
Types of Finance for Construction Companies in EU. Access, Risks and Return on Investment

Master Thesis

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from

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I dedicate this to my family; the people who made this work even possible

**International Master of Science in Construction and Real Estate Management
Joint Study Programme of Metropolia Helsinki and HTW Berlin**

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Conceptual Formulation

Master Thesis for Ms. Anna Malaia

Student number 288205

Topic:

TYPES OF FINANCE FOR CONSTRUCTION COMPANIES IN EU. ACCESS, RISKS AND RETURN ON INVESTMENT.

Background

In general, the construction sector creates a basement for both economic and social development over the European Union (EU). According to the survey held by the European Commission, construction generated near 9 percent of the EU gross domestic product as of 2016. Therefore, raising funds for construction companies plays a leading role in further economy development and wellbeing. During recent years, the sector has been affected by negative factors, such as the 2008 financial crisis's consequences, difficulties in accessing finance, limited legal, and taxation policies. Such obstacles created a barrier for the potential growth of small-to-large scale enterprises involved in construction.

This thesis aims to overview an investment situation in the EU construction sector, to investigate how construction enterprises obtain financing, why different types of companies are rejected when seeking finance, or receive less than required. It also forms logical assumptions on how to find out ways of increasing the amount of investment. This thesis aims to address the following research questions.

Research Questions

- 1) What are the main differences between large, medium, and small construction enterprises in the EU? How is the scale corresponding to the type of project and source of financing?
- 2) What are the main relevant types of funding for construction companies: bank loans, loans from other sources, equity investments? When is each of them can be applied and why?
- 3) What are the requirements and guarantees companies need to provide to the lenders to obtain finance? What are the risks and constraints? What measures implemented to increase the investment climate?
- 4) Project finance as a particular tool to finance large international projects. Benefits and risks.

Methodology

Two types of methodologies will be used for this thesis. First one would be a resources investigation and the second one would be interviews and case studies.

Timeline

Task	Time
Conceptual formulation	February – April 2020
Doing research for thesis	April – October 2020
Arrival of official permission for thesis	July 2020
Working on the thesis	October 2020 – July 2021

Submission of the thesis	2 nd of July 2021
Final oral exam	Last week September 2021

Resources

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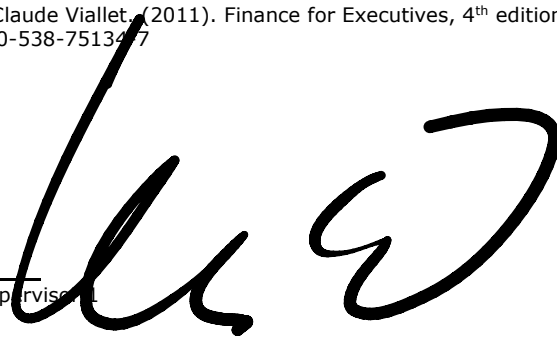
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22/07/20

Signature of the Supervisor



Abstract.

Here I made some explanations regarding the research questions and their importance for potential users. Nowadays, the construction industry combines the economy and society. According to the data mentioned by EC (European Commission) and stipulated in the European Construction Sector Observatory Report, the sector generates near 9 percent of the European Union Gross Domestic Product (GDP) and creates around 18 million job opportunities.

In 2012 the European Commission established a European Union (EU) long-term sustainable growth and development strategy, and the development of the construction sector was an essential element of it. The Strategy included an Action Plan, which contained the following steps to help to withstand the existing challenges, improve investment conditions and maintain healthy competitiveness of the sector:

- To enhance favorable investment conditions and to increase public and private capital injections into the construction sector;
- To improve credit resource efficiency and create new business opportunities;
- To promote EU construction companies to become leading players in global markets.

The Strategy supports various construction projects: from small-scale domestic building renovations to large-scale infrastructural projects (energy, public utilities, and transportation).

How did I go about answering the research questions? In frames of the research project, I set up the scope of precise research questions and research objectives, which I described in the next section. I used both primary and secondary data to carry out the analysis and provide certain conclusions. However, upon giving key findings, I understood that there is still room for further research and investigation.

The research project aimed to identify and investigate financial tools, which construction and real estate investors and managers could implement to achieve higher returns on invested capital, taking into consideration a project's type and size of the company. As a rule, the larger scale the company has, the more financially stable it is, and, therefore, quick and lower price for the employed capital it has to pay. Nevertheless, small and medium-size companies can demonstrate a sound operating performance and execute value-creating projects via working closely with financial institutions and participating in target governmental programs. The research also aimed to analyze what barriers, obstacles, and risks small construction companies meet when seeking capital. Even

though recent reporting materials have shown the growing access to finance for construction and real estate investment companies, especially for small and medium-size, there are still difficulties remaining. The research project was aimed to elaborate measures tailored for the target market participants.

European and international significant project finance cases were investigated in frames of the research. Such projects have demonstrated the growing importance of public sector investments. The increasing demand for public capital creates mutual and beneficial opportunities for key project stakeholders. What did I find out in response to my research questions? What conclusions do I draw regarding my research questions? In frames of the research, it was revealed that large Public-Private Partnerships (PPP) infrastructural projects demonstrate (or at least can demonstrate) relatively higher return rates, both for public investors / public debt holders and equity holders. However, project finance theory and practice require a deep knowledge of innovative financial instruments and advance financial modeling experience, excellent collaborative skills, and sound technical background. Such projects, as a rule, involve numerous stakeholders, and the most important thing is to arrange smooth communication and implement principles of alliancing, such as growing involvement from senior management, different styles of management, outstanding leadership skills.

Furthermore, the leveraged capital structure requires a qualified project management team. The research aimed to reveal the most crucial project conditions and parameters to be considered that managers have to review before undertaking good management decisions. Good in the particular context means to secure the optimal use of funds to meet key stakeholders' interests, allocate the most pressing investment gaps, and ensure a project's value growth. Cases studied in the research frames also show how complicated and unpredictable external investment conditions might be and how difficult, or sometimes impossible, to achieve the project's required profitability. The big emphasis was made on government support and guarantees to provide favorable investment conditions, insurances, securities, tax incentives, and, thus, to secure long-term infrastructural growth. The research is also aimed to present how the private-public collaboration helps to bring improvements to the people's wellbeing and the quality of life, particularly concerning the public utilities and transport infrastructure.

Besides the particular project's parameters, managers have to be aware of governmental financial policies and incentives aimed to foster construction and redevelopment of social

and retail properties of various scales and types, which, in turn, would play an essential role in the domestic inclusive economic growth.

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List of Acronyms

List of Acronyms	
ACP Airport Core Program	65
ADSCR Annual Debt Service Coverage Ratio	91
BOT Build-Operate-Transfer Structure	40
CAGR Compound Annual Growth Rate	24
CAMP Capital Asset Pricing Model	54
CAPEX Capital Expenditures	81
CITIC China International Trust and Investment Corporation	65
COVID-19 Coronavirus disease of 2019	20
DBFMO Design Build Finance Maintain and Operate	48
DSCR Debt Service Coverage Ratio	30
EBITDA Earnings before Interest, Tax, Depreciation and Amortization	20
EC European Commission	10
EPC Engineering Procurement and Construction	47
EPCOM Environmental Pollution Advisory Committee	67
EU European Union	11
FIDIC International Federation of Construction Engineers	48
FINSCOM Financial and Institutional Coordinating Committee	67
GDP Gross Domestic Product	58
ICA Inter Creditors Agreement	36
IRR Internal Rate of Return	36
LED Light-emitting diode	78
LLCR Loan Life Coverage Ratio	30
LOI Letter of Intent	48
LTV Loan-to-Value Covenant	30
MTRC Mass Transit Railway Corporation	67
NAPCO New Airport Project Coordination Office	67
NPV Net Present Value	36
OPEX Operational Expenses	81
PLCR Project Life Coverage Ratio	30
PP Payback Period	36
PPP Public Private Partnership	12
REIT Real Estate Investment Trust	28
ROE Return On Equity	36
ROI Return on Investment	13
ROIC Return of Invested Capital	57
SME Small-medium sized enterprises	14
SPV Special Purpose Vehicle	30
SWOT Strength, Weaknesses, Opportunities and Threats	20
U.S. United States of America	54
VAT Value Added Tax	28
WACC Weighted Average Cost of Capital	54
WHCC/ WHC Western Harbor Crossing	64

Introduction.

The idea about the central message of the research lies in the understanding of how to manage real estate development and construction projects from a financial point of view. It provides an overview of financial instruments for the construction sector in the EU and on an international level. It also reveals main drivers and obstacles to manage small-to-medium and large projects efficiently; review identifies and summarizes governmental rules and regulations that impact the investment climate in the real estate sector, residential, commercial, and infrastructural types of projects particular. The subject is worthy of research because the companies seek projects and external financing. Still, national & EU funds are ready to invest in the sector to get higher returns and boost competitiveness. More than 60 billion euros were transferred to the real estate and construction sector in frames of the EU Construction 2020 Action plan, described earlier in the Abstract section. There are also some tips included and described in the Introduction section to navigate throughout the research project. Firstly, all the terms and concepts presented the way that they were told when first-time introduced. However, there is a list of abbreviations included for easier understanding of the randomly opened section. Secondly, the most precise and detailed calculations regarding large-scale infrastructural projects are included in the appendixes section for the reader's comfort. There are some graphs, formulas, and tables included in the text to understand the content better. Thirdly, a so-called 'route map' presented below gives a brief and clear understanding of 'how to read the thesis' and presents an overview of how the main subject unfolds. Even though each chapter is self-contained, there is a logical sequence prepared to answer the research questions. In turn, the research questions aimed to describe how the interest of a chosen theme has to be transferred into the future research project. This section also includes a complete statement of the research question(s) and research objectives.

Research Questions.

1. What are the main differences between large, medium, and small construction enterprises in the EU? How is the size of the company correspond to the type of project and required amount of financing?

2. What are the main relevant types of funding for construction companies: bank loans, loans from other sources, equity investments? When is each of them can be applied, and why?

3. What are the requirements and guarantees construction companies need to provide to the potential lenders to obtain finance? What measures were implemented to increase the investment climate? What is the required average rate of Return on Investment (ROI), and how can investors achieve it? What are the risks and constraints?

4. Project finance as a particular tool to finance large international projects. What are the conditions, outcomes, benefits, and risks?

After setting up research questions aimed to support the thesis idea and subject investigation process, there was another step forward. Research objectives lead to greater specificity, and they correspond to the research questions. A set of research objectives that are generally more acceptable gives a clear sense of research purpose and direction.

Research Objectives.

1.a) To establish criteria that would help classify EU construction companies as large and SME (small/medium business).

1.b) To make assumptions on how such types match the type of projects and the required amount of financing.

2.a). To identify sources of financing, which construction companies utilize in different circumstances, i.e., internal financing (retained earnings, non-cash expenses) and external investments (equity investments, tax payments, debt capital). To describe the correspondence of the sources of financing with a size of a company, applicable legislation (German example), and a type of project.

2.b) To estimate taxation benefits and legal constraints construction companies meet when implementing strategies to raise capital for German-based real estate companies.

3. To review bank and governmental policies subject to requirements and guarantees construction companies need to provide to obtain finance.

4. To review project finance as a tool to finance large international projects in construction: conditions, profitability, benefits, and risks.

Upon formulating and clarifying the research subject via setting up research questions and research objectives, the thesis's plan was elaborated and presented below in the form of the action plan:

Table 1. The Structural Plan of the Thesis.

Abstract
Introduction Chapter 1. The description of the research approach and the research methods implemented to disclose the subject and to learn the existing information regarding the chosen topic
Chapter 2. Literature review of the research questions and objectives aimed to present the foundation on which the research is based
Chapter 3. The analytical reports' analysis, which is relevant for small-to-medium size companies
Chapter 4. Case studies analysis, which is relevant for large infrastructural projects and large-scale companies
Chapter 5. Discussions and conclusions
Reference list
Appendices

Source: The Table 1 is created by the Author.

CHAPTER 1. Research approaches, the combination of the research methods.

A theory is a critical element in the research design to reveal research objectives and present research findings and conclusions. The clearance of approach and the availability of theoretical material for studying and further investigation defined the creation of the research project and the research method (a combination of the research methods) used. For this particular research project, a deduction approach was selected as a principal method. However, it contains several elements and characteristics which are also applicable for the induction approach. In other words, using a deduction approach meant that empirical data would follow the theoretical base and the use of the induction approach, in turn, suggested that the theory would follow factual data. There is a wealth of literature for the chosen topic, and, therefore, a theoretical framework was combined based on fundamental knowledge. Due to the availability of literature sources deduction approach can also be considered less risky. However, the construction industry, technological progress, and economic trends are often subject to considerable changes, and the existing theoretical base cannot always prove factual data. Thus, the induction approach also took place in the research, making a structure more flexible to embrace changes. The combination of both deduction and induction approaches not only appeared possible, but it also has some advantages.

There are three significant reasons for defining the research approach. Firstly, it was an essential part of the research design, in general; the research design in this context was a configuration that aimed to give good answers to the research questions. It enables to turn research objectives into a research project via establishing a research strategy and time horizon. Secondly, it helped to use the system and tactics that worked in this particular project and those that were ineffective. Thirdly, it helped make the research more flexible and consider constraints and limitations, which occurred while carrying out the task. [17]

The chosen research strategy and its advantages.

There are several types of research strategies. A multiple case study strategy was defined to answer particular research questions and meet research objectives. The case study strategy is a way of carrying out the research based on an empirical investigation of a

particular contemporary phenomenon within its real-life context. Multiple case study approaches were also chosen to deeper understand the research context and find answers to 'how?' and 'why?' questions.

Briefly, the case study appears an insightful and focused form of practical learning. This learning methodology helps deal effectively and efficiently with contemporary economic, social, environmental, market, and technological trends, which are often quite complicated. In addition, it's an excellent way to learn how the decision-making process works and obtain analytical and managerial skills. The case study method includes both qualitative and quantitative analysis and helps to elaborate effective problem-solving outcomes.

Implementing a multiple case study strategy also included documentary analysis, factual data analysis, and interviews with experts from the industry. [17]

Limitations to data access and research ethics.

It didn't appear easy to gain physical or virtual access to secondary and primary data in practice:

1. Organizations, groups, individuals, or private investors could not share valuable information regarding research questions and objectives.
2. The process of sharing and discussing research questions with students might be considered a voluntary activity because of the time and effort spent with no monetary benefits. It is also clear that the necessary information was highly confidential, and its disclosure might create potential risks for the company or project stakeholders in the future. It might become available for competitors, companies, which activity may be hostile to the owner of the information, doubts about the researcher's competency, and so on).
3. Companies and financial institutions often establish internal compliance policies aimed to protect insider information.

Another aspect that has to be considered is that, even in obtaining access to the insider's data, there is no guarantee that something goes wrong in the middle of the unfinished study. The situation may change completely. [17]

Therefore, case studies related to research questions were obtained by the existing literature sources and open online sources (including interviews given by the company

representatives and placed on the company's websites and professional magazines). The purpose of case study research was not to reveal disclosed information, which might be considered confidential by its owners (companies and stakeholders), or to judge the extent of effective or ineffective management decisions. [17]

Limitations of multiple case-study research. In practice, the project finance formula for PPP (public-private partnership) initiatives includes a wide range and a grade scope of economic, technical, industrial, construction, legal, risk, and insurance considerations. These aspects have to be reviewed, quantified, and analyzed to present professional opinion, make comparisons (in case of relevant cases), and explain certain conclusions. The research project aimed to reveal the overall view on how theoretical principles and methods can be implemented into practical calculations and what aspects have to be considered. There are no detailed business plans subject to the area of consultancy companies/investment banks departments or the particular project's stakeholders responsible for preparing precise cash flow models. [9]

The priority of using secondary data rather than primary. Advantages and limitations.

Secondary data is the data that has been accumulated or presented, or published for another purpose. It includes both random numbers and authorized summaries. For this particular research project, the necessity to investigate and analyze international projects and international governmental policies and rules is crucial. Therefore, secondary data was chosen as the primary source to answer research questions and address research objectives. The research theme can be considered business and management research, and secondary data goes in line with the chosen multiple case study research strategy. There is also a logic behind the idea of using secondary data: it is often presented based on summarised and analyzed primary data. For the research, the multiple source type of secondary data was implemented: industry statistics and reports, government publications, European union publications, World bank's publications, journals, and books. Moreover, secondary data helped to get access to various high-quality data in less time and, therefore, concentrate on better description and analysis of research questions. However, the data used to answer research questions was collected for reasons different from the research's nature. Therefore, I spent time and effort tailoring information for the chosen research frame. [17]

Chapter 2. Research objectives. Literature review.

1.a) Criteria to classify EU construction companies as large and SME (small-to-medium sized).

This section presents an overview of the differences between the company sizes. It also demonstrates the advantages and disadvantages caused by an enterprise's scale and the importance of SME type for the domestic economy. [18]

Historical numbers prove that self-employment activity in the EU achieved a relatively high level, and the number of SME companies has grown significantly compared to the large companies.[18] Nevertheless, SME companies contribute instead to the domestic economy and have minimal access to the international market. Therefore, the importance and contribution of large companies to economic development and growth are also high. [11]

The establishment of a single currency for the EU countries allowed large enterprises to accumulate funds and management practices, which, in turn, helped EU companies to get leading positions in the international market. [11]

Criteria to distinguish between SME and large construction companies:

- Innovations. Technical progress is an essential factor of the company's growth and strong competitive advantage. However, Research & Development activity (R&D) requires considerable costs and contains potential risks. Supposedly, only large companies are usually involved in innovative and complex projects due to the larger financial capacity and ability to diversify risks better than small enterprises; However, small companies often specialize in innovations and put them at the center of their strategy for advancement return [18]
- The complexity of the organizational structure and the level of bureaucracy. Smaller companies are much more flexible and faster when adopting managerial decisions. The internal policies and processes maps are clear and easy to implement. Larger companies have more 'inertia' in their operating activity; [18]
- Intensified market fragmentation and the growing consumer demand increased the presence of smaller companies in Europe (according to statistics);

- the average number of employees. According to the research data, a significant share of all construction companies in Europe are SME companies, and their average number of employees is less than 250 people. [13]
- the scale/dimension of the EBITDA margin; factors which affect the EBITDA margin = EBITDA/ Sales: negotiating power of a particular company, project scale,[13] [3]. SMEs are structurally less profitable, and EBITDA margins vary below 4 percent, whereas large companies have an EBITDA margin of around 14 percent. What is more, SME companies are often acting as subcontractors for large companies, and, therefore, the most significant part of profitability under the project goes to large enterprises. [14].
- the risk of insolvency and the ability to withstand a crisis in the economy (especially when talking about COVID-19 consequences), SWOT analysis, which indicates the company's strength, weaknesses, opportunities, and threats; the company's financial analysis and projections; moreover, construction sector itself is considered as the most risk exposed, and near 20 percent of all European insolvencies across all sectors comes to the construction; [14]
- coping strategies and their availability for the company in frames of crisis: large construction companies successfully implemented liquidity preservation actions through dividend shortages and debt issuance in a financial market. They can also attract a borrowed capital at a lower cost than SME companies due to more excellent credit ratings and availability of financial instruments. Large companies are more efficient when implementing cost reduction instruments. SME companies often do not have the superior economic power to protect themselves during crises, and they appear less flexible when changing the structure of operating expenses.
- the type of project company specializes: public works, health infrastructure, and large-scale climate change projects are often carried out by a large-scale construction company; SME companies are, in turn, usually execute the residential and commercial type of projects and project development,
- additional costs which may occur and the company's ability to bear them,
- the ability to quickly adapt to changing market fluctuations, crises, and customers' demands. There is a specific measure called labor intensity, which can be measured as

the number of employees by revenues. In fact, according to the recent statistic data, large companies generate almost 60% higher revenues per employee than SMEs. This trend is negatively affecting the level of salaries and increases employee shortages. Moreover, recent COVID-19 preventive measures require companies to increase the cost of the workers' health protections.[12] [13][14];

- management skills and behavior. Even though EU SME management skills outperform the stakeholders' expectations, the focus of management lies rather on short-term activity than on long-term or strategical one. Therefore, small companies are highly concerned with the maintenance of working capital requirements, and the level of concern increases for smaller companies. [18]

1.b) The correlation between the company's size, the cost of invested capital, and its source.

The most significant sources of capital in the EU are banks, pension funds, and insurance companies. There is are also capital markets, individuals, and corporate investors. [18] Even though SME companies have increased their productive collaboration with central banks worldwide, they still struggle to get credit funds. Funds, secured by a particular form of collateral (such as, for instance, accounts receivable, inventories, intangible assets) or preferable long-term loans in domestic currency with a fixed rate over the whole period. Thus, the cost of borrowed capital for SME construction companies is usually higher than for large ones. This is the main obstacle for SMEs to grow and expand their activity. However, SMEs usually can borrow funds from private investors (especially for start-up projects, if applicable for construction) and non-bank institutions, which operate in a domestic market. Moreover, governmental incentives aimed to support and increase the share of SME companies, especially in a developed country. Large companies, in turn, can obtain better credit offers due to higher credit standing, long-term market presence, positive credit repayment records. [5] European Large companies also have better access to almost all existing sources of capital, especially to private equity funds and venture capitals. [18]

2.a). The sources of financing, which construction and real estate development companies utilize, i.e., internal and external funds. The connection between the sources of funding and a size of a company; a type of a project.

The holistic approach to construction industry and it's characteristics.

Nowadays, the holistic approach to the construction industry is highly appreciated both by the client and end-user. This approach includes the phases that come before and after standard planning, construction, and handover. [4]

Their (phases) definition, in turn, depends on the key question of development - why should the investor contribute to the particular project? The developer forms an initial project program and stipulates the reasons, benefits, and risks of investments to answer the question. Among typical reasons there are:

- the search for investment opportunities,
- expansion / growth / diversification of the real estate portfolio,
- expansion / growth / diversification of the company,
- the idea to increase a company's competitiveness through changed working processes,
- the idea to increase a company's image / reputation / market attractiveness / corporate identity,
- the desire to improve working/storage conditions,
- official requirements, e. g. environmental protection, safety regulations.[4]

The program also should include the parameters, which have to be defined and taken into consideration:

- long-term strategic goals of the project,
- the form of ownership: own use or third-party use,
- the construction or an acquisition (if the property already exists),

- the type of project - an investment (the invested capital is subject to future return and increase) or an organizational one (when the investor later uses the property by himself). Besides, the investor has to carry out a correspondent market analysis to estimate trends and the probability of achieving project targets when undertaking the investment decision. The target value also helps to evaluate appropriate/optimum construction costs. Above all, there should be a location analysis in line with the marketing research. The macro and micro levels location analysis helps an investor find a suitable land plot for the project based on its usage concept and parameters. [4]

The types of construction projects.

The construction industry produces various forms of objects for different use. However, all the newly established structures are usually divided into four main groups: residential construction, commercial construction, heavy/civil/highway construction, and industrial construction. Such a classification is based on the target work specialization, which contracting companies usually implement. The work specialization, in particular, includes the usage of different equipment, methods of working performance, and financial arrangements. [1]

Residential construction generally covers all kinds of residential housing – single-family homes, duplexes, multiunit townhouses, low-rise and high-rise apartments. These types of projects are usually managed by small to medium construction companies. [1]

German residential construction market has demonstrated growth at a CAGR of 5.0% during 2015-2019, according to 'Germany Building Construction Industry Databook Series' report over the period from 2015-2024. The forecast is that the building construction industry will demonstrate growth to achieve a CAGR of 7.9 percent to reach EUR 392.0 billion by 2024. [1]

Despite the reliable long-term forecast, a short-term trend over the next eight quarters is close to negative due to economic recession under COVID circumstances. While cumulated impact across building construction sectors differs, residential, commercial, and industrial segments are negatively affected. However, the residential sector, especially the affordable housing segment, is expected to stay less affected due to the public and private spending support. [14]

As a rule, small or private residential construction projects are financed by private financial lending institutions (for instance, commercial banks). Government agencies also provide mortgage financing or mortgage guarantees for such types of projects. [1]

Commercial construction covers a vast range of institutional (for instance, churches and schools), educational, light industrial, business, social, religious, and governmental. In a healthy business environment, commercial projects are financed by private capital. The share of commercial projects in the total amount of annual new construction is nearly 20 to 30 percent of the domestic economy among the EU countries. [1]

Currently, public and private capital contributions to this type of project were significantly affected by the crisis (2008). Moreover, the trend continues to decline year on year due to the lack of private capital injections in southern, Central, Eastern, and Northern European countries. [12]

Heavy/ Civil/ Highway Construction. The type is also called engineering construction because projects are created more by engineers rather than by architects. This type includes facilities: power plants, dams, flood control structures, canals, airports, tunnels, ports, harbors, and the like. [1] The type is also covering various infrastructural facilities such as street arrangements, sewers, and site clearance. [12] These projects require numerous equipment items for their execution: power shovels, tractor-scrapers, pile-drivers, draglines, large cranes, heavy-duty haulers, paving plants, rock crushers. There might be certain overlaps. Most of the engineering projects are publicly financed and sometimes called public construction projects. [1]

Industrial construction. This type is connected to the process of executing industrial projects – a large and specialized one. Perfect examples of such types are petroleum refineries and process plants of different kinds. Engineers usually perform the design. Sometimes, other engineering companies are engaged in the process of construction. Despite the relatively small share of all new industrial projects built annually (provide numbers for the EU countries), it includes the largest and significant ones.[1]

The legal form of the company ownership and its ability to raise funds from different sources.

