs and duties taken into account) recover in not more than 4 years the full 30-year Transportation Master Plan Implementation Program. Other benefits on the overall national scale are numerous and are quantified, in particular on mining, construction, agriculture, tourism, etc.

Beyond the transport sector and the scope of this Master Plan Study, it is noteworthy to underline how the referenced Rand Study values the cumulative direct costs, associated with the current Israeli occupation, in USD 9.7B reduced Palestinian GDP and an outstanding USD22.8B reduced Israeli GDP.

Moreover, as specified in previous chapters, the removal of movement restrictions (random and fixed checkpoints) would lead to a potential increase of traffic of 1%. As regards journey times and journey delays in the network, **the comparison among the results shows that without restrictions there is a reduction of 11% journey time. By applying the VOT to these values, there would be savings of 335,772 shekels in 4 hours, 1,199,186 shekels per day hence around 420m shekels (around €100m) per year.** For more details, refer to ¶VII–Transport Model Output.

2.2 Benefits on Use of Resources

A second set of benefits relates mainly to increased usage of Palestine Project Resources; excluding foreign players, also involved in the implementation of Projects, directly or indirectly associated with the Master Plan, a substantial flow of internal benefits would be enjoyed by West Bank and Gaza Strip, originated by the incremental utilization, on the Master Plan Projects, of Palestine Human as well as Material, Financial and Entrepreneurial resources. Their evaluation, as a percentage of project investments, by phase, is discussed hereafter:

- Project direct costs, by phase, are summarized in the following table:

Tab 1. Preliminary Cost Estimate per Phase

| Phase | Road | Rail | Ports | Airports | Public Transport | Border Crossing | Logistics | Total |
|-------|-------|-------|-------|----------|------------------|-----------------|-----------|-------|
| 1 | 861 | 274 | 253 | 143 | 30 | 81 | 119 | 1,761 |
| 2 | 685 | 754 | 0 | 119 | 183 | 59 | 146 | 1,946 |
| 3 | 130 | 1,409 | 0 | 0 | 170 | 0 | 0 | 1,709 |
| 4 | 297 | 947 | 0 | 0 | 90 | 0 | 0 | 1,334 |
| | 1,973 | 3,384 | 253 | 262 | 473 | 140 | 266 | 6,751 |

- Project direct costs are considered to utilize a progressively growing percentage of Palestine resources:
 - In Phase 1, an average of 40%;
 - In Phase 2, an average of 60%;
 - In Phase 3, an average of 80%;
 - In Phase 4, an average of 80%.
- The allocation of such utilization is based on the following average split, maintained constant throughout the phases (adjustments being little significant due to the heavily stochastic environment in the medium to long term):



- public administrative resources, 2%;
- private administrative resources, 2%;
- general services resources, 3%;
- material resources, 60%;
- general labor, 15%;
- equipment and miscellanea, 18%.

The following percentages of increment are taken (in brackets, estimated number of additionally hired employees, as per below formulas):

$$(PhjPisCE\%*TLoc\%*HRes\%)/PhjY = \text{Number of Additional Employees by Project, per Year}$$

and

$$\text{SumPhjPisCE}\%*TLoc\%*HRes\% = \text{Number of Additional Employees by Phase, per Year}$$

Where,

- *Phj* is the Master Program Phase;
- *Pis* is the single Project, per Phase and Sub Sector;
- *CE* is the Project Cost Estimate;
- *Loc* is the Total Local Resource;
- *Res* is the Human Resource;
- *PhjY* is the duration of the Project in number of Years;
- *SumPhjPisCE* is the total number of estimated additional Employees, directly generated by the Projects in each Phase.

