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Information Technology
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Management



**Cost Accounting methods for construction projects in
North-West Russia
Case study Pöyry CM Oy**

Accounting and Finance
Master's thesis
Jouni Keisala
June 2009

ABSTRACT

UNIVERSITY OF KUOPIO, Faculty of Business and Information Technology,
Dep. of Business and Management, Major of Accounting and Finance

KEISALA, JOUNI T.:

Cost Accounting Methods for Construction Project in North-West Russia

Master's thesis. 118 p. + 4 appendix pages.

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Keywords: Cost Accounting, Costing, Activity Based Cost-Accounting, Cost Estimate, Budget.

The aim of the thesis is to develop Cost Accounting methods for the Construction Project in North-West Russia. The frame of the thesis is to make the inspection of Russian, Finnish and British cost accounting methods and to analyze their differences. This comparison has been executed not only as a literature research, but also through interviews with professionals, who orientated cost accounting and project's key persons. Activity Based Cost Accounting is added to the thesis to reach a more solid scientific base. The methods of ABC-Accounting are under research to bring benefits and to contribute to the project's cost accounting and cost controlling.

The first part of the thesis describes Russian business environment starting from historical view points to reasons for the ruble crisis. Besides the basic rules of legislation and the impact of recent day recession on Russian economy are being discussed.

The results of different accounting methods inspection show that these methods differ a lot in some parts. It especially concerns the Russian cost accounting method "Smeta" which has formed so wide a system that it can be applied for the most special construction projects as well. On the other hand, the British and the Finnish cost accounting methods are limited only by general construction projects. These two methods are more transparent and clear in their structure. So they resemble each other remarkably well.

Besides construction project price setting mechanism and basic assumptions are under surveillance in Finnish and Russian cost accounting methods. In Finnish method the project's costs start to form from a bigger entity and calculations are specified step by step towards smaller entities. When the project has been divided into smaller construction particles and the price setting has been done, the document forms the basis for the project budget. In Smeta-system it's other way round: the cost can be carried along three different roads to the final cost estimate which forms the basis for the project budget.

The joinings of ABC-Accounting to construction project's cost accounting seems to be quite challenging. The most difficult thing in ABC-accounting implementation is that project is all the time in a dynamic state. Changing production circumstances causes, that the source information which ABC-Accountings requires, is transforming also all the time. This means that more resources are needed to update the basic information in the ABC model. Despite this, the elements of ABC-Accounting can be applied when calculating the costs of additional works and their resource consumption. However, due to the dynamic features of additional works, the strict cost drivers, which are common for ABC-Accounting, could not be found.

TIIVISTELMÄ

KUOPION YLIOPISTO, Informaatioteknologian ja kauppatieteiden tiedekunta,
Kauppatieteiden laitos, Yrityksen hallinnon ja rahoituksen pääaine

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Rakennushankkeen kustannuslaskentamenetelmien kehittäminen Luoteis-Venäjällä

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Avainsanat: Kustannuslaskenta, ABC-laskenta/toimintolaskenta, Kustannusennuste, budjetti.

Pro gradu-tutkielmani tavoitteena oli kehittää rakennushankkeen kustannuslaskentamenetelmiä Luoteis-Venäjällä. Tutkielman raamiksi otettiin venäläisen, suomalaisen ja brittiläisen kustannuslaskennan menetelmät ja kustannuslaskentamenetelmien vertailu. Vertailu toteutettiin kirjallisuustutkimuksena, sekä haastatteleamalla kustannuslaskentaan perehtyneitä ammattilaisia sekä case projektin ammattihenkilöitä. Tutkielmaan tieteelliseksi raamiin lisättiin toimintolaskenta (ABC-Accounting), jonka menetelmätapoja tutkittiin projektin kustannuslaskennan parantamisen näkökohdista.

Työn alkupuolella kuvataan mm. Venäjää liiketoimintaympäristönä aina historiallisista näkökohdista rupla-kriisien syihin sekä Venäjän lainsäädännön perusteita sekä viimeaikaisen taantuman vaikutuksia maan liiketoimintaympäristössä.

Tutkimustuloksiksi saatiin, että vertailussa olleet kustannuslaskentamenetelmät poikkeavat osittain hyvinkin laajasti toisistaan. Erityisesti venäläinen kustannuslaskentamenetelmä Smeta on rakennettu niin laajaksi järjestelmäksi, että sillä pyritään hallitsemaan myös kaikkein erikoisimpiin rakennusprojekteihin liittyvät kustannukset. Sen sijaan brittiläinen ja suomalainen kustannuslaskentamenetelmä rajoittui vain tavanomaisiin rakennusprojekteihin ja nämä järjestelmät olivat rakenteeltaan selkeämpiä ja menetelmät olivat yllättävän lähellä toisiaan. Myös rakennusprojektin hinnan muodostumismekanismi ja mekanismin lähtöoletukset olivat vertailun alla venäläisessä ja suomalaisessa kustannuslaskentamenetelmässä. Suomalaisessa projekti osaamisessa kohteen kustannukset lähdetään muodostamaan suurista kokonaisuuksista ja laskelmia tarkennetaan kohta kohdalta yhä pienempiä kokonaisuuksia koskevaksi, josta muodostetaan projektin budjetti. Sen sijaan venäläisessä kustannuslaskentamenetelmässä kustannukset kulkeutuvat kolmea eri reittiä lopulliseen kustannuslaskelmaan, jotka on esitelty tarkemmin työssä.

Toimintolaskelman liittämisen rakennushankkeen kustannuslaskentamenetelmiin teki ongelmalliseksi se seikka että rakennusprojekti on kokoajan muuttuvassa tilassa tuotannon edetessä. Tämä aiheuttaa sen, että toimintolaskennan vaatimat lähtötiedot muuttuvat myös projektin tuotannon edetessä, joten lähtötietojen päivittäminen vaatii runsaasti resursseja. Sen sijaan toimintolaskennan kustannustiedon keruun elementtejä pystyttiin työn aikana hyödyntämään lisä- ja muutostöiden laskennan yhteydessä. Lisä- ja muutostöiden monipuolisuudesta johtuen työssä ei kuitenkaan pystytty määrittämään varsinaisia toimintolaskennan käyttämiä kustannusajureita lisä- ja muutostöille.

АВТОРЕФЕРАТ

Университет г. Куопио, факультет коммерции и информационных технологий

ЙОУНИ Т. КУЙСАЛА: Методы учета затрат по проекту строительства в северо-западном регионе Российской Федерации

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Ключевые слова: учет затрат, калькуляция стоимости, учет затрат по видам деятельности, смета, бюджет.

Целью данной работы является раскрытие методов учета затрат по проекту строительства, применяемых в северо-западном регионе России. В данной работе рассматриваются методы учета затрат, используемые в России, Финляндии и Великобритании, и анализируются их различия. Данный сравнительный анализ был проведен не только на основе научной литературы – проводились также интервью со специалистами по учету затрат и ключевыми лицами проекта. При помощи использования учета затрат по видам деятельности достигается более глубокая научная основа. Методы учета затрат по видам деятельности рассматриваются для достижения наилучшего результата и внесения определенного вклада в систему учета и контроля затрат по проекту.

В первой части настоящей работы рассматривается деловая практика в России, начиная с истоков и заканчивая причинами обвала рубля. Помимо указанного рассматриваются основные правовые нормы и влияние недавней рецессии на российскую экономику.

Результаты изучения различных методов учета затрат показывают, что такие методы во многом отличаются друг от друга по некоторым вопросам. Это особенно касается применяемого в России метода учета затрат, называемого “Смета” и образовавшего такую обширную систему, что ее можно использовать также для самых специфических строительных объектов. С другой стороны, методы учета затрат, используемые в Великобритании и Финляндии, ограничены только общестроительными проектами. Эти два метода более ясны по своей структуре. Поэтому они очень похожи друг на друга.

Кроме этого, механизм и основные предпосылки установления цены проекта строительства контролируются в методах учета затрат, применяемых в Финляндии и Великобритании. В финском методе затраты на проект формируются с более крупной структурной единицы, а расчеты уточняются поэтапно, нисходя до меньших единиц. Когда проект разбит на меньшие строительные единицы и установлена цена, документ формирует основу для бюджета проекта. В системе «смета» используется другая технология: стоимость можно вывести тремя разными способами до конечной сметы, формирующей основу для бюджета проекта.

Включение учета затрат по видам деятельности в систему учета затрат по проекту строительства кажется достаточно смелым шагом. Самым трудным в применении учета затрат по видам деятельности является то, что проект находится в постоянной динамике. Причины, изменяющие обстоятельства производства, являющиеся источником, который требуется для учета затрат по видам деятельности, также постоянно меняются. Это означает, что требуется больше ресурсов для обновления основных данных в модели системы учета затрат по видам деятельности. Несмотря на это, элементы системы учета затрат по видам деятельности могут применяться при расчете стоимости дополнительных работ и потребления ресурсов ими. Однако, по причине наличия динамических характеристик дополнительных работ отсутствует возможность определить точные факторы, определяющие величину затрат, которые являются обыкновенными для системы учета затрат по видам деятельности.

FOREWORD

Knowing local environment, land, its culture and history is important to every project all over the world. This will help to operate when one knows the local methods, procedures and you can connect your own operational ideology to locally existing information. This will make also the working environment easier and your work more rewarding.

The approach of this thesis was to develop project's cost accounting methods and familiarize oneself to Russian business environment. Here are the results of this half year long process. I want to thank my supervisor professor Jyrki Niskanen and DSc Econ Iikka Korhonen for their support and consultations during the writing process. I also want to thank to Pöyry CM Oy for giving me this chance to develop myself and projects cost accounting methods during this writing time. I am deeply indebted to Jorma Poikolainen and Paula Salmela who have supervised my thesis from the employer's angle. I can guarantee that the development process will continue when this thesis is ready.

I also want to say few words of Russian business culture. In Russia one typical issue of form in book keeping is that formal interest comes before matter interest which is vice versa concerning Finnish Accounting Standards. My own opinion of this form issue is that it has many analogical connections with many sides of business life in Russia.

Russia is a very interesting country. It is now and then difficult to understand the local procedures and methods used in business and everyday life. Someone has said that it is sometimes even impossible to predict the past in Russia. It is the country where things, which were not supposed to occur, take place.



Jouni Keisala
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Saint Petersburg Russia

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Appendices

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Definitions

Act (АКТ)

The Act is a document of work which describes how work or task is designed to be done or realized. Acts are divided in two different documents in Russia and in the area of the former Soviet Union countries. These documents are KS2 and KS3.

Activity Based Cost Accounting of ABC-Accounting

Activity Based Cost Accounting is cost accounting model which divides inspected organization into small activities and assigns the cost of each activity related to their actual consumption. In other words, ABC-Accounting transforms greater amount of indirect costs into direct costs.

Advance Payment (Аванс)

Advance payment is used for example when contractor parties agree to pay some payment in advance according to the contract. One may describe that advance payment is paid to secure subcontractors first positive cash flow.

Bill of Quantities

The list of items comprised in a Contract. The list states brief identifying descriptions and estimated quantities of the work. CESMM is a method of creating the Bill of Quantities.

Blueprint

A blueprint is a technical drawing or in other words documenting an architecture or an engineering design.

CESMM

Civil Engineers Standard Method of Measurement. The purpose of CESMM is to provide standard methods for simple building works to civil engineering works to be measured.

Cost Accounting

One of the main objects of cost accounting is to collect, record and measure numbers that describe economical activity such as amounts, prices, values and other quantities. Another main task of cost accounting is to create and use reports and calculation based on these numbers for decision-making, to cut company's costs and to improve profitability. Cost accounting can be divided in two separate accounting genres, Management Accounting and Financial Accounting.

Financial Accounting or Outer Accounting

Financial Accounting has been formed for the purpose of outsiders of the corporation such as public authorities, taxation authorities, shareholders, financial markets etc.

GAP, Main Architect of the project (Главного архитектора Инженера Проекта, ГАП)

The task of the main architect of the project is to control main architectural design of the project. The main architect is compulsory for every project in the RF.

GIP, Main engineer of the project (Главного Инженера Проекта, ГИП)

The task of the main engineer of the project is to control main engineering works of the site. GIP is not compulsory according to Russian laws.

Goskomstat, Госкомстат, Комитет Государственной статистики

Central Statistical Office of Russia.

Gosstroï, Госстрой

Gosstroï is the State Committee for Construction in Russia. The subject is operating under the Government and Gosstroï is the authority to secure that construction projects will operate according to RF's laws. Its tasks are also controlling construction industry generally, coordinating and surveillance of city construction, architecture, apartment sector and also building material industry.

Gost, Государственный стандарт

In Latin letters: Gosudarstvennyi standarty. RF's standards for construction industry.

Invoice (Счет)

Invoice is a bill of work that is done or material delivered. Invoice includes all needed information of parties agreement to make payment to happen. Also calculation and amount of VAT is included in the information of the invoice.

KS2 (КС2)

KS2 document is act-document which informs how work or task is being done or realized.

KS3 (КС3)

KS3 is official approval document of executed work. Signing the KS3-act empowers contractor to invoice the payment from the client.

Management Accounting or Inner Accounting

Management Accounting is for the purpose of corporation's management and is aimed to support their operational and strategic decision making.

ОАО, Открытое Акционерное Общество

OAO in Latin letters *otkrytoe akzionernoe obschestvo*. OAO means open type of liability corporate, which shares are able to buy and sell more freely without main limitations.

ООО, Общество с Ограниченной Ответственностью

In Latin letters *obschestvo s ogranichennoy otvetstvennostju*, which means Private limited company (LTD).