Overall, minor residential, commercial, and industrial construction projects are financed privately, and heavy/civil/highway and large infrastructural construction projects are financed using publicly accumulated funds. However, in practice, each project requires mixed funding from internal and external sources. In a very general way, the internal

financial sources are classified as retained earnings and equity capital injections. The external ones – as different forms of debt capital. [3]

The difference between how a company can raise funds is in its legal form of ownership. The owner of any construction project is defined as a person or a legal entity. The owner holds the rights of the project upon its finishing and during construction. The owner also bears all expenses during the stages of the design and construction. [1]

The public owner can arrange project finance by using tax revenues, appropriations, and bonds. The public form of ownership, in this case, is called a corporation and is usually applicable for large-scale infrastructural projects. However, large corporations, being privately owned, can issue their securities, such as bonds too. Corporations also have several classifications, but in common, the corporation is aimed to conduct business with limited liability to its owners (stockholders). It can conclude various contracts related to real estate development, investment, and utilization phases; the owners can also act as employees. Corporations are required to pay taxes only on profits received. [1]

Private ownership, in turn, might be presented in the form of an individual proprietorship, general partnership, limited partnership, limited liability company, which act according to the existing domestic legislation. [1]

An average private owner can apply to several possible types of credit sources to fund the deal, which can be borrowed by banks, savings-and-loan associations, insurance companies, real estate trusts, and government agencies. The amount of borrowed capital / external funds is often defined by the expected growth of fixed assets and working capital requirements.

Both private and public companies use internally generated funds. Such funds are presented in the form of retained earnings, adjusted for non-cash expenses such as depreciation. [1] Builder-vendor is another form of private ownership where the owner acts as a prime contractor. The owner intends to sell the residential property during the project's construction or soon upon its completion. That is a scheme of financing, which helps the owner to eliminate initial capital investment in the project, and, thus, to get rid of risks in case of a project's failure. The developer then sells or leases out the object upon completion. [1]

Debt capital. Borrowing through bank loans. Suitable for small and medium-size construction companies / privately-owned companies. As primary lending institutions, banks make a distinction between asset financing and financing of the construction phases.

However, in the case of asset financing, the process of construction is usually completed. The decision to lend is based on a stable cash flow, which can be achieved by renting out the property. This scheme works well for commercial property. However, the owner faces the necessity of permanent reduction of the remaining useful life of the building. [1] Finance of the construction phases is called project finance, and it is more reliable for large-scale projects and typical for a private-public type of ownership. This form is considered the riskiest one, and the government, as a public owner, usually acts as a guarantor to secure the project's feasibility. Main risks can occur on different stages, such as planning, securing building rights, constructing the property, letting, and transfer. Loans granted to construction companies are usually long-term. Risks, in turn, decrease all additional value-added of the property and can cause the default of financing. Banks provide loans, which enable a private owner to arrange a 2-phases financing process: firstly, to obtain short-term financing, which is also called interim financing, for covering land plot acquisition and construction expenses; secondly, long-term lending, which is generally called mortgage loan. In frames of the same object, the short-term loan is fully repaid by the long-term, upon the completion of the design and construction phase. In turn, long-term financing is usually arranged for a long-term period (10 to 30 years) and repaid by sales or by the operating activity of the owner. In particular, lending organizations tend to limit the share of credit in the total amount of financing to no more than 75-80%. Therefore, the owner is obliged to invest its funds in the project. It can be the purchase of a land plot for construction. Banks also carry out professional monitoring of the project at all stages. [1]

Borrowing through lease agreements / to finance the use of assets, for instance, trucks, utility vehicles, and aircraft. Lessor = the asset owner or a leasing company, which bought the asset from the manufacturer. Lessee = the user of the asset. The financial lease usually extends over a long-term period, and the lessee bears additional costs, such as repair, maintenance, and insurance. The difference between leasing and purchasing (taking into consideration other parameters are equal) is financial. Leasing helps to escape a large cash outlay and, therefore, there are no dividend payments and interest payments (equity or debt source of investment in case of purchase). However, when deciding whether to borrow or lease, construction companies have to rely on higher NPV to maximize the firm's equity value. In turn, whether to borrow or to buy depends on the difference between cash flows.[1]

Borrowing by issuing short-term securities and corporate bonds.

Suitable for large construction companies. Companies can issue Euro Commercial papers to raise short-term funds. These papers can be sold directly to an investor or distributed through broker agencies. Although documents are unsecured, banks agree to provide credit coverage/credit in case of a company's inability to repay CP when it is due. Corporate bonds can be a proper alternative to long-term finance to raise debt capital. As a rule, corporate bonds are issued for a term between 5 to 30 years. The issuing company / the borrower pays a coupon payment annually until the maturity date is due. Upon reaching a maturity date, the borrower also repays a bond's nominal value or principal. [1]

Equity capital. Characteristics and valuation. Large companies can raise not only debt capital but equity capital as well. Corporations may raise equity capital by issuing stocks and bonds. Stocks represent a relatively small share in corporate ownership. Thus, those members who hold a more significant number of stocks are called major stakeholders. They can get a specific benefit in the form of dividends and adopt managerial decisions via the voting process. Bonds guarantee a coupon payment to their holders after a certain period, but bondholders cannot participate in a company's management processes. [3]

2.b.) The taxation and legal differences, which real estate investors have to take into consideration when implementing strategies to raise capital. German example.

There is no unified investment tool, which would take into consideration every investor's situation. When investing in a real estate entity, the investor has to carry out his or her research and adopt the decision based on the investment concept, risk assessment, and the existing taxation regulations. [2]

There are the following types of taxes, which have to be considered when considering investments in the real estate sector: German trade tax, German real estate transfer tax, income, and withholding tax. There is no universal structure that meets all the investor's circumstances and needs. Therefore, when executing investments in the real estate sector, every investor has to estimate benefits and risks by himself and choose the investment vehicle carefully. However, four main tools exist for the equity finance strategy: German stock corporation, Real Estate Investments Trusts, Closed-End Funds,

and Open-End Funds. In general, each vehicle covers two levels of taxation: fund level and interest level of taxation. [2]

German stock corporation. The corporation is regulated by German authorities (Stock corporation act). Has two management levels – a management board and a supervisory board; requires initial capital, not less than EUR 50,000. Corporate level of taxation: income tax, land tax. Such a structure is not subject to trade tax to exclude double taxation. Relevant to companies that hold and manage real estate assets in Germany. Shareholder's level of taxation. Shareholders pay a withholding tax after dividends distribution. Capital gains are generally not subject to taxation. Real estate transfer tax is paid only if more than 95 percent of the company share capital is consolidated in one shareholder's hands.[2]

Real Estate Investment Trust (REIT). Not very popular due to a strict regulatory basis (Alternative Investment Funds Managers Directive). Business activities of the entity have to be related to real estate. 15 percent of shares must be in a free float, and no investor may directly hold more than 10 percent of shares—a corporate level of taxation. Profit is subject to tax exemption if it meets the required criteria. First criteria, the trust cannot sell more than its 50 percent portfolio within any given 5-year-old period. Secondly, more than 15 percent of the trust's shares must be in free float over /during three consecutive fiscal years. The third criterion, a single owner cannot hold more than ten percent of the corporate shares over 3-year taxation periods. Besides, the trust should maintain a required asset structure. However, the trust is still subject to the real estate transfer tax, land tax, and VAT. Shareholder's level of taxation: there is an income tax for domestic and foreign shareholders. [2]

Real Estate Investment Funds. One of the significant differences between open-end and closed-end investment funds is that the investor of the first one has a right to claim to redeem the fund assets on an annual basis. When investing in a closed-end fund, the investor relies on a long-term strategy and, therefore, doesn't claim redemption.[2]

Closed-End Funds. regulatory basis (Alternative Investment Funds Managers Directive, integrates The Undertakings for Collective Investment in Transferable Securities Directive). Fund operates under the principles of a German limited partnership. Corporate / Fund level of taxation. Almost all coral activities the fund executes, such as rental income from real estate and capital gains from the sale of real estate, are subject to exemption from income tax at the fund level. Fund's activity is also not subject to German trade tax (if specific rules are followed)—shareholder's level of taxation. Shareholders are obliged

to pay income tax (the requirement works for corporate and individual investors, for foreign investors also). Capital gains from the disposal of fund interests are also subject to income tax. [2]

Open-End Funds. A fund operates according to the rules issued by the German Capital Investment Act. The fund is costumed for a small number of institutional investors, individuals have no rights to invest. The fund is exempt from corporate income tax and German trade tax. Given a certain legal structure, there is no transfer tax. Distributed profits and retained earnings at the fund's level. [2]

Shareholder's level of taxation. Rental income and capital gains are subject to tax at the foreign investor level. Income tax is paid with no distinction between a foreign investor and a domestic investor. [2]

3. EU and international bank policies and governmental regulations, which construction and real estate companies carry out when seeking for finance.

Key words – underwriting standards – financial institutions – pension funds – financial constraints – financial covenants – European Bank of Reconstruction and Development – Reserves – Regulations – Restrictions – six major real estate financing methods

Criteria for providing credit funds by banks.

Company rating. In the case of a non-recourse loan, a Bank usually does not pay any attention to the company's rating. When adopting a financial decision, only the property and the cash flow it generates are considered. These factors are recognized when estimating future loan repayment. If the loan is considered as a recourse one, the Bank calculates/determines a borrowing company rating, taking into consideration the cash flow which the company generates. [1]

Financial and non-financial covenants. Covenant implementation aimed to maintain a global trend to reduce the amount of equity. It became increasingly popular while adopting a non-recourse loan structure.

Loan-to-value. Interest coverage ratio. Debt service coverage ratio. Non-financial covenants.

Financial covenants. When an SPV is 100 percent incorporated by its parental company, there are cases, which often finance planning and construction costs. Then, the parental company intends to attract credit funds, and the modeling, as mentioned earlier, of free cash flows and debt service capacity was estimated. The next step is to define the amount of debt and the interest rate an SPV can serve. Project life coverage ratio (PLCR) is the correlation between the present value of cash flows over the project's life cycle to the present value of total debt. Its variation is the Loan life coverage ratio (LLCR), which presents the same approach, but it covers only a loan life and shows the SPV's ability to repay the debt at the particular stage. Both ratios determine the project's debt structure and its features: interest-only periods, different loan repayment schedules, and so on. The debt service coverage ratio (DSCR) helps to estimate the SPV's ability to service debt and lease obligations during a particular time slot. The ratio equals the amount of cash flow available for debt service.

Loan-to-value covenant (LTV). Covenant allows us to estimate the property's market value (building) and compare it with the loan amount. The ratio helps to evaluate and predict minor deteriorations of pledged property and, therefore, foresee the borrower's inability to repay credit.[1]

Interest coverage ratio and Debt service coverage ratio. Stockholders use these ratios to estimate the borrower's inability to repay the loan from the net cash flow generated by the property). [1]

Non-financial covenants. Used as an additional indicator of the company's business / operating activity and helps lenders minimize credit risks. For instance, a bank is subject to the approval of additional debt financing, minimum rating for anchor tenants (relevant for commercial properties), reporting requirements, the requirement for approval in the event of a change of organizational structure, and change the composition of the shareholders. Non-execution of covenants can lead to the borrower's inability to serve the loan and cause the event of default (or the borrower's insolvency).[1]

Bank / Financial institutions' policies. Nowadays, there are constructions and real estate development companies that want to expand their foreign markets. It can be done by attracting international clients to the home soil or foreign investors abroad (for instance, the execution of the government contracts abroad). To expand abroad companies, have to become familiar with the international requirements to obtain financial and legal support

abroad. (Investing in international real estate). The financing of real estate construction or acquisition is essential in domestic and global finance environments. Such an environment is constrained by the balance of supply and demand for construction in a particular region. There are local regulations that restrict and regulate both lending and financial institutions' activity. Although local financing almost completely satisfies the necessity to raise funds for the real estate sector, international funding (banks, insurance companies, and pension funds) increases worldwide expansion. International businesses worldwide are also interested in increasing the number of real estate assets for their core activities.

Both global and local real estate transactions (for acquisition and construction purposes) are executed under regional and international conventions and the scope of rules. Locally implemented directives are building and zoning codes, institutionally prescribed lending frames, and underwriting standards. Basically, investment constraints exist on an equity and/ or debt basis. For instance, a large number of properties in the Central European zone (which includes Hungary, the Czech Republic, the Slovak Republic, and Poland) cannot be utilized in accordance with its physical and functional meaning due to obsolescence. However, not all renovation loans applications presented by ownership companies meet underwriting standards of the European Bank of Reconstruction and Development.

Global Financial institutions Regulations. The International Real Estate lending process is highly dependent on the Bank for International Settlements (BIS), located in Basel, Switzerland. The Bank stipulates reserve standards to protect banks when lending money to finance the real estate sector. As a result, banks are restricted to invest more money in a large infrastructural project to meet these requirements – the correspondent amount of reserve has to be maintained by the financial institution. [8]

International Government Regulations on Lending institutions. Governmental institutions tend to regulate financial services via establishing general lending parameters and guidelines. Governments also regulate the share of domestic and international real estate developments. A coordinated financial policies provided by a so-called Group of Five (including the United Kingdom, Japan, the United States, Canada, and the EU). The Group coordinates the flows of funds into the real estate sector, in particular, parameters offered by real estate lenders to borrowers:

General interest rate levels

General inflation forecasts

The financing of economic growth in all areas of the world

The financing of special international projects

There are six major real estate financing approaches operated worldwide by financial institutions: mortgage freehold and leasehold financing (generally implemented instead as a domestic method), unsecured institutional lending, joint-venture equity and debt financing, sale-leaseback financing, advance payment of key money, and sale of debt and equity securities.

Less developed financial markets usually offer an unsecured institutional financing, advance payment of critical money, and joint ventures, particularly foreign-domestic joint ventures. Besides, the form of the governmental regime – communism or capitalism is not that important. Economically developed countries also use these methods and freehold and leasehold mortgage financing and the sale of securities for land and building finance.[8]

The foreign–domestic joint venture approach has its own restrictions, which local financial institutions usually establish. For instance, most of the countries that are members of the Organization of Gulf States do not allow construction and real estate management companies or potential borrowers to have foreign ownership. Therefore, joint ventures with a mixed ownership structure – both local partners and foreign investors are appreciated. The important note is that the local partner holds the majority ownership position. Financial partners practice this financial method to construct or acquire, for example, oil refineries, commercial buildings, and residential housing.[8]

Banks also may implement foreign – domestic joint venture type of collaboration. Even though most of the country's banks are owned by the government or by local individuals of that country, foreign banks now operate in many countries alongside local banks. For example, Citibank of the United States and Bank Santander of Spain.

Many of these international banks represent global networks and are subject to the laws and regulations of the particular location of each of its branches: Deutsche Bank and Dresdner Bank from Germany, Bank of Tokyo/Mitsubishi and Daichi-Kangyo Bank from Japan, Credit Lyonnais Bank from France, and Standard Chartered and Hong Kong and Shanghai Bank from the United Kingdom. However, real estate lending policy, including risk exposure considerations and yield expectation, may be carried out globally. [8]

The critical money financing approach often includes developers, space acquirers, financial institutions, and other real estate partners involved in domestic and cross-border transactions. In Bombay, for example, local Indian developers involved in the process of an office building construction according to international requirements may receive advance financing from prospective occupants through critical money payment. The prospective occupants may be Indian companies or foreign companies, or even individuals. The same approach is practiced in Tokyo, Japan. The future retail or office tenants may expect to pay key money to obtain high-quality office space in highly desirable Tokyo office buildings at a good price. [8]

Project's due diligence.

Before entering the financial agreement, both principal(s) and the SPV need to get a third party's confirmation of the project's feasibility. The process itself is called due diligence and aimed to help a financial institution to understand technical, legal, insurance, and financial specifications of the particular lending and meet future demands and outline the areas of potential risks. Due diligence covers the following aspects:

- Risks and ways of their /its' mitigation.
- Confirmation or rejection of the correctness of the information on which a bid was based.
- Estimation/assessment of methods applied to the project's evaluation.

Due diligence may include, but is not limited to the following aspects based on the project's type:

Technical:

Cost and program audit
Method statement
Contingency and risk
Standards and best practices

Legal

Project agreement
Lenders' direct agreement
Service provision direct agreement
Guarantees and warranties

Financial

Trigger step-in rights
Model audit and sensitivity analysis
Risk valuation

Term sheet
ICA
Hedge strategy
Letters of credit
Reserve accounts
Escrow and ring-fencing
Economic indicators
Taxation

Insurance
Cover and policy cross-over
Maximum probable loss
Scenario reviews

All these elements are connected and have an impact on each other. For instance, legal conditions regarding payment mechanisms define financial aspects and so forth.[10]

Technical due diligence aimed to estimate: to reveal if there are any under- or over budget expenditures, which could have an impact on a short-term return on equity (cost and program audit); to check if there is a correspondence between construction and maintenance costs and materials used for that; to confirm that the warranties secure the project over the life cycle. Another aim is to identify potential weaknesses in the SPV's organizational structure, best practices, and contracting preparation and completion standards.

As mentioned earlier, before signing loan documentation, parties are usually involved in risk management to allocate risks and establish prices for the risk taken. The idea of due diligence lies in the evaluation of such risk pricing and risk allocation. Stakeholders usually tend to fix on paper the confirmation of the technical adequacy of the project upon the completion of the technical due diligence.

Legal, due diligence aimed to properly review and appraise the assumptions and mutual agreements reached by parties involved for a better and deep understanding of the content and context. Another important aspect for the financial institution is the part of the release of its right on collateral in court and other legal action to be done in the event of the project's default. The financial institution may require a parent's company suretyship in support of SPV and obtain the additional SPV obligations. This scenario becomes more relevant in the case of a non-recourse type of loan, and due diligence has to investigate if such a guarantee provides any level of recourse to the SPV. [10]

Financial due diligence. Trigger step-in rights. Prior to finance a construction project, a financial institution defines trigger events that may occur during the project and signals that special actions are to be undertaken. The triggers' concept is aimed to control the

project and, thus, the borrower's ability to repay the loan (s). As a rule, a DSCR described earlier may be considered the most common trigger. The DSCR ratio also varies over the different stages of the project's life cycle. Suppose the SPV does not maintain a required level of DSCR. In that case, the financial institution gets increased control over the cash flow generated by the project and could lead to finance termination in some cases. Due diligence is a measure to establish safety aspects for both parties to fulfill future contractual obligations.[10]

Cash flow model's audit and sensitivity analysis. The idea of auditing the model is to check the validity of the information; the method used, assumptions and limitations. Banks also carry out a thorough review of a cash flow financial model to get an idea of the project's acceptability. The reviewing helps estimate probable varieties of key figures in frames of the sensitivity analysis and define both the worst and best-case scenarios and evaluate the criteria, which would signal the high probability of default under the project. Sensitivity analysis helps to understand how durable the project is to withstand potential risks, especially those that are difficult to allocate or mitigate.

Risk valuation. Commercial banks involved in large infrastructural project finance carry out a detailed risk analysis to identify, classify, estimate and allocate risks of the project's key stakeholders. Such a task requires knowledge of the subject and a rich experience obtained from the earlier undertaken projects. Proper evaluation requires a comparison analysis. [10]

The term sheet stipulates the scope of types and amounts of funding, which can be provided by each financial institution based upon certain conditions. Due diligence often includes but is not limited to the evaluation of the following parameters:

- Drawdown intervals and sizes.
- Type of loans.
- SPV working capital requirements.
- The duration of the handover period (when the asset cannot generate 100 percent of the project's predicted revenue).

Inter-creditor agreement (ICA). Large projects are usually funded from different sources and by the syndicate of financial institutions. The document that combines the scope of different lending conditions in frames of one project is called inter-creditor agreement and aimed to establish seniority of the loans and loan lenders. The document is important if the event of default occurs and lenders claim to release their rights in court.

ICA often includes the rights of the borrower and lenders;

the definition of terms agreed by the parties for the efficient communication;

expectations regarding the project's outcomes and mutual actions in case of the event of default;

type and parameters of the financial instruments used to fund the project;

termination and refinancing conditions.

Creditors also rely on commonly used economic metrics of the project due to their standardized meaning; such are:

Net present value - NPV;

The minimum required rate of return - IRR;

Return of equity - ROE;

Payback period -PP;

The total amount of credit funds utilized by the borrower;

Debt and interest coverage ratios.

Due diligence enables the comparison of parameters mentioned above with similar projects, including completed projects. The audit helps to reveal changing market trends, lenders that carry out an aggressive lending policy (too low coverage ratio requirements), which negatively impact the other stakeholders and decrease the optimum level of the project's economic capacity.

Taxation. It is highly demanded by large financial institutions to estimate taxation regime related to the particular project, although the tax payments' execution is usually a borrower's risk. Therefore, relevant authorities and their representatives are often asked to provide written confirmation and support of the chosen tax structure prior to the funding is taken place. [10]

Insurance due diligence. That area covers the mitigation of statutory and common risks a project might face. To protect the lenders' interests:

- claims settlement process has to be determined and proven;
- notes outlining collateral coverage have to be investigated;
- the market trends subject to the collateral's liquidity are duly checked, and market prices are accurate;
- the negative scenario has to be double-checked, and potential losses have to be estimated properly;
- uninsurable risks are identified and allocated.

Today insurance companies provide a broad range of instruments aimed to protect both lenders' and borrower's (SPV's) interests, such as credit enhancement design to support

cash flows generated by the project. Upon the accomplishment of the due diligence of the insurance area, parties usually sign a certain confirmation document regarding the chosen insurance program. [10]

Governmental Regulation of Construction and Enforcement.

Government can regulate land development by establishing incentives or constraints for international developers. To become successful, the developer has to become aware of basic international rules and regulation policies in marketing, finance, and general management. A developer has to keep in mind that construction costs for the same project are different and depends on geological conditions, labor force costs, costs of obtaining construction permits, necessary governmental fees, and contributions, surety expenses, environmental protection policies. Currently, companies carry out planning and design, estimation, and comparison of construction costs in different countries, such as Bechtel, Fluor Daniels, and Blackwell Sanders. Governments of many countries tend to regulate domestic construction activity to achieve a specific expected level of sanitary and safety. Urban governments also establish building costs and zoning regulations to secure the buildings' use and protect the environment. However, rules may vary from strict to lax all over the world. For example, Western European countries and the United Kingdom establish stringent regulations and enforcement mechanisms. Less developed countries (Asia, Africa, Latin America), in turn, are easier to follow and implement. Whatever the rules are, their enforcement is sometimes necessary to prevent major disasters in the established locations. When construction companies become international and start their activities in foreign countries, there are the following cost and construction regulations to be considered (local governments establish rules): geological conditions, available material, labor and management sources, construction permits receiving, insurance, and environmental protection. [8]

4) Project finance as a tool to finance large infrastructural projects: conditions, outcomes, benefits, and risks.

Key words: large-scale infrastructure and other industrial projects – dependence on public sector financing / government financing – private capital and control – private sector sponsors and commercial lenders – substitution of private investment for public expenditures for

government – cash available for the debt service – earnings – enterprise value – net present value – free cash flow – weighted average cost of capital

The growing importance of project finance worldwide: definition, origination, and reasons.

Nowadays, the globalization trend is increasing and, therefore, there is a particular demand for large-scale infrastructural and industrial projects, which would become a basement for the potential economic growth and development. The project finance model has been applied worldwide in both developed and developing countries, including the Asia Pacific area, Africa, the Americas, and Europe. [7].