Therefore, considering the above project preliminary cost estimates, the following incremental split, by Phase and Employment Sector, potential indirect benefits are calculated as follows:

Tab 2. Potential Indirect Benefits

| Phase | | Public Administration | Private Administration | Services | Material | Labor | Equipment & Other | Total |
|-------|------|-----------------------|------------------------|----------|----------|-------|-------------------|--------------|
| | | 0.02 | 0.02 | 0.03 | 0.60 | 0.15 | 0.18 | |
| 1 | 0.40 | 14 | 14 | 21 | 423 | 106 | 127 | 705 |
| 2 | 0.60 | 23 | 23 | 35 | 700 | 175 | 210 | 1,167 |
| 3 | 0.80 | 28 | 28 | 43 | 852 | 213 | 256 | 1,420 |
| 4 | 0.80 | 20 | 20 | 30 | 609 | 152 | 183 | 1,015 |
| | | 86 | 86 | 129 | 2,584 | 646 | 775 | 4,307 |

Based on the Palestinian Central Bureau of Statistics, "Labor Force Survey: Annual Report: 2015" showing percentage distribution of employed persons aged 15 years and above and average daily wage per region and economic activity, average wages are calculated for employees working in the Public Administration, Private Administration, Service Sector, as well as the cost labor in production of material and equipment.



Tab 3. Average Weekly Work Hours, Monthly Work Days and Daily Wage for Employees Aged 15 Years and Above in all Regions by Economic Activity, 2015¹

| Economic Activity | Median of Daily Wage | Average Daily Wage | Average Monthly Days | Average Weekly Hours |
|---|----------------------|--------------------|----------------------|----------------------|
| Agriculture, Hunting & Fishing | 64.2 | 77.4 | 18.6 | 36.8 |
| Mining, Quarrying & Manufacturing | 76.9 | 88.8 | 22.2 | 45.3 |
| Construction | 150.0 | 161.0 | 17.7 | 38.7 |
| Commerce, Hotels & Restaurants | 57.7 | 71.3 | 24.0 | 50.6 |
| Transportation, Storage & Communication | 57.7 | 81.3 | 21.7 | 41.2 |
| Services & Other Branches | 92.3 | 98.4 | 23.6 | 38.6 |

Considering at constant 2015 values the following average annual employment costs are calculated as follows (1NIS=0.23€):

- €5,500 the average annual employment cost in the Public Administration;
- €4,600 the average annual employment cost in the Private Administration;
- €6,400 the average annual employment cost in the Service Sector;
- €6,300 the average annual employment cost for Labor for production of material;
- €6,600 the average annual employment cost for Labor for production of equipment;
- Cost of material includes a 30% for man power content at an average annual cost of €6,300;
- Cost of equipment and others includes a 22% for man power content at an average annual cost of €6,600.

Based on the above, the resulting Employment Projections, from direct Project Investment Costs, only from Infrastructural Capital Cost of Projects development, is shown below:

Tab 4. Employment Projections Resulting from Direct Project Investment Cost

| Phase | | Public Administration | Private Administration | Services | Material | Labor | Equipment & Other | Total |
|-------|------|-----------------------|------------------------|----------|----------|---------|-------------------|---------|
| | | 0.02 | 0.02 | 0.03 | 0.60 | 0.15 | 0.18 | |
| 1 | 0.40 | 2,562 | 3,063 | 3,303 | 20,131 | 16,776 | 4,227 | 50,062 |
| 2 | 0.60 | 4,245 | 5,076 | 5,472 | 33,356 | 27,796 | 7,005 | 82,950 |
| 3 | 0.80 | 5,164 | 6,174 | 6,656 | 40,573 | 33,811 | 8,520 | 100,898 |
| 4 | 0.80 | 3,690 | 4,412 | 4,756 | 28,990 | 24,158 | 6,088 | 72,093 |
| | | 15,661 | 18,725 | 20,188 | 123,049 | 102,541 | 25,840 | 306,003 |

Employment projections resulting from maintenance costs will also contribute significantly to adding yearly resources. The number of average additional employed resources, per year, throughout the Phases is calculated and shown below:

¹Source: PCBS



Tab 5. Total Added Resources Per Year

| Phase | Number of Years | Added Resources | Add. Res./Year |
|-------|-----------------|-----------------|----------------|
| 1 | 8 | 50,062 | 6,258 |
| 2 | 7 | 82,950 | 11,850 |
| 3 | 6 | 100,898 | 16,816 |
| 4 | 8 | 72,093 | 9,012 |
| | 29 | 306,003 | 10,552 |



3 Financial Analysis

3.1 Sectoral Funding

3.1.1 Channels of Funds to the Transportation Sector

Funds are channeled to the transportation sector through governmental and quasi-governmental institutions (public institutions) or directly from donors. Mainly, two transportation-related ministries exist: MoT, aiming to administer, plan, and set the policies and regulations for the development of the transportation sector, and the MoPWH, aiming to execute and maintain the developmental projects. Another institution was created just before the establishment of these ministries, the Palestinian Economic Council for Development and Reconstruction (PECDAR), to administer and finance the development and rehabilitation activities across all the sectors, including the transportation sector². Other ministries and institutions are also involved (see the following table). This complex institutional structure has its effect on the funding and financing of the sector.