Perestroika

Perestroika means economic restructuring which President Gorbachev introduced when he came into power in 1985 in the USSR. The aim of Perestroika was to reduce central government's power over the economy. The target was to change the Soviet Union's command economy more towards free market economy, and allow the individuals to make their own decisions on the market.

Pravda (Правда)

Newspaper Pravda was one of the most important part of the core media in the Soviet Union. The Pravda was the official organ of the Communist Party in the USSR and newspapers pages were strictly censored before published. The news in the Pravda was regarded as truth because news supported the government policy. The maximum circulation of the Pravda was about ten millions before Gorbatshev's glasnost. Translation of the word "Pravda" is "truth" but it is not a contrast to falsehood or injustice. It means some kind of harmony on Earth.

Progress Payment (Оплата по договору подряда)

Progress payment is a payment that is agreed to be fulfilled when a certain milestone is reached. The amount of payment might differ from the money amounts parties have spent in projects, and it is based on what have been agreed only.

Смета, Смета

Traditional Russian type of Cost Estimate which has been created according to SNiP.

SNiP –norm system, Строительные нормы и правила "Stroitelnie Normi I Pravila"

The Construction norms and regulations first version was released in the 1950-ies. These documents include norms, guidelines and authorities' regulations related to construction industry. These documents correspond to Suomen rakennusmääräyskokoelma -document as extent. The overall list of Construction Norms and regulations are translated and listed as an appendix number 2 of this thesis. (www.snip-info.ru)

The Council of Federation (Совет Федерации)

The Council of Federation is the Upper House of the Parliament and it is set up of two representatives from each subject of RF, altogether 168 members.

The Parliament of Russia (Парламент)

In Russian Federation highest execution powers are held by the Parliament of Russia which is located in Moscow. The Parliament has two chambers: The State Duma and The Council of Federation.

The Soviet Union, United Soviet Socialist Republics, USSR**(Советский Союз, Союз Советских Социалистических Республик, СССР)**

The USSR was the union of 15 socialist countries which were governed by socialist parties in every participant country. These fifteen socialist republics were: Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

The State Duma (Дума)

The State Duma is the lower house of the Parliament, which includes 450 representatives from different parties, chosen through general elections.

TSN, Территориальные строительные нормы

Areal construction norms which are released by the authorities of each subject of Russia (84 subjects all in all) concerning the predominant norms in this particular area.

VAT or Proforma Invoice (Счет-фактура)

Value Added Tax invoice, VAT –invoice or pro forma invoice is required by VAT-authorities if enterprise is VAT-liable. VAT-liability enables the company to reduce VAT-expenses from the VAT share of the company's sales.

ЗАО, Закрытое акционерное общество

ZAO in Latin letters *zakrytoe akzionernoe obschestvo*. ZAO means limited type of liability corporate, which shares are limited to buy and sell with limitations.

1 Introduction

Introduction reveals the background information of the thesis, the aims of it and explains the research problems accurately. It also describes the scope and the structure of the thesis and finally it acquaints the readers with the implementation of the thesis. At the end of the introduction Pöyry group's project management in nut shell is given.

1.1 Thesis Background information

Development of information technology and production methods has created possibilities for better economical results in every field of industry. Construction industry hasn't yet reached the full weighted utilization of all new possibilities and positive development. Implementation of new methods has been decelerated due to few typical issues of construction projects. These issues are conservative attitudes in construction industry, unique location of projects and construction projects different execution details. Despite the uniqueness of production there are similar smaller processes inside larger projects, and this gives possibilities to use similar methods in project management. That's why the best way to use or to create new methods is to find similarities and exploit them as much as one can in construction management.

Workable cost accounting and cost control require well planned timetable, resource planning, cost estimating and budgeting, which are suitable for production management. These all have to be suitable for production management. Projects cost estimate is composed normally performance based, when the Bill of Quantities (BoQ) of the project is not represented together with the cost target of each main cost code. The lack of consistent BoQ leads to overlapping work when the same amounts of construction particles are needed to calculate in many steps and by many participants of the project. (Pekanpalo, 2004)

The delay of project schedule's execution has significant negative impact on the costs of the project and throughout that on the relation towards the clients. It is quite common that cost control is separated from project schedule and quality control, which makes it more

difficult to control the whole project. Also costs, which are directly dependent of time consumption, are usually remarkable. If there are delays in the time schedule, the time dependent costs will expands the cost easily over the budget.

Projects are difficult and challenging to control despite all new theories, methods and information channels. Even if economical calculations have been done at the highest level, unskilled project management can and probably will spoil construction projects economy. But for skilled and competent project management well done economical calculations are a stepping stone to success.

This master's thesis has been written on assignment of Pöyry CM Oy, which has also financed the thesis. Economical figures in this thesis are collected, calculated, computed and analyzed as a case-study of massive department store –project in Saint Petersburg Russia. Pöyry CM Oy operates as a Project Management Consultant in case-site.

Construction project is not executed by methods and information related to these methods. These are only tools to help in project managing process. Real construction activity is executed by strong will to affect and to be part of the team which wants to create something actual.

Theoretical parts of this thesis have been built on the basis of three different cost accounting methods. They are: Russian, Finnish and British cost accounting methods, and this country differentiation is concerned only in construction industry. Cost accounting methods have many differences, and one aim of this thesis is to clarify these differences to the reader.

The money amounts in this thesis are converted to euro units to eliminate changes in exchange rates, to clarify money amounts and to equalize the whole picture about this thesis. Euro amounts are calculated using the next exchange rates:

- 1 EUR = 43.5980 RUB (Date 08.05.2009)
- 1 EUR = 1.3425 USD (Date 08.05.2009)

(The European Central Bank)

Anyway some of the money amounts are informed as they were informed in the source. This is due to conversion would have change the value of elder sources remarkably.

Some details of the case projects contracts and monetary amounts:

- More than 250 separate contracts
- About 95 per cent of contracts are using ruble as contract currency
- The rest 5 per cent of contracts are using euro as contract currency
- Slightly more than 60 per cent of combined contract sums are in euro.
- Less than 40 per cent of combined contract sums are in rubles.

Contracts are not secured by terminating because the currency alteration risk is arranged at the uppermost corporate level of the investor company. This project is playing a small role in investor's currency alteration.

1.2 Main aims of the thesis and definition of the research problem

There are usually several problems in a project that need to be solved before real estate is executed and handed over to the client. The main problems in construction projects are related to Cost Accounting and Cost Control. One of the most problematic issues is that accounting and controlling methods are not operating in real time. Methods don't take into account the fact that costs are dependent on time factor which has quite a remarkable impact on projects total costs. Another problem is that production controlling and cost accounting and controlling are managed as different processes which don't have consistent control method.

The aim of this thesis is to familiarize the reader with different methods of cost accounting and cost controls via case project. One of the tasks is to create a cost control method which is simple and easy to use to control construction sites execution. The method should be easily updated as often as it is needed. This model also has to be flexible so that it can be used with small modifications in other projects as well.

The aim of Cost control is to secure that the project will be constructed first of all according to the cost estimate and later on according to the budget or updated budget. At the moment many construction sites costs are controlled by the developer's accounting department, which does not have concrete connections with the construction site. This method can be named as invoice based cost control, and it never occurs in real time situation at the site. This control method is always more or less behind the actual situation, and cost discrepancy cannot be perceived early enough, so the actions to react are a few steps too late.

Cost control needs to generate updated budget which needs to be reliable and well timed. Updated budget should also inform monetary changes in production compared to the latest cost estimate. Budget and Cost estimate are created based on sites manager's knowhow or lucky guess in many construction sites. Cost estimator should know the details of estimated tasks before one can give reliable cost estimation so that the estimation wouldn't be just a guess. Details that are necessary to know are content, realization and remaining costs. Cost estimations are updated quite rarely because updating is labor-consuming, that's why the data they give are less informative.

The research questions:

- How can the project costs be estimated well enough?
- How should Cost Accounting and Cost control be organized?
- How to react on gap between Cost Estimation and realized costs?
- What are the main problems and reasons for cost overrun in the project?
- How can Activity Based Cost Accounting be used in construction projects?

One of the aims of the thesis is to clarify cost accounting methods that are used in case-site and to find out what methods are necessary. In other words, what methods are required to guarantee success and adequate discipline in cost accounting.

1.3 Scope of the thesis

Theoretical part of this thesis dives into Russian, Finnish and British cost accounting methods in building sector. The thesis is limited to investigating only cost accounting methods which are as mandatory position in these countries. As a clarification to the reader, this division is used only in construction industry. Also benefits of using ABC-Accounting to construction project are under surveillance in this thesis giving the thesis deeper theoretical base.

The geographical area of implementation of the thesis is limited by the North-West Russia and Leningrad Oblast because the case project is located in this area. The case project has been under construction during the time this thesis has been written, that is why, thesis was steered towards the economical needs of the project.

The universal Project Life Cycle is represented in figure 1. View is from the perspective of an investor of a constructed facility. There may be considered various possibilities in the conceptual planning stage, and the technological and economic feasibility of each alternative will be assessed and compared in order to select the best possible to the project. This thesis will handle only cost accounting part of the project which is limited with dash line in figure 1, so earning calculations are left outside of this study. As a result of *Design and Engineering* step provides blueprint for construction, and the definite cost budget which will serve as the baseline for cost control. (Duncan, 1996).

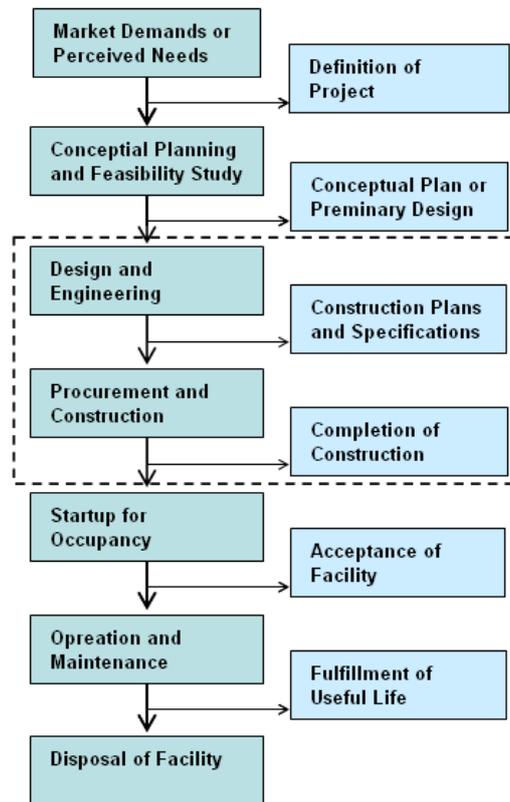


Figure 1: The Project Life Cycle of a Constructed Facility

1.4 Implementation of the thesis

Literature research and interviews were selected as implementation methods of this thesis. Interviews were held to experts who have long experiment of construction management in different projects and also experts who have experiment of business life in Russia. Thesis includes a case study of previously mentioned project's economical material. Some of the thoughts are based on undersigned experience of cost accounting in construction industry. Experience has been gathered from many interesting projects in Finland, Russia and even in Lebanon.

Research material has been collected from the internet, public and university level libraries, the company's library and the company's considerable database. Case study material has been received from the project's database.

1.5 Description of Project Management

The term *Project Management* is often used to express an organizational approach to the management of ongoing operations. This approach is more properly called *Management by projects* and it covers ongoing operations which are managed via different kinds of smaller projects. Felicitous definition to the term Project management is as follows: “Project management is the application of knowledge, skills, tools, and techniques to project activities in order to meet the exceed stakeholder needs and expectation from a project.”(Duncan, 1996)

Project management can be divided into smaller knowledge areas which cover specific entities. These entities can be noticed in figure 2.

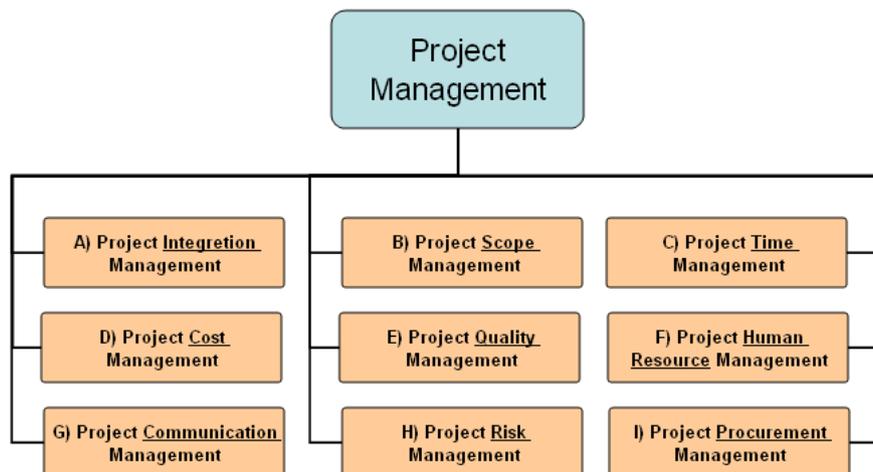


Figure 2: Overview of Project Management Knowledge Areas (Duncan, 1996)

The purpose of A) *Project Integration Management* is to ensure that the various elements of the project are properly coordinated. This area consists of a project plan development, a project plan execution, and an overall change control.

The purpose of B) *Project Scope Management* is to ensure that the project includes all the work required, and only the work required, to complete the project successfully. This area consists of initiation, scope planning, scope definition, scope verification, and scope change control.