Today national, regional and local governments face a wide range of spending alternatives among cost-consuming infrastructural projects such are roads, rail facilities, public buildings, etc. However, funding resources are usually limited, and, therefore, the provision of public infrastructure is no longer a government's responsibility (or public capital responsibility). Project finance is an efficient tool for cash-starved governments to launch/build up infrastructure to sustain domestic economic development. Such a project is often financed through the project finance tool, which generally means that the project beneficiaries raise debt funds and accumulate public and private capital for the intended project considering future income streams generated by the project, rather than the beneficiary's assets and guarantees. Project sponsors, especially those invested in the project company's equity, have no adverse effect on their credit rating or balance sheets in case of the project's failure. The critical feature of such a project is that the lenders (both debt and equity) only have a right of recourse to cash flows and assets of the project itself, not the right of recourse to the sponsors' cash flows and assets. In practice, if the project appears unable to generate anticipated income, project sponsors/equity lenders, usually acting like other companies / legal entities, have no direct legal obligation to repay the debt. The amount of equity investments limits their risk. In order to minimize risks that affect the sponsor's credit rating and financial standing, project finance deals are usually arranged as off-balance sheet transactions.[16]

However, the sponsors of the project, legally acting as an SPV (Special project/purpose vehicle, in fact, a legally and economically independent project company) have to present sound evidence of potential income through legal guarantees / contractual arrangements, for instance, power sales contracts, allowance the collection of tolls for infrastructural

projects, tenant leases for commercial real estate projects. A typical project finance deal also includes a construction contract, including material supply, the product offtake contract, maintenance contract, loan agreement, bond agreement, and shareholders agreement. Previously, large-scale infrastructural projects were primarily financed from official public sources – host country governments, various development institutions, domestic promotion agencies, etc. However, public financing did not appear effective or sustainable since the late 1980s, and governments had faced a lack of necessary funding. Hence, the role of private sector finance revealed the importance and had demonstrated sufficient growth.[16]

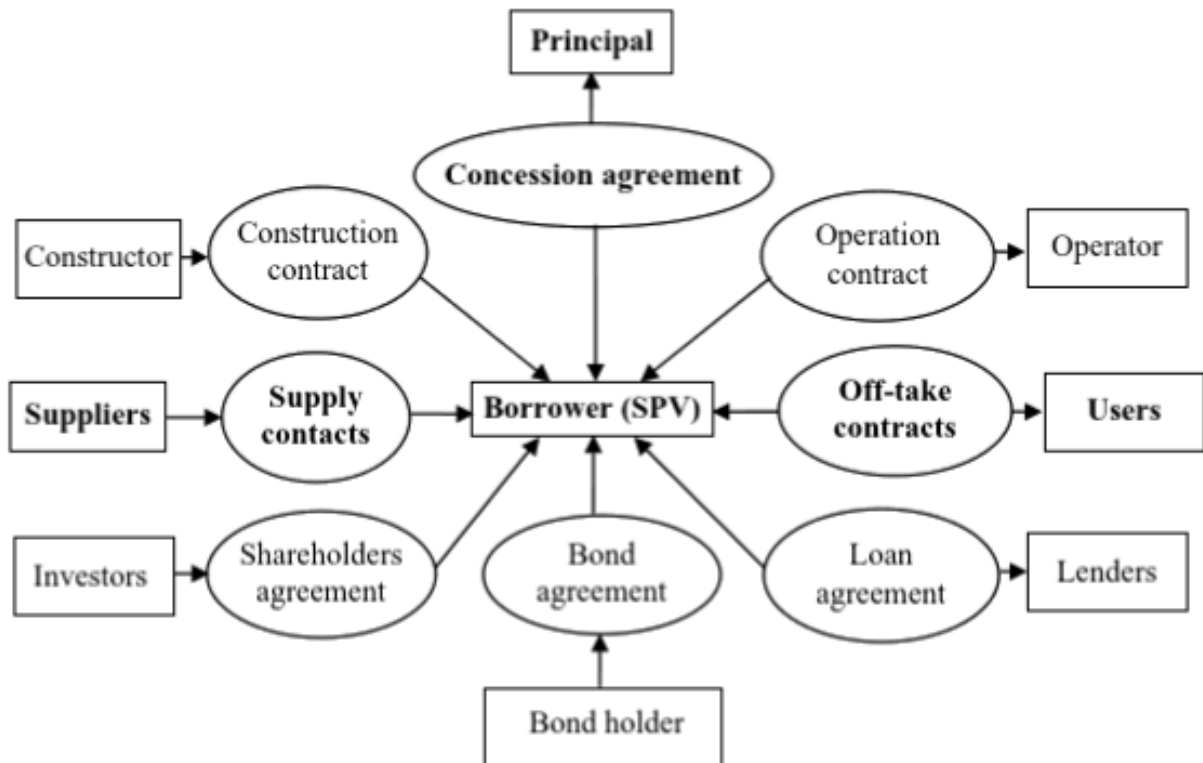
The situation revealed the necessity to support private capital injections and ensure the execution of massive projects via flexible techniques and creative methods. [16]

There are certain supply-side factors, which boosted the popularity and recognition of the project finance, and therefore, private capital participation in large-scale projects: increasing role of private ownership – privatization of the state-controlled enterprises is being carried out worldwide; reduced government involvement in domestic industrial and commercial activity; there is also an increasing government intention to mitigate the risks and therefore, they tend to subcontract the management of large-scale projects to the private management companies; country budget constraints and limitations to launch capital-consuming projects. At the same time, there are demand-forming factors, such as investors' desires to rely on predictable and stable cash flows generated by major or sometimes monopolistic assets. Infrastructure class assets are often attractive for large pension funds, oriented for long-term returns. Also, energy consumption increases globally, which requires new capacities and development.[10]

The important-to-notice feature is that the project is presented solely by a private sector project company. The asset it has is meant for public use, and the project company (Special Purpose Vehicle SPV or Special Purpose Entity SPE) will not own it forever. As a rule, depending on the project's life cycle, when funding public sector infrastructural projects, rights to build and operate the asset over a fixed term is transferred to the private company. After that, the rights are returned to the public sector legal entity. Such a scheme is called a Build – Operate – Transfer (BOT) model, and it is famous all over the world. The model helps to achieve a synergize – the public sector finally obtains an

accomplished working asset without considerable funding. The private sector gets an option to temporarily control and operate the asset for a profit.[10]

Figure 1. A typical BOT corporate structure.



Source: Tony Merna, Yang Chu. (2010) 'Project Finance in Construction', by John Wiley & Sons.

Legal and financial aspects of project finance.

When structuring the deal, it's important to consider the following legal and financial aspects:

- To arrange a collaborative form of participation between governments and the private sector: public-private partnerships (PPPs), private finance initiatives (PFIs), build-operate-transfer (BOT) schemes; [7]
- Legally define the type of concession agreement; it's a sort of a contract, which regulates the collaboration between a governmental agency acting as principal and a private company, acting as a concessionaire, which gets the right to build utilize, and maintains the asset; it stipulates the following major legal aspects of the deal: volume to be generated, future prices, a duration of a construction, operation and maintenance phases; concession agreements may vary in dependence of a particular project, whether

a concessionaire pays a fixed price for its product or service or pays on the basis of demand; concession agreements may also include tax benefits and other privileges to motivate private investors;

- foresee a type of securities for lenders (step-in rights, guarantee, liquidity facilities, cover ratios, and so on);
- include financial parameters such as revenue and costs projections, future tax payments, macro-level projections such as interest rates, inflation rates, price of a product and service;
- ratios, which indicate if the project faces the stakeholders' and lenders expectations – equity rate of return, debt-coverage ratios, valuation multipliers;
- the structure of loan tranches and their maturities and purposes – construction phase financing, working capital financing, and so on; very often the lenders set up the way how financing is arranged to mitigate risks and project's default event;
- Very often, the number of banks participating in a particular project is more than 1, and banks are located in different countries providing finance in different currencies; therefore, syndicate creditor structure has to be elaborated;
- Mezzanine bank loans (if there is a necessity to cover the gap between debt and equity);
- The form of equity financing – the type of shares and their amount; to establish voting rights and the number of voting shares.[7]

Project life-cycle. The connection between the project's life cycle and risks.

The project finance model generally includes five stages in the project's life cycle: planning, design, and engineering (1), construction (2), commissioning (3), operation (4), decommissioning (5). In practice, investors combine the first three stages to the pre-completion / construction phase, which may contain a major share of various risks, and the remaining two as a post-completion / operational phase. Some risks are relevant for both pre-and post-completion phases. [9]

Risks during the construction / pre- completion phase.

Activity Planning Risk. These risks are usually connected with planning, design, engineering project facilities, and then risks connected with the construction. It is important to keep in mind that during the development phase project's stakeholders do

not receive any repayment, neither dividends nor debt. Considering the duration of this phase and the scale of invested capital, the situation can also be characterized as uncertain and risk-creating itself. [9]

Technological risks. The construction phase, likewise, holds further complexities and problems no one planning agency can fully anticipate. In this situation, for instance, when the general contractor's approach and technology supplier approach do not match, there is the risk that the plant/factory won't be operating. Often projects also face logistic difficulties due to their specific locations, usually far from transportation lines and poor local infrastructure. Geographical and climatic circumstances may appear challenging as well.

Construction Risk or Completion Risk. This type also has different forms, but the idea is that the project may face the situation when the construction cannot be completed and run due to force majeure, cost overruns, and so on.

Risks during the operational / post-completion phase.

Operational risk. Here it is assumed that an SPV is characterized as a going concern. Going concern basis is an assumption according to which a company / SPV will operate forever. This assumption is used when estimating a discounted cash flow values over a certain period; going concern assumption means that a company will continue to generate cash beyond the forecasting period. This assumption is needed to estimate the company's terminal value at the end of the forecasting period. [3]

Business risk negatively affects/impacts major business processes of a project at every project's phase – construction or operation. For instance, the risk of tangible asset damage can be transferred to the insurance company. Financial risk occurs because the project accumulates borrowed capital and, therefore, borrowed funds have to be repaid when they become due. [3]

SPV's capital structure is often considered as a high levered. In other words, the share of borrowed capital is relatively high. Implementation of this model causes the following operational risks – unstable cash flow and consequent financial risks, input risks, process risks, demand, and distribution (customer risks). All of them influence the SPV's ability to

generate sufficient cash flow and, therefore, perform its credit commitments towards creditors.[9]

Supply and demand risk. Every project needs a constant input supply and demand to distribute a product/service as a project's output. Another critical factor, which brings a negative impact on a company's operational activity is the market fluctuations.

Risks are found in both the pre- and post-completion stages.

Project finance transactions usually face at least two major types of risks: business risk and financial risk. Financial risk covers financial investment risk and currency risk. Companies, which invest in the project, both as lenders or equity holders, face financial investment risk. Financial investment risk, in turn, splits up into liquidity risk and price risk (this type of risk is not always applicable to the SPV, only if SPV borrows money through the financial market and its share price may go down unexpectedly). Liquidity risk is related more not towards the project's SPV but the investors. Companies that invest money may face a lack of liquidity in their core business/activity frames. It might be challenging to sell SPV shares or assign the debt to a third party, especially at the construction phase. Currency risk may occur if the investors invest in their domestic currency, but the cash flow expected is nominated in another currency.[3]

There are also Interest rate risks and Exchange rate risks.[9]

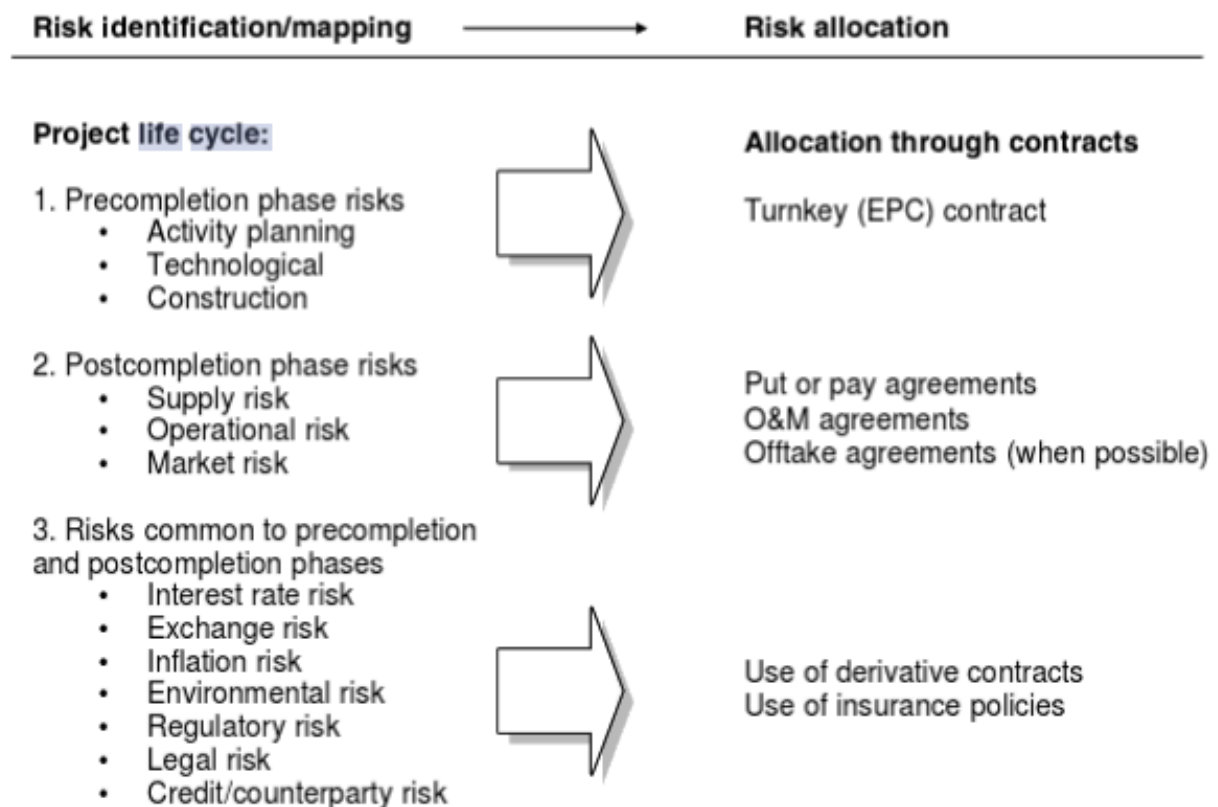
What's more, is that the construction and operational phases are financed in a logical sequence with the two significant transactions. An SPV's parent company often guarantees a design and construction loan repayment, and the operational phase's loan can be obtained only upon the successful completion of design and construction. [9]

The process of risk management.

It is said / considered that project finance loans are riskier than other corporate loans. There are three main reasons – limited or non-recourse type of project finance loans, only future cash flows can be referred as a loan repayment source and long-term concept of project (usually, more than 5 years). In practise, the task to mitigate potential risks of a project means to identify, measure, and distribute / allocate such risks among the number of the project's stakeholders. It can be done through the matrix of contractual agreements

and mutual guarantees. However, the risk cannot be excluded completely, but can be anticipated and managed effectively to minimise losses and secure the execution of the project. [9][10]

Figure 2. The risk classification matrix and the Strategies for their allocation (hedging).



Source: Gatti, Stefano. (2018) 'Project Finance in Theory and Practice' by Elsevier Science & Technology.

There is no standard / legal approach of how the risks have to be managed. However, the arrows at the picture above present the risk management model, which includes:

- a risk identification (step 1), means to understand circumstances and events that can become a source of risk, which may affect the project's cash flows;
- a risk analysis (step 2), means the estimation of the size of impact and estimating a potential reduction of the project's value / future cash flows;
- a prioritization (step 3), the process of ranging the risk from minor to major;
- a risk response / risk allocation proceeding (step 4), which has to be established and implemented to decide the risk either to be rejected or accepted;

- a control / monitoring over measures' execution (step 5), which means a periodical monitoring and control of actions executed to minimize a negative impact of revealed risk.

Pre-completion risks' mitigating proceedings. In practice, project companies utilize different and sometimes even contradictive techniques to mitigate planning risks. Being equity investors and shareholders, some large corporations try to control and execute planning 'in-house,' which means they have their own capacities to carry out design and planning documents. Other companies, in turn, tend to outsource such roles to large and well-known design agencies, which may have a similar experience and positive track record. However, it's almost impossible to eliminate planning errors/mistakes due to the fact that every project is unique and created in different circumstances.[9]

Operational risks can be mitigated through implementing procurement systems and work performance guarantees and guarantees of maximum costs or other incentives included in contracts or with the conditions of mutual sharing construction savings and overruns.[9]

Post-completion risks' mitigating proceedings. Such operational risk can be mitigated by concluding long-term supply contracts, which correspond to the long-term off-take agreements. [9]

Both pre- and post-completion proceedings for the risk mitigation. Currency risks mitigation via implementation of the financial instruments. Quite often, large-scale infrastructural projects are financed from abroad, our using foreign capital. In practice, foreign exchange rate fluctuations become important when repaying interest and principal on loans contracted in a foreign currency and the collection/distribution of dividends in equity investments. (Finance for executives). Currency risk can be both a business risk (affects an SPV's assets) and financial risk (affects an SPV's financial activity). To secure future debt repayments, an SPV has to buy foreign currency. Therefore, it's important to fix the price of a foreign currency or, in other words, hedge a company's foreign exchange exposure. The borrower may choose among several hedging techniques commonly used to reduce or eliminate the exchange-rate risk associated with credit agreements service when they are denominated in a foreign currency; the purchase of raw materials during the construction phase; and purchase equipment. These techniques currently available in the financial markets are: forwards, futures, currency options, and swaps contracts.

The project company, as a borrower, can conclude a forward hedge contract with a bank to buy from that bank an amount of money required for the interest repayment (for

instance, EUR 100,000) U.S. dollars in three months. In other words, the borrower can fix the rate today.

As an alternative to forwarding contracts, the SPV U.S. can use currency futures contracts. Currency futures contracts, or simply currency futures, are similar to forwarding contracts, except that they have standard sizes and fixed maturity dates. However, forward and futures agreements can make a benefit only in case of unfavorable exchange-rate movements. There is also a hedging technique that helps to benefit from the unexpected currency depreciation in favor of the borrower / SPV. It is the currency option hedge. [3]

An option contract is a beneficial tool for its owner because it creates the right, not the obligation, to buy or sell currency at a pre-agreed/fixed exchange rate. Although, despite the opportunity to save some money in case of unfavorable currency fluctuations, an option contract has its own price. The SPV has to bear additional costs, so-called option premium, determined by the options market. [3]

A currency option contract is available from both banks and organized exchanges. A currency call option gives the right to buy a certain amount of currency at a fixed exchange rate from the seller of the option. A currency put option, in turn, provides the right to sell the stated amount of currency at a particular rate. The maturity date of an option or the date when the option becomes due is the date after which the option can no longer be executed. In practice, if an SPV has, for instance, a euro-denominated loan with an interest repayment due date, which comes in three months. If a company decides to hedge the interest repayment with an option contract, it will buy a three-month euro call option.[3]

Forward, futures, and options contracts work well for the short-term credit obligations, usually in terms of a year. In order to hedge long-term credit exposure to currency risk, a SPV may prefer to conclude a currency swap agreement with its bank. The swap contract requires that the SPV performs several future cash flows denominated in the currency to be hedged. These hedged cash flows are then exchanged for a set of cash flows denominated in the currency of SPV's choice. In other words, the swap agreement would transform the foreign loan into a domestic loan, thus eliminating the currency risk exposure caused by the foreign currency debt. [3]

All in all, an SPV may decide to take on risks without protection and cover any potential losses with its own resources – assets or cash, generated in the future. Alternatively, it may decide to take on the risk and protect itself and its stakeholders using three possible

methods: risk insurance, currency hedging, and risk diversification according to the nature of such risk.[3]

Pre- completion phase. Risk mitigating measures under the project's contracting cycle.

The description above gives the idea of how the investment decision can be made whether to participate in a project. Case studies will present a more detailed view. However, the construction phase was not taken into consideration. As a rule, construction can be funded by borrowed capital but with considerable limitations. During the construction phase, investors and creditors have no return on invested capital and, thus, equity contributions have to be done before credit tranches. [10].

Legally an SPV is often incorporated in the form of a public-private partnership. As mentioned above, the SPV signs the concession agreement with the government and subcontractors to build the facility and then operate and maintain it. Typically, shareholders' structure varies but often includes a building contractor (main contractor) and maintenance company. The development stage of a large international project can be risky, complex, and recourse-consuming. In theory, the construction process itself goes through the contracting cycle, which includes the following major stages: procurement strategy decision, the bid process management (invitation to tender, bidders' qualification, landing the contract/ financial closure), subcontracting and procurement arrangements, contract execution (the construction of the facility), testing and delivery, guarantee period maintenance, and claims resolving (if applicable). It is easy to differentiate among the stages in the contracting cycle. In practice, in turn, these stages are very much interconnected, and it is not easy to distinguish between them.[6]

Procurement strategy decision. The following types of contracts have different purposes and can be beneficial independence of the type of a project, clients' objectives, and intentions. Construction only contract is recommended for buildings or engineering works. Design and construction contracts suitable for asset creation – chemical plants, electrical facilities, and so on. Engineering, procurement, and construction contract (EPC contracts) work on a turnkey basis of the project – often the infrastructural one. When implementing this type, the contractor takes full responsibility for the project's execution. Another type is the Design, Build, Finance, Maintain contract (DBFM). This form is usually implemented in case of complex and long-term projects (20 years or more), and the contractor covers

almost every step of the project's life cycle (excluding a maintenance phase). Therefore, the type's variance is a Design, Build, Finance, Maintain and Operate contract type (DBFMO), which includes an operational / maintenance phase. The construction of a toll road is a good example. All these contract models can be presented by different international standard contracts, such as the International Federation of Consulting Engineers (FIDIC).[6]

Invitation to tender / the tender process/management of the bid process. Successful execution of the construction project in the private-public sector requires a good understanding of local legislation to submit competitive bids for tender, especially those laws that relate to procurement directives (such as the European Directives on Public Procurement). There is also essential to understand individual stakeholders' interests that may underlie the project. As a rule, there is a tender team engaged in forming a detailed bid, which has to be submitted to the project management board. Bidding documentation should also contain clear deadlines and milestones. Besides, the tender team has to form a list of key persons to be asked for advice and professional judgment; prepare all the necessary tender documentation, elaborate a precise risk assessment plan. This particular stage contains risks, which may bring adverse effects to the future phases of the construction process. Two aspects have to be counted to mitigate them: the level of competency of the tender team and the amount of time and effort contributed to bidding preparation. Contemporary practice is to include a potential project manager in the tender team. Although it is difficult to achieve in reality, it brings some logic. When a project manager steps into the project, he faces reality, and he is not allowed to bring his ideas, and he is not acquainted with the project. Another essential item to be considered is a type of contract. Landing the contract: The Letter of Intent (LOI). It comes before the contract's conclusion. At this stage, parties are engaged in the constant dialogue on issues stated in the tender documentation. Clients usually arrange personal meetings with all the contractors to discuss questions arising from project documentation. Upon his stage, the two best contractors are selected and included in a shortlist. These two contractors are instructed/proposed to prepare a detailed bid, which becomes the basis for final selection. Parties may draft a Letter of intent – a sort of document signed before the final decision is made. The legal power of the paper is subject to questions; usually, the LOI means the client's commitment to act on an exclusive basis with the contractor and the feeling of potential success with the contractor in case of starting the entire project (contract). [6]

Contract negotiations and closure. Key stages prior to that: Decide the procurement strategy – market the PPP (SPV) – qualify bidders – manage the bid process – reach financial close

At this stage, the major rights, responsibilities, and liabilities among contract parties are stipulated.

In general, construction contracting burdens a high level of competency from the client's side. The client defines the level of construction and establishes technical requirements. Once a contract is concluded, the cost of a mistake rises significantly. The wise and experienced contractor did not implement any changes in the design and constructions process before obtaining sufficient approval from the client.

Subcontracting and project execution. It is assumed that every project, especially a large infrastructural one, has to be profitable. In practice, the project manager often faces the situation when project parties (procurement organization, supply partners, subcontractors) demonstrate their self-interest with no regard to the client. Moreover, the risk of non-performance may occur at every time of project execution. Ensure profitability under these circumstances is a challenging task. To execute such a task, a back-to-back principal agreement between participants may improve the picture when the client's interest is neglected. Back-to-back principles include penalty and incentive approaches, which together may form a strong motivation among subcontractors and supply-chain partners. Typical measures are to be taken into consideration by the project manager: to establish general purchase conditions, to assign a project buyer, to have a proper contract administration, implement an order-to-pay system, which would allow to track and trace material flows, to hire a quantity surveyor or contract manager on-site, to establish a quality inspection procedure on site. These measures would help save and mitigate risks of resource wasting, payment delays, and theft incidents. A project manager should also ask a subcontractor for the bank guarantees if material supply was pre-paid (relevant for piping, steel plates, and other materials). [6]

Testing, delivery, and payment. Upon achieving the next project's milestone, the correspondent control procedure must be taken to ensure that all the construction requirements are met. A particular payment may be executed in favor of the project participant (subcontractor). There were numerous examples when the subcontractor did not fulfill the work, which was agreed to by the contract. There are the opposite cases when a contractor did not execute the payment in time for no reason. Usually, both parties

try to resolve the situation via negotiations without bringing it to the court to see what solution could be found to determine the adverse effect.

