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Contents

1. Context

'Financial Appraisal' (FA) is the term used to describe the financial viability of a project. Traditionally FA has been used in the private sector more frequently than the public sector. However, FA has now been identified as an essential component of detailed public sector appraisal. The Public Spending Code (PSC) now states that FA should be carried out in advance of an 'Economic Analysis' (EA) in order to clearly establish the financial cost of a project.

FA is an essential tool for policy makers in terms of:

- Evaluating the cash flows that result from implementation; and,
- Assists in the understanding of the ongoing financial burden of a project over and above the initial capital costs.

Financial appraisal is considered mandatory in the preparation of all business cases for transport projects, regardless of scale.

The scale of FA is proportionate to the scale of the project. Guidance on the scale of the appraisal will be provided in this PAG Unit.

This PAG Unit has been developed with reference to the Guidelines on a Common Appraisal Framework for Transport Projects and Programmes[1] and by extension the Public Spending Code[2], which outline the approach to the preparation of Business Cases for transport projects.

[1] Guidelines on a Common Appraisal Framework for Transport Projects and Programmes (Department of Transport, Tourism and Sport, March 2016)
[2] Public Spending Code (Department of Public Expenditure and Reform, July 2012)

2. Principles of Financial Appraisal

The focus of FA is to evaluate the financial viability of a project from the perspective of the exchequer. This is achieved by assessing the net cash flows which result from the implementation of project. This is useful for exchequer budgeting purposes. It is commonplace that FA returns negative results, considering the lack of inflows/revenues associated with public schemes/projects.

FA is routinely undertaken in the private sector in order to determine the commercial rate of return, and inform the investment decision. In contrast, public sector organisations base investment decisions on the economic rate of return. This reflects the wider social and economic goals of government. FA in this case informs the exchequers budgeting process and the time requirements of funding.

FA has now been identified as an essential component of detailed public sector appraisal. PSC now states that FA should be carried out in advance of an EA in order to clearly establish the financial cost of a project.

In reality, most of the calculations necessary to carry out FA, are required to calculate the EA. Monetary inflows and outflows to be shown as opposed to the social costs and benefits associated with a scheme that are included in an EA.

Core to public sector appraisal is the concept of ‘opportunity cost’, this assumes that the demand for public sector intervention exceeds the availability of resources. Efforts must therefore be taken to maximise the utility of funding by reducing outflows and identifying inflows.

The principles of ‘effectiveness’ and ‘efficiency’ are enshrined in the PSC. While the former considers the scale of outcomes, the latter considers the use of resources in delivery and implementation.

FA identifies the cost element of delivery. This aids in the identification of the timing of funding, potential cost reductions or additional sources of funding which may lower the cost to the exchequer e.g. tolling.

Three types of financial appraisal typically feature in public sector financial appraisal:

- General Financial Analysis (Project Cash Flow Analysis from the perspective of the sponsoring agency);
- Exchequer Cash Flow Analysis; and
- Sources of Funding Analysis.

Project Cash Flow Analysis identifies the financial inflows and outflows which occur as a result of a projects implementation. This type of analysis is required in all business cases.

Exchequer Cash Flow Analysis identifies and quantifies the direct flows which impact upon the exchequer budget. This must be completed for any project with an annual budget exceeding €5 million per annum, or €20 million over the project lifespan.

As described in the PSC, a Source of Funding Analysis identifies the sources of finance for a given project. The provider of finance is usually the sanctioning authority. Sources of Funding Analysis should be carried out for projects deriving funding from a number of sources.

3. General Financial Analysis

As previously stated a project cash flow analysis is mandatory for all business cases.

The process of creating a cash flow analysis is a relatively straight-forward process and very similar to the completion of EA. For the purposes of this PAG Unit, the development of cash flow analysis will be explained as a seven-stage process. These stages may be summarised as:

- **Stage 1**: Identify the project time horizon;
- **Stage 2**: Identify cash inflows and outflows;
- **Stage 3**: Quantify the cash inflows and outflows;
- **Stage 4**: Adjust the pattern of cash flows;
- **Stage 5**: Calculate the key indicators;
- **Stage 6**: Sensitivity analysis; and
- **Stage 7**: Reporting.

An illustrative example of General Financial Analysis is presented in **Table 11.3** of this PAG Unit.