Tab 6. Local public institutions related to the transportation sector

| Public institution | Responsibility | Related bodies |
|--|--|---|
| The Ministry of Transport (MoT) | Policy development and implementation Manages the traffic and transport regulatory system | Traffic Higher Council Civil Aviation Authority Port Authority |
| The Ministry of Public Works and Housing (MoPWH) | Responsible for the maintenance and rehabilitation of roads in areas "A" and "B" outside municipalities and village councils ("C" areas are managed by Israel) | |
| The Palestinian economic council for Development and Reconstruction (PECDAR) | Established in 1993 before the other ministries of the PA in order to manage and implement donor-financed projects including road rehabilitation and construction. Still manages some road projects financed by donors | |
| The local government units LGUs (municipalities and village councils) | Responsible for planning, development and maintaining road network within their immediate jurisdiction | Donors channel funding to these local governments through the Municipal Development and Lending Fund (MDLF) |
| Ministry of Agriculture | Responsible for development and management of rural roads | |
| General Administration for Crossings and Borders (GACB) | Responsible for managing, operating and developing all terminals and crossings with foreign countries (including Israel) | |
| Ministry of Local Government (MoLG) | Responsible for endorsing roads planned by LGUs | Supreme organizing council |
| Ministry of Finance | Collect fees, taxes and fines and channel funds to other ministries through the general budget and also channel 50% of MoT revenues to LGUs. | |

3.1.2 Foreign Aids to the Sector

The transport-related financing of the previous institutions comes mainly from donor community particularly for development and reconstruction activities. Factual and reliable estimates of

²Abu-Eisheh S Al-Sahili K., The framework for the development of a medium-term transportation program for an economy in transition: The Palestinian case. the Palestinian conference for development and reconstruction in the West Bank. March 2006



international aids channeled to the transportation sector needs reconstruction as it is not declaredly given by any governmental body. Nevertheless, two sources covering different periods can be found.

- A strategy note report issued by the World Bank³ for the period from 1994 to 2007
- QWIDS database for the period from 2002 to 2013.

Combining the two estimates by eliminating the overlapping years, we find that the transportation sector received about USD 551m for the period from 1994 to 2013. Details of yearly estimates from 2002 to 2013 are presented in the first table below while the second table presents donations by sub-sector for the period 1994 to 2007.

Tab 7. Aids for transportation sector by year between 2002 and 2013⁴

| Time Period | Total Aids (million Dollars) | Transportation aids (million Dollars) | Percentage |
|-------------|------------------------------|---------------------------------------|------------|
| 2002 | 971.61 | 0.001885 | 0.0002% |
| 2003 | 1041.84 | 0.03943 | 0.0038% |
| 2004 | 1160.84 | -1.688756 ⁵ | -0.1455% |
| 2005 | 1015.71 | 6.281973 | 0.6185% |
| 2006 | 1360.25 | 11.18813 | 0.8225% |
| 2007 | 1717.11 | 4.357572 | 0.2538% |
| 2008 | 2470.08 | 3.383984 | 0.1370% |
| 2009 | 2826.68 | 47.239726 | 1.6712% |
| 2010 | 2518.7 | 77.199328 | 3.0650% |
| 2011 | 2441.97 | 53.959703 | 2.2097% |
| 2012 | 2011.43 | 9.650143 | 0.4798% |
| 2013 | 2608.77 | 23.107094 | 0.8857% |

