Economic concepts and terms

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The following summary of economic concepts and terms is based on (ITU-T, 2008). The terms and associated concepts are the most frequently used to analyze the Telecom business and decide on best project alternatives with its specific properties due to the multiplicity of diverse equipments, life cycles and operational practices. For a more detailed economic terms definition refer to classical books of Economy.

Amortisation refers to the paying off of a debt with regular payments and it also has the meaning of the accounting procedure that gradually reduces the cost value of an intangible asset, that is, depreciation. Amortization is the method of liquidating a debt on an installment basis; for example an amortized loan would be one where the principal amount of the loan would be paid back in installment over the life of the loan. Sometimes used as an alternative term for depreciation, in particular with regard to the process of writing off the cost of an intangible asset, such as a lease or patent, over its useful life.

Assets are resources owned by an enterprise. In the balance sheet assets are listed in rising order of liquidity. They include fixed assets (land and buildings, plant and machinery, etc), current assets (inventories, account payable, etc.) and liquid assets (cash in hand, cash in banks, cheques, etc).

Breakeven period is time required for project revenues (after deduction of operating expenses) to offset investment expenditure. This method of comparing project avoids the need for discounting calculations. It takes account, however, neither of the effects of the time factor of the different alternatives, nor of what happens after breakeven.

Business case is a special instances of the business model are analysed to figure out the quantitative foundation for the management decisions.

Business domain is an environment where the business is run including all relevant entities, regulation, standards, etc.

Business model (BM) that can be understood as a snapshot of reality that enables effective modelling and analysis of different aspects of the business.

Business modelling is the process of planning and designing business models—it is an important input to strategic management, usually by assuring the qualitative results.

Business plan is a document that collects information on all relevant aspects of the BM -- (1) industry and market models, (2) product, production and marketing process, and (3) financial data (cash flow analysis, income statement, balance sheet).

Business situation is a particular situation of interest for the focal entity; it is described by the market picture (customers, partners, competitors), technical solution (network, services, applications, terminals), environment structure (regulation form, politics) and organisation of the entity.

Cash flow consists of cash receipts and cash disbursements over a given period. Also funds generated internally by the activity of an enterprise or a project equivalent to the balance between the inflow of funds arising from revenues and the outflow of funds arising from expenditures. The following diagram illustrates the main generators for the inflows to the

company classified in three categories: The first one at the left is the specific business operating income due to the selling of services to customers and the most interesting to analyze when comparing projects or evaluating strategies for the operator evolution. The other two consider the generic financing capital increases either due to the shareholders by a capital increase or to the external sources of capital by credits or loans.

Typical originators for the outflows in a company are also summarized in the diagram with the first three concepts due to the proper activities of the Telecom activity itself like labor force, network equipment investment and all technical, operation and administrative expenses. The other three concepts reflect the generic outflows due to taxes, debt payment and dividends for the shareholders that are needed to have an overall company running.

A detailed analysis of the specific Telecom associated inflows and outflows is the nucleus of the operational business analysis when a decision has to be taken in a modernization of the network, migration to NGN, introduction of new services, etc. Yearly cash flows are taken as the main base for the evaluation of a company value, capability to generate business and calculation of the NPV when transforming into present values and decide which evolution alternative is recommended.

Main sources of inflows are due to the revenues of the different operation services and at the end of evaluation period also the terminal value of those network elements that did not reached the end of life cycle have to be taken into account as they have a positive value.

As main components of the outflows we have the major CapEx equipment investment at the project start with the corresponding equipment extensions or upgrades for capacity increase in subsequent years as well as equipment substitution when some of the elements reached their end of life cycle. OpEx increases as a function of the cumulative invested CapEx through time and is the main outflow component at the medium long term.

Net cash flow is derived from the difference of the inflows and outflows and provides the main input for a more detailed dynamic evaluation of the project added value to a company. Higher cash flows at the end of the evaluation period and a prompt turn into positive values are good indicators for a better project.
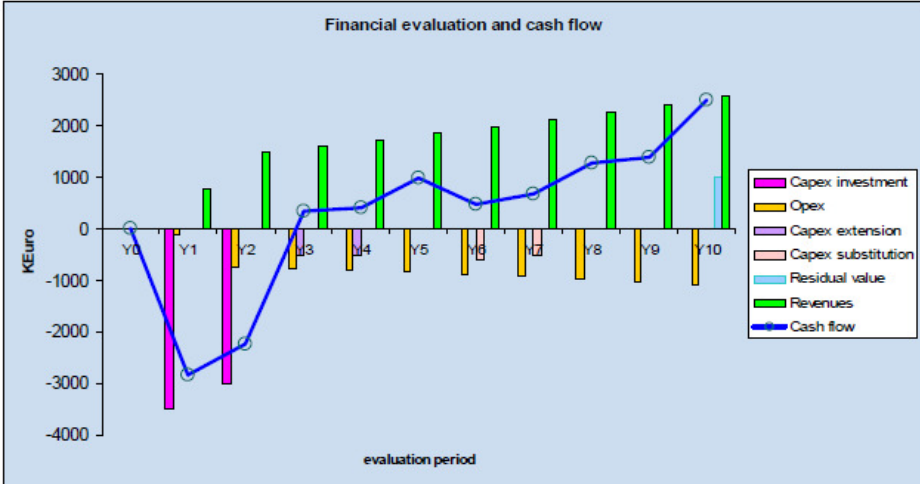