Stage 1: When carrying out an appraisal, it is essential to consider the length of the appraisal period. The length of the appraisal period should match the useable economic life of the project, plus the time to deliver the project e.g. 30 years after opening is a standard assumption for the useful economic life of a road, with ongoing maintenance. The appraisal period should also allow for any costs incurred prior to scheme opening. For example, assuming the acquisition of land and construction of a hypothetical road was two years. In reality, the appraisal period in this case would be 32 years. This time horizon should be consistent throughout the business case.

Stage 2: Now that a time horizon is selected, it is necessary to identify the cash inflows and outflows that arise as a result of the project. Examples of inflows include Operating Revenues; or the Residual Value of the land used for a Motorway Service Area. In contrast, typical examples of outflows include:

- Capital Costs;
- Operating Costs;
- Maintenance Costs;
- Start-up Costs; and
- Decommissioning Costs.

The level of detail provided for in financial analysis should be proportional to the scale of spending anticipated. To assist in the preparation of the financial analysis, **Table 11.1** on the following page identifies and describes some of the standard inflows and outflow included in a cash flow analysis.

Table 11.1: General Financial Analysis Example Inflows and Outflows

Variable	Description
Inflows	
Operating Revenues	Cash flows from the users of the good or service provided by the operation. For a road this comprises any tolls, if applicable, and any additional fuel excise paid by road users as a result of additional fuel use. Transfers and subsidies are not included as revenues, nor financial income e.g. interest rates on deposits.
Residual	If any of the assets in the project will still have a market value at the end of the appraisal period, this residual value should be treated as a cash inflow.
Outflows	
Capital Costs	Must include the capital costs of all fixed assets (e.g. land acquisition costs, construction cost of pavement and structures, ITS equipment). In addition to non-fixed assets (e.g. start-up and technical costs such as design, planning, project management, technical assistance, construction supervision, publicity etc.). Investment should be split annually over the construction phase in order to account for cash disbursements in line with activity. Climate mitigating costs identified in a projects Environmental Impact assessment should also be included.
Replacement Costs	Include reoccurring costs during the reference period to replace short-life assets and/or equipment e.g. pavement renewal, engineering plant, IT equipment, office furniture and vehicles.
Operating Maintenance Costs	Costs to operate and maintain the new or upgraded service. Cost forecasts may be based upon historical unit costs where expenditure ensures adequate quality standards. This includes winter operations, routine maintenance, and other recurring costs over the appraisal period. Financing costs should not be included.
Decommissioning Costs	This is the cost of removing an asset from use at the end of its economic life. This applies to items which are undesirable at the end of their economic life.

In addition to the cash inflows and outflows highlighted on the previous page, a number of items explicitly should not be included, these are:

- Depreciation;
- Cash Reserves such as sinking funds; and
- Sunk Costs.

Stage 3: Once the cash inflows have been identified, it is necessary to quantify the inflows and outflow. This process may require the input of accountants, economists, engineers, quantity surveyors and other specialists. Costs should be based upon the most accurate available data.

Stage 4: It is necessary to estimate the flow of funding over the course of a projects useful economic life. Forecasting the future flow of funding is a difficult task. One method often adopted is to base future cost upon historical trends. If attempted in this fashion, it is important to exclude inflation going forward (the constant price). This is to avoid conflicting with the conversion of future values to the present values.

In order to adjust future cash flows to their present value, a discount factor must be applied. Currently a discount value of 5% is applied to future costs[3]. This 5% value is applied to future flows using the following formula:

$$\textbf{Present Value} = \textbf{Future Value} \times (1 - \textbf{Discount Rate})^{\textbf{Time Period}}$$

In certain cases, it is insufficient to purely apply the discount formula. This is due to the fact that prices in some areas of the economy may be expected to grow, or decline at a rate drastically different from general price changes. Historical examples of this include land and construction prices during periods of great economic expansion or contraction.

While discounting takes into consideration natural expected growth, it does not account for this excess. Therefore, it may be appropriate to account for increase above or decreases below general long run inflation. For example, long-run European Central Bank target for inflation is 2%, this is utilised within the PSC. If construction costs were assumed to increase by 6% for the foreseeable future, they would be increasing annually at a rate of 4% above inflation. This 4% would need to be accounted for. This can be completed by applying the following formulae to expected costs for the construction period.

$$\textbf{Present Value} = \textbf{Future Value} \times (1 + \textbf{Excess Inflation})^{\textbf{Time Period}}$$

Stage 5: Three key indicators are used to assess the outcome of cash flow analysis:

- Net Revenues;
- Financial Net Present Value; and
- Financial Rate of Return.

Net Revenues estimates if the project is capable of sustaining itself after initial investment or if supplementary funding is required in order to supplement the projects continuing operation. Note should be made of any periods which incur a loss.