The purpose of *C) Project Time Management* is to ensure timely completion of the project. This area consists of activity definition, activity sequencing, activity duration estimating, schedule development, and schedule control.

The purpose of *D) Project Cost Management* is to ensure that the project is completed within the approved budget. This area consists of recourse planning, cost estimating, cost budgeting, and cost control.

The purpose of *E) Project Quality Management* is to ensure that the project will satisfy the needs for which it has been undertaken. This area consists of quality planning, quality assurance, and quality control.

The purpose of *F) Project Human Resource Management* is to ensure that the project will get the most effective people involved in the project. This area consists of organizational planning, staff acquisition, and team development.

The purpose of *G) Project Communication Management* is to ensure well-timed and appropriate generation, collection, dissemination, storage, and ultimate disposition of project information. This area consists of communications planning, information distribution, performance reporting, and administrative closure.

The purpose of *H) Project Risk Management* is to identify, analyze, and respond to project risks. This area consists of risk identification, risk qualification, risk response development, and risk response control.

The purpose of *I) Project Procurement Management* is to clarify acquired goods and services which are needed from the outside the performing organization. This area consists of procurement planning, solicitation planning, solicitation, source selection, contract administration, and contract close-out.

(Duncan, 1996)

1.6 Pöyry group and their Project Management in a nut shell

1.6.1 Pöyry CM Oy in brief

Pöyry CM Oy is one of the biggest and the most international enterprise in Finland which is operating in the field of project management and construction developing. The letters

CM in the name of the company come from the words Construction and Management. The enterprise is offering services to its clients in real estate development, project planning, project management and construction management. (Orientation manual of Pöyry CM Oy, 2008)

The firm's project planning is based on estimating and clarifying client's expectations and requirements related to technical, economical, schedule and qualitative factors. Projects are controlled during design meetings, site meetings, control group / construction committee meetings and different kinds of inspections. It is absolutely important that plans, drawings and every kind of realized deviation in the product are approved by the client. In this way the firm can verify that targets are reached.

Clients are reported by well prepared progress reports which contain:

- Current status and deviation to goal (cost, time scale, quality, extent, benefit)
- Risk management related to project (including economical risks)
- Memo about decisions which have to be done in deadline and related draft resolutions to help decision making

1.6.2 Pöyry group's 4ePCM project management method

The 4ePCM process is a unique project management method which is used in Pöyry group's affiliates. Project management method ensures that all parties know their role and that all tasks are performed on time. The 4ePCM is an abbreviation for Engineering, Procurement and Construction Management. The process defines responsible parties for each task in the project. Pöyry group's main project functions are represented in figure 3.

MAIN PROJECT FUNCTIONS	
Project supervision	
EPCM project management	
Engineering management	
Procurement management	
Construction management	
Commissioning management	
Project control	Preparation for operation
Quality assurance	Health, safety & environment
Site security	Permitting assistance

Figure 3: Pöyry's Main Project Functions

Pöyry group's processes have been designed to give the clients additional value for using integrated processes, methods and tools throughout the project's lifecycle. (www.poyry.com, 4ePCM Project Management Process)

2 General information about Russia and its economy

This chapter will handle Russian Federation as individual state. At the beginning of the chapter there is some historical information that can help the reader to understand the massive changes which have taken place and which have impacted the development of the country. The chapter raises questions and gives answers about basic legislation, its main principles and national economy of Russia. It also informs of the differences in business life in Russia and financial crisis impact on the country's economy. At the end of the chapter there is a small summary about close-connections of all above mentioned things with the construction projects in Russia.

2.1 Russian Federation as a sovereign state

The Russian population has been counted to be about 144 million people (www.pravda.com, 2005). The Russian Federation has received its existing form after the collapse of the Soviet Union (United Soviet Socialist Republics, the USSR) at the end of the year 1991. Before the collapse the USSR consisted of fifteen socialistic republics: Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

Most of these republics formed the Commonwealth of Independent States (CIS) after the USSR's collapse to arrange unfinished businesses belonged to the USSR. Only the Baltic countries and Georgia left themselves outside the CIS. The Russian Soviet Federative Socialist Republic (the RSFSR) became the successor of The USSR and inherited partnerships in the international treaties which were signed by the USSR. The new constitution converted the name of the country from the RSFSR to the Russian Federation in year of 1993.

At the time of the Soviet Union (1922-1991) political ideology was based on socialism, communism and Leninism. These ideologies did not give any room to free market economy which is ruling ideology in the west and also in Russia nowadays. At the end of Soviet Union existence small scale entrepreneurship were allowed due the perestroika, which was the very last attempt to save the Soviet Union from collapse.

2.2 Recent Ruble crises in Russia

Since 1991 the life span of free market economy hasn't been long in Russia, economy has been unstable and it has suffered different kinds of crises. Lack of products and groceries among common people were the crises which started at the time of the USSR, and this was one reason for the collapse of the socialist system. This crisis lasted till free market economy and black market started to fulfill the massive demand after the collapse of the USSR. This fact resulted in the product prices and salaries releasing from governmental strict control. Finally, almost all the prices become based on supply and demand of the market. Furthermore, the resources and public property started to be treated valuable fortune, not anymore free dissipated resource. (Susiluoto, 1996)

At the present moment the existing financial crisis and decreasing gas and oil prices have put pressure to rubles valuation, and thus the ruble has devaluated rapidly from 37 to 45 against euro at the first months of the year of 2009 (The Central Bank of Europe, www.ecb.int). These changes can be seen in the following figure 4, which informs of the Ruble – Euro exchange rates from September 2008 till April 2009.

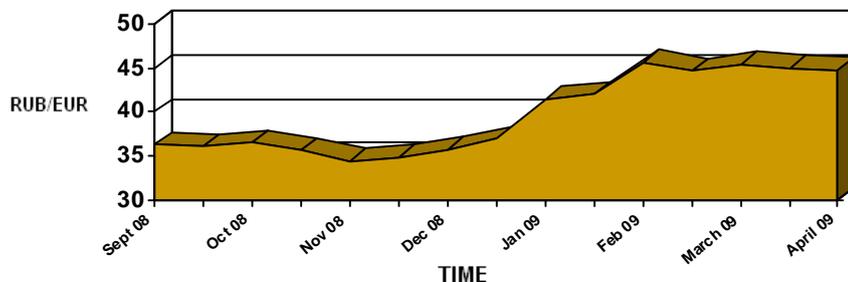


Figure 4: Ruble – Euro exchange rates from September 08 till April 09 (Solovjova, 2009)

There are three main historical reasons for not trusting Ruble as a currency, which are:

- Money reform in 1991. Every citizen of Russia had a 3 days time period for exchange of 50 and 100 ruble notes to new rubles, and moreover not more than 1000 rubles per person were allowed to execute the change. At those times inflation was around 300%.

- Money reform in 1993. Every citizen of Russia had 2 months for the exchange of Soviet rubles to Russian rubles, not more than 100 000 rubles per person (USD 80, at that time). Changing limits were observed by changers stamping passport when changes were done.
- Money reform in 1997-1998. At that time the ruble devaluated massively and many banks went to bankruptcy, that's why the citizens lost their savings because the state did not have a change to secure savings in the bank due to the fact that the state had also run out of money.
(Solovjova, 2009)

During the last years the ruble currency has been connected to USD and EUR related currency basket. The basket was formed to 45% of US dollars and 55% of euro. Since 2008 the connection to the basket was gradually opened through currency pipe where sides of the pipes were receded bit by bit. The encouragement of floating ruble currency came from the high oil and gas prices. (www.bof.fi)

All these above mentioned factors have formed the situation in which ordinary Russian citizen will trust more a foreign currency like US dollar or Euro than their own Ruble. That is why, many Russians have emptied their ruble accounts as their reaction to this crisis and change all the cash to foreign currencies just to save their purchasing power for the future or to consume the money. (Solovjova, 2009)

The same interest to foreign currencies has been seen also in the contracts between companies. It is very common that contractors require fasten the contract prices to foreign currency. The prices are usually fastened to euro or US dollars and the reasons are the same as mentioned before. (Laakso, 2009)

2.3 Legal environment in Russia

2.3.1 Legal environment in Russia

Right after the collapse of the Soviet Union the legislation appeared to be out of date, especially in the field of economics and, which worse, amongst economical crimes. In the country where enterprises were illegal and which suddenly became market economy, legislation undoubtedly could not exist. The power struggle of governmental polity was taking authorities attention and creation of new legislation needed to wait. (Susiluoto, 1996)

The economic reform has been massive since the collapse and the legislative restructuring has been in the core of the reform. There can be mentioned three major problem areas relevant for the development of legal system in the field of legal studies. The first is the influence of external factors on the legal system and legal hierarchy in general. The second concern is the implementation of the legislation. The third, which is closely related to the second, is the administrative organizations capability to adjust to the changing conditions. (Kärkkäinen, 2007)

In the early 1990's International Monetary Fund (IMF) defined a strict program to economic reform by the clause of funding the Russian economy. Nowadays the driving force to implement the economic reform is aimed at accession to the World Trade Organization, which relates especially foreign trade sector. In any case one can declare that Russian legal system is beginning to open up stable environment for business to operate.

Nowadays the legislation is very market oriented, which can be notified through these quick governmental actions released on the 21st November 2008 to beat financial crisis:

- Corporate profit tax was lowered from 24 % to a 20 %.
- RF regions have legislative rights to differentiate tax rates between 5-15% among businesses that operate on the basis of a simplified system of taxation (governed by Chapter 26.2 of the Tax Code) instead of a previous flat 15% rate.
- Cancellation of decided increase of export tax to saw-timber tree.

These examples represent adaptability from the government to react rapidly changing economical environment. (www.bloomberg.com & www.dlapiper.com & www.bof.fi)

The legal development in other fields like civil rights and democracy has been more unpredictable. (Kärkkäinen, 2007)

The RF's administrative system is highly centralized and it is formed based on the legacy which was left after the Soviet Union. Russia is a president-governed federation and it consists of 84 subjects (republics, territories, regions, cities of federal importance and autonomous areas), which have their own constitutional characters. The constitution was approved by a referendum in 1993 and it defines the division of powers between the federation and its subjects. The constitution assures large powers to the president who chairs the Security Council which has taken a leading role in Russian politics especially during Putin's and Medvedev's presidency. (Kärkkäinen, 2007)

The Parliament with two chambers is the main legislative institution in Russia. The chambers are: The Council of Federation and the State Duma. The first mentioned is set up of two representatives from each subject (168 representatives) of RF and the second mentioned (450 representatives) is chosen through general elections. Thus, the executive power in RF belongs to the Government which is appointed by the President with the approval of the State Duma. (Kärkkäinen, 2007)

In the Soviet Union the private entrepreneurship was illegal and was defined as criminal activity except very special and rare cases. This is why there was no legislation of entrepreneurship at the end of the Soviet Union existence, and the legislation had to be formed from zero-level. When forming legislation concerned companies and entrepreneurship, Russia followed European models. Anyway there are some differences compared to European models, and the main differences occur for example in different business cultures, novelty of legislation, structure of ownership and different ownership. (Kärkkäinen, 2007)

Regional legislation may often differ from the national level law. This causes sometimes different attitude to the companies if they are operating in different parts of the county. This may also lead to the fact that foreign companies might find themselves in less favorable situation compared to domestic companies. (Kärkkäinen, 2007)

In law creation process there is one remarkable difference compared to European law creation system. When the new law is released in RF, the old law stays existing but resigns when facing the new law. In Finland, for example, the old law is overruled at the same time when the new law is released. This kind of law creation system prevents many different interpretations and leaves many possibilities to lawyers to interpret the existing law, which often results in problematic situations.

2.3.2 Contract law in Russia

The basic principles of Russian Contract law are based on the following parts of Russian Civil Code system:

- Transactions, including invalidity (article 153-181),
- General provisions on obligations (article 307-419),
- General provisions on contract (article 420-453), and
- Specific contracts (sale of goods and others).

The basic principle “freedom of the contract” is mentioned in the Civil Code Article 421, which informs of the following: Parties are free to conclude a contract both specified and not specified in the Civil Code. Terms of a contract are determined by the parties themselves. They may also conclude contracts containing elements of various contracts provided for by the law a.k.a. mixed contracts. The second basic principle informs of the priority of the law over the contract. The contract must meet the rules, obligatory for both parties declared by the law or other legislative act current at the date of its signing. A contract that does not meet the law is considered as void, as a rule. (Russian Contract law, 2008)

The principles are similar in Finland. The contract in Russia may be also made by oral agreement but it is recommended to do it in written form because it is more trouble-free to certify the existence and the content of the agreement. In the cases when Russian company enters into a contract which includes foreign trade, the contract has to be made in written form. The parties must take into account the requirements and matter of forms of the contract and Russian legislation. In Russian Civil Code can be found formal

requirements for many types of contracts like land selling or renting just to mention few. (Kärkkäinen, 2007)

2.4 Russian Economy in general

It is difficult to predict the future of Russian economy in the situation of the financial crisis. The next chapter 2.4.1 *Economy in Russia* will reveal few predictions from 6 month time span, and these predictions are quite different even if they have been done by the same institution.

2.4.1 Economy in Russia

The earlier prediction was released in September 2008, and economic growth assumed to be around 8 percent in the year of 2008 and it assumed to decrease gradually to 6 percent till the end of year 2010. The consumer demand and investment demand are growing rapidly but economic growth is assumed to slow down when oil price is establishing and capacity constrain is effecting. Import is growing still remarkably faster than export.