Claims and dispute resolution. Based on the idea of the complexity of large constructional projects, it's almost impossible to avoid conflicts between the parties involved. Of course, preventive actions and negotiations may help to correct the situation. It's the function of a project's manager to cooperate in a formal and personal way with the key stakeholders regularly to anticipate negative issues arising from the construction process. However, sometimes, escalated conflicts require court procedures to be implemented. The involvement of legal counsels will definitely need more time and effort from both arguing parties, and it will definitely postpone the construction work execution. Therefore, legal actions can be categorized as highly unfavorable, cost, and time-consuming. The necessity to initiate them is subject to further considerations. The type of contract and local legislation is to be considered when predicting the court's decision. Often parties even agree on what legislation has to be relied on in case of court proceedings (UK law, European law, and so on).[6]

In practice, the mentioned stages may interrelate with each other. The last step of the contracting life cycle also covers a guarantee period to correct upcoming problems after a specific work was delivered. In general, whatever risk is, it should be shared between all stakeholders/partners involved. Moreover, risk has to be allocated to that partner, accepting this risk at the lowest possible cost. The risk, which cannot be estimated, has to be taken solely by the partner, which initiated this risk.[6]

Criteria and purpose of the project financial assessment.

Whatever the project finance structure might be, all the parties involved expected to get the minimum required return, which is often specified and agreed upon. The desirable rate of return usually depends on the type of the project and a specific combination of risks it may face. As a rule, all the stakeholders adopt 2 or 3 different project scenarios to undertake a project decision. The most important is the worst-case scenario to determine the metrics for project viability and risks. The other typical project metrics are

- Net Present Value (NPV),
- Static and dynamic payback periods,

- Internal Rate of Return (IRR). In case if the risk is high, an investor expects a higher return rate to compensate for its participation in a potential risk project. Otherwise, an investor can allocate funds to a less risky project. [3]

In the case of debt utilization, capital lenders may require the project to meet cover ratios. Financial assessment usually takes place before the stakeholders' commitment. The more detailed project becomes, the more often re-assessment may be required. In any case, it's not a one-time performance and covers a whole life cycle of the project – construction phase, operation and maintenance, utilization. Cost of finance and revenue generation aspects are also taken into consideration.[10]

It can be assumed that project finance is an effective but quite complicated tool for the execution of large-scale infrastructural projects due to a number of potential stakeholders, involvement of a public sector, long-term investment concept, reliance on contracts, dependency on potential cash flows with a non- or limited- recourse to the lenders, the technical complexity of the project, volatile economic trends and so on.[10]

Financial evaluation of the project company (SPV).

A project company (SPV) at the beginning of a project has its value which has to be estimated by creditors before the physical life-cycle of the project starts. Based on the assumption that SPV has a parent company, usually a large corporation, which has to evaluate the project before adopting a managerial decision. The SPV value (or the value of the asset) is estimated by the ability of this asset to generate cash flow over a certain period. Investors can further review the project if the present value of these cash flows is larger than the cost of the asset and brings a profit to debt holders (both credit and equity). However, the return on the investment depends on the nature of the investment. [5]

When estimating the SPV value, two major aspects have to be taken into consideration. At first, it's a highly specified asset (sometimes unique), and secondly, it has a limited life-cycle usually defined by its nature and stipulated in the concession agreement. To make a capital budgeting decision, investors often face both problems – to define a present value of future cash flows and prices of the assets needed to generate such cash flows. The general approach is to estimate the NPV of the project by summarizing discounting operational cash flows (in particular, Earnings Before Interest Tax Depreciation and Amortization - EBITDA's) and by subtracting the sum of the initial investment. [10]

Another important aspect lies in a definition of a free cash flow, or cash flow generated from the asset.[10] This situation may be different in practice – the project finance mechanism requires mixed funding to distribute risks between stakeholders. Creditors, in turn, may invest in equity as well.

Based on two major principles of accrual accounting (the realization and matching principles), it is known that a firm's earnings after tax are not equal to the difference between the firm's cash inflows and outflows that occurred during the accounting period (the firm's net cash flow). However, there is always a connection between a company's reported profitability and the free cash flow it generates. Therefore, there is a need to analyze financial information (financial statements) to develop a model that operates based on a free cash flow. Free cash flow generally equals the cash flow from operating activity reduced by capital expenditures (or investments in property, plant, and equipment). Large corporations often publish the amount of free cash flow in the company's cash flow statement. An SPV's initial estimation stands on the assumption that a company has no debt. Therefore, a free cash flow calculation will help to define the amount of cash available for the debt service. In other words, there is an idea to determine the forecast amount of debt an SPV is able to serve. [10]

In case if there is no information about a company's cash flow statement, the starting point is the profit and loss statement. The first step for valuation based on the P&L statement is the amount of EBITDA calculation and the operating structure of SPV. An investor has to extract the amount of EBITDA or earnings before interest, tax, depreciation, and amortization. There is a need to forecast sales and cost of sales and general cost structure to estimate EBITDA. However, EBITDA, as it is stated, cannot be used as profit for taxation purposes. Depreciation is not an expense, and the company does not need to pay it. Depreciation is also excluded from the calculation of taxable profit or the amount of income before taxes. However, depreciation is an important instrument/tool for the company's ability to reinvest into the acquisition of assets in the future. Interest payments are excluded from taxation as well, but the number of interest payments reduces the base for income tax calculation (reduce the amount of income before taxes). Therefore, the more interest company pays, the more it borrows, the fewer taxes it has to pay. This important issue has to be taken into consideration when establishing a capital structure. After subtracting interest and paying 20 percent income tax, we profit after tax, which is still not the same as a free cash flow. Technically, at least two items have to be added into consideration: factual reinvestment in fixed assets and

net investment in working capital. The formula includes (in a general way, in practice, it can be adjusted a bit): a net operating income, then we add depreciation and amortization costs and plus changes in working capital requirements. Changes in a working capital requirement are the difference between current assets and current liabilities. Current assets, in turn, are equal to the number of accounts receivable, inventory, and prepaid expenses; current liabilities – accounts payable and accrued liabilities. It is important to mention that we consider a difference in a working capital requirement, so the difference between the amounts at the beginning and at the end of an accounting period (financial statements are reported quarterly and annually). For the free cash flow projections, annual numbers are usually used). In the end, we have net operating income added depreciation and amortization, added change in working capital requirement, and deducted capital investment (or, if simplified, a net cash flow from investment activities). A deduction of capital expenditures is based on the idea that the business is not sustainable without regular reinvestment; therefore, it is necessary. Sometimes (according to the project finance for executives), the firm's operating activities include interest expense, which is considered as a part of the firm's financing activities. It can be concluded that different sources present different approaches. [7] [10]

There is a need to establish depreciation allowances, taxation periods, factual taxation rate, and dividend policy to accomplish the first stage. After that actions, broadly investigated in a case study section, there is an amount of cash available for debt service or the cash, which can be utilized to serve all contracted liabilities. The larger the amount of cash the company generates, the greater debt service capacity the project has. It is essential to mention that the decision to lend is also based on the project risk analysis or, in other words, it can be said that the SPV's ability to generate cash flow under risk factors. However, the amount of cash varies, and it's almost impossible to model a precise number. Usually, there is a so-called cash space, and investors define an expected cash flow and a range in frames of which cash fluctuations are highly probable to occur.

Besides EBITDA determination, another important factor, as mentioned above, is the discount rate to be defined. Firms/governments/entrepreneurs need cash to finance their investment projects. Usually, this cash is generated internally from the firm's operations. If there is a shortage of internally generated funds, firms will ask investors (lenders and shareholders) to supply them with additional cash. Whatever its origin, money is not free; it comes at a price. The price is the cost to the firm of using investors' money, which has to be repaid. When this cost is presented as the return expected by investors for the

capital they supply, it is called the cost of capital. The cost of capital is the rate at which a project's stream of future cash flows must be discounted to estimate its net present value (NPV) and to decide whether the project is worth undertaking, that is, whether it has the potential to create value. [3]

Free cash flow series have to be forecasted over the project's life cycle and discounted to calculate a project's value. Based on going concern and zero inputs at the end of the project life, the SPV valuation includes only free cash flow assumptions and (Weighted Average Cost of Capital – WACC) calculations assumptions.[10] The weighted average cost of capital (WACC) is the approach implemented to define a discount rate in case if a project is financed using debt and equity financing. As a rule, the higher proportion of debt a company has, investors require a higher return on equity – they expect a higher return from the risk project, and credit burden increases the risk on the company. [5] The capital asset pricing model (CAMP) is based on the idea that the expected return rate is defined by the particular type of activity an SPV performs.[3]

Practically return on equity based on the CAMP model is calculated as a sum of the risk-free rate and risk premium rate multiplied by the beta coefficient. The risk-free rate is measured by the U.S. government bonds return rate, which is considered risk-free or risk minimum. Premium rate, in turn, is the difference between the return on the market portfolio and the return on government bonds. The market portfolio's beta coefficient is generally measured as 1, and other assets are compared to 1. Beta equals more than one if the project is riskier than the market and, thus, should secure a higher return. Beta equals less than 1 earn less than the market return. Risk premium and beta can be found in various market reports, mass media related to the financial market fluctuations, etc. [3]

The enterprise valuation model, or, company's equity value = value of company's operations minus the value of debt and other liabilities. Furthermore, there are basic steps of SPV evaluation, which can be rather reviewed as a case study.

The basic parameters of a concession agreement have to be considered when evaluating an enterprise (SPV) value: regulating authority; the duration of a concession period; government incentives, future prices on the product generated by SPV.

Basic parameters of a supply agreement. The mutual positive effect of product purchasing agreement and supply agreements merging helps secure an SPV's gross income stream.[10]

The project's target capital structure.

Almost every project requires an optimum balance between borrowed and equity capital to satisfy lenders' and sponsors' interests. Investors seek a finance structure design that would create more value in frames of limited sources. Each large-scale project is usually financed via its unique/individual combination of:

- equity capital (usually in the form of shares), bond finance (a typical long-term agreement between the borrower and bondholder / SPV, according to which a bondholder pays a series of coupon payments during the agreed term and also repays the bond value at the end of the term);
- senior debt and
- subordinated debt (sometimes provided in the form of mezzanine finance; mezzanine finance / subordinate debt; may be considered as the equity finance to calculate Debt – Service – coverage Ratio / DSCR; can be converted to equity in case of a project's success, is used by insurance companies and pension funds). [7]

Equity capital is initially not secured and, therefore, is riskier than the borrowed capital. In case of the event of a default, equity holders have no registered rights to claim on any asset. At the same time, in the case of the success of a project, the value of shares increases, and shareholders have a right to get a compensation/bonus in the form of dividends (after debt claims were fulfilled). Due to the risk nature of equity capital, its price is usually higher than the debt one (in other words, investors require higher return rates). A high proportion of equity signals in a project finance structure show that the project is riskier, but potential returns on equity / available for distribution part of retained earnings are higher. This structure is characterized as low financial leverage. [7]

The borrowed capital often takes the biggest portion of funds in a project finance deal. Debt falls into two categories – senior debt and subordinated debt. Senior debt has the priority to be repaid in case of default. Debt also can be divided into secured and non-secured. Secured debt has an additional guarantee, and pledged / collateral assets secure its return. In case of default, assets can be converted into cash under the court proceedings. In case of financial difficulties, loans (both secured and unsecured) have to be repaid prior to dividends. Therefore, the price of debt capital is usually lower than equity capital. Borrowed capital is presented not only in the form of commercial loans but also in bonds. The main bond markets are in Germany, Japan, the United Kingdom, and the United States. [7]

There is a third type of capital source, which falls between debt and equity, and, thus, it has some features of both previous types in the capital structure. Mezzanine finance can be presented in the form of private equity, bonds, preferred stock, or their combination. [7]

It's obvious that large-scale infrastructural construction projects are rarely financed only with one type of capital. Equity capital is limited, but there is often a question about the exact percentage of the debt capital required for the project's execution? The great portion of debt demands the project to generate enough cash to serve it. When serving a proportionally big loan, shareholders may face the situation when there are no cash/earnings to pay dividends. Initially, it was assumed that equity holders expect dividends to be repaid regularly. It was a fundamental condition of investment. From the other point of view, more significant interest payments (when serving a debt) help reduce a taxable income base and, therefore, optimize tax payments and save the equivalent amount of cash. At the same time, a lack of borrowed funds may create a lack of finance. Therefore, the project does not meet the necessary power/capacity/ other characteristics to become profitable. All the above-mentioned aspects must be taken into consideration when adopting investment and capital structure decisions.[7]

The debt-to-equity ratio and debt-to-assets ratios, which identify the existing proportion unique to every project. These ratios impact the SPV / project's profitability – earnings after tax per share divided by the number of shares, the market value of the project's assets, and the cost of the project's capital. [3]

Cash flow modelling for the project finance.

There is an important principle when estimating a project's cash flows is that they must be measured at the time they actually occur. For instance, expenses or cash outflows must be taken into account when they have to be paid, not the time such expenses are recorded. It's also important to keep in mind that there is often a time lag between revenues and expenses reported in accounting financial statements and their actual appearance.[3]

This principle is also applicable when estimating future prices and costs, which are different from today's prices and costs. In other words, future cash flows have to include anticipated inflation. Moreover, inflation rate adjustment has to be included in Net Present Value (NPV) calculations and a project's Internal Rate of Return calculations. Inflation considerations are helpful for the accurate estimation of the project's cost of capital.[3]

Moreover, a project's expected cash flows must be measured in the same currency.

A successful cash flows estimation is highly dependent on initial contractual commitments between different project stakeholders. Such contracts create a sort of guarantee that there will be a reliable opportunity to get a required return on invested capital.

As a rule, construction projects usually include three major stages: project appraisal, project implementation, and project operation. The idea is that the future inflows and outflows are spread over these stages. Certain enlarged items have to be included in a cash flow modeling (as an example, depends on the capital structure, project type, and type of finance): expected revenues, expenses, net cash losses, assets, liabilities, debt service payments, dividends on equity payments (if applicable), the coupon rate on bonds repayments, tax payments, and so on. Project cash flows usually estimate on an annual basis during the project life cycle. Therefore, stakeholders generally consider a project's cumulative cash flow – calculated by adding the cash at the end of each year.[3]

The project's initial cash outflow may include the following positions:

- the cost of the assets acquired to start the project;
- various setup costs, including shipping and construction costs;
- an additional working capital is required to support the operational phase of the project.

The cash flow for the last year of any project, its terminal cash flow, may include the following items: the net cash flow the project is expected to generate during the terminal year; the recovery of the project's working capital requirement; the after-tax resale value of physical assets acquired earlier in relation to the project; any capital expenditure and other costs associated with the termination of the project.[3]

The Return on invested capital (ROIC) and a 'hurdle rate' concept.

Before the management decision is made, investors ask themselves if the project is worth to be invested in. To answer, there is a measure, which helps to estimate the potential after-tax profitability generated by the project (ROIC). ROIC is aimed to measure the project's total capital, including equity and borrowed one. Therefore, the measurement uses after-tax operating profit before interest under credit agreements are repaid. After-tax operating profit at the end of the particular year is divided by the amount of year-end invested capital. The other idea of estimating the potential ROIC is to determine if the SPV, being a project company, becomes valuable while carrying out its activity. ROIC

has to be compared with WACC (cost of total capital employed). If the ROIC overcomes WACC, the project is value-creating. The difference is a return spread, which, preferably, has to be positive, and that means that the project overcomes required returns.

Investors also describe the project's ability to create value as a combination of three key elements: SPV's ROIC, the project's WACC, the project's ability to grow. [3].

Upon calculating a return spread based on returns and cost of capital, there is a consequent question, if the number obtained is sufficient or not? The concept of a so-called 'hurdle rate' may answer. 'Hurdle rate' is a minimum return under which the investor is ready to invest. In a capital constraint environment, hurdle rate assumes the time value of money, inflation risk, and volatility [5].

CHAPTER 3. The analytical reports' analysis, which are relevant for small-to-medium size companies.

Key words: drivers – turnover – investment conditions – macro-economic conditions – migration – ageing – house price index -digitalization -energy savings – carbon emissions – infrastructure – public spending – technology – safety - compatibility

This Chapter presents main findings regarding construction companies' financial analysis in the SME segment. The study is based on a thorough investigation of thousands of SME construction companies, including official statistics data, financial reporting, and management interviews. It's important to mention that the SME sector plays a key role for Europe, with about 80 percent of the overall turnover. Companies with less than 250 employees make up to 99 percent of the total input. For Instance, in Germany, SME companies' share is 75 percent, and they focused on residential /renovation and commercial types of projects. [13] [14]

The macro- drivers for investment in construction.

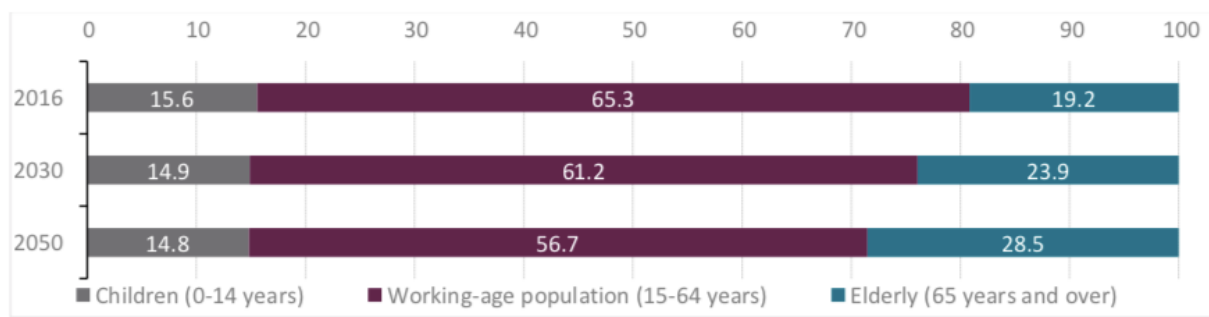
Macro-factors don't directly impact the SME companies' ability to obtain capital but create special circumstances, which affect all the market participants to stimulate project development and financial growth. As of today, the financial standing of the construction enterprises in the SME segment and the availability of external financial resources at reasonable prices depends on the following key macro- factors:

- domestic economy growth; which is measured as the percentage of increase of Gross Domestic Product (GDP); since 2015, most of the European countries demonstrate

stable GDP increase mainly due to the recovery from the financial crisis, consequent private consumption growth, and the unemployment decrease; moreover, the forecast is also positive, even though COVID 19 outbreak worsened that gradual trend;

- demographic change; traditionally EU has experienced low-to-moderate population growth over the last decade, but some countries, such as Germany, Italy, Finland, Austria, are affected by the growing migration trend; at the same time, the share of working population over the EU is forecasted to drop down to 56,7 percent by 2050, and the share of elderly will increase at near 9 percent in more than a half of the EU countries;

Figure 3. Population projections from the age groups by 2050.



Source: Catharina Hillenbrand Saponar, sector advisor for Energy, Metals, Machinery and Equipment. (2020). 'Allianz and Euler Hermes Research. Construction companies in Europe: size does matter'.

housing demand; people tend to move to the large cities, and the trend is valid almost for all the EU countries, especially for Northern European countries, Germany and Luxembourg; European house price index continues to grow, and it brings a positive impact on the investment climate; favorable investment conditions, in turn, create additional options for capital injections in construction companies;

- energy efficiency & renovation demand; the increasing trend for energy-efficient buildings force the demand to renovate the existing buildings in order to reduce the negative impact of carbon emissions and increase energy savings; currently, almost all EU countries faced the residential building stock age problem, which leads to the poor energy performance;

- maintenance needs; the aging infrastructure and the growing population creates the necessity to increase maintenance costs and public spending on repair works;

Innovations; which help increase capital and labor productivity significantly and, at the same time, reduce risks and costs of construction projects. Innovations have a global

meaning and positive effect on different aspects of the industry: digitalization, the use of new materials and technology, environmental compatibility.[14]

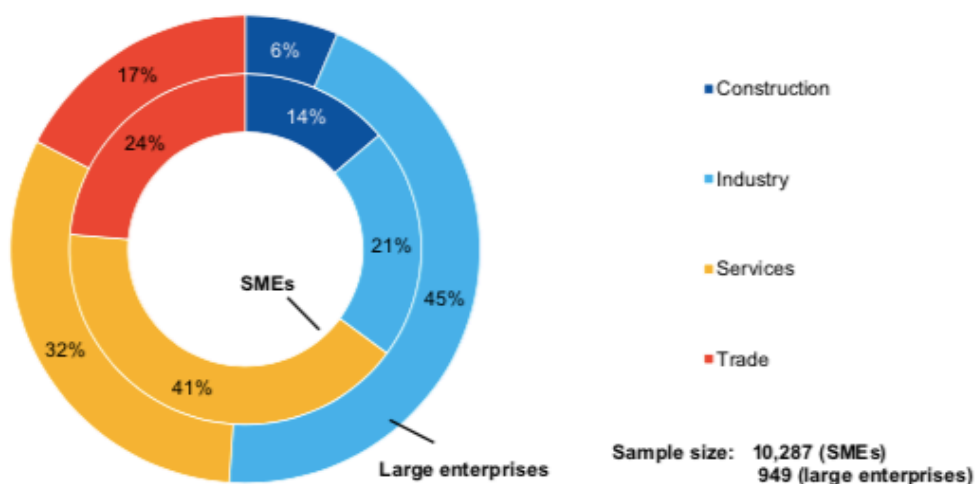
The obstacles managers meet when seeking for external financing. The existing risks and required returns.

The Survey on the Access to Finance of Enterprises (SAFE) describes the environment in which large and SME (small and medium-sized) European companies operate, estimates their need for financial support, and the current availability of external funding. The content covers the period starting from October 2019 to March 2020. The document was prepared based on a colossal sample size and included 10,287 (SME's) companies and 949 large enterprises. For the large companies, the percentage of construction companies equals 6%, and for the SME's – 14%. [13] [14]

Figure 4. The Breakdown of enterprises by sector.

Breakdown of enterprises by sector

(unweighted percentages)



Base: Figures refer to round 22 (October 2019-March 2020) of the survey.

Source: Catharina Hillenbrand Saponar, sector advisor for Energy, Metals, Machinery and Equipment. (2020). 'Allianz and Euler Hermes Research. Construction companies in Europe: size does matter'.

Overview of the survey results.

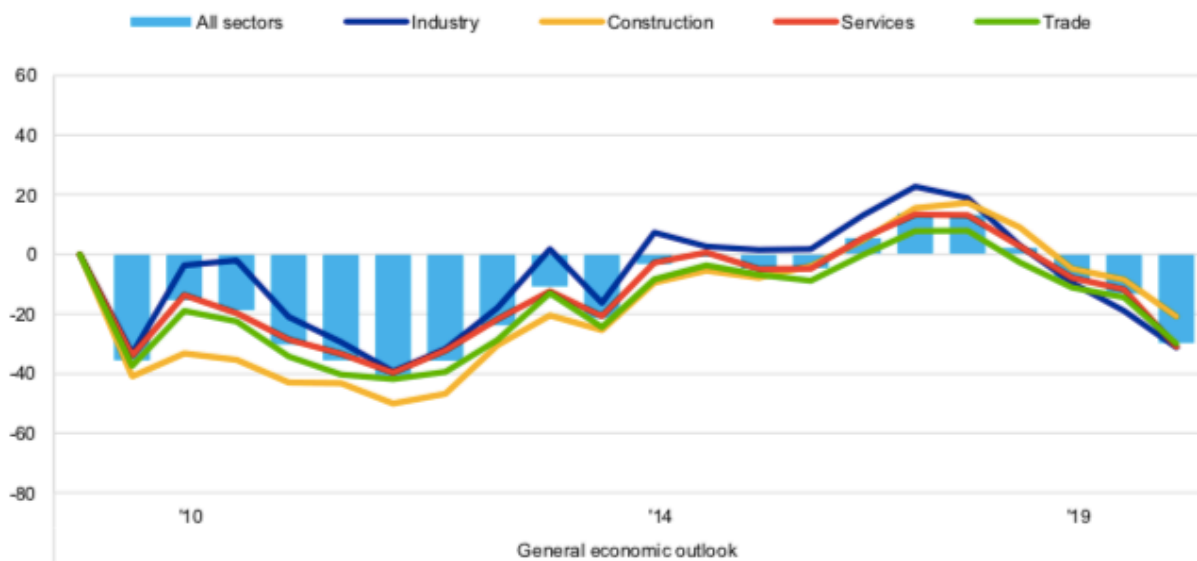
Despite relatively favorable financing conditions and funding availability, SME companies admitted their weaknesses and profitability in deteriorating macroeconomic outlook frames.