Net Revenues = Operating Revenues – Operating Costs – Replacement Costs

Financial Net Present Value (FNPV) is used to estimate the ability of a project to cover operation costs and achieve a return on investment over the projects useful economic life in present value terms. FNPVs typically produce a negative financial return in public sector appraisals and should not be considered grounds for disapproval. However, identifying additional sources of revenue, or cost/design based saving measures will improve the possibility of a project being accommodated within the exchequer budget. FNPV may be calculated by totalling:

FNPV = Discounted Sum Total (Net Revenues – Investment Costs – Decommissioning costs + Residual Value)

[3] Public Spending Code – E—2, Technical References: Test Discount Rate for Economic Appraisal, Department of Public Expenditure and Reform. (July 2012)

Financial Rate of Return (FRR) is the discount rate at which the nominal (non-discounted) value of all financial cash flows would be rendered equal to zero. This is used to estimate the financial attractiveness of a project. This interest rate should be compared to the financial discount rate of 5%. The FRR can be calculated in excel by applying the IRR formula to the annual nominal value. This is calculated as:

$$0 = \text{Sum Total (nominal value}_{\text{time}}\text{) / (1 + Financial Rate of Return)}^{\text{time}}$$

Stage 6: Sensitivity analysis is required with all economic and financial analysis. The purpose of this is to determine variables which give rise to risk. CAF identifies that sensitivity rates must at minimum be applied to transport demand and project costing, including any calculations based upon these assumptions, additional sensitivities should be considered where required. It is recommended that a sensitivity of 20% and 10% is applied in all cases. A table should be included in the business case outlining the NR, FNPV and FRR in each option according to the sensitivity.

Table 11.2: Recommended Sensitivity Tests

Financial Appraisal Sensitivity Test	
Scenario	**Test**
Costing: for the target cost and total scheme budget.	Total Scheme Budgets (TSB) and Target Costs (TC) are produced as part of the EA at Phase 3 and 5. See PAG Unit 6.2 for further detail.
Demand: To account for revenue raising measures such as tolls	Specific regional traffic growth sensitivities are provided in PAG Unit 5.2. Should be applied to use based calculations e.g. tolling.

In addition to sensitivity analysis switching values should be assessed. A switching value is the percentage change required by a variable to render the FNPV to 0. This should be applied to the same set of variables as the sensitivity analysis. The switching value may be obtained using the following formula. If no revenues are observed, a simple statement explaining this will suffice:

$$\text{Switching Value} = (\text{FNPV} - \text{Variable})/\text{Variable}$$

Stage 7: The results of the General Financial Analysis should be included in the financial analysis section of the report.

Table 11.3: Example of General Financial Analysis

Example General Financial Analysis[4]										
Description/Years		**Total (€ Thousand)**	**Construction Phase**		**Operational Life**					
			1	**2**	**3**	**4**	**5**	**…**	**…**	**32**
a	Tolling Revenue	**60,000**	0	0	2,000	2,000	2,000	…	…	2,000
b	Residual	**20,000**	0	0	0	0	0	…	…	20,000
c	**Total Inflows (a+b)**	**80,000**	**0**	**0**	2,000	2,000	2,000	…	…	**22,000**
d	Main Construction Contract	**30,000**	15,000	15,000	0	0	0	…	…	0
e	Main Supervision Contract	**6,000**	3,000	3,000	0	0	0	…	…	0
f	Archaeology	**100**	100	0	0	0	0			0
g	Advance Works and Other Contracts	**300**	300	0	0	0	0	…	…	0
h	Land and Property	**3,000**	3,000	0	0	0	0	…	…	0
i	Planning and Design	**500**	500	0	0	0	0	…	…	0
j	**Initial Construction Outflows (d:i)**	**39,900**	**21,900**	**18,000**	**0**	**0**	**0**	**…**	**…**	**0**
k	Ongoing Maintenance Costs	**9,150**	0	150	300	300	300	…	…	300
l	Labour Costs	**3,050**	0	50	100	100	100	…	…	100
m	**Ongoing Operational Outflows (k+l)**	**12,200**	**0**	**200**	**400**	**400**	**400**	**…**	**…**	**400**
n	**Total Outflows (j+m)**	**52,100**	**21,900**	**18,200**	**400**	**400**	**400**			**400**
o	Operational Revenue (c-m)	**67,800**	0	-200	1,600	1,600	1,600	…	…	21,600
p	Nominal Cash Flow (c-n)	**-27,900**	-21,900	-18,200	1,600	1,600	1,600	…	…	21,600
q	**FNPV (p*s)**	**-10,859**	-20,857	-16,508	1,382	1,316	1,254	…	…	4,533
r	**FRR (IRR(q))**					**-2%**				
s	**Discount Rate (%)**	**N/A**	95%	91%	86%	82%	78%	…	…	21%

[4] Numbers presented here are completely fictional and purely for illustration purposes.