Tab 8. Donors Contribution (in actual disbursement) to the Transport Sector/Sub-sector (1994 – 2007)⁶

| Transport Sector/Subsector | Donors | Contribution(USDm) |
|-------------------------------------|---|--------------------|
| Road Rehabilitation | IDB, BADEA, IDB, Japan, World Bank, OPEC | 34.3 |
| Road Development and Rehabilitation | Saudi Arabia, World Bank, Arab Fund, EIB, EU, Arab Fund, IDB, France (AFD) | 183.3 |
| Road Damage Repair USAID, | World Bank | 23.6 |
| Border Crossings Infrastructure | Japan (JICA), EC | 3.6 |
| Gaza International Airport | Saudi Arabia, Germany, the Netherlands, (loans from Spain and Egyptian Banks) | 86.5 |
| Gaza Sea Port | France, the Netherlands, EIB and the PA | 5.4 |
| Total | | 336.7 |

³World Bank. 2007. *West Bank and Gaza - Transport Sector Strategy Note*. Washington, DC. © World Bank. <https://www.openknowledge.worldbank.org/handle/10986/12584>

⁴ Aids values are extracted from <http://stats.oecd.org/qwids>

⁵ The number is negative from the source without explanation

⁶ Reproduced from: World Bank. 2007. *West Bank and Gaza - Transport Sector Strategy Note*. Washington, DC. © World Bank. <https://www.openknowledge.worldbank.org/handle/10986/12584>.



Tab 9. All Donors Contribution to the Various Sub-Sectors Within the Transportation Sector

| Time Period | Transport & Storage, Total | Transport policy & administrative management | Road transport | Water transport | Air transport | Education and training in transport & storage |
|-------------|----------------------------|--|----------------|-----------------|---------------|---|
| 1995 | | | | | | |
| 1996 | | | | | | |
| 1997 | | | | | | |
| 1998 | | | | | | |
| 1999 | | | | | | |
| 2000 | | | | | | |
| 2001 | | | | | | |
| 2002 | 0.001885 | | | 0.001885 | | |
| 2003 | 0.03943 | 0.014236 | | | 0.025194 | |
| 2004 | -1.688756 | | | -1.706147 | 0.017391 | |
| 2005 | 6.281973 | 5.62331 | 0.407 | | 0.246085 | 0.005578 |
| 2006 | 11.18813 | 6.233265 | 4.891 | | 0.057288 | 0.006577 |
| 2007 | 4.357572 | 0.022351 | 4.277523 | 0.05084 | | 0.006858 |
| 2008 | 3.383984 | 2.547976 | 0.836008 | | | |
| 2009 | 47.239726 | 47.122542 | 0.117184 | | | |
| 2010 | 77.197777 | 76.919805 | 0.277972 | | | |
| 2011 | 53.959706 | 53.57352 | 0.386186 | | | |
| 2012 | 9.65014 | 8.741225 | 0.908915 | | | |
| 2013 | 23.123054 | 12.45823 | 10.664824 | | | |
| 2014 | 59.424655 | 50.372424 | 9.052231 | | | |

3.1.3 Fiscal Operations of the PNA

The national budget allocates little local resources for the transport sector, mainly for the administration purposes. Details of how much local funds are channeled to the sector are not available, however the Development Expenditure section in the PNA (Government) fiscal operation report highlight the fact that all development expenditures (including transportation-related infrastructure) represent less than 9% of the total revenues of the PNA most of which is financed by grants and donations (See the highlighted section of the following table).

Tab 10. Revenues, expenditures and financing sources of PNA fiscal operations (cash basis) (USD Millions)⁷

| Items | 2011 | 2012 | 2013 | 2014 | 2015 |
|--------------------------------------|----------------|----------------|----------------|----------------|----------------|
| Total net revenues and grants | 3,160.3 | 3,172.3 | 3,677.9 | 4,021.7 | 3,688.2 |
| Total net revenues | 2,177.0 | 2,240.1 | 2,319.9 | 2,791.2 | 2,891.4 |
| Total revenues | 2,190.5 | 2,289.7 | 2,542.0 | 2,928.9 | 2,959.6 |
| Gross domestic revenues | 701.6 | 715.3 | 851.5 | 874.5 | 912.8 |
| Tax revenues | 482.3 | 483.2 | 597.2 | 604.0 | 606.6 |