However, such deterioration varies significantly between countries and spreads over the industry, construction, services, and trade sectors, reviewed in the survey. The worst situation is fixed in Italy – 37 percent deterioration, and in Spain – 33 percent. The overall decrease for the euro area is 21 percent. The current situation in each country depends on measures the governments undertake to fight the pandemic. [13]

Figure 5. Change in the general economic outlook affecting the availability of external finance for euro area SMEs across the main sectors

Change in the general economic outlook affecting the availability of external finance for euro area SMEs across the main sectors

(over the preceding six months; net percentages of respondents)



Q11. For each of the following factors, would you say that they have improved, remained unchanged or deteriorated over the past six months?

Base: All SMEs. Figures refer to rounds 1 (March-September 2009) to 22 (October 2019-March 2020) of the survey.

Source: (October 2019 to March 2020). 'Survey on the Access to Finance of Enterprises in the euro area' by European Central Bank.

Both large and SME companies (though percentage rates vary) named the following essential factors when conducting their business and setting up prices for their own product/services:

- uncertain demand for their own production; this factor was acknowledged as the most important one by 60% of companies, both large and SMEs; the factor reaches its maximum for Germany, though, it is pretty low for France;
- growing labor costs; this factor is consequent to the first one, and, therefore, brings the almost the same level of importance for each country;
- Input costs (raw materials, energy costs, etc.);
- Market prices and market shares; for approximately 50 percent of companies, this factor was appeared very important as well;
- Expected inflation rates; this factor is essential for small or even micro-size companies – near 37 percent, but only 17 percent for large companies);
- financing costs;
- currency exchange rates.[13]

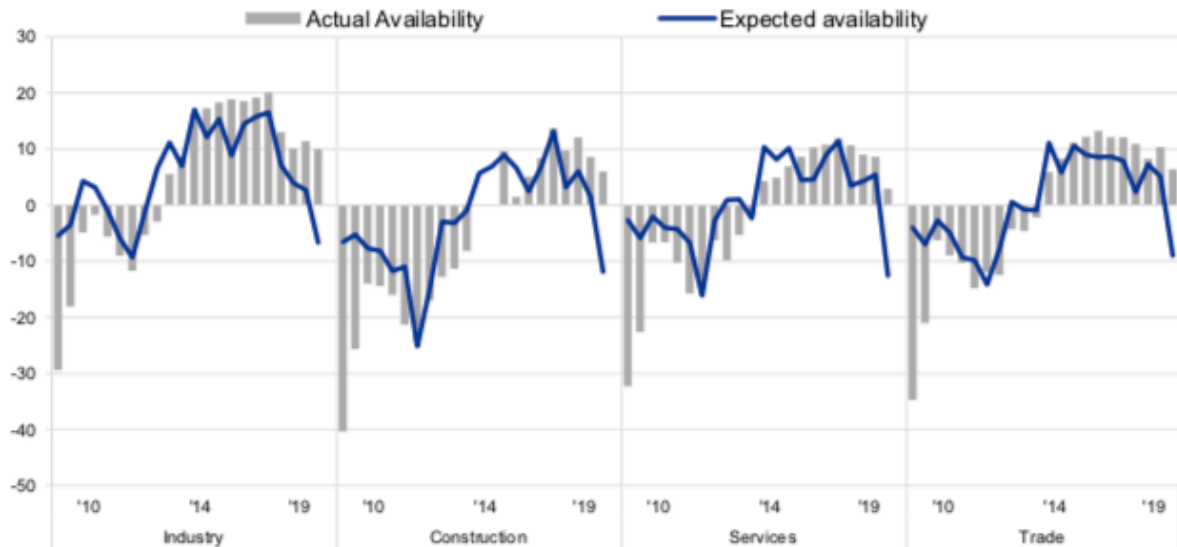
SME companies' expectations regarding access to the external finance.

The necessity for external finance increased during the coronavirus pandemic, especially for SME companies in all sectors due to the lack of liquidity and raising working capital requirements to execute short-term mutual obligations. Even though banks' policies aimed to support business initiatives across industries and across countries, expectations among companies are moderate or rather negative. Companies reported that their projections on future access to financial sources tend to worsen in a short-term perspective. Though the fact, that a negative outlook is common for the whole sector, the degree of deterioration varies. The companies in the construction sector expect a 12% deterioration. As for the countries, Italian SMEs predict a more significant decline in all sectors than average euro area averages, especially in construction and services sectors – 16 percent decrease per each. For Spanish SMEs, the projected reduction in the construction sector is expected as minus 17 percent.[13]

Figure 6. Change in the actual and expected availability of bank loans for SMEs across sectors

Change in the actual and expected availability of bank loans for SMEs across sectors

(over the preceding six months and over the next six months; net percentages of respondents)



Q9. For each of the following types of financing, would you say that their availability has improved, remained unchanged or deteriorated for your enterprise over the past six months?

Q23. Looking ahead, for each of the following types of financing available to your enterprise, please indicate whether you think their availability will improve, deteriorate or remain unchanged over the next six months.

Base: SMEs for which the respective instrument is relevant. Figures refer to rounds 1 (April-September 2009) to 22 (October- March 2020) of the survey.

Source: (October 2019 to March 2020). 'Survey on the Access to Finance of Enterprises in the euro area' by European Central Bank.

Recovery perspectives according to the project types in frames of recent demand fluctuations. Experts estimate large companies' perspective to recover from the crisis as more optimistic than SME's. Recent demand changes caused by the COVID-19 crisis and the growth of remote working may increase the development of massive residential construction outside big cities. Customers require spacious accommodations at lower prices. This trend, in turn, may launch new infrastructural projects necessary to develop new locations. This trend is beneficial mostly for the extensive development and construction companies that may become major beneficiaries.

Office and commercial premises. Both these projects have suffered from the crisis, and their recovery depends on future economy macro- economy requirements. However, the probability of commencing new projects related to office and commercial spaces is considered low in a short-term perspective. The positive aspects of the situation are a carbon footprint reduction due to the less office area occupation and the decrease in transportation usage. The hospitality sector will probably face a significant rollback as

well, and its recovery is subject to government regulations of tourism activity and traveling guidelines/permissions and climate change issues. Infrastructural and large-scale public projects will first and foremost benefit due to the long-term characteristic of such type. Moreover, this type of project is usually referred to as energy infrastructural projects, national healthcare projects, and the demand on them is not affected by temporary lack of activity. Although SME types can join such projects as subcontractors, the profitability difference will be large or remain the same in frames of the best-case scenario.

In general, governmental support policies are firstly aimed at large-scale companies. Although some countries establish public tender processes to maintain small and medium-sized construction companies, its benefit appears uncertain in practice. [14]

Before the COVID-19 crisis and restrictions, despite the common opinion that commercial banks are not interested in funding small and medium-size enterprises due to high credit risk, banks, in turn, establish procedures and risk-management approaches to increase their SME portfolio. SME companies seem interesting clients and profitable investment opportunities for large, multi-service banks. There is a resulting collaboration between governments and banks aimed to support SME companies. Firstly, because of engagement of large and even international banks with their standardized tools for risk-rating and risk-assessing tools, developed to serve the SME sector. Secondly, due to different types of credit products for SME companies: asset-based lending, factoring, fixed-asset lending, and leasing. Thirdly, different products and services proposed by major banks for SMEs and banks' holistic approach place cross-selling at the heart of mutual collaboration. [5][14]

CHAPTER 4. Project finance case studies' analysis.

Case study 1. Infrastructure project finance. The Hong Kong Western Harbour Crossing (WHCC). The reasons of failure. Financial package assessment and final assessment to determine project commercial viability.

Key words: Built-operate-Transfer concept – Internal Rate of Return – Memorandum of Understanding – Toll Adjustment Mechanism – equity and debt balance – funding sources

The introduction to the project / project background / project history.

Until 1997 Hong Kong was a United Kingdom colony, and, therefore, methods, approaches and legislation studied under the case study are British. The United Kingdom, in turn, was a member of EU until 2020.

Initially, the WHC construction was part of the Hong Kong Governmental Airport Core Program (ACP) and nine other mega infrastructural projects, such as highways, bridges, and tunnel links, to serve Chek Lap Kok International Airport. The program was launched in the 1990s, and the WHC was completed in 1997. The WHC also becomes the third Victoria's Harbour crossroad aimed to reduce the working load at Cross Harbour central Tunnel (1972) and Eastern Harbour Crossing (1989). Upon its completion, the WTC became the longest cross-harbor road in Hong Kong. [19]

Table 2. Project parameters.

No. of Traffic Lanes	three lanes in each direction
Projected maximum daily traffic capacity	Maximum 180,000 vehicles per day
Tunnel length	near 2 km, between West Kowloon and Sai Ying Pun
Speed limit	80 km/h
Estimated Life span of the Tunnel Structure	120 years

Source: www.westernharbourtunnel.com

Construction company/ SPV/ franchise holder / project's general manager.

Western Harbour Tunnel Company (Co, LTD); SPV owners are China International Trust & Investment Corporation Hong Kong (Holdings) Limited (CITIC HK), CITIC Pacific (CITIC Pacific, the largest investor in Hong Kong's harbor tunnels), and Kerry Holdings (Kerry) both incorporated Adwood Company for the investment purposes, which hold 50 percent of shares in an SPV's capital structure), the Cross Harbour Tunnel (Holdings) Ltd. (37 percent of shares in a capital structure) and China Merchant Holdings Ltd. (International), 13 percent of shares; incorporated in 1992. [19], [20]

A legal form of collaboration between government (public sector) and private investors.

A 30-year franchise was granted to a feasible build-operate-transfer (BOT) project model; the company got the right to design, construct, operate and maintain the tunnel for a concession period of 30 years. The involvement of private finance helped the Chinese government execute the construction project, including the asset's handover at the end of the maintenance phase, and relocate funds to construct 150 standard-size primary schools, 28 thousand public housing units, or 125 secondary schools. [7] [20]

Table 3. Franchise agreement's parameters.

Franchisee	Western harbour Tunnel Company Limited
Franchise Period	30 years, including the construction phase
Construction phase duration	August 1993 until April 1997 (45 month)
General contractor	Nishimatsu Kumagai Joint Venture

Source: www.westernharbourtunnel.com

Corporate functions of the SPV: the way how the project runs. Legal viewpoint.

In some cases, the SPV's economic activity may cause additional concerns regarding its legal and functional nature. From the legal point of view, the SPV is the enterprise and, as the owner of the project initiative, the company, which poses all assets and accepts all liabilities. Moreover, the SPV contains all relationships with the project's stakeholders, including all financial and legal transactions. Therefore, the project company acts as an entrepreneur. However, in practice, it is not fully correct. The main reasons, which restrict the SPV's activity are as follows:

- internal costs have to be fixed or vary only in a certain range;
- functions of the company are outsourced, and outsourcers were asked to achieve a pre-agreed goal; there are KPIs established to measure if the targeted numbers/levels are achieved; contracts with outsources can be terminated if the targeted level were not achieved.

This structure is the only way to obtain financing with extremely high debt-to-equity ratios. The level of outsourcing, costs and risks transparency make an SPV a tool to accumulate cash flows for debt repayment. [7]

The scope of feasibility studies (Hyder Consulting).

Engineering feasibility, including traffic requirements assessment and interchange networks at each landfall assessment; drawings report to evaluate the orientation and the form of the crossing; the land and marine site investigations, the Outline Zoning Plan was also reviewed when the project was planned; the financial analysis aimed to estimate financial aspects and their viability from both public and private perspectives; the environmental impact assessment to measure the probable effects on environment and actions aimed to mitigate negative impact. [19]

Project's stakeholders / major players engaged in the preparation, implementation, and operation of the WHC project.

Government bodies and departments: Joint Liason Group's airport Committee, which involved British and Chinese government representatives; the Committee was appointed to review and approve infrastructural and financial issues before the project's start; Hong Kong Legislative Council, which was responsible for the toll adjustment mechanism adoption; Highways Department, the organization empowered to carry out daily project management duties during the whole construction period – the approval of contractors' reports, dealing with utility companies; Transport Department responsible for long-term transport strategy and traffic volume projections; Consultative Committee established purposely for the different matters related to the new airport projects, but with no decision-making power; New Airport Projects Co-ordination Office (NAPCO) responsible for the providing simultaneous operations under all ten Airport Core Program (ACP) projects; Financial and Institutional Coordinating Committee (FINSCOM) an organization set up to supervise the financial aspects; Environmental Pollution Advisory Committee (EPCOM) responsible for the pollution control actions' implementation and environmental sustainability; Transport Advisory Committee responsible for the approvals regarding major transport-related projects; Local / District councils, which aimed to perform the same support -related actions on a local level; Mass Transit Railway Corporation (MTRC) for both projects coordination (the rail way construction, which goes in parallel, and the tunnel's construction); Marine Department responsible for the coordination of dredging works, placement activities, and backfilling works; Agricultural and Fisheries Department engaged to carry out temporary product market; Agricultural Services Department. SPV. Western Harbour Tunnel Company Limited took the concession permission until August 2023. Upon ending the concession, the company has to transfer the object back

to the Hong Kong government at zero cost. The construction period was agreed to accomplish within 48 months and there was an agreement to maintain debt-to-equity ratio at 69:31 as of the date of the operation's phase starts. Main responsibilities of the SPV included the arrangement of project financial structure, the establishment of reporting proceedings (progress reports, financial reports and so on), future operation and maintenance of the tunnel, the establishment of employment policies and employee's training.

The contractors and construction coordinators. NKJV - The joint venture of Nishimatsu Construction company Ltd. and Kumagai Gumi Company Ltd.; NKJV, in turn, hired Gammon Construction Ltd., to execute civil works and GEC Hong Kong Ltd. to carry out design, manufacture, installation, and commissioning of MEP works; as a general contractor NKJV was responsible for hiring a project manager and the project management team under its supervision; NKJV also agreed with MAPB Joint Venture, which performed design works, including tube work design, road work design, toll plaza sections design, and the design of 2 ventilation buildings. Scott Wilson Kirkpatrick (SWK) was employed to check design and construction works as an independent engineer and appraiser. The checking process continued during the whole construction phase. Ove Arup & Partners were involved in reporting and submitting to the board of WHCC as a project coordinator. Its area of responsibility covered both design and construction issues, cost and progress coordination. Hyder Consulting Ltd., which combined several consulting companies in the form of the joint venture, and which performed a diversified feasibility study of the project. GEC (HK) Limited was engaged to check the MEP design standards execution. Pioneer Internationals exclusively produced a special concrete mix to construct the approach roads, the cut and cover tunnels, and the ventilation building. Financial advisors and the Insurance companies. HSBC became the stakeholder, which arranged the private sector type investments into the project; the syndicated credit aimed to finance contract price, operating costs, and working capital under the project. Barclays de Zoete Wedd, being a subsidiary of Barclays Bank Plc, was employed by the government as a financial adviser for the project. Jardine Construction Insurance Services, Allianz Group of Germany, and SCOR of France were responsible for implementing insurance policies, which would cover all design and construction-related risks for the contractors and third parties. [7][19]

The financial structure of the project as of the beginning of operation phase (upon the completion of construction, SPV's balance sheet).

The financial model of the project had been approved before 1997 when the sovereignty of Hong Kong was returned to China. The project's SPV signed the syndicated non-recourse loan agreement with the 22 banks in November 1993, including major credit institutions: Hong Kong & Shanghai Banking Corporation Ltd., Fuji Bank, Industrial Bank of Japan Ltd, the long-term credit bank of Japan Ltd., The Mitsubishi Bank Ltd., The bank of Tokyo Ltd., ABN AMRO Bank NV, Credit Suisse, Société Générale Asia Ltd., Tokai Bank Ltd.

Credit limit was approved in amount of HK\$ 5.2bn for 15 years. The purpose of credit: various cost finance including contract costs, operating cost and interest during construction phase.

Figure 7. The funding structure of the project.

	HK\$ million
The cost structure	
Total contract costs	6,004
Provisions	328
Pre-operating costs	73
Interest paid during construction	1,007
Fees and commissions	122
Total costs	7,534
Shareholders' equity funding (32% of total financing)	
Adwood Company (CITIC Pacific and Kerry Holdings Joint Venture)	1,216
Cross Harbour Tunnel (Holdings) Ltd.	900
China Merchant Holdings Ltd. (International)	316
Total Equity financing	2,432
Syndicated bank facility (68% of total financing, obtained in a form of a syndicated limited-recourse project loan)	5,102
Tranche A (project's cost financing, 15 years long-term facility)	
Sub-tranche A (term loan, maturity date before the commencement of the operation and maintenance phase)	
Sub-tranche B (revolving credit facility)	
Sub-tranche C (revolving letter of credit & guarantee issuance facility)	
Tranche B (INCL. SWAP facility to hedge the interest rate of 50% of the loan facilities for the period up to 5 years)	

The sub-tranche B was approved as optional in frames of a credit limit. Basically, it meant that the option to utilize the sub-tranche B was only allowed after the repayment of the sub-tranche A. The utilization of the tranche B (swap hedging agreement) helped to fix

interest rate of at least 50 percent of loans over the period between 2 and 5 years. Therefore, the risk of unfavourable interest rate fluctuations was mitigated.

Total (debt + equity)
7,534

Source: UCL project profile, Hong Kong, West harbour Crossing, Centre for Mega Projects in Transport and Development; The Asia Case Research Centre at the University of Hong Kong in frames of Project Finance for Construction and Infrastructure: Principles and Case Studies.

The projected revenues and Toll Adjustment Mechanism.

According to the initial concept of the project, the main source of revenue would become toll payments. There was the entity, The Western Harbour Crossing Ordinance, incorporated for the purpose of inventing and implementation toll adjustment mechanism as an alternative to price cap regulation (sets a cap on the final price the utility provider can charge; bases on various factors such are production inputs, energy savings or inflation; and stands in contrast to the rate of return regulation measure and revenue cap regulation). The company was also responsible for the revenue projections. The toll adjustment mechanism would help to increase control over the financial cash flow generated by the project. The purposes of the adjustment mechanism were as follows:

- to achieve cash sufficiency for the debt repayment;
- to provide a return on investment to the shareholders (equity holders); a toll adjustment mechanism would provide the ability to maintain projected IRR between 15 and 18 percent;
- to arrange better control to cover cost inflation, decrease the grade of the uncertainty of potential cash flow and return rate;
- to maintain affordable toll rates to satisfy community interests;
- to minimize the risks of public disputes caused by toll increases; however, legislators protested due to lack of control over toll increases, excessively high IRR of 16,5%, and the fact that the government forced them to approve questionable and unreasonable franchise terms.

The mechanism contained six major scheduled dates on which the Western Harbour Crossing Ordinance established a toll increase: Jan 1, 2001-2021. It also included regular toll indexations and toll insurance funds. The insurance fund was established in order to recover the cash deficit and helped to secure scheduled interest payments. The three

levels of future net revenue amounts were estimated and defined as a minimum, upper and maximum. Net revenue was determined as the difference between the gross revenue and interest and operating costs. If the factual net revenue amount reached a level, which lay between earlier predicted upper and maximum levels, the company (SPV) had to save nearly 50 percent into the fund of the amount exceeding the upper estimated level. If the passengers' flow was high enough to exceed an earlier estimated maximum level of the net revenue, then the SPV had to save 100 percent of a surplus. What is more, the remaining 50 percent of the amount lay between the upper and maximum ones. Suppose the net revenue generated by the tunnel was less than the upper estimated level. In that case, the SPV could release its right to increase the toll rates in frames of the anticipated calculations. [7][19]

Construction phase and construction related issues.

In general, based on the various interviews of the project stakeholders carried out during the construction phase, it was agreed that WHC was an outstanding infrastructure object for Hong Kong from both engineering and technical perspectives.

The access roads to WHC: elevated bridges in Sai Ying Pun on Hong Kong island and tunnel approaches. Overall, the project included 17 bridges and access roads connected with the existing road network. Overall, it required forty-three months to accomplish construction works. Because the construction of roads was carried out near the heavily populated residential district Connaught Road West, numerous measures were undertaken to reduce construction noise down to the tolerable level and prevent dust spreading. Moreover, the construction required considerable traffic and public utilities redistribution to combine the road pattern. These additional works had been accomplished prior to the major construction phase commenced making the site available. [21]

Table 4. WHC key technical characteristics can be found in the following table (the tunnel approach at Sai Ying Pun).

No. of ventilation building	1 unit (45m diameter)
Length of cut and Cover tunnel	355.5m
Length of open Ramp	134m

Sai Ying Pun Interchange:

Length of Ground Level Roads	3,000m
No. of Traffic Control Point	1 unit

Route 4 (Sheung Wan to Belcher Bay)

No. of Bridges	17 units
Elevated length	3,230m
Paved Deck Area	43,000m ²

Source: UCL project profile, Hong Kong, West harbour Crossing, Centre for Mega Projects in Transport and Development; The Asia Case Research Centre at the University of Hong Kong in frames of Project Finance for Construction and Infrastructure: Principles and Case Studies.

The immersed WHC tunnel. The tunnel contained the simultaneous construction of 12 precast units fabricated in three batches of four in a casting basin. Units were arranged together in an L-shape layout. Each unit amounted to 12,400 cubic meters of concrete and 2,500 tones of steel (reinforcement). Every four units were cast at the same time. The first batch was drawn into position in march 1995, and the last one – in April 1996. In order to secure the casting, the entrance channel to the casting basin was closed by the floating caisson gate to continue the fabrication of the second batch. The units were put into a specially prepared pit drawn from the harbour bed, from which marine sand was removed and replaced with sand up to the proper tunnel level to reimburse the transmission. When all the batches were accomplished the basin was flooded, and the units were pulled to the temporary station for the final fitting before the delivery to the harbor. Meantime, the high-volume logistics operations through the marine required normal shipping fairway transformation to continue the units' setup. [20]

Table 5. The immersed WHC tunnel's parameters:

Total Length	1,363m
Size of Each Unit	113,5 m (L) x 33,4 m (W) x 8,57 m (H), weighting 35,000 tonnes of average

Source: www.westernharbourtunnel.com

Cut-and-cover Tunnel and Ventilation buildings. The project comprised two identical ventilation buildings located at the West Kowloon and Sai Ying Pun. RMJM was responsible for their architectural performance and met the high technical and environmental protection standards established by the Government-controlled entity

responsible for advisory issues under highway projects and correspondent facilities (the Appearance of Bridges and Associated Structures). Thus, the project included the mounting of sunscreens and surfacing works to decrease heat absorption and reduce glare effects.

Toll plaza. Basically, the project counted twenty toll lanes and four additional lines, which can be utilized optionally, depending on the traffic flow, in both directions. Moreover, at least eight lanes were equipped with automatic toll collection mechanisms. There were also public transportations facilities: two separated bus lanes at either side of the tunnel and the pedestrian footbridge across the wide toll plaza area. [20]

Table 6. The toll plaza's parameters.

No. of Toll Lanes	20 lanes (4 reversible to provide 12 toll lanes traffic in one direction at peak hours)
Speed Limit	50 km/h
No. of Footbridge	1 unit
No. of Bus Interchanges	2 units (on both sides of the Toll Plaza)

Source: www.westernharbourtunnel.com

Administration building. The building is located at the east side of the open ramp near the toll plaza and has three stories and looks like an oval-shaped form building. The construction was carried out based upon a sustainable development concept, and contemporary environmental design methods were implemented. For instance, solar control features fitted on all windows of the building aimed to reduce the air conditioning system's burden and improve exterior vision. [20]

Table 7. Administration building's parameters.

Administration building	3 storeys with the total gross floor area of 4,280m ² including the central control room
Length of cut & cover tunnel approach at West Kowloon	251,5m
Length of open ramp	164m

Source: www.westernharbourtunnel.com

The competitive landscape.

The initial governmental idea of WHC was to decrease the traffic overflow throughout the Cross Harbour Tunnel. However, despite providing an alternative way of crossing the harbor, WHC could not successfully compete with the existing facilities. The main reason that led to the project's inability to compete was the combination of the highest toll and moderate location. Earlier constructed Cross Harbour Tunnel and Eastern Harbour Crossing were performed in different economic conditions, had other technical and engineering models, and were managed by different operators, which established tolls based on their own forecasts and cash flow models. WHC was an initially expensive and risky project, and, consequently, investors expected higher risk premium returns. Higher return rates could not be achieved without specific toll prices. For instance, the beneficiaries of the Cross Harbour tunnel could maintain the lowest tolls due to the termination of the concession agreement with the government (the asset was returned to the government). Every toll increase at WHC resulted in the rise in traffic at both Cross Harbour Tunnel and Eastern Harbour Crossing. The government, in turn, could implement toll price adjustments that were not available for the WHC (annual inflation rate adjustments, for instance). The vicious circle cannot be quickly resolved, and the project's year-o-year financial performance remained poor. Moreover, based on the interviews of tunnel daily users, it took more time to pass through the crowded city center to reach the tunnel's entrance, whereas a straightway took less time and effort. [7][19]

Factual financial standing of the SPV during the operational phase.