4. Exchequer Cash Flow Analysis

Exchequer Cash Flow Analysis is a mandatory appraisal requirement for all projects in excess of €20 million or incur capital expenditure in excess of €5 million per annum. Exchequer Cash Flow Analysis identifies and quantifies the direct flows which impact upon the exchequer budget.

The process of creating an Exchequer Cash Flow Analysis is similar to the process for carrying out the project cash flow analysis. Again this process may be summarised as a seven stage process. These stages may be summarised as:

- **Stage 1**: Identify the project time horizon;
- **Stage 2**: Identify cash inflows and outflows;
- **Stage 3**: Quantify the cash inflows and outflows;
- **Stage 4**: Adjust the pattern of cash flows;
- **Stage 5**: Calculate the key indicators;
- **Stage 6**: Sensitivity analysis; and
- **Stage 7**: Reporting.

For general instruction on how to complete the Exchequer Cash Flow Analysis please see the previous instruction on the project cash flow analysis. Minor adjustments are only required to include additional direct and indirect inflows and outflows associated with the project which solely impact the exchequer. These inflows and outflows are identified in the following paragraphs.

In addition to the outflows and inflows identified in the Project Cash Flow Analysis, dividends and tax impacts may also be included. Dividends are primarily composed of tax impacts, but may also include other flows. An adjusted table detailing these inflows and outflows are identified on the following page.

Tax impacts can be subdivided into Indirect Taxes (VRT, Fuel Excise[5], Carbon Charge[6], VAT[7], Customs and Excise) and Direct Taxes (Income and Corporation Tax) in both cases only additional taxes which are directly attributable to the project should be included. Positive tax impacts should be identified as additional inflows. These are illustrated on the overleaf in **Table 11.4.** This table should be considered supplementary to **Table 11.1** which details examples of inflows and outflows for General Financial Analysis.

[5] See Appendix 1 for calculation method.
[6] See Appendix 1 for calculation method.
[7] See Appendix 3 for calculation method.

Table 11.4: Examples of Financial Inflows and Outflows for Exchequer Cash Flow Analysis (additional to General Financial Analysis Inflows and Outflows)

Variable	Description
Inflows	
Indirect Dividends	Direct dividends are considered operating revenues e.g. tolling. Indirect dividends capture also increase as a result of the project going ahead. Examples of indirect dividends include: • VAT, • Excise Duty[8]; • Carbon Tax[9]; • Corporation Tax; • Income Tax; • VRT; and • Avoided Unemployment Costs (social welfare benefit). Inclusions must be net of deadweight and must only include what would not have been received in the absence of the project.
Outflows	
N/A	N/A

In addition to Tax impacts, other flows should be included. Examples of miscellaneous flows which may impact the exchequer may include Shadow Tolling and PPP Availability Payments, EU finance passing through the exchequer (co-funding) and fines. These may be classified as inflows or outflows accordingly depending on the flow of funds to/from the exchequer.

[8] See Appendix 1
[9] See Appendix 1

5. Source of Funding Analysis

A Source of Funding Analysis confirms the role played by participants in the funding process. In most cases the funding is singularly provided by the sanctioning authority. In this case it is unnecessary to carry out a source of funding analysis. As Advised by PAG Unit 6.1 and the CAF, advice in relation to funding should be sought from the National Development Financing Agency for all projects exceeding €20 million.

However, if funds are sought from more than one source for a project, the analysis should be carried out.

A Source of Funding Analysis is a straight forward four stage process. This process can be summarised as:

- **Stage 1**: Identify the project time horizon;
- **Stage 2**: Identify providers of funding;
- **Stage 3**: Quantify the flows of funding; and
- **Stage 4**: Confirm funding needs.

Stage 1: The length of the appraisal period should match the useable economic life of the project. This should match the time horizon adopted for the Cash Flow Analysis.

Stage 2: Now that a time horizon is selected, it is necessary to identify the providers of finance. Common providers of finance include: EU financing, Exchequer contribution, private capital, EIB funding and other loans.

Stage 3: Quantify the flow of funding annually by provider. Tally the total flow of funding.