Figure 1. Typical components as a basis for evaluation of a company (ITU-T,2008).

Churn is an annual rate at which the own customers or subscribers leave the service either to move to a competitor, to migrate to other service or leave the market.

Depreciation represents loss of value of an asset over time, as a result of wear, aging or obsolescence. With the method of linear (or straight-line) depreciation, the loss of value of an

asset is spread uniformly over the number of years of its useful life. Depreciation charges do not give rise to an actual outflow of funds and the sums remain available to the enterprise.

Discounted cash flow (DCF) approach describes a method of valuing a project, company, or asset using the concepts of the time value of money. All future cash flows are estimated and discounted to give their present values. The discount rate used is generally the appropriate cost of capital and may incorporate judgments of the uncertainty (riskiness) of the future cash flows. Discounted cash flow analysis is widely used in investment finance, real estate development, and corporate financial management. Very similar to NPV.

Discounted payback period (DPP) is an investment decision rule in which cash flows are discounted at an interest rate and then one determines how long it takes for the sum of the discounted cash flows to equal the initial investment.

Discount factor is the discount rate used to calculate the net present value of a company or project. This rate has to consider the cost factors for the capital of the company such as interest rate, and expected inflation in a strict sense. In a wider sense has to consider also the risk rate for long term evaluation in large projects and new scenarios with uncertainty.

Earnings before interest and taxes (**EBIT**) is a measure of a firm's profitability that excludes interest and income tax expenses.

EBIT = Operating Income + Non-operating Income

Operating Income = Operating Revenue – Operating Expenses

Operating income is the difference between operating revenues and operating expenses (OpEx), but it is also sometimes used as a synonym for EBIT and operating profit. A professional investor contemplating a change to the capital structure of a firm (e.g., through a leveraged buyout) first evaluates a firm's fundamental earnings potential (reflected by Earnings Before Interest, Taxes, Depreciation and Amortization EBITDA and EBIT), and then determines the optimal use of debt vs. equity. To calculate EBIT, expenses (e.g., the cost of goods sold, selling and administrative expenses) are subtracted from revenues. Profit is later obtained by subtracting interest and taxes from the result.

Earnings before interest, tax, depreciation and amortization (EBITDA) means all the (annual) revenues minus operating costs that is the basic information for the evaluation of a business from its own specific factors and the first indicator to be calculated and analysed. The following diagram illustrates a simplified interrelation among main generators for the EBITDA and the sequence to proceed in the obtention of the Net Income.

Economical value added (EVA) or net operating profit (after tax) minus the cost of the capital used to generate that profit either in debt or in equity. It is a good indicator for the point of view of the investors.

Future value (FV) is the value of a present amount at a future date. It is found by applying compound interest r over a specified period of time.

$$FV = PV(1+r)^n$$

Internal rate of return (IRR) is a capital budgeting metric used by firms to decide whether they should make investments. It is an indicator of the efficiency or quality of an investment, as opposed to NPV, which indicates value or magnitude.

The IRR is the annualized effective compounded return rate which can be earned on the invested capital, i.e., the yield on the investment. Put another way, the internal rate of return for an investment is the discount rate that makes the net present value of the investment's income stream total to zero.

Definition:

IRR is the value of *r* that satifies:

$$NPV = \sum_{t=0}^{n} \frac{CF_t}{(1+r)^t} = 0$$

Objective is to have IRR ≥ required minimum IRR.

Advantages of IRR:

- Takes into account all CFs
- Takes into account timing of CFs (time value)

Disadvantages of IRR:

- Does not take into account size of project

Life cycle costing is the full cost of an asset over its life. This includes all costs associated with acquiring, controlling, operating and disposing of the asset.

Net present value (**NPV**) is defined as the total present value (PV) of a time series of cash flows. It is a standard method for using the time value of money to appraise long-term projects. Used for capital budgeting, and widely throughout economics, it measures the excess or shortfall of cash flows, in present value terms, once financing charges are met.