The financial performance of the project / financial standing of the SPV company was strongly connected with the lack of daily passenger flow throughout the tunnel. As of the end of July 2006 (based on the last financial statements available and provided by the SPV), the daily factual traffic was near 43 thousand vehicles, whereas the estimated volume was at 118 thousand vehicles. The project's owners undertook several attempts to increase traffic flow, such as Midnight Empty Taxi promotion, Midnight goods vehicle promotion, Fantastic holidays, etc. They also applied technics to raise money from a non-core business, such as installing outdoor advertising billboards and telecommunication antennas. Moreover, the SPV company could extend loan agreements due dates and enter into a swap agreement to minimize currency risks. The measures described above provided a positive impact on financials – the SPV could report a profit after tax of HK\$299

mln., a nineteen percent year-on-year growth. The market share of the SPV company increased up to 19% as well. However, the improving financial performance did not meet the high expectations of the project's investors. Despite the positive trend and gradual increase in numbers, the SPV could not meet the targeted Minimum Net Revenue over the years during the operation phase. As of the same date, July 2006, the project's IRR remained negative at 32,48%, which practically meant that the project was not worth to be invested in. As mentioned earlier (in a literature review section), IRR can be considered as a measure of the profitability of its expected cash flow before estimating the project's cost of capital. In addition, the project's operating profitability (measured by IRR) did not exceed the project's weighted cost of capital (which had a positive number), and, therefore, the project, in fact, did not create any value. [7][19]

Traffic capacity, expected and reported traffic volumes.

As mentioned earlier, the cash flow model aimed to predict the project's profitability over the years was based upon traffic forecasts. These forecasts, consequently, defined the overall way of the project's funding and persuaded creditors, public and private investors, to contribute. According to the feasibility study, fulfilled prior to the project's commencement, the average daily traffic capacity was approximate 165 thousand Vehicles per day. WHC tunnel is expected to facilitate up to 75 thousand vehicles per day during the first year of the operational phase. The WHTCL Chairman foreseen the volume be reached at 75 thousand levels. The gradual increase of the daily traffic volume was also taken into consideration by the project's stakeholders. However, the reported traffic volume during 1997, the first year of operations, and the whole operations stage appeared to be times lower. For instance, the traffic flow, including private cars, taxis, goods vehicles, and busses, was around 20 thousand vehicles per day during the first year, or less than half predicted. Despite the gradual increase of the daily flow (as projected), the factual numbers remained relatively low, and the project became unable to recover. As of the end of the financial year of 2007, the share of private cars was the most significant end counted for approximately 51,45 percent, whereas the share of personal vehicles in the total flow of cross-harbor transfers was only 23,82 percent. [7][19] The dynamic of a daily traffic is presented in the Appendices B.1. (page 98) and B.4. (page 101).

Major reasons and factors affected the poor project financial performance and negative returns on invested capital.

There is no particular reason or a particular stakeholder who can be considered responsible for the project's financial failure/fall. It is assumed by various project representatives that there is a fatal combination of circumstances, which could lead to such a negative outcome. Firstly, the idea that the project's factual daily average traffic flow did not exceed even the minimum projected level gave a thought the initial forecasts were overestimated or simply too optimistic.

Secondly, the incomplete road network and project's poor integration into the existing Hong Kong road infrastructure might affect negatively. Despite being a well-functioning part of the Hong Kong International Airport's access infrastructure, the project went out of control of a concept of the city's urban development plan. Besides, the government announced another two infrastructural highway projects, which were called Central-Wanchai-Bypass and Route-7 (from Kennedy Town to Aberdeen), to connect WHC with major city's highways and stimulate a traffic flow. However, none of these two projects was executed after the opening WHC tunnel in 1997.

Thirdly, as mention earlier in the 'competitive landscape' section, the difference of tunnel tolls among three cross-harbor tunnels has become a project's milestone, which could not be overcome. The WHC project could not take a leading part in the process of cross-harbor traffic congestion decrease due to the highest tolls it charged, both for corporate and private types of vehicles. As of today, the traffic situation remains difficult, and the idea of WHC construction remains questionable. The disputes are still being held with this matter. According to different responders, there is also a lack of governmental interest in the project, which causes obstacles while trying to implement various efficiency-raising measures.

Another negative aspect, which stands in the way of the WHC project's success is the lack of public transport, which goes through the tunnel. Indeed, there are no buses coursing through the WHC tunnel and connecting the airport with upper-level streets in the Western District of Hong Kong. Passengers who decided to use a mode of public transport to get to the airport have to go on foot for a considerable distance. [7]

In addition, there are aspects of the overall economic situation and urban development, which brought a negative impact on a macro level. According to the governmental urban development concept, the territory near the tunnel's northern entrance has to be built by residential houses at the same period when the WHC operational phase started.

However, the Asian Financial crisis, which took place in 1997-98, made its own adjustments and cut off the residential construction perspectives, and, therefore, the opportunity to increase the traffic flow of WHC. As of the end of 2006, the government was still guessing on the idea of the best use of the land and regarding the funding options to move the project forward. Moreover, the crisis itself became a trigger of the overall decay of the economic development in the region. As a result, the amount of newly registered vehicles appeared to be lower than expected.

There is a common sense between the responders that the government does not connect the concept of land use and transportation infrastructure development over the Hong Kong area. [7]

Current status of the project. The covid-19 impact and limitations. Source: the SPV annual financial report.

In general, the Western Harbour Tunnel Company Limited had announced itself to become an efficient tunnel operator aimed to satisfy high customer demand and meet stakeholders' interests. WHTCL focused on safety and quality standards when providing the services. The project company executes regular maintenance and scheduled repair works to secure the operations, and such are: drain pipes lied between basement level of ventilation buildings and tunnel, concrete road pavements reconstruction, fire protection services, and steel enclosures installment, new battery banks installment, and so on.

The 30—year franchise period ends in August 2023, and, currently, the company is operating on a going concern basis. Since the year of the commencement of operations, the company has significantly improved its financial standing, and, as of the end of the year ended 2020, the internal rate of return exceeded 8%. There is no information available about the cost of invested capital, but, for instance, as of the end of 2006, the IRR was negative, more than 30 percent. The dynamic of IRR is presented in Appendices B.2. (page 99) and B.5. (page 102).

COVID-19 impact. As of the end of July 2020, the company registered a slight 16.5% decrease in the average daily traffic, compared to the last year, mainly due to the covid-19 outbreak. The government had to restrict social contacting and forced companies to arrange remote work for their staff. This fact caused a considerable decline in the average daily traffic through the tunnel. In fact, the average daily amount of vehicle journeys

decreased down to approximately 57 thousand in 2020 compared to 69 thousand in 2019. [19][22]

The existing environment, current risk factors and future perspectives. One of the major obstacles which prevents the increase of the project's profitability remains the uncompleted roads framework. As of today, there is the constant lack of roads leading to WHC. The accomplishment of the central Kowloon Route was postponed. Another crucial factor, which prevents revenue increase, is that the tolls in two other cross harbour tunnels remain relatively lower than in WHC. Moreover, the government currently estimating the probability of implementing electronic road access to the central district of the city during the peak hours, which might be discouraging for people to use cars when going for work at the daily basis.

The only source of future revenues' increase might be the passenger's / vehicles' traffic increase is the development of the conjunction areas – West Kowloon Cultural District and the completion of new road to Nga Cheung (adjacent area from the WHC's southbound toll plaza).[19][20]

Key financial performance indicators for the financial year ended July 2020 and the project's profitability.

The SPV company implemented a scheduled toll increase in 2019. However, even the toll increase could not cover the daily vehicles' decline, and, therefore, the annual revenues were almost 11% lower than in 2020. In other words, despite the average toll' increase from HK76.6\$ up to HK 81.62\$ over the financial year ended 2020, the net profit decrease was about 14 percent. However, the company could maintain its operational expenses at the desired level, and the increase of 8,7 percent was mainly because of staff costs increase, repair and maintenance expenses increase. As of the end of the financial year 2020, the SPV generated excess cash, available for the shareholders in the form of dividends of HK\$ 1,300 mln. [22]

The dynamic of an SPV profit and loss is presented in the Appendices B.3. (page 100) and B.6. (page 103).

The company's social responsibility, safety, and environmental protection policy, compliance with relevant laws, regulations, and standards. The company has followed a strict safety policy over the maintenance stage of the project to mitigate

any potential risks that might arise due to poor attention or bad attitude. New facilities were mounted, staff manuals revised, safety requirements were fulfilled. The WHTCL also implemented measures to make the project sustainable: environmental protection and reduction of the global warming effect. As a result, the company installed LED and induction lamps, motion-activated lighting, and inverter-type air conditioners inside the tunnel.[19][20]

Conclusions and remarks to the case (main points): the large infrastructural project has a very diversified funding structure, and there are different sources of capital; however, the returns on invested capital have a high dependency of the overall economic situation of the region and further development of adjacent areas; these factors were difficult to estimate and accurately predict. Therefore, despite successful completion and well-arranged operation and maintenance, the return appears relatively small.

Case study 2. Italy Water Project. The analysis of operating cash flows and their behaviour during the different project's life cycle phases. The definition of the optimal capital structure of the concession deal.

Building a financial model is a key component to undertake a BOT/ BOOT scheme of participation in a public-private initiative. The concession agreement is always subject to the tendering process, and to compete, the project company / SPV has to propose a certain tariff level for the product or service a project would generate. Governmental authorities will pay attention to the tariff rate when adopting the decision on which private company will hold the rights under the concession agreement. The tariff, in turn, has to meet two opposite criteria: to be high enough to cover all necessary construction costs (which would also include construction, additional charges, and development costs) and operating expenses, and at the same time, to be low enough to compete with the other companies, meet local community interests and make the investment economically attractive.

Thus, it's crucially important to model and analyze the operating cash flow the project would be able to generate at the different stages of the project's life cycle. Prior to identifying the components of the cash flow, a thorough feasibility analysis has to be executed.

According to the case study, there is an Italian leading construction company became nominated concessionaire, based on bidding results. This SPV became responsible for the design, construction, operating, and financing of the project aimed to rebuild the water supply and sewage system in the southern region of Italy. The project's life cycle consists of two phases – construction and operational. It was assumed that there were no revenues during the construction phase. Thus, the SPV started to utilize credit resources (both private equity and borrowed capital) to cover the cash deficit at the construction phase. [9]

The project has two major purposes. Firstly, it is the necessity to maintain and operate the existing water system. Secondly, there is a construction and start of 2 additional sections (Section 1 and Section 2). Operational phase for the Section 1 starts in 2020, and for the Section 2 in 2023. [9]

Business plan of the project.

The business plan concept aimed to answer the question of the project is feasible in frames and duration of the concession agreement, which is 35 years; it ends in 2051. The operation phase starts from 2022 - the end of the construction period, which lasts for six years since 2017 (the concession period started on January 1st, 2017).

The detailed business plan of the project is compiled on an annual basis and covers the following parts (calculations were presented in the form of the EXCEL sheet format, and there are Appendices for the cover ratios, debt utilization and debt sources charts – C.1., page 104, detailed IRR calculations are in the Appendix C.2., page 105; Water and Energy revenues calculations are in the Appendices C.3. and C.4., pages 106-107):

- Syndication sheet; this section covers the list of lenders with corresponding amounts of loans granted to the project, the sums of loan fees amounts, various types of credit instruments, rates of return on capital, required by lenders, banks IRRs calculations (the calculations assume, that the project starts to generate a positive net cash flow since December 31st, 2021;
- Sensitivity analysis; this part aimed to estimate how slight fluctuations of the amounts of input parameters affect the overall image of the project and its feasibility;
- Assumptions part; which presents all the project's key input parameters necessary for calculations, such as timing, long-term inflation rate forecast, CAPEX distribution according to the design and expropriation steps; depreciation calculations for both plant's section: for section 1 – starting from 2020; for the section 2 – starting from 2023 (the

linear method of depreciation is used; the annual depreciation rate is 3,4%; the life span of the building equals 29 years); VAT rates for the production (water and energy), and VAT facility parameters;

- Capital expenditures analysis / CAPEX Analysis;
- Life cycle costs estimated to maintain water and energy production facilities;
- Operational phase inputs / OPEX phase inputs; this part includes water production volumes (existing and newly built) calculated based on established tariffs, personnel costs, water system maintenance costs, general costs, and other costs; the energy production volumes, calculated based on established tariffs, fees charged by local authorities on an annual basis during the operational phase of the project;
- Summary sheet; the part is considered as the most important from the key project's stakeholders' point of view; this part contains project's and equity sponsors' IRR calculation, visualization presentations, graphs, and pie charts; the important note is that the project IRR is lower than the sponsors IRR (equity IRR) due to the fact that there are cash surpluses at the end of each year after the debt repayment was made; these surpluses increase the annual amounts of dividends flows available for the equity holders;
- Sources and uses tab; shows the sources of CAPEX and their usage distribution during the construction phase; the amounts of capitalized interests under the credit facilities; the cash amount accumulated on the debt service reserve account;
- Forecasted financial reporting documents: profit & loss statement, cash flow statement, balance sheet;
- Water revenues (detailed calculations, including 1,5% revenue increase due to inflation);
- Energy revenues (detailed calculations, including 1% annual revenue escalation due to inflation);
- OPEX and CAPEX tabs;
- Public Grant;
- Financial debt;
- Depreciation;
- Tax calculations;
- VAT calculations;
- Working capital requirements;
- Guarantee facility;
- Equity calculations;

- IRR calculations.

The business plan section contains similar parameters, used in a different manner to perform a thorough estimation of the project's feasibility and estimate all the potential outcomes for various project stakeholders, especially for those who brought financial contributions. [9]

Inflation impact for water sales revenues and operational costs is calculated based upon consumer's prices index and equals 1,5 percent per year; capital expenditures contain 2 percent annual increase, energy revenues are increased by 1 percent annually.[9]

The identification of the inputs and outputs as major components of the project's cash flow. Cash flow framework and characteristics.

The first step here is to find the precise amount of cash obtained from operations, which the project might generate to secure (fully or partially) transfers to the various financial purposes: for instance, principal and interest debt payments, reserve account provisions, retain earnings for further dividends payments and so on.

In terms of international standards of financial reporting, this is the determination of the operating cash flow gross:

(+) Revenues from sales;

(-) Raw materials and operating costs during the operating life of the project and during the entire concession;

(-) Operational & Management fees;

(-) insurance costs;

(-) Taxes;

(+) Depreciation and amortization expenses;

And after that, the calculation of the unlevered free cash flow (which becomes important due to the fact that unlevered free cash flow doesn't take into consideration the impact of the SPV's capital structure):

(-) Increase in working capital; working capital is the result of management activity and is calculated as the difference between the operating assets and operating liabilities: (accounts receivable + inventories + prepaid expenses) – (Accounts payable + Accrued expenses);

(-) capital expenditures.[3][9]

Two components were taken into consideration when the model was carried out. First, the credit amortization period was shorter than the estimated duration of the project's life cycle. In other words, there is a time difference that investors intentionally left. The time difference or the tail can be used if the factual unlevered free cash flow will appear much less than the projected, and the loan restructuring might occur. The time difference makes the probable loan restructuring at least feasible. The second is the amount of a terminal flow, which depends on the type of the concession scheme. In the case of BOT, the terminal value can be neglected.

There is also a mechanism of interest calculation on positive free cash flows and reserve account balances at the end of the year. The percentage amount is 1 percent. [9]

Project's assumptions.

The business plan of the project, mentioned earlier, was prepared by different stakeholders, whose professional competencies cover adjacent areas: for instance, the construction parameters and the technological methods of both sections were provided by technical and engineering specialists; in turn, operational projections, such as water consumption volumes, tariffs, power generation capacity, operational and maintenance expenses were estimated but marketing and planning colleagues. [9]

The Construction phase.

The plant is divided into two sections. However, when estimating financial costs and their impact on the project in general, such as interest payments and commitment fees, the construction phase is considered the solid and continuous step. The due date of the construction phase brings a considerable impact on the overall project's feasibility. In case if the plant's construction is overdue, and, therefore, the minimum performance level was not achieved on time, the contractor has to pay penalties for each day. The functional life span of the plant depends on the design parameters, materials, and equipment used. As a rule, this type of project's technical and economic obsolescence lies between fifteen to twenty-five years. In any case, the asset's life span has not exceeded the concession period. In addition, the time horizon of the concession period and the lifetime of the asset have a significant impact on the project's IRR (Internal Rate of Return). The longer the time horizon, the more profitable the project is. Once the credit obligations are fulfilled

and debt is fully repaid, the project generates greater cash amounts available for the equity sponsors. [9]

The operational phase of the project. Operation of the existing water facilities.

The newly established SPV starts to operate the existing water facility system, including the production of drinkable and undrinkable water. Upon the completion of the construction phase the system generates 123 million m³/year of drinkable water and 209 million m³/year of undrinkable water. The existing volumes and tariffs are as follows:

Table 8. The existing Water System’s parameters.

Existing water system	Mln m ³ /year	Tariff (eur/'000m ³)	1-1-2017
Drinkable water	123	200	
Undrinkable water	209	-	

Source: Gatti, Stefano. (2018) 'Project Finance in Theory and Practice' by Elsevier Science & Technology.

Operation of the New water supply and treatment systems.

The SPV as a concessionaire also gets the right to operate the existing water facilities during the construction phase. The first year of operations starts in 2020 and the second stage starts in 2023. The project is supposed to reach its target capacity upon completion of the second phase of construction phase. The table below provides targeted adjustments to the existing volumes:

Table 9. New Water System’s parameters.

1 st level of operations		
	Additional volumes	Tariffs (euro/'000m ³)
Drinkable water	100	340
Undrinkable water	40	170
2 nd level of operations		
	Additional volumes	Tariffs (euro/'000m ³)
Drinkable water	170	340
Undrinkable water	40	170

Source: Gatti, Stefano. (2018) 'Project Finance in Theory and Practice' by Elsevier Science & Technology.

Maintenance costs starting from 2020 remain the same at approximate level of 22 million euro per year. The SPV as a concessionaire pays the annual fee in amount of 5 million euro.[9]

Operations of the two hydroelectric plants.

The two plants together are able to produce near 71,65 GW/h, and there are tariffs established for the whole concession period. The life cycle of each plant is 25 years. Plants are aimed to sell the produced energy to the state-owned company, which incorporated to support renewable energy initiatives. The estimated amount of maintenance cost is approximately 1,35 mln. Euro. Moreover, the concession holder is obliged to pay a fee in favor of the authorities on a regular basis.

Revenues under the project, in turn, are divided by two different activities – water production and hydroelectric plant (electricity) production.[9]

Table 10. VAT rates for the project.

Grant rate	%	11.0
Capex rate	%	22.0
Opex rate	%	22.0
Concession fee rate	%	11.0
Water revenues rate	%	11.0
Energy revenues rate	%	22.0

Source: Gatti, Stefano. (2018) 'Project Finance in Theory and Practice' by Elsevier Science & Technology.

The scope of initial investment costs (direct + indirect).

The construction of the plant is not the only component of the investment budget (in other words, the budget of the direct investments). Even though the price of the construction is known and estimated in frames of the turnkey type of the contract, it is often difficult to properly estimate other important parameters, such are:

- the cost of the land plot on which the asset is built,

- owners and development costs (including, but not limited to, the preliminary excavation works and building of transport infrastructure to secure the road access to the object).

However, the business plant should also keep in mind that indirect investments will definitely occur in progress. For instance, VAT (value-added tax) on direct investments, capitalized interests on debt, guarantees, and insurance costs. Capitalization here means the following: credit funds have to be used only for the purpose of construction, and once the debt is granted, the SPV company has to utilize it; otherwise, there are penalties to be paid. Consequently, the bank starts to charge interest on the utilized debt. Until the moment the project starts to generate a cash flow, accumulated interests are capitalized and then paid separately, according to the agreed schedule. Moreover, construction costs under the turnkey construction contract are not paid at once; payments to the contractor's favor are made when special milestones are reached. It also helps to ensure the constant verification of the process. Value-added tax occurs in the case of an Italian / European project because SPV buys services from other companies during the construction phase but has no revenues during this phase. Therefore, the SPV has the right to VAT reimbursement. However, in practice, VAT reimbursement is often delayed, and the time gap has to be funded by a separate, so-called VAT facility. Under the case study, VAT is supposed to be 20 percent. [9]

Public grants are a form of funding, which is necessary to serve public interests, and therefore, funds are accumulated to construct unique assets. Public authorities provide public grants to the project's SPV. To obtain the public grant, SPV has to follow certain requirements, or the project has to pass a certain milestone. The terms of payment define a model's numbers. In the Italian water case, the public grant is the percentage of the construction contract, which is paid in proportion to the construction stages. [9]

Sales contract, supply contract, operating expenses.

Practically, the consultant builds up a model without having signed off taking contracts, and, therefore, there is a space for risk allocation, and parameters can still be changed. Based on the project's concept, the concession holder agrees to conclude an agreement with a water supplier, which, in turn, agrees to buy a certain amount of potable water at the agreed price to deliver the product to the end-users. Prices are also subject to the annual increase based on the annually established prices indices. The SPV also provides

untreated water, which the project company sells for agricultural needs under variable-length contracts at the prices agreed individually. What is more, the plant (2 plants) itself consumes water for energy production purposes. Plants produce about 71,65 GWh/year. The energy then can be sold under long-term type or take-or-pay type contracts to the end-users in the power sector. There are tariffs established for that. Operational is near 1.35 mln. Euro per year starting from 2020, and the SPV pays a fee in the amount of 2 mln. Eur to the local authorities on an annual basis. [9]

The scope of contracts concerning the project's cash flow gross are as follows:

- the amount of revenues arises from the off-take agreement; the forecast implemented in the model assumes that there is a 1,5% annual increase in revenues due to the inflation; this rate is valid over the whole concession period; the over-estimated inflation could lead to the project's profitability overestimation, which negatively impacts on the investors' expectations;
- the amount of raw materials expenses and other operating costs arise from put or pay agreements;
- The amount of maintenance expenses arises from a certain type of maintenance agreements (or service-level agreements); very often, the maintenance of the asset is outsourced, and an external company acts as the asset operator; SPV, in turn, budgets an Operational & Maintenance fee and it's in the model; sometimes, SPV carries out the maintenance by itself, but costs are budgeted in detail (not a fee-only basis); in the Water case O&M annual expenses are defined as a percentage amount of Capex at 0,5%; the project also contains annual fee payments to the public administration – both to energy- and water- authorities;
- Insurance contracts provide information regarding insurance costs.[9]

The EPC (Engineer, Procure, Construct) type of contract/turnkey contract provides information on capital expenditures used to determine a net operating cash flow / unlevered free cash flow. Working capital requirements' parameters necessary to estimate an unlevered free cash flow are often taken from the projected financial reporting (balance sheet and income statement). In the abroad way, working capital represents a short-term outlay and source of cash necessary to exclude/ minimize cash deficit during the operational phase. In the Water case, the amount of initial investment in the working capital is not that much. There are no investments in inventories of finished products, and

the accounts receivable are negligible due to the conditions stipulated in the offtake contracts. Retail consumers pay in cash (accounts receivable occur when there is a delayed payment and a client served before the payment is physically made). As for the public-private type of projects, the number of working capital and payments' timelines are linked to the regular payments to the public authorities, who provided a concession. [6] The period between the SPV pays its operating expenses and the date it receives water- and electricity- receipts is considered as the cash conversion cycle. The cycle includes the following working capital assumptions for the project:

Table 11. The cash conversion cycle under the project.

Average water receipts time	Days	60
Average energy receipts time	Days	60
Average OPEX payments time	Days	60
Average existing water system payment time	Days	60
Average authorities fee payment time	Days	60
Average power plant OPEX payment time	Days	60

Source: Gatti, Stefano. (2018) 'Project Finance in Theory and Practice' by Elsevier Science & Technology.

Tax payments projections.

The fiscal policy of the large infrastructure initiative is usually narrowed to the particular policy, which exists at a certain time in a particular country (the country where the project is physically based). In the Water case study, the SPV has to pay the corporate income tax and, in addition, the regional tax on productive activities.

Table 12. The project's taxation rates.

Taxation	
Corporation tax rate	24.0%
Regional tax rate	3.9%

Source: Gatti, Stefano. (2018) 'Project Finance in Theory and Practice' by Elsevier Science & Technology.

However, there is still room for the tax optimization reached via choosing the proper depreciation strategy for the asset. The legislation provides a certain margin when the company decides how quickly the asset has to be amortized. Though the amortization payment is a non-cash expense, it's still a part of the income statement and is included in calculations when defining the base for the taxation. [9]

Macroeconomic variables.

The most efficient way to include the impact of macroeconomic parameters to the project's business plan is to obtain a detailed forecast performed by reputable agency. Such a report usually includes long-term forecasts on interest rate fluctuations; national inflation rates; various trends regarding the chosen industry, especially those which affect potential revenue and costs increase.