⁷ Palestine Monetary Authority Depending on PCBS and MOF Data



| | | | | | |
|---|-----------------|-----------------|-----------------|----------------|----------------|
| Nontax revenues | 219.2 | 232.1 | 254.4 | 270.5 | 249.8 |
| Earmarked Collections* | — | — | — | — | 56.4 |
| Gross clearance revenues | 1,488.9 | 1,574.4 | 1,690.5 | 2,054.3 | 2,046.9 |
| Tax refunds | 13.5 | 49.6 | 222.1 | 137.6 | 68.2 |
| Grants and donations | 983.3 | 932.1 | 1,358.0 | 1,230.4 | 796.8 |
| External budgetary support | 814.3 | 777.1 | 1,251.2 | 1,029.4 | 707.1 |
| External financing for development expenditures | 169.0 | 155.0 | 106.8 | 201.0 | 89.7 |
| Total expenditures and net lending | 3,254.6 | 3,258.2 | 3,419.1 | 3,606.9 | 3,621.4 |
| Gross wages and salaries | 1,677.9 | 1,557.7 | 1,813.8 | 1,899.6 | 1,759.5 |
| Nonwage expenditures | 1,142.3 | 1,212.2 | 1,225.7 | 1,259.0 | 1,352.3 |
| Net lending | 139.9 | 277.2 | 211.2 | 287.4 | 300.5 |
| Earmarked Payments* | — | — | — | — | 32.8 |
| Development expenditures | 294.5 | 211.0 | 168.4 | 160.9 | 176.4 |
| Financed from treasury | 125.5 | 56.0 | 61.6 | -40.1 | 86.8 |
| Financed from grants and donations | 169.0 | 155.0 | 106.8 | 201.0 | 89.7 |
| Current balance | -783.1 | -807.0 | -930.8 | -654.7 | -553.6 |
| Overall balance (including development expenditures) | -1,077.6 | -1,018.0 | -1,099.2 | -815.6 | -730.0 |
| Balance after external budgetary support | -94.3 | -85.9 | 258.7 | 414.8 | 66.8 |
| Financing budget | 94.3 | 85.9 | -258.7 | -414.8 | -66.8 |
| Net domestic bank financing | 93.2 | 132.1 | -241.8 | -143.5 | 166.5 |
| Others | 0.0 | 0.0 | 0.0 | -280.8 | -237.4 |
| Clearance revenues (accrued) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Residual | 1.1 | -46.2 | -16.9 | 9.4 | 4.1 |

*Earmarked collections & earmarked payments are collections from taxes and revenues due to LGU, 90% of property tax and 50% of transportation fees.

3.2 Financial Analysis

The financial analysis section aims at the qualification and quantification of the financial requirements generated by the proposed Master Plan projects in the different time phases and scenarios in terms of implementation, maintenance and operation costs. Rates of Returns of eventual grants from international financial institutions is also included.

As a matter of fact, financial restrains will result into interruptions of work flow and plan implementation, the reason for which the financial plan is considered preliminary, requiring continuous and periodic updates for optimizing available funds.

3.2.1 Main Assumptions

The following data constitute the basis of all assumptions taken for carrying out the subject preliminary financial analysis.

Tab 11. Main Assumptions

| Assumption | Value |
|-----------------------------------|---|
| Financial discount rate | 12% |
| Time horizon | 30 years starting from the first operating year |
| Estimated scrap value | 5% of total investment costs for the last evaluation year |
| Reference year for constant costs | 2015 |
| Currency | Euro |



3.2.2 Financial Input Data

Based on recently implemented benchmark projects, locally (where applicable) and internationally, cost estimates for investment, maintenance, operation and management for all transport sub-sector types are established for carrying out the financial analysis. In detail:

- Constant investment costs for each sector as a function of investment costs (%) divided by different year
- Constant maintenance and operating costs for each year of any given Project throughout the 30-year duration
- Estimation of possible revenues based on traffic and ridership data extracted from the multimodal traffic model