Investments growth reached 19 percent in the first quarter of 2008. Growth seems to slow down already at the second quarter of 2008 reflecting construction markets and process industry as a slower growth. The high level of investment demand is based on economy's huge need for investments and companies sustainable profit level.

The development of export has been weak in the previous year. For example, during the last years first quarter the export of oil decreased by 5 percent. Investments in energy industry have been reduced on average because of high taxation and political risks. The growth of export is assumed to slow down this and the following year. Despite the export, the import has continued its rapid growth. At the first quarter of year 2008 the import grew by 27 percent in real and over 40 percent in monetary units. The import demand is impossible to answer by inserting domestic production simply due to the fact that there is not enough production, and the domestic production is not competitive. Plan of expanding domestic production is suffering capacity constrains and lack of professionally skilled labor force due to rapidly growing economy. Inflation has also accelerated during the last years and now the inflation level has end up to 15%. If the tense liquidity

situation goes along in the global market it will also affect domestic company's state to get funding to their operational usage. (Bofit, 2008)

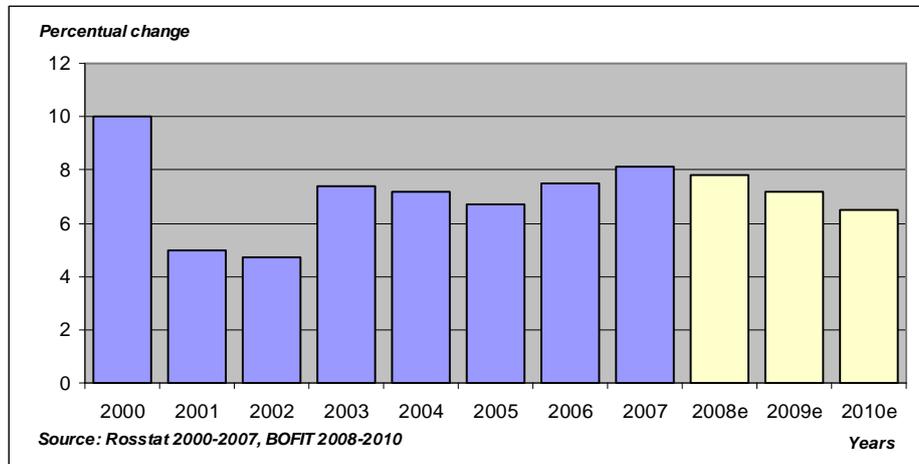


Figure 5: Pro cent growth of Russian economy from 2000 to 2007 and predictions for the years 2008-2010. Dated: 11.9.2008

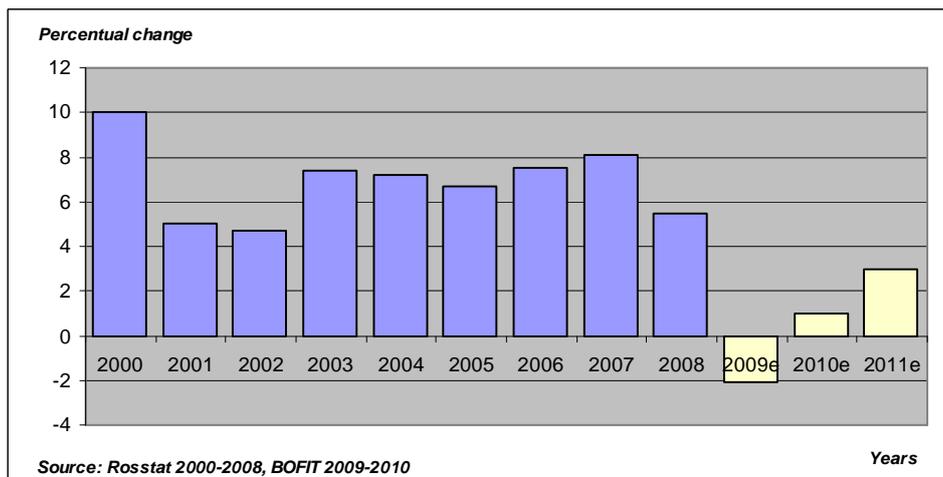


Figure 6: Pro cent growth of Russian economy from 2000 to 2008 and predictions for the years 2009-2011. Dated: 23.4.2009.

These two figures 5 and 6, inform of the latest predictions which show different forecasts about the future. The main reason for this rapid change between these two predictions is predominant finance crisis and oil price decrease when oil prices are connected with Russian economy more than clearly.

Figures represent growth rates of Russian economy from year 2000 to year 2011. Blue columns are based on the information from RosStat. Yellow columns in the diagram represent predictions towards to future made by Bank of Finland.

Massive incomes from high oil price in previous years have made Russian government prepare for oil price decrease by collecting reserve funds. More about reserve funds in the chapter *2.6.3 Reserve fund, one attempt to stabilize economy in Russia*. Economy in Russia is hugely based on oil price and its price development, since almost 50 % of governmental budget is on formed the tax income from energy industry.

2.4.1.2 Salary level in Russia

The salary level has accrued rapidly during the last years. During the last year (2008) period from January to May the central salary level was about 430 euro a month. Salaries real growth, when inflation has been taken into consideration, was about 14 %. Despite the huge pro cent growth of salaries, it has been slowed down and even decreased because of financial crises. When comparing salary levels to western countries one might say that level is sensible because the labor forces productivity is about 25-30 per cent lower in Russia compared to western countries. The positive issue in economy's development in RF is that the share of poor people is decreasing furthermore. Officially the poverty line was in year 2008 as much as 3 847 rubles per month (about 110 euro) and around 14 per cent of the population lived under the line. . For example in year 2002 it was around 25 %. The progress has been excellent. (Bofit, 2009)

The minimum salary in Saint Petersburg is agreed to be about 137 euro (6 200 rubles) at the beginning of year. The parties behind this agreement are governments of the City of Saint Petersburg, the labor market organization and the trade union. The average salary in Saint Petersburg is at the moment about 508 euro (23 000 rubles) per month. (General consulate of Finland, newsletter 3.3.2009)

2.4.1.3 Inflation and rubles rate differential

Inflation accelerated the beginning of the year of 2008. The consumer prices were 12.8 per cent higher year-on-year in February. In May the difference was 15.1 % year-on-year, and the growth was based on the raise of the following commodities:

- Food supplies 22 %
- Other goods 8 %
- Services 14%.

IMF sees the inflation as the biggest threat to economic growth in Russia. That's why governments have been encouraged to transform towards more flexible exchange rate policy and restrain lightening of their fiscal policy. The value of ruble was connected to currency basket till the end of April 2008 as mentioned in chapter 2.2 *Recent Ruble crises in Russia*. The RF's central bank announced that they would start to intervention if the ruble reached the lines of the pipe. According to the central bank, it is expanding the currency pipe step by step till free floating of ruble. (Bofit, 2009). Present day financial crisis has made the target of free floating ruble more expensive, besides Russia has used much of its reserve fund to stabilize the devaluation of the ruble.

2.4.2 Trade between Russia and Finland

The Russian share of Finland's total export of products has varied from 0 % to 100 % from the historical times till today. At the time of the Russian Empire, Finns were travelling to Saint Petersburg to sell their handicrafts, products and tar. They brought luxury goods when they came back to Finland. Right now Russia is the most remarkable and the biggest trading partner to Finland. (Vihavainen & Ketola, 2008)

The era of bilateral business started when Finns carry through the judged war indemnity to the Soviet Union. These war indemnities were curse and blessing to Finland at the same time. The curse was related to the point that Finland needed to pay first judged damages of war before they could start to build their own community. The blessing was that these damages were stimulus to growth of Finnish industry. The trade between the

USSR and Finland was only bilateral, because private companies and SME's did not exist in the USSR, moreover, they were pointed illegal by socialist laws of the Soviet Union.

Since the collapse of The Soviet Union at the end of 1991, the trade between countries came also to an end. However from the year of 1993 till the summer of 2008 the trade had been expanding and changing enormously towards the level of western business culture.

According to last year's economical sights, the Russian market will offer remarkable business opportunities to Finnish enterprises far to the future. Operating in the Russian markets requires, above all, competitiveness, but also consistency of actions and perseverance. (Vihavainen & Ketola, 2008)

Knowing history and business environment is vital, when operating in Russia. For instance knowing history helps to understand customer behavior and gives opportunity to understand culture better. Business environment in Russia is much more different than in western countries because of the state short history in free market economy and legislations short operational period. Many western firms have entered the Russian market via alliance with the local partner. This is because local manpower is a remarkable position, when running business due to the fact that they have a better know-how of local business culture. Besides, local firms and some joint companies are threaded better than global firms due to the policy aiming to support domestic production, actually patriotism is raising its head in Russia.

2.5 Differences in Business life in Russia

Executing business is much more different in Russia than it is in western countries. The differences are closely related to cultural differences and through culture to country's history. That is why, when a western company is planning to establish in Russia, they should first learn their lessons of a more different business environment and the history of the country. Many companies have founded trusted ally to reduce their risks to operate in

Russia, and many have tried to manage on their own. The purpose of this chapter is to form the impression of risk types and possible bribes that company might face in Russia.

2.5.1 Business sectors risk types in Russia and risk management

Risk is usually defined as a threat or danger, or, in other words, even the possibility of unfavorable incident to happen, so that set goals will not be reached. When there is a risk, there is always also uncertainty. The economy in Russia is changing all the time rapidly and towards the directions that are not easy to predict. Operating in this kind of economy sets huge challenges to the western companies which are planning to invest in Russia. The risk types can be named according to the following array (Junttila, 2001):

- Country risk
- Execution risk
- Force Majeure –risk

2.5.1.1 Country risks

Country risks are defined through factors that are not dependent on the project itself. The risks are linked with political, economical or legislative factors. Otherwise they might be caused by some natural phenomena or the risk is related to data-communication or transportation, which fails to operate as they are planned to operate. (Junttila, 2001) One example of political risk was the case of Jukos and Michail Hodorkovsky in 2005. Jukos were accused of taxation crimes and the firm was driven to bankrupt on purpose by the Russian government. This caused decreasing of foreign investments for a certain period of time.

2.5.1.2 Execution risks

Execution risks are counted risks which are dependent primarily on the project. These risks are caused by the contract and contract's realization. Examples of these are technical, commercial, contract juridical and also human resources related risks. The risk in exchange rates is also included in execution risks. Normally when a western company is investing in to Russian markets, they use mainly three different currencies in their inner

cost accounting. These currencies are: Russian ruble, US dollar and euro. Negative changes in currency markets can be secured by hedging, which means that a company makes an agreement with some actor in a financial market to buy certain currency in agreed price in the future. (Junttila, 2001)

2.5.1.3 Force majeure risks

Force majeure risks are risks which are not dependent on a contract, unpredictable and causing insurmountable consequences. Examples are: a war, a natural or an other disaster, a plague or an other unexpected catastrophe just to name a few. One cannot interact against these risks, but one can minimize the negative consequences of the disaster. (Junttila, 2001)

2.5.1.4 Management of risks

Project Risk Management includes risk identification, risk qualification, risk response development and risk response control. The main aim of Risk Management is to maximize the results of positive events and minimize the setbacks of harmful events. The purpose of Risk Identification is to specify which risks are likely to affect the project and document features of each. The idea of Risk Quantification is to evaluate the risks and their interactions to projects outcome. The Risk Response Developments main point is to define enhancement steps for opportunities and responses to threats. The reason for Risk Response Control is to respond to changes in risk over the different stages of the project. (Duncan, 1996)

2.5.2 Bribes in Russian business culture

First of all the author states that none of the firms related to the case project is involved in bribes at any level of business. This small chapter is here just for the readers to learn more about business culture in Russia.

Offering bribes or acceptance of bribes is illegal in Russian Federation. Moreover, in Russian business culture it is quite common. This can be illustrated by examples from the

Russian language, in which there are such words as “взятка” [vzjatka] meaning “bribe” and “откат” [atkát] slang name for the word “bribe”. There is also a widespread term “официальный откат” [ofitsiálnyi atkát] “official bribe” in Russian business language. The official bribe means that a contract includes a clause about bribe payment and the terms like amount, cause, effect and reason to realize this payment. Official bribe can be renamed also as a different type of work as a consulting work for example. Using bribes is quite a common and ordinary thing in Russia, and this forms part of a business culture, even though the main aim of governmental actions is to get rid of corruption. (Medvedeva, 2008)

In the era of the Soviet Union the assistance or help from governmental institutions was time-consuming or there were no social coverage to some separate problems. This necessitated to situations where problems were solved throughout own social networks. Goods and service were not bought, in fact they were provided with the help of cooperation, acquaintances, relatives and friends. The term for this unofficial procurement was “блат” [blat] .This term is described as an intermediate form for gift and trade because it does not require payment or service in return but creates the net of indebtedness. Blat differs from bribe in details, when in bribe the individual does not need to know the receiver because money talks. In blat it is characteristic to show appreciation, respect and remembrance. The significance of blat has reduced because goods and service are more available nowadays than in the old times. (Ledeneva, 1998)

2.6 Financial crisis impact on the Economy in Russia

2.6.1 Expectations of big firm managers about Russian economy

Finland Central Chamber of Commerce executed questioning survey to more than 1 100 Russians which are in a manager position in their company. Questions concerned about future expectations in Russia for the next 12 months starting from the beginning of the year 2009. The following material is based on the results of this survey. Table 1 gives a detailed information of the sample group.

Sector	%	Size of company (employees)	%	Area or city	%
Industry*	38 %	1-50	74 %	Moscow	43 %
Retail*	42 %	51-250	20 %	Saint Petersburg	26 %
Service*	38 %	more than 250	6 %	Other N-W cities	31 %

* Some companies represent more than one industry sectors.