Stage 4: Confirm that the flow and timing of funding is sufficient to meet the investment costs. If this is not the case, take corrective action. An example of the Sources of Funding Analysis is outlined in **Table 11.6**.

6. Reporting

Guidance on the presentation of results is given within PAG Unit 9.0. It is important to provide commentary upon results. Reference should be made to the source or derivation of cost assumptions for transparency purposes.

The results of all elements of the Financial Appraisal shall be presented in the relevant Section of the Business Case (refer to Business Case template in PAG Unit 8.0 PE-PAG-02033) along with some commentary on the results. The financial appraisal section should include references to the derivation/ sources of all costs and revenues used in the analysis.

Table 11.6: Sources of Funding Analysis

	Year 0	Year 1	Year 15	Year 30	Ref	Notes
Calculation of Total Funding						
EU finance passing through the Exchequer	30	-	-	-	[a]	Scheme Detail
Exchequer contribution	40	-	-	-	[b]	Scheme Detail
EIB financing	20	-	-	-	[c]	Scheme Detail
Other	10	-	-	-	[d]	Scheme Detail
Total Funding	**100**	**-**	**-**	**-**	**[e]**	**a + b + c + d**

Appendix A:

Excise Duty and Carbon Charge

The proposed methodology to calculate Excise Duty is carried out in this Appendix. This is only required for the manual calculation of Excise Duty, which is included in the financial appraisal. Both Excise Duty and the Carbon Charge are calculated automatically in TUBA.

The excise benefit / cost of any road project is measured as the sum of the change in fuel consumption multiplied by the excise duty. This is represented by the equation.

$$\mathbf{EB = (\Delta FC_P * ED_P) + (\Delta FC_D * ED_D)}$$

Where:

- EB is the Excise Benefit
- ΔFC is the change in fuel consumption (See Box1)
- ED is the excise duty
- $_P$ denotes petrol
- $_D$ denotes Diesel

The change in fuel consumption calculation is presented on the next page in Box 1. Excise duties for petrol and diesel are obtained from the Revenue website under mineral oil taxes. Petrol is classed as 'light oil'. Diesel is classified as 'Heavy Oil'. Component A identifies the excise charge. Component B denotes the carbon charge element. While these can be calculated together, it is recommended that these are represented separately in the appraisal.

Box 1: Change in Fuel Consumption

In order to calculate a range of fuel related excises, it is necessary to estimate the change in fuel consumption. Instruction here allows for the manual calculation of the change in fuel consumption, TUBA will automatically account for the change in Fuel consumption. Separate calculations are required for diesel and petrol based consumption as excise differs for the two fuel propellants (petrol and diesel). As fuel consumption also varies by vehicle type it is necessary to account for and is represented by the following formula:

$$\Delta FC = \Delta FC_{vt1} + \Delta FC_{vt2} + \Delta FC_{vt3} \ldots$$

Where:

ΔFC is the change in fuel consumption

Vt is the vehicle type

Change in fuel consumption is estimated for each vehicle type by the following formula:

$$\Delta FC_{Vt} = n_{vt}(\Delta DT * CP_{vt})$$

Where:

ΔFC is the change in fuel consumption

vt is the vehicle type

n is the number of vehicles

ΔDT is the average change in distance travelled

CP is the fuel consumption parameter

The change in fuel consumption calculation presented above is a distance based calculation, the output of which is presented in litres. The calculation must be made for each vehicle type. The number of vehicles and change in distance travelled can be obtained from the transport model. The consumption parameters are located in PAG Unit 6.11 (Table 6.9 and Table 6.15). This parameter is present in Litres per 100km and must be adjusted for this. All vehicles are presumed to use diesel propellant aside from petrol car.

Appendix B:

VAT

The proposed methodology to calculate additional VAT dividend is carried out in this Appendix. This is only required for the calculation of VAT, which is included in the financial appraisal.

The additional VAT benefit / cost of any project is measured as the sum of the change in fuel consumption multiplied by the market price of fuel and diesel. This is represented by the equation:

$$\Delta VATB = \Delta FC_{ft} * MP_{ft} * VATR$$

Where:

ΔVATB is the change in VAT benefit

ΔFC is the change in consumption of the fuel type

MP is the market price of the respective fuel

VATR is the VAT Rate

ft represents the fuel type

ΔFC calculation is demonstrated in Appendix 1. The calculation of Petrol VAT is a straightforward calculation using the above. The VAT rate applied to fuel is the standard rate, and is charged on top of all other taxes including excise duty.

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