Tab 12. Maintenance and Operating Costs and Revenues By Sector

| Sector | Unit values | |
|---|-------------|----------------------------------|
| ROAD TRANSPORT | | |
| Maintenance & Operation Cost | 1.0% | of Construction Cost |
| Revenues | - | None (except for Toll scenarios) |
| RAIL TRANSPORT | | |
| Maintenance & Operation Cost | 2.0% | of Construction Cost |
| Revenues | 0.08 | €/ pass./ km |
| MARITIME TRANSPORT | | |
| Maintenance & Operation Cost | 0.5% | of Construction Cost |
| Revenues | 0.74 | €/ ton |
| AIR TRANSPORT | | |
| Maintenance & Operation Cost | 0.5% | of Construction Cost |
| Revenues | 10.0 | €/ pass. |
| PUBLIC TRANSPORT (Bus)⁸ | | |
| Maintenance & Operation Cost | - | (see related chapter) |
| Revenues | 0.05 | €/ pass./ km |
| BORDER CROSSING POINTS | | |
| Maintenance & Operation Cost | 0.2% | of Construction Cost |
| Revenues | - | None |
| LOGISTICS | | |
| Maintenance & Operation Cost | 1.0% | of Construction Cost |
| Revenues | 5.0 | €/sqm(yard) |
| | 10.0 | €/sqm(building) |

⁸ Costs are based on the annexed Public Transport Survey Campaign including a detailed survey of the local tariff structure



3.2.3 Performance Indicators per Sector

Financial analysis is shown below for every transport sub sector. As commonly known, projects without or with low revenues present a negative Net Present Value (NPV) and therefore shall not be evaluated in terms of their financial performance however through their economic benefits. Roads and BCPs generate no revenues and governmental funds or donations need to be allocated. As regards the remaining sectors, despite the revenues generated by Rail, Ports, Public Transport and Logistics projects the NPV is negative and require partial subsidies from external (governmental/non-governmental) fund sources. The only exception is considered to be the Airport which will present a positive NPV given the high expected traffic volumes per year.

Tab 13. Roads Performance Indicators

| Road | Invest. Costs | Maintenance and operating costs | Revenues | Scrap value | Cash Flow | NPV (12%) | IRR (12%) |
|----------|----------------|---------------------------------|----------|-------------|-----------------|---------------|------------|
| Phase 1A | 84.6 | 20.2 | - | - | -104.7 | -69.2 | N/A |
| Phase 1 | 776.1 | 232.8 | - | 38.8 | -970.1 | -414.4 | N/A |
| Phase 2 | 684.5 | 205.3 | - | 34.2 | -855.6 | -179.1 | N/A |
| Phase 3 | 130.3 | 39.1 | - | 6.5 | -162.9 | -14.7 | N/A |
| Phase 4 | 297.3 | 89.2 | - | 14.9 | -371.7 | -23.5 | N/A |
| | 1,972.7 | 586.6 | - | 94.4 | -2,464.9 | -700.9 | N/A |

Tab 14. Rails Performance Indicators

| Rail | Invest. Costs | Maintenance and operating costs | Revenues | Scrap value | Cash Flow | NPV (12%) | IRR (12%) |
|----------|----------------|---------------------------------|----------------|--------------|-----------------|---------------|------------|
| Phase 1A | 13.9 | - | - | - | -13.9 | -10.3 | N/A |
| Phase 1 | 251.3 | 150.8 | 112.5 | 12.6 | -277.0 | -121.9 | N/A |
| Phase 2 | 760.3 | 456.2 | 593.9 | 38.0 | -584.5 | -177.8 | N/A |
| Phase 3 | 1,399.1 | 839.5 | 772.5 | 70.0 | -1,396.1 | -152.0 | N/A |
| Phase 4 | 964.2 | 578.5 | 201.4 | 48.2 | -1,293.1 | -54.6 | N/A |
| | 3,388.8 | 2,024.9 | 1,680.3 | 168.7 | -3,564.7 | -516.6 | N/A |

Tab 15. Ports Performance Indicators

| Ports | Invest. Costs | Maintenance and operating costs | Revenues | Scrap value | Cash Flow | NPV (12%) | IRR (12%) |
|----------|---------------|---------------------------------|--------------|-------------|--------------|--------------|-------------|
| Phase 1A | 32.0 | 4.4 | 25.5 | 1.5 | -9.4 | -19.7 | -2.0% |
| Phase 1 | 221.0 | 30.9 | 413.3 | 2.0 | 163.3 | -72.0 | 3.2% |
| | 253.0 | 35.3 | 438.7 | 3.4 | 153.9 | -91.6 | 2.7% |