Table 1: Detailed information of the questionnaire answerers

The state of Russian economy has impaired clearly during the last year. The Russian enterprises' executive managers are expecting the state of economy to impair even more within the following year. Moreover the expectations for the development a year ahead are much more cautious than a year ago. In the field of commercial sector the development is seen more optimistic than in industry or service sector. The managers assume that economical situation has deteriorated seriously more in Saint Petersburg and Moscow than in other areas of northwest Russia. The flow of investments grew onwards in the year 2008 and managers assume that in the year 2009 the positive development remains. North-West Russia is on average more optimistic about investments and their growth than Saint Petersburg and Moscow. (Finland Central Chamber of Commerce, 2008)

The governmental institutions actions have been seen effecting positively for enterprises operational preconditions now and in the future during the President Putin's and the present president Medvedev's time. However, Putin's government actions have been seen as weakening clearly foreign enterprises investment possibilities during the last years. President Medvedev's government actions are assumed to improve foreign enterprises possibilities to invest within the becoming year instead. (Finland Central Chamber of Commerce, 2008)

One of the Putin's presidency times government merit was the law of strategic line of businesses in Russia which is one of possible explanations for weakening foreign enterprises investment possibilities. The law was approved in the State Duma on the 21st March 2008 and it specifies 42 lines of businesses which are partly or completely

strategic concerning federal security. The purpose of this law is to inform foreign investors unambiguously in which line of businesses they can operate and what are limiting principles in this area of business. (www.bof.fi)

2.6.2 Present day impact of financial crisis on Russian economy

The Russian economy minister informed at the end of February 2009 that RF's gross domestic product had contracted by 8.8 per cent year-on-year in January. This led to speculations that Russia's economic downturn might be much deeper than had been thought previously. Still at the beginning of the year 2009 the economy ministry predicted the reduction of GDP by 2.2 per cent in the year 2009. But predictions might need to recalculate. The economic data from industrial sector informed that in January there was a 17 per cent decline in construction and a 16 per cent decline in industrial production, however, there was a 2.4 per cent rise in retail trade. One of the reasons for these depressing data is high interest rates, which are kept high because of stabilizing ruble process. Another explanation is that part of this drop is a consequence of a high rate growth (8 per cent) recorded in January 2008. The banking system is frozen and many second and third-tier borrowers are not provided with credit. One possible explanation of this freeze lies in the fact that banking system now is working hard to accumulate foreign currency like US dollar or euro, and not to provide credit. (Clover, 2009)

Index for industrial production in monetary units in Saint Petersburg decreased for the first time within last 4 years. This has been explained by the fact that most of the employees in production factories have had longer holidays or they have made shorter working time during January. Index decreased by 13 per cent, so now it is at the same level as it was in January 2004. The size of decrease is equal to indexes decrease in whole Russia. At the same time the share of groceries production increased from 37 per cent to 39 per cent of the whole industrial production. (General Consulate of Finland, 2009)

Lending from private banks to private sector enterprises is still on freeze. The total money amount lending from private banks decreased till the end of February 2009 about 15 per cent in year to year. In year 2008 private banks total money amount of lending was

about 16.3 billion euro (740 billion rubles). Overseas credit became almost impossible to Russian enterprises starting from last autumn and short term ruble based interest credit rates are between 25 to 30 per cent. (General Consulate of Finland, 2009)

2.6.3 Reserve fund, one attempt to stabilize economy in Russia

The Russian Federation's overheating economy has been the issue in the media for already several years. The International Bank for Reconstruction and Development (IBRD) and the International Monetary Fund (IMF) mention that the risk of overheating still occurs. Signals of overheating are, e.g. more than 8 per cent annual economic growth, real salaries are growing faster than productivity of labor, reduction of unemployment and acceleration of inflation. The effects of overheating can be confined by extorting finance- and monetary politics. (Bofit, 2008)

Russia's massive and mainly still untouched resources of raw materials are essential on the global scale and also for the European Union. These resources give to Russia a strategic position in energy policy as well as in international relations. RF owns the biggest natural gas resources and second biggest coal reserves, its oil reserves are rated 8th place internationally.

<u>Product</u>	<u>Quantity at 2006</u>	<u>RF's portion of global resources</u>
• Oil	79.5 billion barrel	6.6 %
• Natural gas	47.65 billion cubic meters	26.3 %
• Coal	157 010 billion tons	17.3 %

(British Petroleum, 2007)

RF's economy is much dependent of oil price and energy sector. The oil and natural gas share of total export of Russia were 63 per cent in the year of 2006 (Ministry of Defense of Finland, 2008).

Figure number 7 represents price formation of Brent Crude Oil during the last 5 years. All the period high prices were noted at the beginning of July 2008, and the price was

around 150 US dollar per barrel. Today's price is a little more than 53 US dollars per barrel.



Figure 7: Price formation of Brent Crude Oil from 2004 till March 2009.

(Financial Times, 2008)

As an answer to overheating economy the Russian government decided to establish the reserve fund in 2004. The aim of the reserve fund is to channel funds, which are mainly due to high taxation of exporting oil, to balance oil prices random variations impact to RF's economy. The reserve fund reached its all time highest value of 3 841 billion' rubles and about 104 billion euro in the summer of 2008 before the financial crisis had started to impact the Russian economy also. At that time reserve fund's value was about 12 per cents of RF's GDP so it was the third biggest in the whole world. For comparison to RF's foreign dept is about 3 per cent of GDP at the moment.

At the beginning of 2008 the whole reserve fund was divided into two different funds. The first one, a new reserve fund, got about 80 per cent of the wealth, which was purposed to use to fill the federal budget if cash flow from the export or oil price reduces remarkably. The upper limit to reserve fund are set to be 10 % of yearly gross domestic production. The rest of the old reserve fund's wealth was removed to the national welfare fund. This fund will grow by the overflow of a new reserve fund when it becomes bigger than 10% of the GDP. The purpose of the national welfare fund is to use for e.g. funding pension reform and also many other remarkable reforms in the future.

This huge fund has been collected in the time when oil price has been growing (2004-2008) (figure 7). Now, when oil price has moved downwards, it led to the fact that

reserve fund money has been needed to use funding economy in Russia. These actions have reduced the amount of the fund.

Russia is well protected against global economy's sudden turbulence. Short time collapse in oil price doesn't collapse RF's economy, but in the longer time scale, low oil price might have serious effects on RF's economy and via that on the whole country's stability. If required investments to energy and industry infrastructure are not done, the confidence towards Russia as a reliable energy deliverer will be endangered and the economy in Russia will not continue its way to diversify. (Ministry of Defence of Finland, 2008)

2.7 Foreign investments in Russia and in Saint Petersburg

In 2007 straight investments in Russia expanded by 62 per cent if compared to the previous year, and the amount of investment was about 52 billion US dollars. As for earlier period Russian Central Bank hasn't given any specific information about foreign investments. Investments to the banking sector became almost 3 times bigger than in a year before mainly due to the fact that several huge banks in Russia made directed issue of shares to international institutional investors. Bank sector's share of total foreign investments was a little more than 11 per cent in 2007.

Realized direct investments in Saint Petersburg in 2008 stayed at the same level as in a previous year. According to the official statistics, beginning from 2008 investments about 8.1 billion euro (367 billion rubles) were made to Saint Petersburg area. This is only 0.4 percent more than in 2007. About 45 percent of investments were made to infrastructure, 16 per cent to real estate, 11 percent to industrial production, 5 per cent to energy and water supply and 4 percent to retail trade. The biggest investors in Saint Petersburg area were General Motors (about 300 million USD) and Nissan (about 200 million USD) which both invested in their car production factory. About 40 per cent of all invested money did come from federations and oblast's budget to invest mainly oblasts infrastructure. (Petrostat, 2008)

2.8 Short summary of the Russian Federation and its economy

Russia is not an ordinary country, and its economy is different when compared to western countries. The country is not entirely democratic and that's why it does not operate according to all free market principles. Circumstances are complicated, for example, the government has a strict control of media and the authorities do not follow all the existing laws.

Another typical feature of Russian economy is that the chasm between the rich and the poor is bigger than in western countries and it is still expanding and enlarging in a new Russia.

Through out its long history, the country has faced many rapid changes and it is quite common that history repeats itself. This means that changes will also happen in the future, but no one can predict the magnitude correctly. The author has no doubt that the country will rise from the present day crisis. It will happen sooner or later but it will happen someday anyway. The author has a strong belief that Russia continues its development towards western economies with freedom of speech, more free media and less controlled economic life. The purpose of this chapter was to reveal to the reader some specific features of Russia and its economy, because all these things go hand in hand with construction projects in Russia.

3 Cost Accounting in general and ABC-Accounting

The following content will analyze cost accounting methods first generally and then more detailed, concentrating on Activity Based Cost Accounting. The first part of this chapter focuses on classification of costs, main problems in Cost Accounting and the relation between Cost Accounting and Investment Calculations. The second part concentrates on basic rules of ABC-Accounting and gives example of practical application of this accounting method. The second part also discusses discovered difficulties concerning ABC-Accounting.

3.1 General approach to cost accounting

One of the main objects of accounting is to collect, record and measure numbers that describe entities' economical activity like amounts, prices, values and others. The other task is to make reports and calculation based on the above-mentioned numbers. Examples of calculation and reports are profit calculations or economical state for a single product, a project, a production line or a whole enterprise.

The concept of Accounting is not unambiguous. Accounting produces among other information which is needed in planning, controlling and measuring. The term "Cost Accounting" can be defined to be a method which defines prime cost of a certain product, where prime cost is needed, for example, to mark storage value to balance sheet. In some literature the term "Cost Accounting" is kept as a synonym to management accounting moreover, management accounting is more related to decision making than normal cost accounting (Drury 2008). Nowadays management accountings and organizations strategic connection are emphasized (Ittner & Larcker 2001). One example of this is that strategic decisions have to be done based on the facts that management accounting produces. Strategy has to be profitable and purpose-oriented, and management accounting is one of the effective tools for execution.

Accounting can be divided in two separate accounting genres, because two different entities need information for different purposes. These genres are Management Accounting and Financial Accounting, the division is illustrated in figure 8.

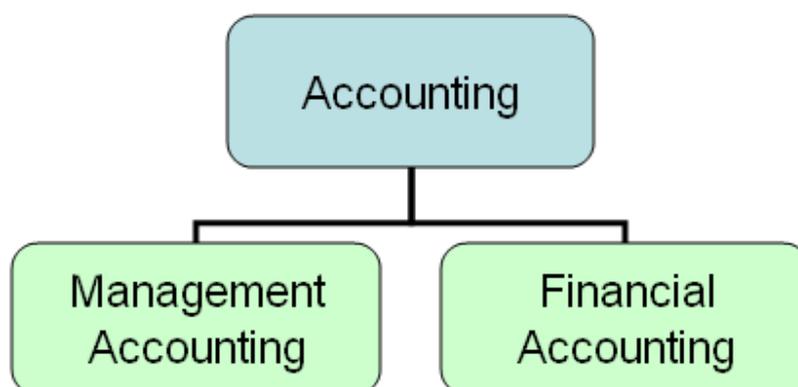


Figure 8: Division of Accounting in Management and Financial Accounting

Management Accounting is targeted to corporation's managers to support their operational and strategic decision making. Inner Accounting is a synonym for Management Accounting and the term reveals that the information is aimed at managers inside the corporation. This accounting genre is based on operational convenience, so the need for accounting calculations comes from inside the enterprise. The tasks of Financial Accounting are to produce information to outsiders of the corporation, like public authorities, taxation authorities, shareholders, financial markets etc. Bookkeeping is closely related to Financial Accounting and reports are very official form (Horngren, Bhimani, Foster & Datar 1999). Calculations in this thesis are related mainly to Management Accounting and this is why there is no strict rule to follow when creating new methods.

Reports that Cost Accounting creates are useful in many different ways. That is why an individual has to take into account the purpose this particular report is originally made for, when using report for decision-making. One problematic question is, for example, if an individual uses calculations, where basic assumptions are made of long run future sights, for short run decision making.

Some of the accounting authorities have an opinion that reports created in cost account department are only for outer information purposes, that is why reports should not be used in inner decision making at all (Drury 2008). This is one reason why inner and outer

cost accounting should and already have been separated to serve different purposes. These differences should be emphasized more and more nowadays.

The following table number 2 represents differences between Management and Financial Accounting.

	Management Accounting	Financial Accounting
Norm steering of knowledge	No universal rules, every entity may create own methods like balanced scorecard	Universal norm commitment (laws and custom)
Target of calculation	Corporate, profit centre, product, part of corporate etc.	Juridical entity, corporate as a financial unit
Basic values of information	Theoretical or computational prices. Many different variants.	Usually purchase prices, a.k.a. realized prices are common
Time orientation of information	Ex-post and ex-ante information needed. Sight to past and also forward.	Uses ex-post and realized information. Sight to past information.

Table 2: Differences in Financial and Management Accounting

Single product's manufacturing costs is a good example of *Management Accounting*. When allocating manufacturing costs, ex-post information from production is needed like machinery hours, designing hours etc. Also future (ex ante) information is necessary such as, prices of raw materials needed for production and salary expenses of employees just to name a few. Allocating universal costs in Management Accounting can be done in many different ways, for example, with the help of traditional cost accounting method, ABC-Accounting method or another calculation method. Target of calculation is the main focus and there is no single rule to limiting calculation methods.