The deal's optimal capital structure.

The purpose for building up an operational cash flow model is to define an optimal capital structure, in other words, a balance between the debt and equity capital structure. When the operational phase of the project begins and annual cash flow (unlevered) becomes positive, there is a cash available for the debt service. Cash available determines a debt service capacity represented by creation and maintenance of debt service reserve accounts (DSRA), aimed to reimburse initial cash outlay provided by sponsors.

The amount of DSRA required is as follows:

Monthly debt service (DS) x n (number of months the reserve account has to cover*)

*_ forecasted requirement for each following year

Debt service capacity is compared with debt service requirements, and, if the capacity meets the requirements, the financial structure becomes clear. In case if the balance exceeds the requirements, the cash can be re-allocated to the dividend's payments in favor to the project's sponsors / SPV shareholders.

Table 13. Sources of funds for the project (debt, equity, public grants, cash injections).

Senior facility	keuro	406,873	29.8%
VAT facility	keuro	43,696	3.2%
Total debt	keuro	450,569	33%
Cash during the construction phase	keuro	134,026	9.8%
Public grant	keuro	549,170	40.2%
Equity	keuro	118,163	8.7%
VAT reimbursement	keuro	113,739	8.3%
Total sources	keuro	1,365,666	100%

Source: Gatti, Stefano. (2018) 'Project Finance in Theory and Practice' by Elsevier Science & Technology.

The senior facility can be divided into several components depending on the project's characteristics. In the Water case, the loan is aimed to cover design and construction capital expenses. The is also credit for the VAT payments. The model also should contain basic parameters of the loan: loan life, starting date, repayment period, interest rate (base rate and margin), fees paid to the financial institution. The bank may also approve and fix the tail/period length from the loan maturity date and the expiry concession date in this particular case. The longer it is, the more preferable conditions under the loan will be provided to the SPV as the borrower.

Interest costs under the VAT facility are capitalized during the construction phase.[9]

Table 14. Senior and guarantee facilities arranged in frames of the project.

Senior facility			VAT facility		
Amount	Keuro	406,873	Amount	Keuro	121,334
Interest			Interest		
Base rate	%	2.00	Base rate	%	Euribor 6month
Margin	%	2.25	Margin	%	1.75
Annual interest rate	%	4.25	Annual interest rate	%	
Financial fee			Financial fee		

Commitment fee	%	1.25	Commitment fee	%	0.50
Up-front fee	%	1.75	Up-front fee	%	1.75
Guarantee facilities					
Public grant	Keuro	363,294	VAT reimbursement	keuro	121,334
Margin	%	1.75	Margin	%	1.75
Commitment fee	%	0.50	Commitment fee	%	0.50
Up-front fee	%	0.50	Up-front fee	%	0.50

Source: Gatti, Stefano. (2018) 'Project Finance in Theory and Practice' by Elsevier Science & Technology.

*_Stand-by facility was granted to cover probable project's cost increase.

Stand-by facility. Despite of the fact that project finance type of investment initiatives requires fixed price contract implementation, it is often difficult to fix the particular price, and perform contractual obligations without any adjustments. Firstly, concession authorities may require changes in the plant construction when works have already commenced. Secondly, new laws and regulations, especially those which are subject to environmental and labor safety protection, might lead to the construction cost increase. Therefore, there is a stand-by type of credit agreement implemented. It helps to deal with cost overruns. It requires project's sponsors to deposit additional funds in case of any unforeseen circumstances. It helps to maintain the required debt-to-equity ratio and the sponsors' commitment. [9]

Equity. When starting to build up a model, sponsors negotiate the amount of equity they are ready to invest. The assumption is that the capital structure is preliminary and subject to further adjustments when works are in progress. Initial input is based on the following factors:

- overall economic feasibility of the project; there is the necessity to define a break-even point for the project's indebtedness; once it's reached, the project cannot be attractive to potential lenders;

- the level of risk shareholders and debt holders ready to accept; in other words, sponsors have to be persuaded that the project demonstrates a sufficient level of profitability to withstand probable negative scenarios;
- the availability to borrow funds on the international financial market; this option means a more excellent range of financial instruments, and often, there is a chance to attract bond investors to the project on better conditions to the borrowing company (SPV).

Capital expenditure. For the water project, the overall amount of capital expenditure (CAPEX) made at the construction phase was about 1056 million euro, and capital injections were divided into two sections:

- 1st Capex = 579 million euro;
- 2nd Capex = 477 million euro.[9]

Annual Debt Service Coverage Ratio (ADSCR). The dynamic of a loan repayment depends on the project's cash flow volumes and periods of its generation. Initially, it has a negative number, but when the plant starts its operational phase, and the working capital amount starts to grow, extra cash can be distributed for the loan repayment (both principal and interest). The Water case project annual DSCR also includes life-cycle maintenance costs, which occur approximately every two years over the concession period. $DSCR = \text{cash available for the debt repayment} / \text{annual debt repayment}$. These costs are necessary to budget, and they may impact the debt repayment schedule. The general DSCR principle states that it has to be more than one during the whole loan life period. The greater DSCR, the more flexible and stable the project is. [9]

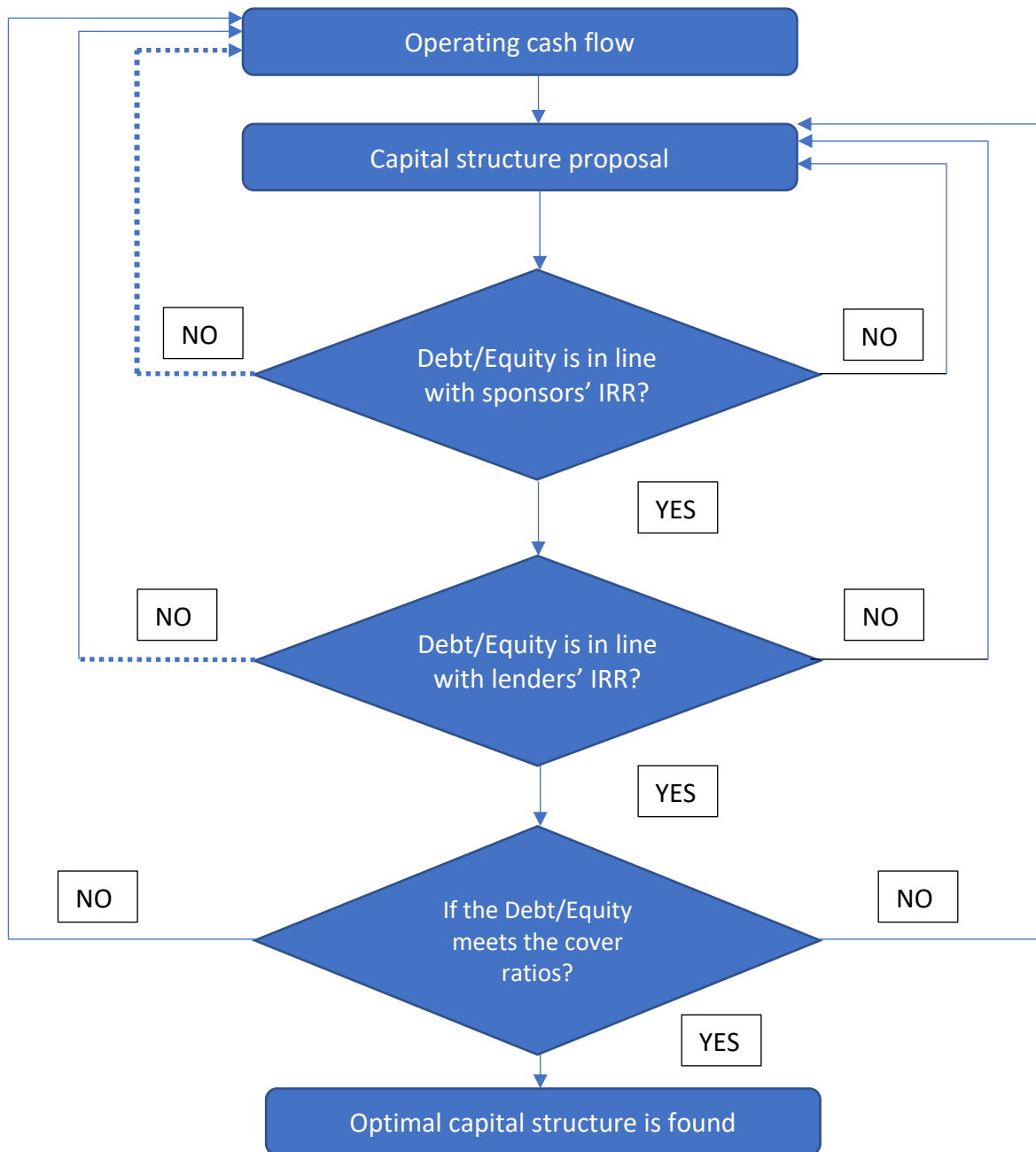
The approach of defining the suitable capital structure for the case study.

The debt service coverage ratio aimed to estimate a credit burden a project can serve and also the number of funds available for the dividend distribution to the equity holders. However, there is still room for identification of what exact percentage of debt and equity is needed to meet the mutual interests of all project stakeholders. This point, in practice, requires an empirical approach. The adviser provides several scenarios. There is always a sort of compromise between the IRR (internal rate of return) required by equity sponsors and interest rates required by financial institutions. There even might be a range of proportions, which still meet the following requirement: operating cash flow > debt service.

However, the final decision on the capital structure is subject to the project's sponsor's compromise. If the compromise cannot be reached, the project cannot be funded.

In a simplified way, the process can be presented in the form of an algorithm below (dotted narrows indicate indirect connections between steps but still indicate interdependencies to pay attention to):

Figure 8. The cash flow's estimation algorithm.



Source: Gatti, Stefano. (2018) 'Project Finance in Theory and Practice' by Elsevier Science & Technology.

Project's sponsors require the return on equity, which should be consistent with the level of risk they ready to undertake. As for the project finance type of the deal, it's rarely has only one source of capital, and, therefore, there are different IRR requirements. However, when the advising company builds a cash flow model there is a clear idea of the lowest acceptable IRR. According to the NPV rule, the project can be accepted when the $NPV > 0$, and IRR rate makes the project's NPV equal to zero. Therefore, it can be concluded that

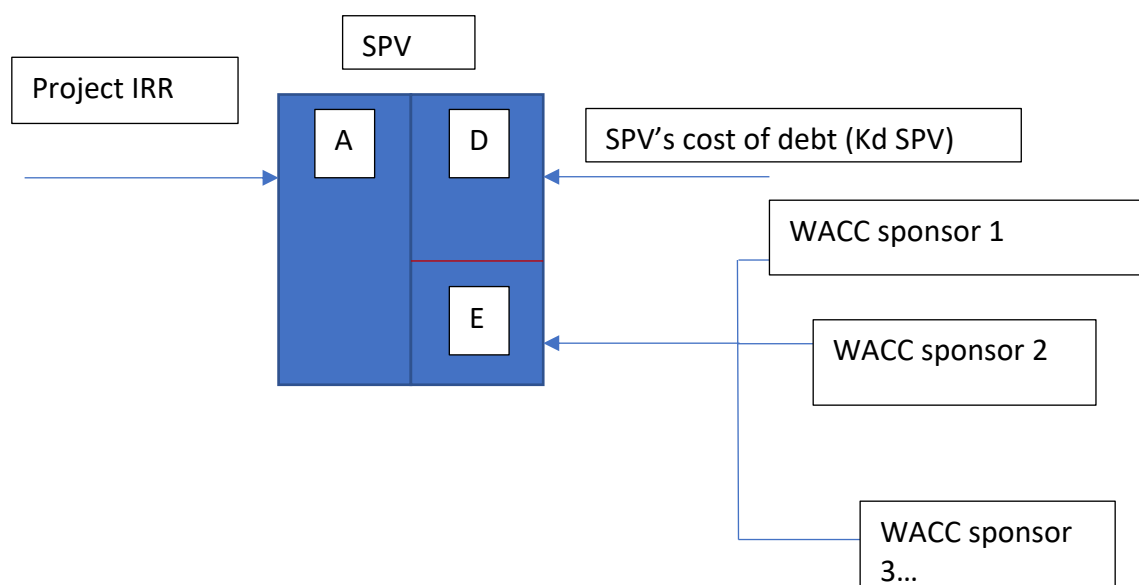
the lowest acceptable IRR is the weighted average cost of capital (WACC). Below WACC the initiative has no interest among the project's sponsors, both equity and debt investors.

In practice, there is a difference when comparing the project's IRR (there are IRR for lenders and IRR for equity sponsors, which can be also different), and the SPV's WACC (average cost of capital, which consists of the equity granted by the sponsors and the cost of loans provided by creditors). The latter is the average of the various equity sponsors prices and the costs of loans provided by creditors.

For the Water case, Project IRR was calculated by estimating the negative CAPEX value and the operating cash flow over the concession period (excluding working capital requirement and tax paid). There was also Equity IRR calculated as the difference between the amount of cash injections made by the sponsors and the dividends paid to the shareholders and cash released at the end of the concession period. The results are as follows:

Project IRR: 9.65%;
Equity IRR: 14.38%. [9]

Figure 9. The overall balance between project's profitability and SPV's profitability, and how they correlate:



Source: Gatti, Stefano. (2018) 'Project Finance in Theory and Practice' by Elsevier Science & Technology.

It's also important to keep in mind that the WACC's for the SPV formula does not include taxation factor. Regardless the way of how the cost of debt was estimated, it has to be corrected due to the income tax incentive proceedings. Therefore, the after cost of debt for the SPV equals:

$$\text{After-tax cost of debt} = k_D \times (1 - T_C),$$

Where the k_D is the cost of debt before correction, and T_C is the income tax rate of the country, the project is physically located.

The WACC formula, implemented for the Water case project, therefore, looks as follows:

$$\text{WACC} = k_D(1 - T_C) \frac{D}{E + D} + k_E \frac{E}{E + D}$$

However, the project has to be accepted if the project's IRR equals or higher than the WACC, especially in case of the project finance deal. [3][9]

Besides NPV and IRR methods of the project's profitability calculation, The Water Case model also includes the payback period method, which shows the particular time period when project's outflows equal the project's initial investments (the method has two variations – discounted cash flows and nominal flows). [9]

Cover ratios.

Cover ratios aimed to serve the concept that the cash flow generated by the projects can cover at least short-term loan obligations. The project might have an extremely high IRR, but it won't be undertaken if lenders cannot get regular repayments over the required term. Therefore, the project has to provide a certain level of 'economic convenience to meet sponsors' and lenders' requirements and credit policies (correspondingly). Cover ratios are important to maintaining a certain pre-agreed level, and they are part of, for instance, the financial covenants paragraph of the credit agreement. Financial covenants can also be used as an early warning tool and indicate that the project declines from required characteristics and changes to be made in short terms. [9]

1. There are two main ratios aimed to meet creditors' requirements on scheduled debt repayment to show that the SPV can provide scheduled repayment.
2. DSCR, which starts to work during the operational phase of the project and aimed to show that the cash flow covers annual interest and principal repayments. The cash flow from operating activity is taken into consideration.

$$\text{DSCR} = \text{Operating cash flow (year } t) / (\text{interest and principal payments scheduled over the year } t).[9]$$

The other variance of DSCR is the DSCR (interest). The interest coverage ratio shows how many times an SPV's operating income or EBIT (sometimes EBITDA, though depreciation and amortization are non-cash expenses) can cover interest payments on a pre-tax basis.

There are no fixed requirements, though the higher the ratio, the less is the company's debt burden and vice versa. Financial institutions tend to consider a ratio of 2.5x as a signal of possible weaknesses and the ratio of 1.5x or less as problem financial standing. Advantages of implementing the ratio – popular and commonly used metric to a quick estimation of the company's ability to maintain a certain level of debt burden and a good indicator of the company's overall financial standing. However, the ratio cannot be used on a sole basis to make a management decision. There are other metrics and indicators to be used, such as the debt-to-equity ratio, for instance.

Besides the algorithm presented above, there is the necessity to verify the agreed capital structure mathematically.

Loan life cover ratio. The project generates the sum of discounted operating cash flows during the loan repayment schedule (net income tax paid) until the last year of the debt repayment and funds accumulated in the debt reserve account. This sum, in turn, has to be divided by the amount of the loan outstanding. [5][9]

The results are as follows:

Project IRR: 9.65%;

Equity IRR: 14.38%;

Annual DSCR has a value of 1.57x, minimum of 1.52x;

LLCR (Loan life cover ratio) has an average value of 1.58x and a minimum of 1.56x.

Case study model assumptions. Input parameters, calculations, and probable outcomes.

Due to the fact that the case study financial model has many different parameters, there is the list of most important and necessary to carry out the calculations:

- Time: the duration of the construction period and the operational phase; there is the necessity to keep in mind that the completion date, start and end production dates can change as well;
- Tax rates, VAT assumptions, inflation indices changes, which are subject to macro-economic level, can vary and affect energy prices;
- Numbers regarding direct and indirect investments;
- Operational phase parameters (fixed and variable input parameters); current calculations are made based on 2017 year-end factual numbers;
- Working capital assumptions: average time of cash collected from sales; the average time to pay for suppliers; time difference and cash requirements to cover the gap (Finance for executives, page 69);
- The total contribution of public funding;
- The total contribution of project's sponsors' funding;
- Debt service reserve account. [9]

This case study does not contain water & energy plant's construction details, but the project's feasibility, ability to generate stable cash flows, secure, stable returns on invested capital both for debt and equity holders, and also the project's ability to create value depends mostly on the success of the construction phase execution. The business plan can be used as a tool for future negotiations between project stakeholders, for elaborating and implementation the risk-mitigating measures, for controlling the overall project's execution, and for the opportunity to provide amendments in case of macro-and micro-level market fluctuations duly. However, the construction phase only cannot be approved and commenced by private and public investors without estimating a project's potential outcome.

Chapter 5. Discussions and Conclusions.

Discussion. Overall, it can be assumed that despite the unique aspects of each project, there is a certain way to distinguish the difference between the type of the project and the scale of the company, which can be named a project owner. Though small and medium-sized companies often act as subcontractors for large companies, they use different management strategies, obtain financial support from different sources, have different

profitability margins, face different types of risks, and implement different risk-mitigating measures. The research aimed to support managers from different companies and project types when seeking financial stability and external capital to stay efficient and value-creating and successfully compete in uncertain and risky environments.

There are the following strong points of the research: In frames of literature and survey reviews, I found that there is quite a strong alignment either to SME scale or to a large scale. In other words, there are not that many sources that present differences and how such differences correlate to the value-creating theory and the construction enterprise and construction projects' profitability. The research contains a thorough investigation of two different case studies which are relevant for large-scale industrial projects. The small to medium size project is not that complex. However, there are some metrics used to analyze large-scale enterprises, which are relevant for the small scale as well: debt service coverage ratios, EBITDA margin, IRR, Return on Equity.

Limitations. Weaknesses and limitations. Lack of SMALL-scale projects case studies – building renovation, energy-saving projects, local social projects, which are subject to public capital investments too, but differently. Project technical parameters and lack of connection between the project's financial modeling and construction scheduling (for the case studies, due to the lack of additional information).

The construction industry is characterized by relatively high complexity and a high level of social responsibility. Development and construction projects are often requiring enormous resources and time contributions. Nevertheless, construction projects are launched to create additional value for the projects' stakeholders. Especially for those key private and public stakeholders which / who provided sound capital injections. It is impossible to get the return on investment without raising the project value. Therefore, to meet investors' requirements. The thesis aims to present the ways of how to manage construction and real estate projects efficiently and effectively from the financial point of view. It is assumed that the research project meets research objectives.

Moreover, it answers research questions. It shows which tactics and requirements would be helpful for large projects and those, which would effectively work only for small-to-medium size companies. The ranging of construction and real estate companies based on their scale and projects' portfolios provides a better understanding of financial strategies managers can follow.

Based on the literature review (Chapter 2) and the Research results (Chapters 3 and 4), it is assumed that large projects require a more significant amount of measures to be implemented to the company's operational, investment, and financial activity to secure its liquidity position and operational efficiency. In contrast, small-to-medium real estate companies implement different measures and their overall approach to the company's management is less complicated.

However, small and medium-size real estate and construction companies' management practices, when managed effectively, demonstrate sound results of the operating profitability. The research aimed to point out the scope of effective measures managers can implement to their investment and financial activities. Such measures help to increase the positive impact on companies' operations and, therefore, overall economic performance.

Table 15. The scope of measures for further consideration and implementation.

	Types of a project	Measures to improve financial activity	Measures to improve investment activity
SME companies	<ul style="list-style-type: none"> • Residential construction: single family houses and multi-family units; • residential buildings renovation and refurbishment projects; infrastructure maintenance and repair; • commercial real estate; office spaces; • special types of construction work for larger projects. <p>In general, projects can be characterized</p>	<ul style="list-style-type: none"> • Companies often execute several projects simultaneously, and for the financial executive, it's necessary to maintain a certain level of working capital requirements to secure positive operational cash flow; the implementation of the EU new Late Payment Directive may bring a positive impact and improve a company's operating liquidity; • To seek for short-term financing 	<ul style="list-style-type: none"> • To form the portfolio of construction projects based on crisis's customers' demand; • To adapt to the market fluctuations, which is possible for short-term projects; • Implement various asset holding strategies to increase the asset's market value by reducing operational

	as short-term and / or seasonal.	<p>provided by local financial institutions to eliminate cash deficit, especially during the COVID-19 phase;</p> <ul style="list-style-type: none"> • To learn and follow government tax incentives and funding to support construction and real estate companies at the local level during the pandemic crisis. • To reinvest the amount of retained earnings into business to provide financial stability based on internal resources. 	costs (valid for facility managers, small real estate investment companies).
Large companies	<ul style="list-style-type: none"> • Public projects; • health infrastructure and large-scale climate change projects; • heavy / civil / highway construction; • industrial construction; • large public utilities construction. <p>In general, projects can be characterized as long-term.</p>	<ul style="list-style-type: none"> • To implement measures aimed to secure financial preservation through dividend shortages and debt issues on the financial markets; • To prevent currency risks via risk mitigation instruments like SWAP and forward contracts to secure debt and interested repayment provided in a different currency; • To estimate and include into the project's profitability calculation life-cycle costs of the 	<ul style="list-style-type: none"> • To fulfill through investment calculation, which becomes essential due to the long-term type of the project's duration; • To negotiate long-term project financial covenants to be able to maintain them over the whole

		building/plant/ public utility structure; <ul style="list-style-type: none"> • To arrange debt financing via implementation alternative tools of borrowing via financial markets (public finance) – issuing bonds, shares, getting public grants; • To establish an optimal capital structure between debt and equity finance; to accumulate a large amount of funds via syndicated loans; • To get more beneficial parameters of debt financing via providing governmental guarantees; collateral securities. • To create a cash provision account to allocate financial risks under the project. 	period – Debt Service Coverage Ratio, Loan Life Coverage Ratio; <ul style="list-style-type: none"> • To investigate legal framework in case of launching large international projects.
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Source: The table is prepared by the Author.

Investment activity demonstrates how managers should make investment decisions that maximize the firm's value. Chapter 2 estimates the net present value (NPV) rule in detail and shows several alternative approaches, including the internal rate-of-return (IRR) and the pay-back period rules. It also shows how to identify and estimate the cash flows generated by an investment proposal and assess its capacity to create value. Chapter 4, in turn, presents practical implementation. Investment activity is relevant rather for large projects. However, small companies also may use the same approach in a more simplified manner.

Financial activity explains how managers should make financing decisions that maximize value; the function of financial markets as a source of cash and examines the role markets play in the process of value creation; how to estimate the cost of capital for a project and the construction firm; value-creating financing decisions by designing a capital structure (the mix of owners' funds and borrowed funds) that maximizes its market value and minimizes its cost of capital.

Efficient management for SME companies means, from one side, the accumulation of borrowed capital and implementing taxation incentives from the other. Taxation incentives, for instance, such as the decrease of the firm's taxable profits, are reached by the subtraction of interest expenses. Interest payments are considered tax-deductible.

As for the large companies, it is more about forecasting over the long-term perspective. The Results section (Chapter 4) showed how large and complicated construction projects can be not only in terms of financing tools and the number of project's sponsors but also in terms of a unique design and technological innovations, which were elaborated and implemented exclusively in the particular case (WHC construction project). The analysis of the Water case, in turn, gave an overview and understanding on how to evaluate the company's ability to generate and control project's cash flow over the forecasting period, how to accumulate and customize input parameters, such as income tax rates, depreciation, capital expenditures (CAPEX), Operational expenditures (OPEX), VAT, inflation, working capital requirements to prepare a levered cash flow analysis, estimate return rates for equity sponsors and overall projects profitability.