Tab 16. Airports Performance Indicators

| Airport | Invest. Costs | Maintenance and operating costs | Revenues | Scrap value | Cash Flow | NPV (12%) | IRR (12%) |
|----------|---------------|---------------------------------|----------------|-------------|----------------|-------------|--------------|
| Phase 1A | 40.5 | 5.3 | 332.0 | 1.8 | 288.9 | 14.3 | 16.1% |
| Phase 1 | 102.9 | 47.4 | 624.1 | 5.1 | 478.9 | 4.1 | 12.8% |
| Phase 2 | 118.9 | 178.3 | 627.0 | 5.9 | 335.7 | -6.4 | 9.5% |
| | 262.3 | 231.1 | 1,583.0 | 12.9 | 1,103.5 | 11.9 | 13.1% |

Tab 17. Public Transport Performance Indicators

| Public Transport (Buses only) | Invest. Costs | Maintenance and operating costs | Revenues | Scrap value | Cash Flow | NPV (12%) | IRR (12%) |
|-------------------------------|---------------|---------------------------------|----------------|-------------|--------------|-------------|--------------|
| Phase 1A | 3.9 | - | - | - | -3.9 | -2.9 | N/A |
| Phase 1 | 25.6 | 632.5 | 1,088.0 | 31.6 | 461.5 | 32.7 | 31.4% |
| Phase 2 | 13.0 | 295.3 | 480.0 | - | 171.7 | 24.0 | 101.5% |
| Phase 3 | 13.0 | 316.4 | 576.5 | - | 247.1 | 6.2 | 136.6% |
| | 55.5 | 1,244.2 | 2,144.5 | 31.6 | 876.4 | 60.0 | 31.3% |

Tab 18. Border Crossing Performance Indicators

| Border Crossing | Invest. Costs | Maintenance and operating costs | Revenues | Scrap value | Cash Flow | NPV (12%) | IRR (12%) |
|-----------------|---------------|---------------------------------|----------|-------------|---------------|--------------|------------|
| Phase 1A | 25.2 | 15.1 | - | 1.3 | -39.1 | -21.6 | N/A |
| Phase 1 | 55.8 | 33.5 | - | 2.8 | -86.5 | -29.0 | N/A |
| Phase 2 | 59.2 | 35.5 | - | 3.0 | -91.8 | -15.2 | N/A |
| | 140.3 | 84.2 | - | 7.0 | -217.4 | -65.8 | N/A |

Tab 19. Logistics Performance Indicators

| Logistics | Invest. Costs | Maintenance and operating costs | Revenues | Scrap value | Cash Flow | NPV (12%) | IRR (12%) |
|-----------|---------------|---------------------------------|--------------|-------------|---------------|--------------|--------------|
| Phase 1A | 1.50 | 0.45 | - | 0.75 | -1.20 | -1.18 | N/A |
| Phase 1 | 117.8 | 35.3 | 105.0 | - | -48.1 | -47.7 | -2.8% |
| Phase 2 | 146.2 | 43.9 | 60.0 | - | -130.1 | -32.9 | -9.6% |
| | 265.5 | 79.7 | 165.0 | 0.8 | -179.4 | -81.8 | -6.1% |

3.2.4 Overall Performance Indicators

The performance indicators used for the financial evaluation are as follows:

- FIRR (Financial Internal Rate of Return) at 12.0% discount rate;
- FNPV (Financial Net Present Value) at 12.0% discount rate.



Accordingly, Financial Analysis computations are completed and shown below:

Tab 20. Main Financial Values and Performance Indicators by Phase

| Total NTMP | Invest. Costs | Maintenance and operating costs | Revenues | Scrap value | Cash Flow | NPV (12%) | IRR (12%) |
|------------|----------------|---------------------------------|----------------|--------------|-----------------|-----------------|---------------|
| Phase 1A | 201.6 | 45.5 | 357.4 | 5.2 | 116.6 | -110.6 | 2.5% |
| Phase 1 | 1,550.5 | 1,163.2 | 2,342.8 | 92.9 | -278.0 | -648.2 | -1.0% |
| Phase 2 | 1,782.1 | 1,214.6 | 1,761.0 | 81.1 | -1,154.5 | -387.5 | -5.1% |
| Phase 3 | 1,542.4 | 1,195.0 | 1,349.0 | 76.5 | -1,311.9 | -160.5 | -8.2% |
| Phase 4 | 1,261.5 | 667.7 | 201.4 | 63.1 | -1,664.8 | -78.1 | N/A |
| | 6,338.1 | 4,285.9 | 6,011.6 | 318.8 | -4,293.7 | -1,384.9 | -11.4% |