Juridical entity like corporations yearly financial reporting is a good example of *Financial Accounting*. In financial accounting the steering rules and methods come from universal and national norms, laws and customs. It is quite usual that also the calculation formulas for used prices are given. The time orientation of calculations is always towards the past and only recorded information is under surveillance.

3.1.1 Tasks of Cost Accounting

Costs in business operations and also in other productivity operations are usage or consumption of production factors which are measured in monetary units. Cost is a term in accounting, and it differs from such terms as expense or expenditure. Costs are expenses that are earmarked to certain period of time, normally accounting period, so costs are always expenses but expenses are not always costs. This is represented in figure 9.

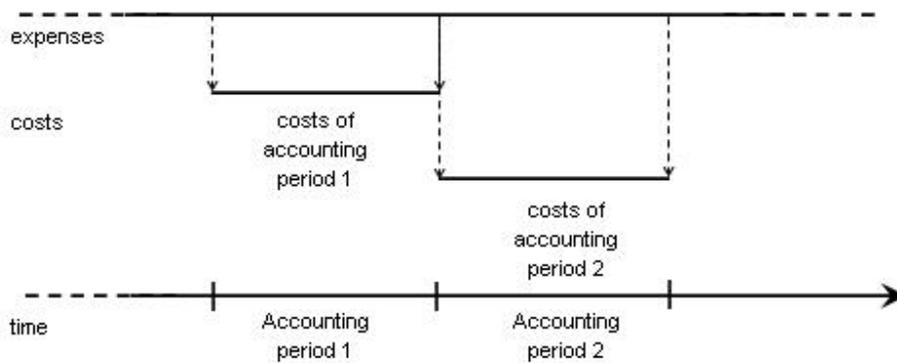


Figure 9: Difference between costs and expenses

Cost accounting is used for various purposes and one example is depreciation of fixed assets. Depreciation methods are used in Financial Accounting and also Management Accounting. In Financial Accounting the depreciation rules are stricter because depreciation rules are controlled by International Accounting Standards (IAS), Generally Accepted Accounting Principles (GAAP) and national accounting standards which are normally related to laws. In Management Accounting there are no strict rules as for how depreciation should be done, but it follows normally principles of Financial Accounting. There are no universal rules how costs should be calculated in Management Accounting to cover all situations. Only in bookkeeping the history of costs is controlled strictly. Bookkeeping represents one part of Financial Accounting but the information that bookkeeping delivers can be used also for the needs of Management Accounting as well. The relation between Management Accountings and book keeping is quite clear. When book keeping, the focus is paid attention to events which have happened, while in Management Accounting the focus is aimed forwards and aimed at predicting the future (Uusi-Rauva, 2003). Example of this can be mentioned comparing company's *Annual*

Report, which is past year's report and it is closely related to book keeping versus *Project Budgeting*, which will give estimate of future and it is closely related to Management Accounting.

One task of Management Accounting is to prepare reports for decision making and/or resource controlling when releasing new production line, for example. Reports might be ordinary periodical reports or for special purposes. Well operative Management Accounting method reveals effects and impacts of made decisions. One way to reveal effects of made decision is to record accrual of costs in many different ways (Drury 2008).

The main task of Management Accounting is to offer necessary and well-timed information to managers and other decision makers. Too rigorous accounting methods will increase the costs of accounting work, that is why reports are needed to produce by optimizing spent time and the money used, so that work is as economical as possible. The reports should be created and informed quickly enough to the managers that need the information the most. (Drury 2008).

After all Cost Accounting has to support the strategy of the company and its main functions. Managers need to focus on the fact that the viewpoint of accounting is correct and accuracy of accounting method is appropriate.

3.1.2 Classification of costs

There are several ways to classify costs in Cost Accounting. Traditionally the costs are classified according to the following figure 10.

Separate costs	Variable costs	Direct costs	Overall costs
	Fixed costs	Indirect costs	
Joint costs			

Figure 10: Classification of different costs (Uusi-Rauva, 2003)

The height of the figure represents the whole project's overall costs and these overall costs can be classified in three different ways, which are:

- Separate Costs vs. Joint Costs (SC vs. JC)
- Variable Costs vs. Fixed Costs (VC vs. FC)
- Direct Costs vs. Indirect Costs (DC vs. IC)
- Overall Costs = SC + JC = VC + FC = DC + IC

The first column of figure 10 represents *separate costs* versus *joint costs*. This distribution is quite common, for example, for different kinds of project models. Separate costs are expenses that are caused by activity that has been done, if this activity is not done the expenses do not born. Thereupon all the variable costs are always separate costs and this can be seen in the above figure. Joint costs are costs which are consumed even when there is no activity in the project, so they are running all the time. Support services of the project, like head office expenses, represent joint costs. Temporary office arrangement of a single project represents separate costs which will not be born if a project is not executed.

The second column represents *variable costs* versus *fixed costs*. Fixed costs are expenses that are fixed in short time period and they are not changing with the increase or decrease of production. Defining the right time period in question of fixed costs is the most problematic task because if we lengthen the time period enough every cost will turn out

to variable cost. Usually in fixed costs are counted buildings, production machines, management of firm and their expenses. Variable costs are normally materials which are needed or consumed in production related somehow to output of production. All variable costs are separate costs as mentioned before and also some part of fixed costs belongs to separate costs.

The third column shows the relation between *direct costs* and *indirect costs*. Difference in direct and indirect cost depends on how easily or straightly costs can be allocated to a certain product or service. Direct costs allocation is straight and easy when indirect costs can be allocated to products only for example with the help of cost drivers. Even if the major part of variable costs is typically direct costs, there is no straight connection between these types of costs. Building element is an example of direct cost which can be directed to unique project. Salaries of cost accounting department are an example of indirect costs which need cost driver for allocation.

3.1.3 Main problems in Cost Accounting

In the field of cost accounting there are several problematic tasks that need to be solved. This array lists main problems concerned with cost accounting field.

- Problem of Scope
- Problem of Measurement
- Problem of Valuation
- Accrual problem
- Allocation problem

(Stolowy & Lebas, 2002)

In Problem of Scope the question is what earnings and cost will be taken into account and how long is the period under review when executing calculations. The results will be totally different when used calculating period is few years on behalf of few months. A good example of this is a long project where cash flow is stressed to be as advance payment. So the progress of production is living its own life far away from cash flow.

The question is, how earnings and costs should be recorded to income statement at the end of each period.

In Problem of Measurement the focus is how object's profits and cost can be measured reliably. Problem of measurement is based mostly on questions related to measurement technology like how to measure time used to finish some production step or how much material is used to produce one unit, for example. Efficiency of carpenter in construction site is a good example of the problem of measurement. How much mould can one carpenter produce against 1 000 euro salary and if there are differences between productivity of carpenters.

Problem of Valuation comes into question especially in unit prices. What unit prices should an individual use when the circumstances differ. When should he use purchase price, replacement price, current price etc. for instance. Practical example of this is when iron bars were bought to the project two months ago at the price of 1.0 euro per kg. One month ago the price was 1.2 euro per kg and nowadays the price is 0.9 euro per kg. The problem of valuation here is what price should be used. The International Financial Reporting Standards (IFRS) order that the method of valuating needs to be First in first out (FIFO)-method. A more problematic situation is in Management Accounting which has many variants due to the individual who will process the calculation.

Accrual problem is raised in situations when costs or other monetary amounts are needed to be registered in a certain accounting period. The main question is which amounts belong to which accounting period. This problem is raised normally when long time costs like fixed assets are needed to depreciate as a cost of some time period. Normal answer to this problem is depreciation plan, which says how costs of fixed assets are depreciated. A practical example of this is how to depreciate construction site's tower crane in its economical utilization time. How much of crane's value decreases during the construction time and what is the crane's value at the end of the project. In Financial Accounting national and international standards have given orders of maximal depreciation pro cents. In Management Accounting this issue is depending on cost accountant.

Allocation problem is under surveillance when profits and costs are needed to be allocated to specific calculation entity. This entity might be, for example, an operation, an

independent profit centre, a product or a service. Allocation problem arises often in conglomerates. Matching principle is frequently used to solve this problem. The principle says that profits and costs are directed to those operations which have caused them. To enforce matching principle might be problematic in many cases. One example of this is when two profit centers have the same managerial level and problematic question is how to allocate managerial level costs to profit centers if the usage of managerial level services is not clearly recorded.

Despite these problems, profits and costs need to earmark certain accounting periods, operations, sphere of responsibilities, unite products, projects etc. In other words, cost accountant must make decisions and these have to be made as good as possible. It is cost accountants' responsibility to calculate and report to managerial level's decision making, which product is profitable and which unprofitable. So, cost accountant needs to know cost structure of different products or part of a whole product quite strictly.

There are two things that are extremely essential in cost accounting. The first is to understand the situation of cost accounting. This is because the individual needs to understand what purposes calculations are made for. The second is to respect the matching principle in that if some object has created costs, these costs have to be allocated to this object. (Uusi-Rauva, 2003)

3.1.4 Cost Accounting relation to Investment calculations

Investment calculations always include one element of cost calculation which takes into account all the costs from this investment. On a large scale one might say that about half of the content investment calculations are cost accounting calculations and the remaining half includes profit calculations.

Making investment calculations can be started with working out a cost calculation where an accountant clarifies negative cash flow from the investment. Negative cash flow includes information of money amounts which are leaving the firms treasury and which

are engaged with this investment project, such as equipment, buildings, just to name a few.

Investment calculations can be started also with profit calculations when it is a question about positive cash flow. In other words, profit calculations include all the positive money amounts in this project such as profits from sales, leasing and renting, just to name a few.

Investment calculation is divided roughly into cost- and profit- calculations and also interest rate calculations. Nonetheless, this thesis deals only with the question of cost calculation part and cost accounting mentioned above.

3.2 Activity Based Cost –Accounting in general

3.2.1 Activity Based Cost -Accounting

The main idea of ABC-Accounting is that organization can establish the true cost of individual services and products. The purpose is to identify and eliminate services and products which are low profitable or even unprofitable. The principle in Activity Based Cost Accounting is to divide inspected organization into small activities and assign every cost of each activity related to their actual consumption. Or in other words, ABC-Accounting assigns more indirect costs into direct costs.

Activity based cost accounting was developed to correct defects in financial system, especially the inability of traditional costing systems to identify the drivers of indirect and support costs (Kaplan and Cooper 1998). ABC-accounting operates by relating organizational spending to activities and processes that support the design, production, marketing, and delivery of products and services to customers. (Kaplan & Norton, 2001) Above mentioned differences between traditional cost accounting and ABC-accounting are described in Figure 11.

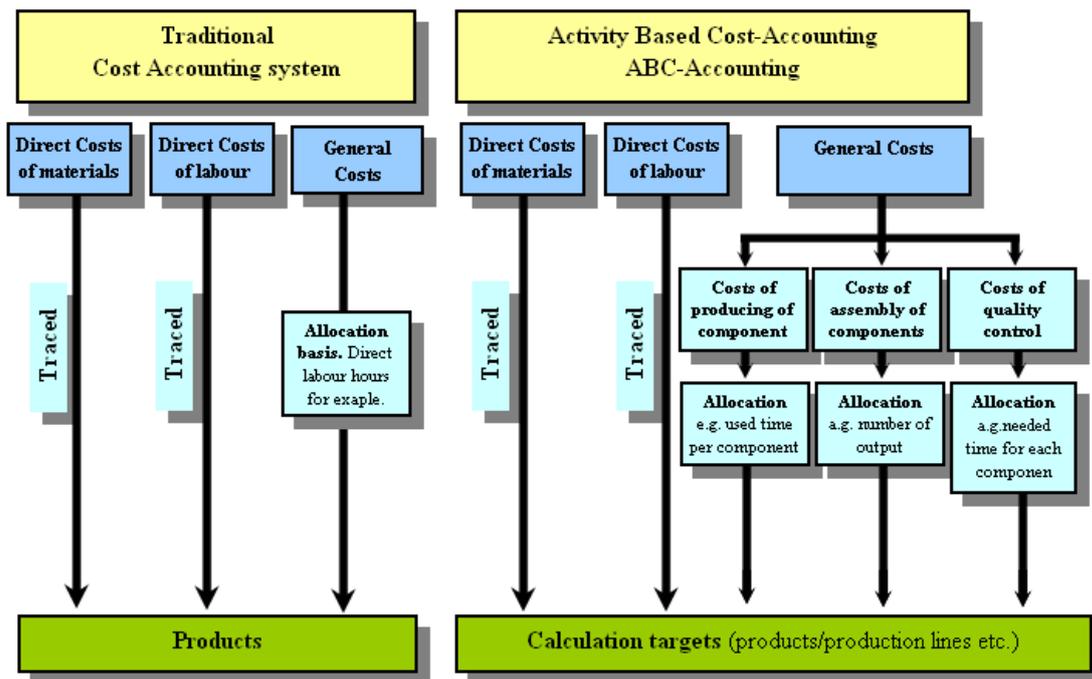


Figure 11: The differences between Traditional Cost Accounting system and ABC-Accounting system.

ABC-Accounting is a generally used tool to understand products costs and profitability. The method has been used to support strategic decision making like price setting, outsourcing and also when finding and measuring process improvements etc. ABC-Accounting requires strict consideration of the basis of allocations and much know-how and knowledge of production details.

3.2.2 Practical application of ABC-Accounting

The purpose of this example is to reveal to the reader the main points and principles of ABC-Accounting. The Factory produces three different products A, B and C, which direct costs, output units, used labor and machine hours are represented in table 3. Also the amounts of indirect costs, which are sometimes called universal costs, are available.