Definition:

$$NPV = \sum_{t=0}^{n} \frac{CF_t}{(1+r)^t}$$

where

t - the time of the cash flow

r - the discount rate (minimum required return on investment)

CF_t - the net cash flow (the amount of cash, inflow minus outflow) at time t

Projects with NPV<0 should be rejected. Projects with NPV>0 may be accepted. This does not necessarily mean that they should be undertaken since NPV at the cost of capital may not account for opportunity cost, i.e. comparison with other available investments. Projects with NPV=0 adds no monetary value and the accept/reject decision should be based on other criteria, e.g. strategic positioning or other factors not explicitly included in the calculation.

Advantages of NPV:

- Takes into accound all CFs
- Takes into account timing
- Takes into account size of the project (size of cash flows)

Disadvantages of NPV:

- Dependent on considered lifetime (t)
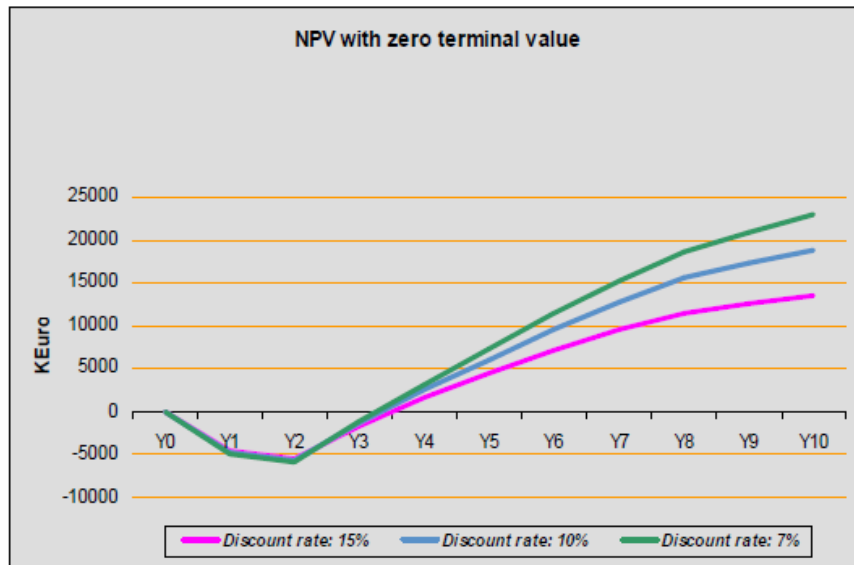- Does not penalize huge intermediate losses

Figure 2. Typical NPV evolution for a new project as a function of the discount rate (ITU-T,2008).

Payback period is the number of years required for a firm to recover the initial investment required by a project from the cash inflows it generates. Short payback periods are preferred.

Like internal rate of return, the payback period metric takes essentially an "Investment" view of the action, plan, or scenario, and its estimated cash flow stream. Payback period is the length of time required to recover the cost of an investment (e.g. purchase of computer software or hardware), usually measured in years. Other things being equal, the better investment is the one with the shorter payback period. Also, payback periods are sometimes used as a way of comparing alternative investments with respect to risk: other things being equal, the investment with the shorter payback period is considered less risky.

Present value (PV) is the current monetary value of a future amount. The amount of money that would have to be invested today at a given interest rate r over a specified period to equal the future amount.

$$PV = FV/(1+r)^n$$

PV is the currency value today of some future inflow, outflow, or balance of funds. In essence, it is the discounting of future funds to their present value by taking into account the time value of money. It is useful in providing a common basis for comparing investment alternatives. See also discounted cash flow, future value, and net present value.

Residual value is the value of an investment at the end of its economic or estimated life. At the end of the period, residual value may be treated as a positive cash flow, and discounted as such. The present value of the business attributable to the period beyond the forecast period.

Return on investment (**ROI**) is the ratio of money gained or lost (realized or unrealized) on an investment relative to the amount of money invested. The amount of money gained or lost may be referred to as interest, profit/loss, gain/loss, or net income/loss. The money invested may be referred to as the asset, capital, principal, or the cost basis of the investment. ROI is usually expressed as a percentage rather than a fraction. ROI does not indicate how long an investment is held. However, ROI is most often stated as an annual or annualized rate of return, and it is most often stated for a calendar or fiscal year.

Definition:

$$ROI = \frac{V_f - V_i}{V_i}$$

where

V_i - initial value of an investment
V_f - final value of an investment

The objective is to have ROI ≥ minimum required ROI.

Advantages of ROI:

- Takes into account CFs after payback time
- Takes into account size of project (size of cash flows)

Disadvantages of ROI:

- Does not take into account timing of CFs

Return on capital employed (ROCE) is net income divided by the sum of fixed assets and working capital. Shows the company profitability from the point of view of the owners.

Techno-economic analysis is the process of analysing different business cases to find out adequate technological solution and/or the overall profitability of the case—its input to the strategic management includes the quantitative results.