Tab 21. Main Financial Values and Performance Indicators by Sector

| Total NTMP | Invest. Costs | Maintenance and operating costs | Revenues | Scrap value | Cash Flow | NPV (12%) | IRR (12%) |
|-------------------|----------------|---------------------------------|----------------|--------------|-----------------|-----------------|---------------|
| Road | 1,972.7 | 586.6 | 0.0 | 94.4 | -2,464.9 | -700.9 | N/A |
| Rail | 3,388.8 | 2,024.9 | 1,680.3 | 168.7 | -3,564.7 | -516.6 | N/A |
| Port | 253.0 | 35.3 | 438.7 | 3.4 | 153.9 | -91.6 | 2.7% |
| Airport | 262.3 | 231.1 | 1,583.0 | 12.9 | 1,103.5 | 11.9 | 13.1% |
| Public Transport* | 55.5 | 1,244.2 | 2,144.5 | 31.6 | 876.4 | 60.0 | 31.3% |
| Border Crossing | 140.3 | 84.2 | 0.0 | 7.0 | -217.4 | -65.8 | N/A |
| Logistics | 265.5 | 79.7 | 165.0 | 0.8 | -179.4 | -81.8 | -6.1% |
| | 6,338.1 | 4,285.9 | 6,011.6 | 318.8 | -4,293.7 | -1,385.6 | -11.4% |

* Public Transport investment costs do not include BRT projects. This is mainly due to incomplete ridership data that will require further modelling and studies on the urban scale.

As expected, the proposed Projects do not generate revenues capable of covering investment, maintenance and operation costs, whereas it is widely acknowledged that the benefits of proposed projects are in their economical direct and indirect benefits as well as in their financial effects such as increase of tax revenues due to the development of employment and enterprises and social benefits such as employment development, time savings, economic boost of all sectors that involve freight and bulk movements, overall wellbeing, etc. Moreover, it is worthwhile stressing the need to assess said results further to the normalization of transport and mobility conditions.

3.2.5 Financial Plan Analysis

The activity aims at the qualification and quantification of the financial requirements generated by adopted transport supply scenarios in terms of implementation, maintenance and operation costs; also rates of return of eventual grants from international financial institutions are included. The results are the financial plan to be covered in the future in order to allow the development of the desired scenario.

As a matter of fact, some budget caps could generate constraints also in the implementation plan, which has to be built in relation to funds availability.
The table below shows, for all sectors, investments percentage that can be covered with internal resources according to the revenues that each sector can generate.

Tab 22. Percentage of Non-repayable Funds Investments and Revenues

| Sector | Repayable investments (value %) | Repayable investments (million €) | Non repayable investments (value %) | Non repayable investments (million €) | Total investments |
|-----------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|-------------------|
| Road | - | - | 100.0% | 1,972.7 | 1,972.7 |
| Rail | 12.1% | 410.0 | 87.9% | 2,978.8 | 3,388.8 |
| Maritime | 31.0% | 78.4 | 69.0% | 174.6 | 253.0 |
| Airport | 100.0% | 262.3 | 0.0% | - | 262.3 |
| PT (Buses only) | 100.0% | 55.5 | 0.0% | - | 55.5 |
| BC | - | - | 100.0% | 140.3 | 140.3 |
| Logistic | 8.3% | 22.0 | 91.7% | 243.5 | 265.5 |
| Total | 13.1% | 828.3 | 86.9% | 5,509.8 | 6,338.1 |

Investment share can be reduced through non-repayable funds deriving from international donors which contribution can lead to reach at least to an IRR of approx. 12% and a NPV equals zero. Foreign investments, together with investments presented in the table above may allow to cover annual operating and maintenance costs, along with the remaining investments costs.

For more detailed calculation sheets refer to [Annex 19–Financial Performance Indicators Sheets](#)