Products	A	B	C	
Direct raw-material costs, €/unit	25,00	20,00	11,00	
Direct labour costs, €/unit	8,00	12,00	6,00	
Output, units	30 000	20 000	8 000	total
Labor hours per unit, h/unit	1,33	2,00	1,00	88 000 h
Machine hours per unit, h/unit	1,33	1,00	2,00	76 000 h
Indirect costs totally		1 848 000 euro		

Table 3: Source information of factory which produces A, B and C –products.

3.2.2.1 Traditional Cost Accounting

Traditional Cost Accounting solves allocating problem of costs usually by Indirect Cost – driver (IC-driver) which is calculated using the following formula:

$$\begin{aligned} \text{IC-driver} &= \text{Indirect costs} / \text{universal allocation unit} \\ &= 1\,848\,000\text{€} / 88\,000\text{ h} \rightarrow 21,00\text{ €h.} \end{aligned}$$

The calculation yields the cost per universal allocation unit. In this example total labor hours of whole production is used as a universal allocation unit. Following table 4 represents results of Traditional Cost Accounting.

Products	A	B	C
Direct raw-material costs	25,00	20,00	11,00
Direct labor costs	8,00	12,00	6,00
Addition caused IC-driver	28,00	42,00	21,00
	(= 21 x 1,33)	(= 21 x 2)	(= 21 x 1)
total €/unit	61,00	74,00	38,00

Table 4: Result of Traditional Cost Accountings for unit costs of products.

Indirect Costs are transmitted to products by the relation of total labor hours. Thus, allocation done in this way often gives wrong results because IC-driver is too inaccurate. Traditional Cost Accounting does not take into account the fact that products are using different amounts of different resources. That is why one needs to allocate indirect costs by each production unit based on their activity of using resources.

3.2.2.2 Activity Based Cost – Accounting

The essence of ABC –Accounting and ABC –management is the management and measurement of the organization’s capacity. (Kaplan & Cooper, 1997)

To perform these purposes the ABC Accounting requires two estimates:

- i) The supplying capacity’s unit costs, and (*Unit Cost Estimate*)
- ii) The consumption of capacity of the activities (*Unit Time Estimate*)

Normally a new procedure starts by estimating the cost of supplying capacity (*Unit Cost Estimate*). This includes recording of various groups of resources which perform activities. In well-designed ABC models the analyst also estimates the practical capacity of the resources supplied. (Kaplan & Anderson, 2004)

“The on new information element required for the time-driven ABC approach is an estimate of the time required to perform a transactional activity.” (*Unit Time Estimate*), (Anderson, 1997)

Cost drivers in ABC-Accounting can be divided in two categories: transaction drivers and duration drivers. Most ABC systems use a large number of transaction cost drivers, such as number of setups, or number of custom orders. Duration drivers estimate the time required to perform the task like setup hours, material handling time and direct labor hours or machine hours. The transaction cost driver rates are calculated by dividing the activity expense by the quantity of the transaction cost driver. (Kaplan & Andersson, 2004)

$$\begin{aligned} \text{ABC-Transaction driver} &= \text{Activity expense} / \text{transaction cost driver} \\ &= 435\,000 \text{ €} / 270\,000 \text{ pieces} = 1.6 \text{ €/piece} \end{aligned}$$

The calculation yields the cost per transaction which is ready to allocate to each product.

The assumption behind ABC way of thinking is that each occurrence of the event consumes the same quantity of resources and assumption is the key to the alternative approach for estimating cost driver rates. (Kaplan & Andersson, 2004) In ABC Accounting cost driver rates should be calculated at practical capacity not at actual utilization. (Cooper & Kaplan, 1992)

ABC-Accounting needs more source information of the production and the following table 5 represents this useful additional information.

Products	Total	A		B		C		Total		unit
Machines	790 000 €									
Input of materials	435 000 €	15000	6 %	35000	13 %	220000	81 %	270 000	100 %	pieces
Packing of output	250 000 €	9000	28 %	3000	9 %	20000	63 %	32 000	100 %	pieces
Production design	373 000 €	15000	30 %	10000	20 %	25000	50 %	50 000	100 %	hours
Total	1 848 000 €									

Table 5: Indirect costs by their activity, or in other words, how much every activity uses each resource.

Input of materials and *Packing of output* –actions represents transaction drivers and *Production design* represents duration driver. Drivers for activities in example can be found in table number 6:

ABC-Driver		Unit	Formula
Machines	10,4	€/h	=790 000 € / 76 000 hours
Input of raw materials	1,6	€/piece	=435 000 € / 270 000 pieces
Packing of output	7,8	€/piece	=250 000 € / 32 000 pieces
Production design	7,5	€/h	=373 000 € / 50 000 pieces

Table 6: ABC-Drivers for different activities

ABC-driver for machines is calculated dividing total machine costs by the amount of hours of machinery production. The Driver for raw material input is calculated dividing Costs of this action by the amount of input of raw materials. The Driver for packing of output is calculated also dividing costs of packing by amount of packing output and the driver for production design is calculated using the same formula where total costs of activity is divided by amount of the activity. The following table number 7 gives the total production prices calculated by the ABC-factors for each product.

Products	A	B	C
Direct raw-material costs	25,00	20,00	11,00
Direct labour costs	8,00	12,00	6,00
IC-cost of machines	13,83	10,39	20,79
Formula	10,4 €/ h x 1,33 h / unit	10,4 €/ h x 1,00 h / unit	10,4 €/ h x 2,00 h / unit
IC-cost of Input of raw materials	0,81	2,82	44,31
based on input of raw materials per unit	1,6 €/ piece * 15 000 / 30 000 piece	1,6 €/ piece * 35 000 / 20 000 piece	1,6 €/ piece * 220 000 / 8 000 piece
IC-cost of packing of output	2,34	1,17	19,53
based on packing of output per unit	7,8 €/ piece * 9 000 / 30 000 units	7,8 €/ piece * 3 000 / 20 000 units	7,8 €/ piece * 20 000 / 8 000 units
IC-cost of production design	3,73	3,73	23,31
based on production design per product	7,5 €/h * 15000 / 30 000 units	7,5 €/h * 10 000 / 20 000 units	7,5 €/h * 25 000 / 8 000 units
total €/unit	53,70	50,12	124,94

Table 7: ABC-Accountings results to cost of products A, B and C.

Indirect cost (IC-cost) from the *machinery* usage is based on machine hours used by one unit. The Formula is the following: ABC-driver multiplied by the machine hours per unit. IC-cost for *input of raw materials* is calculated multiplying ABC-driver by indirect cost usage of a certain product divided by output units of a certain product. The Same formula has been used for calculating IC-costs for *packing output* and *production design*.

3.2.2.3 Summary of example

This example will give totally different results when comparing Traditional cost accounting and ABC Accounting. When calculations are done by traditional cost accounting method the cheapest product is C and the most expensive is B. But in ABC Accounting the cheapest product is B and the most expensive is C. C is more than three times expensive when costs are allocated in ABC method. Differences of allocation results can be seen in table 8.

Products	A	B	C
Costs total by <u>traditional method</u>	61,00 €/unit	74,00 €/unit	38,00 €/unit
Ranking by traditional method	2.	3.	1.
Costs total by <u>ABC method</u>	53,70 €/unit	50,12 €/unit	124,94 €/unit
Ranking by ABC method	2.	1.	3.

Table 8: Summary table of examples with different result according to calculation method

This example proves that traditional method of cost accounting can be lethal for a company's price setting. If a company, for example, calculates the wholesale price for C-product based on total costs by traditional method and adds company's profit margin 25%, then the wholesale price for the product forms to be $38,00 \text{ €} * (1 + 25\%) = 47,50 \text{ €unit}$. By these calculations the company will sell each product at over 63 % discount compared to total costs of product C calculated by ABC method.

Vice versa the method will also work by overpricing the other products. For example, product B might be priced $74,00 \text{ €} * (1 + 25\%) = 92,50 \text{ €unit}$ when the competitor might use ABC accounting and get the following wholesale price for their substitute product B $50,12 \text{ €unit} * (1 + 25\%) = 62,65 \text{ €unit}$. In this case, the company has overpriced their product and the company will lose their market share to a competitor all the time.

3.2.3 Difficulties in ABC-Accounting

In many cases ABC model has had difficulties to implement because of the high costs incurred from surveys, observation and interviews needed for ABC model for the use of allocations. The process of collecting and calculating necessary additional information has proven to be time-consuming and expensive. It has also proven to be expensive to store, difficult to process, report and update small changes. Also some difficulties have been found maintaining and updating the model related to (i) changes in process and resource spending, (ii) new activities added, and (iii) diversity and complexity of individual channels, orders and customers. (Kaplan & Anderson, 2004)

Another problem is accuracy of the cost driver rates, which are derived from subjective estimates of past or future behavior. If accuracy is not correct, level ABC-accounting does not bring any fringe benefit to production. (Anderson, 1997).

The high costs of survey for more detailed information were found problematic in the case project.

4 Cost Accounting in construction projects

This chapter will handle first Cost Accounting in construction project in general, coding in construction projects and Cost formation. Then it enlightens Russian, Finnish and British Cost Accounting methods. This division concerns only the construction industry. The Chapter represents basic rules and basic assumptions, which cost accounting methods are based on. At the end of the chapter there is a small summary of the differences in these cost accounting methods.

4.1 Cost Accounting in construction projects in general

During the last twenty years the climate around building industry has changed a lot. Basically the house building production is the same, but the economical steering mechanisms have changed. Account methods are nowadays run and ensured by computers and accounting software. Construction project's design is also computer assisted in most of the cases. Some of the software companies have tried to connect 3D-modeling and cost accounting so that during the model creation the project's cost estimate is available. Also the changes in different models can be seen in the changes in cost estimate. Many of these attempts are still under development work.

The development of software models has given possibilities to create and follow many kinds of economical documents and the variety of different reports is enormous. One of the hardest parts of creating economical documents like budgets, estimates, realized cost, cost control etc. is to find the right tool based on the needed solution and the reliability of the information used and the results of calculations. The Following text will inform of general coding principles and cost formation in construction projects.

4.1.1 Coding in construction projects Cost Accounting

The purpose of coding is to get the whole project and especially economical mechanisms as controlled as possible. The theory in coding is that the cost estimate, cost controlling items and the whole projects' realized costs are divided into smaller elements to ensure

better control. By this way the costs of the project are more easy and reliable to predict and control during the construction project.

When starting to create construction project's cost estimation the first thing is to divide the whole project in to small building components according to the coding-manual of the firm. The next step is to calculate the amounts of these elements from the drawings. If drawings are not available, as it is quite often, an individual needs to use other plans like program of needed premises to calculate amounts.

Cost accountant's task in price setting is to find out the prices of building elements. Prices might be both with the installing work or without it. Usually if the accountant uses actual cost calculation of elder project the company's price system gives prices which include installing work. The prices are normally defined with the construction cost indexes. If a cost accountant is using the prices from the suppliers they are usually without installing work and if from the contractors they include what is agreed on the contracts or contract requests. When amounts of building elements and pricing have been calculated the cost estimate for the unique code letter number can be calculated using formula:

$$\text{Letter number cost estimate} = \text{amounts of units} \times \text{unit prices}$$

This formula is used for every single building element in precise letter code. When every letter code has been calculated the main letter number can be calculated by adding all sub letter numbers together.

$$\text{Main letter number cost estimate} = \sum \text{amounts of units} \times \text{unit prices}$$

When all coding units are calculated the whole project's cost estimation can be formed by adding all coding units together.

Every enterprise has their own coding manuals which are developed as cooperation of cost/offer accounting department and operating building sites. These manuals are under update all the time because the instructions are not universally suitable in every project. Usually a manual includes the information about items like elements, equipment, work

etcetera. These items should be calculated to particular coding unit when creating cost estimation. A manual also includes the information about the expenses that can be rolled to a particular coding unit or, in other words, which expenses can consume specific coding unit. Coding manuals don't usually include unit prices. One reason for this is movement in prices according to economical changes.

4.1.2 Cost formation in Construction projects

From the viewpoint of the control and interaction of costs one must control resource usage, prices and investigate them with following them by matching principle. One responsible for the project needs to take into account decisions and requirements, and also predominant conditions in the operational area and work execution methods as well. These decisions have effect on construction design, plans and finally to execution drawings. The costs of real estate are caused by:

- Decision of needed premises
- Decision of what kind of activity premise is designed to
- Predominant circumstances in construction site
- Predominant weather conditions
- Chosen design solutions
- Features relation to renovated building
- Operational form of the project
- Timescale of the project.

The need and demand for premises can be born for example when organization grows, production grows, production method changes, company develops new activity or new product or simply the amount of population grows causing need for new apartments.

The circumstances in unconstructed site as a rule might cause the need for additional construction and the need for extra resources at constructions site. Example of these kinds of activity are strengthening of foundations, piling work, soil stabilization, the change of soil, quarrying of rock, installation of additional isolation etc.

The optimum relation between construction time and total costs of construction work have been tried to solve with several research-cases but optimum time is still not found. Too short construction time leads to shift work which higher at least salary costs of workers. Too long construction time leads to inefficiency and increase time related fixed costs. The determining of optimum time schedule of project is very complex and many times impossible process. There are many factors which need to take into account for example construction physiques like setting and drying of concrete, predominant circumstances like difficult foundation conditions, procurement schedule like needed materials availability, resource like needed machines and equipments and manpower availability etcetera. All these and above mentioned variables are related to each other and equation they form is too complex to solve.

The construction expenses are born of usage of resources. Resources are work, needed material, energy and capital. Main parts of expenses are born during the construction period even if designing period is normally much longer in time. But on the other hand main part of expenses is determined during designing period but expenses are born and main part of negative cash flow happens during construction period.