Declaration of Authorship

I hereby declare that the attached Master's thesis was completed independently and without the prohibited assistance of third parties, and that no sources or assistance were used other than those listed. All passages whose content or wording originates from another publication have been marked as such. Neither this thesis nor any variant of it has previously been submitted to an examining authority or published.

30.07.2021

Location, Date

Anna Malaia

Signature of the student

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Appendices.

Appendix A. Information requests in frames of projects' case studies analysis.

From: Stefano Gatti stefano.gatti@unibocconi.it 
Subject: Re: project finance excel model
Date: 15 May 2021 at 15:43
To: Анна Малая anna.info7@gmail.com



Dear Anna,

glad to receive your kind email.

Attached the file you are talking about

Best

SG

Professor Stefano Gatti
Antin IP Professor of Infrastructure Finance
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Bocconi University
Via Sarfatti, 25
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ph. +39-2-5836-6106
fax + 39-2-5836-5920
stefano.gatti@unibocconi.it

From: Анна Малая <anna.info7@gmail.com>
Sent: Friday, May 14, 2021 20:10
To: Stefano Gatti <stefano.gatti@unibocconi.it>
Subject: project finance excel model

Dear Mr. Gatti,

I was happy to find your book "Project finance in theory and practice: designing, structuring, and financing private and public projects" in our University's e-library. My name is Anna Malaia, and I'm a Master's double-degree student at the mutual program between the Metropolia University of Applied Science in Helsinki and HTW Berlin. Currently I'm working on my Master's thesis and I'm seeking an excel sheet file you referred to in your book (in Chapter 5 and when describing a water case).

Could you please be so kind to help me to obtain the information?

Thank you in advance!

With kind regards,
Anna Malaia

AIUTA GLI STUDENTI MERITEVOLI
A COSTRUIRE IL PROPRIO.

Please note that the above message is addressed only to individuals filing Italian income tax returns.
5x1000 is a percentage of Italian personal income tax that taxpayers can allocate to Universities, scientific research and non profit organizations.



Modello
acqua_...ng.xlsx



Refresh Compose Reply

Reply all Forward Delete

Mail

- Inbox** **204**
- Drafts
- Sent
- Junk
- Deleted Items

Subject	Date	Size
Webmaster	10.05.2021 08:20	8 KB

 Messages 1 to 1 of 1

Re: cost of capital of the WHC pr...

From **Webmaster** Date **10.05.2021 08:19**

Our ref.: 20210510E05/(EN&CO)/LSHI

Dear Ms. Anna Malaia,

Thank you for your message regarding the captioned subject.

You may find relevant information at our website:
(<http://www.westernharbourtunnel.com/index.html>).

Thank you very much for your attention.

Regards,

Ingmar Lee
Commercial Manager
Western Harbour Tunnel Company Limited

This communication may contain information which is confidential and privileged and intended only for the addressee. If you are not the addressee you may not use, disseminate or copy this information. If you have received this information in error please notify us immediately.



Appendix B.1. WHC Case. Total cross-harbor traffic and WHC market share (year ended in July).

Year ended July	2006	2005	2004	2003	2002	2001	2000	1999*	1998*	1997*(5-7/1997)
Motorcycles	412	385	470	461	520	566	655	445	375	300
Private cars	22,522	21,232	21,986	21,808	23,778	24,377	25,343	25,858	20,626	15,860
Taxis	8,522	7,044	6,007	4,679	4,824	5,107	4,685	—	—	—
PC sub-total	31,456	28,661	28,463	26,948	29,122	30,050	30,683	26,303	21,001	16,160
Light goods vehicles	3,886	3,434	3,500	3,499	3,889	3,954	4,245	5,117	2,914	2,209
Medium goods vehicles	740	658	633	641	728	749	781	870	453	314
Heavy goods vehicles	96	77	46	64	81	85	71	123	21	20
GV sub-total	4,722	4,169	4,179	4,204	4,698	4,788	5,097	6,110	3,388	2,543
Public light buses	2,414	2,414	2,460	2,477	2,291	2,208	2,061	1,357	554	162
Single-decked buses	1,221	1,128	1,069	943	962	933	913	821	309	131
Double-decked buses	3,182	3,168	3,127	3,048	3,063	3,009	3,001	3,034	1,980	1,223
Bus sub-total	6,817	6,710	6,656	6,468	6,316	6,150	5,975	5,212	2,843	1,516
Total	42,995	39,540	39,298	37,620	40,136	40,988	41,755	37,625	27,232	20,219
*Remarks: taxis were previously grouped under Private Cars										
Traffic mix for the WHC										
PC	73.2%	72.5%	72.4%	71.6%	72.6%	73.3%	73.5%	69.9%	77.1%	79.9%
GV	11.0%	10.5%	10.6%	11.2%	11.7%	11.7%	12.2%	16.2%	12.4%	12.6%
Bus	15.8%	17.0%	17.0%	17.2%	15.7%	15.0%	14.3%	13.9%	10.5%	7.5%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Pretorius, Frederik; Chung-Hsu, Berry-Fong. (2008) 'Project Finance for Construction and Infrastructure: Principles and case studies' by John Wiley & Sons.

Appendix B.2. WHC Case. IRR calculations up to July 2006.

Period	Year ended	Shareholders' investment/return	#Discount factor b	NPV of 1994 cash flow × discount factor
		HKS'000 a IRR = -32.48%	—	HKS'000 a × b
0	Jul-94	(555,000)	1.0000	(555,000)
1	Jul-95	(515,200)	1.4810	(762,989)
2	Jul-96	(537,500)	2.1932	(1,178,863)
3	Jul-97	(592,300)	3.2481	(1,923,841)
4	Jul-98	—	4.8103	—
5	Jul-99	(138,000)	7.1238	(983,086)
6	Jul-00	(172,000)	10.5501	(1,814,610)
7	Jul-01	(160,000)	15.6242	(2,499,869)
8	Jul-02	(250,000)	23.1387	(5,784,685)
9	Jul-03	(190,000)	34.2675	(6,510,821)
10	Jul-04	—	50.7487	—
11	Jul-05	130,000	75.1566	9,770,358
12	Jul-06	110,000	111.3037	12,243,406
	Total	(2,870,000)		0

Discount factor for period 0 = 1

Discount factor for period n = $1/(1 + \text{IRR})^n$

Source: Pretorius, Frederik; Chung-Hsu, Berry-Fong. (2008) 'Project Finance for Construction and Infrastructure: Principles and case studies' by John Wiley & Sons.

Appendix B.3. WHC Case. Profit & loss statement up to July 2006.

HK\$'000	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997
Turnover	766,524	704,709	636,266	600,830	642,932	621,372	555,611	477,104	327,450	55,960
Operating and administrative expenses*	(261,845)	(255,918)	(257,277)	(246,671)	(226,516)	(215,329)	(202,808)	(186,015)	(191,676)	(49,450)
Operating profit	504,679	448,791	378,989	354,159	416,416	406,043	352,803	291,089	135,774	6,510
Finance costs										
– Interest on bank loans	(113,712)	(114,704)	(124,980)	(165,513)	(245,280)	(355,802)	(408,347)	(449,831)	(441,070)	(91,149)
– Interest on shareholders' loans	(28,426)	(29,251)	(30,238)	(29,744)	(25,963)	(23,513)	(22,150)	(20,041)	(119,624)	(44,950)
	(142,138)	(143,955)	(155,218)	(195,257)	(271,243)	(379,315)	(430,497)	(469,872)	(560,694)	(136,099)
Profit/(loss) before taxation	362,541	304,836	223,771	158,902	145,173	26,728	(77,694)	(178,783)	(424,920)	(129,589)
Deferred tax provision	(63,458)	(53,625)	(39,833)	(5,484)	—	—	—	—	—	—
Profit/(loss) after taxation	299,083	251,211	183,938	153,418	145,173	26,728	(77,694)	(178,783)	(424,920)	(129,589)
Accumulated losses brought forward	37,952	(213,259)	(397,197)	(639,085)	(784,258)	(810,986)	(733,292)	(554,509)	(129,589)	—
Prior year adjustment on deferred taxation	—	—	—	88,470	—	—	—	—	—	—

Source: Pretorius, Frederik; Chung-Hsu, Berry-Fong. (2008) 'Project Finance for Construction and Infrastructure: Principles and case studies' by John Wiley & Sons.

Appendix B.4. WHC Case. Total cross-harbour traffic and WHC market share (year ended in July 2020).

	2020	2019	2018	2017	2016
Motorcycles 電單車	8,992	8,156	8,277	8,016	7,866
Private Cars 私家車	125,377	129,915	128,370	126,661	122,943
Taxis 的士	43,979	57,216	58,063	58,315	60,244
Private Cars sub-total 私家車總計	178,348	195,287	194,710	192,992	191,053
Light Goods Vehicles 輕型貨車	31,607	34,188	34,218	34,167	34,581
Medium Goods Vehicles 中型貨車	8,100	9,055	9,096	8,991	8,905
Heavy Goods Vehicles 重型貨車	1,679	1,777	2,237	2,378	2,603
Good Vehicles sub-total 貨車總計	41,386	45,020	45,551	45,536	46,089
Light Buses 小型巴士	2,248	2,962	3,281	3,588	3,875
Single-decked Buses 單層巴士	2,805	5,168	5,508	5,537	5,483
Double-decked Buses 雙層巴士	10,232	11,165	10,915	10,813	10,866
Bus sub-total 巴士總計	15,285	19,295	19,704	19,938	20,224
Total 合共	235,019	259,602	259,965	258,466	257,366

Source: (2019-2020) Western Harbour Tunnel Company Limited annual report.

Appendix B.5. WHC Case. IRR calculations up to July 2020.

Period 階段	Year ended 完結年度	Shareholders' (Investment)/ Return 股東(投資)/回報 S'000	#Discount Factor #貼現率	NPV of 1994 (Cash flow x discount factor) 一九九四淨現值 (現金流x貼現率) S'000
		a 甲	b 乙	axb 甲 x 乙
IRR 內部回報率 = 8.811%				
0	Jul-94	(555,000)	1.0000	(555,000)
1	Jul-95	(515,200)	0.9190	(473,480)
2	Jul-96	(537,500)	0.8446	(453,974)
3	Jul-97	(592,300)	0.7762	(459,748)
4	Jul-98	-	0.7134	-
5	Jul-99	(138,000)	0.6556	(90,471)
6	Jul-00	(172,000)	0.6025	(103,630)
7	Jul-01	(160,000)	0.5537	(88,594)
8	Jul-02	(250,000)	0.5089	(127,218)
9	Jul-03	(190,000)	0.4677	(88,856)
10	Jul-04	-	0.4298	-
11	Jul-05	130,000	0.3950	51,349
12	Jul-06	110,000	0.3630	39,931
13	Jul-07	1,770,000	0.3336	590,491
14	Jul-08	-	0.3066	-
15	Jul-09	250,000	0.2818	70,442
16	Jul-10	300,000	0.2590	77,685
17	Jul-11	440,000	0.2380	104,712
18	Jul-12	500,000	0.2187	109,355
19	Jul-13	452,000	0.2010	90,852
20	Jul-14	990,000	0.1847	182,877
21	Jul-15	1,248,000	0.1698	211,866
22	Jul-16	1,280,000	0.1560	196,583
23	Jul-17	1,358,000	0.1434	194,716
24	Jul-18	1,409,000	0.1318	185,669
25	Jul-19	1,498,000	0.1211	181,412
26	Jul-20	1,375,000	0.1113	153,031
Total 合共		9,980,000		

Discount factor for period 0 = 1

Source: (2019-2020) Western Harbour Tunnel Company Limited annual report.

Appendix B.6. WHC Case. Profit & loss statement up to July 2020.

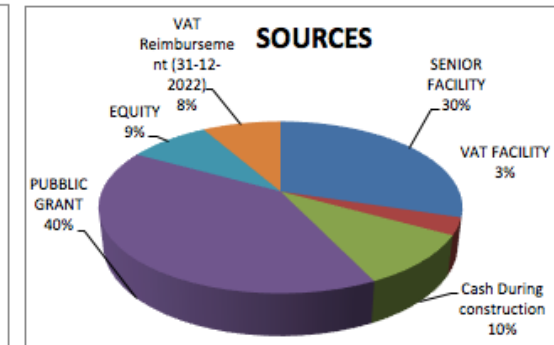
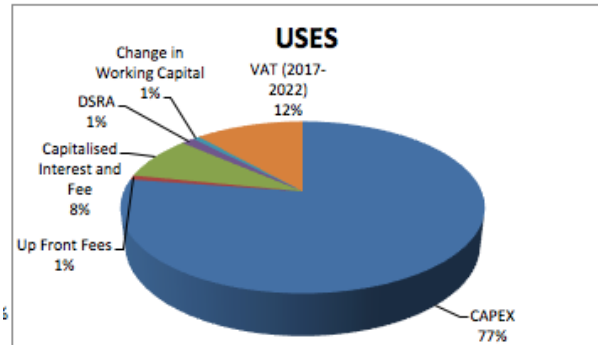
	2020	2019	2018	2017	2016
	HKS'000	HKS'000	HKS'000	HKS'000	HKS'000
Revenue 收入					
Toll revenue 隧道費收入	1,730,636	1,940,454	1,793,087	1,684,496	1,578,400
Other revenue 其他收入	54,892	61,051	51,429	52,808	43,574
	1,785,528	2,001,505	1,844,516	1,737,304	1,621,974
Other income 其他收益	7,076	25,491	2,386	1,010	727
Expenditure 支出					
Operating and administrative expenses 經營及行政費用支出	(124,015)	(113,945)	(104,938)	(98,146)	(92,796)
Rates and government rent 差餉及地租	(78,591)	(72,450)	(69,503)	(62,639)	(56,251)
Amortization and depreciation 攤銷及折舊	(355,887)	(397,933)	(374,839)	(367,006)	(359,399)
Operating profit before finance charges 未計融資費用之營業溢利	1,234,111	1,442,668	1,297,622	1,210,523	1,114,255
Interest on shareholders' loans 股東貸款之利息	(52)	(52)	(51)	(51)	(51)
Profit before taxation 除稅前溢利	1,234,059	1,442,616	1,297,571	1,210,472	1,114,204
Income tax 所得稅	(204,605)	(239,641)	(216,051)	(202,018)	(186,133)
Profit for the year 本年度溢利	1,029,409	1,202,975	1,081,520	1,008,454	928,071
Other comprehensive income 其他全面收益	-	-	-	-	-
Total comprehensive income 本年度全面收益總額	1,029,409	1,202,975	1,081,520	1,008,454	928,071

Source: (2019-2020) Western Harbour Tunnel Company Limited annual report.

Appendix C.1. Water Case. Financial Ratios, USES and Sources pie charts.

Financial Ratios

Anno	DSCR	LLCR
2023	1,66	1,62
2024	1,61	1,59
2025	1,57	1,58
2026	1,55	1,57
2027	1,55	1,57
2028	1,52	1,56
2029	1,55	1,57
2030	1,54	1,56
2031	1,54	1,57
2032	1,55	1,57
2033	1,56	1,58
2034	1,56	1,57
2035	1,57	1,59
2036	1,56	1,59
2037	1,59	1,65
2038	0,00	0,00
2039	0,00	0,00
2040	0,00	0,00
2041	0,00	0,00
2042	0,00	0,00
2043	0,00	0,00
Min	1,52	1,56
Max	1,66	1,65
Average	1,57	1,58



Source: Gatti, Stefano. (2018) 'Project Finance in Theory and Practice' by Elsevier Science & Technology.

Appendix C.2. Water Case. IRR calculations.

Starting		01-Jan-17	01-Jan-18	01-Jan-19	01-Jan-20	01-Jan-21	01-Jan-22	01-Jan-23	01-Jan-24	01-Jan-25	01-Jan-26	01-Jan-27	01-Jan-28	01-Jan-29	01-Jan-30	01-Jan-31
Ending		31-Dec-17	31-Dec-18	31-Dec-19	31-Dec-20	31-Dec-21	31-Dec-22	31-Dec-23	31-Dec-24	31-Dec-25	31-Dec-26	31-Dec-27	31-Dec-28	31-Dec-29	31-Dec-30	31-Dec-31
Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Cumulated		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Unlevered IRR																
Total Capex	keuro	(74 117)	(232 874)	(391 651)	(146 829)	(142 953)	(67 671)	0	0	(2 991)	0	(1 613)	0	(3 174)	0	(1 613)
Total Revenues	keuro	0	0	0	66 676	77 940	78 981	91 934	107 525	109 009	110 517	112 047	113 599	115 175	116 775	118 326
Total Opex	keuro	0	0	0	(22 522)	(26 456)	(26 853)	(31 417)	(37 644)	(38 209)	(38 782)	(39 364)	(39 954)	(40 554)	(41 162)	(41 775)
Total Tax paid	keuro	0	0	(0)	(0)	(5 876)	(7 863)	(7 682)	(7 844)	(11 624)	(12 209)	(12 710)	(13 220)	(13 718)	(14 342)	(14 975)
Working Capital Requirement	keuro	0	0	0	(8 090)	(1 455)	(122)	(1 443)	(1 812)	(209)	(176)	(179)	(144)	(221)	(187)	(150)
Grant	keuro	38 541	121 094	203 659	76 351	74 336	35 189	-	-	-	-	-	-	-	-	-
VAT CAPEX	keuro	(12 066)	(37 912)	(63 761)	(19 661)	(18 170)	(5 865)	0	0	0	0	0	0	0	0	0
VAT Reimbursement/(Cost)	keuro	0	0	0	12 066	37 912	63 761	19 661	18 170	5 865	0	0	0	0	0	0
Project Cash Flow	keuro	(47 642)	(149 691)	(251 754)	(42 009)	(4 722)	69 556	71 054	78 393	61 843	59 349	58 181	60 282	57 508	61 085	59 349
Concession Maturity																
		30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Final Maturity																
		31-Dec-52	31-Dec-51	31-Dec-50	31-Dec-49	31-Dec-48	31-Dec-47	31-Dec-46	31-Dec-45	31-Dec-44	31-Dec-43	31-Dec-42	31-Dec-41	31-Dec-40	31-Dec-39	31-Dec-38
Unlevered IRR		0,00%	9,65%	9,58%	9,50%	9,40%	9,30%	9,18%	9,06%	8,90%	8,73%	8,53%	8,33%	8,13%	7,93%	7,73%
EQUITY IRR																
Equity	118 163 keuro	10 319	26 966	45 188	14 791	13 485	7 414	0	0	0	0	0	0	0	0	0
Cash to equity	1 252 736 keuro	0	0	0	0	0	0	20 547	23 838	19 079	21 544	19 733	22 083	19 314	22 062	20 547
Cash flow to Equity	1 134 574	(10 319)	(26 966)	(45 188)	(14 791)	(13 485)	(7 414)	20 547	23 838	19 079	21 544	19 733	22 083	19 314	22 062	20 547
IRR																14,65%

Source: Gatti, Stefano. (2018) 'Project Finance in Theory and Practice' by Elsevier Science & Technology.

Appendix C.3. Water Case. Water revenues.

WATER REVENUES															
		01-Jan-17	01-Jan-18	01-Jan-19	01-Jan-20	01-Jan-21	01-Jan-22	01-Jan-23	01-Jan-24	01-Jan-25	01-Jan-26	01-Jan-27	01-Jan-28	01-Jan-29	01-Jan-30
Year		31-Dec-17	31-Dec-18	31-Dec-19	31-Dec-20	31-Dec-21	31-Dec-22	31-Dec-23	31-Dec-24	31-Dec-25	31-Dec-26	31-Dec-27	31-Dec-28	31-Dec-29	31-Dec-30
Cumulated		0	0	0	0	1	2	3	4	5	6	7	8	9	10
Annual Inflation Rate		0,0%	0,0%	0,0%	0,0%	1,5%	1,5%	1,5%	1,5%	1,5%	1,5%	1,5%	1,5%	1,5%	1,5%
Escalating Factor		100,0%	100,0%	100,0%	100,0%	101,5%	103,0%	104,6%	106,1%	107,7%	109,3%	111,0%	112,6%	114,3%	116,1%
1* Adduction Level															
Additional Undrinkable Water	Mln mc/year	-	-	-	32	40	40	-	-	-	-	-	-	-	-
Tariff	€uro	-	-	-	178	180	183	-	-	-	-	-	-	-	-
Additional Undrinkable Water Revenues	keuro	-	-	-	5 688	7 217	7 326	-	-	-	-	-	-	-	-
Additional Drinkable Water	Mln mc/year	-	-	-	80	100	100	-	-	-	-	-	-	-	-
Tariff	€uro	-	-	-	356	361	366	-	-	-	-	-	-	-	-
Additional Drinkable Water Revenues	keuro	-	-	-	28 442	36 086	36 628	-	-	-	-	-	-	-	-
1* Adduction Level Revenues	keuro	-	-	-	34 131	43 304	43 953	-	-	-	-	-	-	-	-
2* Adduction Level															
Additional Undrinkable Water	Mln mc/year	-	-	-	-	-	-	32	40	40	40	40	40	40	40
Tariff	€uro	-	-	-	-	-	-	186	189	192	194	197	200	203	206
Additional Undrinkable Water Revenues	keuro	-	-	-	-	-	-	5 948	7 547	7 660	7 775	7 892	8 010	8 130	8 252
Additional Drinkable Water	Mln mc/year	-	-	-	-	-	-	136	170	170	170	170	170	170	170
Tariff	€uro	-	-	-	-	-	-	372	377	383	389	395	401	407	413
Additional Drinkable Water Revenues	keuro	-	-	-	-	-	-	50 561	64 149	65 111	66 088	67 079	68 085	69 107	70 143
2* Adduction Level Revenues	keuro	-	-	-	-	-	-	56 509	71 696	72 771	73 863	74 971	76 096	77 237	78 395
Total Adduction Revenues	keuro	-	-	-	34 131	43 304	43 953	56 509	71 696	72 771	73 863	74 971	76 096	77 237	78 395
Water Adducted															
Total Undrinkable Water	Mln mc/year	-	-	-	241	249	249	241	249	249	249	249	249	249	249
Total Drinkable Water	Mln mc/year	-	-	-	203	223	223	259	293	293	293	293	293	293	293
Total Water Adducted	Mln mc/year	-	-	-	444	472	472	500	542	542	542	542	542	542	542

Source: Gatti, Stefano. (2018) 'Project Finance in Theory and Practice' by Elsevier Science & Technology.

Appendix C.4. Water Case. Energy revenues.

		01-Jan-17	01-Jan-18	01-Jan-19	01-Jan-20	01-Jan-21	01-Jan-22	01-Jan-23	01-Jan-24	01-Jan-25	01-Jan-26	01-Jan-27	01-Jan-28	01-Jan-29	01-Jan-30	01-Jan-31
		31-Dec-17	31-Dec-18	31-Dec-19	31-Dec-20	31-Dec-21	31-Dec-22	31-Dec-23	31-Dec-24	31-Dec-25	31-Dec-26	31-Dec-27	31-Dec-28	31-Dec-29	31-Dec-30	31-Dec-31
Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Cumulated		0	0	0	0	1	2	3	4	5	6	7	8	9	10	11
Annual Escalation		1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%
Capitalization Flag		100,0%	100,0%	100,0%	100,0%	101,0%	102,0%	103,0%	104,1%	105,1%	106,2%	107,2%	108,3%	109,4%	110,5%	111,6%
HYDROPLANT #1																
Energy Production #1	41 500 MWh/year	-	-	-	33 200	41 500	41 500	41 500	41 500	41 500	41 500	41 500	41 500	41 500	41 500	41 500
Feed in Tariff #1	119 €/MWh	-	-	-	119	119	119	119	119	119	119	119	119	119	119	119
Revenues Feed in Tariff #1	keuro	-	-	-	3 951	4 939	4 939	4 939	4 939	4 939	4 939	4 939	4 939	4 939	4 939	4 939
HYDROPLANT #2																
Energy Production #2	30 150 MWh/year	-	-	-	24 120	30 150	30 150	30 150	30 150	30 150	30 150	30 150	30 150	30 150	30 150	30 150
Feed in Tariff #2	119 €/MWh	-	-	-	119	119	119	119	119	119	119	119	119	119	119	119
Revenues Feed in Tariff #2	keuro	-	-	-	2 870	3 588	3 588	3 588	3 588	3 588	3 588	3 588	3 588	3 588	3 588	3 588
Energy																
Energy Sold #1 #2	71 650 MWh/year	-	-	-	57 320	71 650	71 650	71 650	71 650	71 650	71 650	71 650	71 650	71 650	71 650	71 650
Energy	40 €/MWh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Green Certificate Revenues	keuro	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL ENERGY REVENUES	keuro	-	-	-	6 821	8 526	8 526	8 526	8 526	8 526	8 526	8 526	8 526	8 526	8 526	8 526

Source: Gatti, Stefano. (2018) 'Project Finance in Theory and Practice' by Elsevier Science & Technology.