One part of price formation is company's willingness to operate in projects. In economical world this willingness is measured by operating margin and its variety. When there are less construction works in the market and much capacity to do the works the operating margin is low because many enterprises are willing to have work. In the economic boom the margin level will be increased because there are much works to do in any case. The very typical issue in construction business is so called iterative margin which means that construction project is divided parts and these parts are operated different contractors. These contractors will divide their own part into smaller parts which are contracted to other subcontractors etc. By this way the chains of subcontracting are long and hard to manage and every step of these chains have their own operational margin level in their contract price. (Haahtela & Kiiras, 2007)

4.2 Russian method of Cost Accounting in construction projects

In Russia the construction projects Cost Accounting has proven to be a few degrees more difficult than in Finland. First of all, projects include more risks related to decisions of authorities and their bureaucratic systems. The Start of projects delays quite often and the reason might be lack of permission from: fire authorities, hygiene authorities, building inspection supervisors, militia, traffic militia, façade inspection supervisors, land register authorities, etc. There are several different authorities from where a project needs to get permission for its next stage. (Laakso, 2009)

Another reason is legislation overall. Legislation is bureaucratic and authorities don't have single register of enterprises' different documents. This has led to the situation when many different documents need to be reported to many different authorities. On the other hand, this has given a chance to companies to modify the documents the way that taxes or other administrative payments are easier to minimize. (Tuominen, 2009)

4.2.1 Shortly of Smeta's history

In the Soviet Union era cost accountings in huge factories were very large-minded and most of the factories were serving military purposes. This can be seen for example in budgeting which was based on current years used resources. All the enterprises' economical budgets were managed and controlled by the governmental planning institution Gosplan. No one needed to care about costs and profits because those were given by administrative institutions. The more the factory used limited resources, the more it received resources in budgeting for the next year. In that time there was not much importance of productivity. Later the first deputy prime minister of new Russia Anatoli Tsubais said that in the Soviet Union around 60% of the country and 70% of Saint Petersburg industry were serving military purposes. (Susiluoto & al. 1996).

The Russian method of cost accounting is forming around the Russian word "smeta" (смета). This word is undoubtedly and always linked to cost accounting even in the outside of the building industry. The noun "smeta" means cost accounting and it derives

from the Russian verb “smetat” (сметать) which means “to calculate”. *Smeta* is cost estimate for the project done by Russian method of Cost Accounting. It sets out the expenditure items such as wages, taxes and contribution on wages, purchase and installation work of components, rents of needed equipments and machinery etc. The *Smeta* estimate is the basis for determining the amount of capital investment, financing, construction, formation of the contract price and accounting for completed contract works etc.

The usage of *Smetas* as a base of a design agreement is not advisable because the system is unclear even to most of the companies using it. (Luukkonen, 2008).

The of *Smeta*-system was formed at the time of the Soviet Union. At those times the Gosstroy of the USSR was the developer of central state cost price setting system which was pre-stage of *Smeta*. *Smeta*'s principles became apparent in the 1950ies, when construction norms and regulations (SNiP) were added to budget norms and regulations. SNiP has been updated several times when it needed improvement and when it was formulated more systematically. Some parts of the SNiP are also now under updating. (Baranovskaja, 2005)

After the collapse of the Soviet Union the price forming methods changed quite rapidly from state controlled to free market economy based on supply and demand. This meant also changes in *Smeta* when prices became to be based on contracts between companies. However, to reach a price agreement Parties need to follow the same approaches when creating cost estimates. But only price setting have changed and alternation of prices is wider than state controlled time. So this means that there is still a need in regulating price setting in construction both in part of estimate cost making and estimate cost normative system. The Gosstroy of Russia was responsible for the cost normative system, recommendation letters, code of rules (Свода правил, СП), leading documents in construction projects (Руководящих документов в строительстве, РДС) and guideline documents in construction projects (Методических документов в строительстве, МДС) after the collapse of the USSR. After the shutdown of the Gosstroy in the year of

2004 its tasks were removed to the Ministry of regional development of the RF (Министерству регионального развития РФ). Thus, price setting issues in different parts of Russia belong to the Regional Centres on construction price setting (Региональные центры по ценообразованию в строительстве, РЦЦС). (Baranovskaja, 2005)

New approaches to price setting were presented in 1993 when the document “Basic statements of price-setting and estimated rate setting in construction in market relation development” (Обновных положениях ценообразования и сметного нормирования в строительстве в условиях развития рыночных отношений) was released. (Baranovskaja N, 2005)

4.2.2 Procedures in Smeta-system

In the year of 2004 the Code of rules and practical instructive regulations was substituted by the Procedure of determination of building goods cost on the RF territory (MDS 81-35.2004), (Методикой определения стоимости строительной продукции на территории РФ). The Procedure contains general clauses of price-setting and estimated rate setting as well as certain recommendations to make all patterns of estimated documents of different types of works. Together with existing procedures (figure 12), they are constantly effecting renewed instructive regulations, recommendations and authorities` letters. They are also effective for more specific issues of construction price setting, determination of estimated prices on resources, preparation and application of element estimated norms and unit rates, rate setting for overheads and estimated profits and etc (Baranovskaja, 2005).

Code of edition	Title
МДС 81-2.99	Methodical instructive regulations on development of collection books (catalogues) on estimated prices for materials, articles, items, structures and collection books on shipping estimate prices for construction and major repair of buildings and building structures
МДС 81-3.99	Methodical instructive regulations on development of cost estimate norms and rates for operation of building machinery and vehicles
МДС 81-25.2001	Methodical instructive regulations on appraisal of estimated profit value in construction

МДС 81-26.01	Methodical instructive regulations on development of state element cost estimate norms for installation
МДС 81-27.01*)	Guidelines on use of state element cost estimate norms on commissioning (ГЭЧП-2001)
МДС 81-28.01'	Guidelines on use of state element cost estimate norms on common building and specific building works (ГЭЧ-2001)
МДС 81-29.0П	Guidelines on use of state element cost estimate norms on installation (ГЭЧМ-2001)
МДС 81-30.2002*1	Temporary methodical instructive regulations on work costs estimation during roads construction and repair
МДС 81-32.03	Methodical instructive regulations on use of federal unit prices for building, assembling, specific building, repair-building and commissioning (ФЕР-2001) when estimating building goods costs on the territory of subjects of the RF
МДС 81-33.2004	Temporary methodical instructive regulations in determination of overheads value in construction
МДС 81-34.2004	Temporary methodical instructive regulations in case of cold-region engineering
МДС 81-35.2004	Cost estimating procedure for building goods on the territory of the RF
МДС 81-36.2003	Guidelines on use of Federal unit prices for building and specific building works (ФЕР-2001)
МДС 81-37.2003	Guidelines on use of Federal unit prices for installation works (ФЕРМ-2001)
МДС 81-38.2003	Guidelines on use of Federal unit prices for Federal unit prices for repair-building works (ФЕРр-2001)
МДС 83-1.99	Temporary methodical instructives on appraisal of labor costs in contract prices and cost sheets on construction and labor cost of assembling and repairing staff

Figure 12: Normative regulations literature of price setting and cost rate setting in construction project (Baranovskaja, 2005)

4.2.3 Structure and composition of cost estimate according to Smeta

Cost estimate for a construction project is formed according to Smeta adding together estimated prime costs and estimated profit from the project. Prime costs are normally divided into direct costs and overheads of the project. So, the whole formula of cost estimate can be represented as follows:

$$\text{Cost estimate} = \text{Direct expenses} + \text{Overhead costs} + \text{Estimated profits}$$

Project's *overhead costs* cover projects executing company's overheads, such as project's supporting works, maintenance, arrangement and management of the project. As a rule, overheads are estimated, determined and also accepted through as pro cent amount of direct expenses.

Project's *estimated profits* vary according to demand and supply of the market. Smeta defines estimated profit as a sum of money needed to cover separate general costs of construction or project management companies for the development of production, social sphere and procurement encouragement. All this constitutes normative part of construction goods cost.

Project's *Direct expenses* (ПЗ) include costs items directly related to construction work. In Smeta the direct expenses are divided in to different classes according to the following:

$$\text{ПЗ} = \text{З} + \text{ЭМ} + \text{М}, \text{ where}$$

- ПЗ (Прямые затраты) *prjamyje Zatraty*, direct expenses factor
- З (Заработная плата), *zarabotnaja plata*, labor cost factor
- ЭМ (Эксплуатацию строительных машин), *machinery cost factor*, and
- М (Материалы), *material cost factor*.

These costs are estimated on the basis of physical work scope, estimating norms and prices.

Labor cost factor

This factor includes wages of site workers who are operating construction works at the site. Installing construction materials and elements, taking care of concrete casting, carpenter works, sheet metal works, for example.

Machinery cost factor

Costs for building machinery operation are determined against operated time of a machine. Information that is needed is a scope of work and cost rates for a machine per hour. Estimated cost rates include all the costs related to machines operation: usage of machines, costs on repairs and spare parts, costs of power sources, costs of auxiliary materials, wages for machinists. Also wages of control and maintenance of machinery and mechanisms are included into machinery costs.

Material cost factor

Material cost factor covers costs of materials at their purchase price used for building work. It also includes assembling elements and their delivery up to project's storehouse and storing. Costs of worker's wages involved in loading and delivery of materials to and from storehouse is included into Material costs.

Costs of wages of worker's who are carrying out temporary installed structure, facility works as well as improvement of building areas and also finalizing the objects to handing out to client is calculated in overheads item.

Smeta calculation procedure starts from the selection of calculation method, which is the first stage of the procedure. There are three kinds of methods which are marked letters A, B and C in figure 13.

- A, Estimate calculation on separate types of costs
- B, Dependent cost estimates (cost sheets) for building types, different equipment and their installation
- C, Work scope calculation

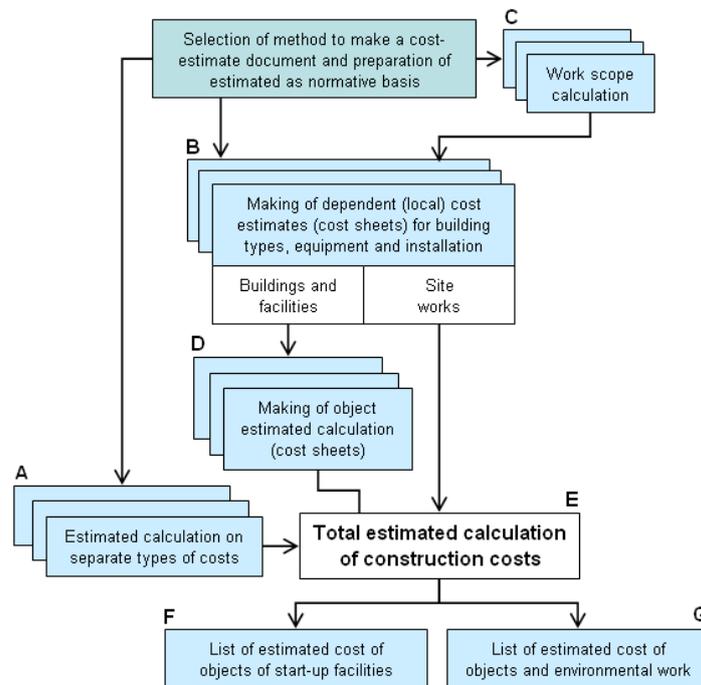


Figure 13. Procedure of construction projects cost estimate documents development

A. Estimated calculation on separate types of costs

Cost estimations on separate types of costs are made as a rule to determine other costs related to construction and not accounted by cost norms. For example, compensation costs due to expropriation of land area, bonuses for timely commissioning and early commissioning etc. Path A will create cost estimate of construction costs without intermediate steps.

B. Dependent (local) cost estimate

Dependent cost estimates are primary estimates and are made for a separate type of work and costs of buildings and facilities or general building works.

C. Work scope calculation

Work scope calculation will tell how wide is the operational task related to task or agreement and this has a very massive impact on the final result of total cost estimate and also realized costs.

D. Object estimates (cost sheets)

Object estimates are executed by dividing data from local cost estimate into smaller objects. The documents which are created at this stage are named as cost sheets.

E. Combined (summary) cost calculations of construction stage are made based on the information from D object cost estimates, B local cost estimates on general building works and A Estimated calculations on separate types of costs.

F. & G. List of estimated costs

List of estimated costs are divided in two different parts according to figure X. These parts are *List of estimated costs of construction project* and *List of estimated costs of environmental issues of the project*. These calculations are executed on the basis of independent combined cost estimates for the previous steps of the procedure.

4.2.4 Cost Estimate norms in Smeta

Cost estimate norms in RF have been divided into five levels. This division is done according to the stage of preparation of norms and to the addressee of the application if it is needed to differ the norms. These levels are:

- state (federal) estimate normative (государственные сметные нормативы, ГСН)
- branch (departmental) estimate normative (отраслевые сметные нормативы, ОСН)
- territorial estimate normative (территориальные сметные нормативы, ТСН)
- branded estimate normative (фирменные сметные нормативы, ФСН)
- individual estimate normative (индивидуальные сметные нормативы, ИСН)

State estimate normative is developed upon the request of the state construction authorities. They are applied when determining estimated cost of construction performed in different branches of agriculture at the expense of the federal budget. State estimate may be applied in all regions of the country considering local conditions.

Branch (departmental) normative came into force by executive administration (ministries) and other authorities of the federal administration of Russia as well as by big corporations. The Normative is used to estimate costs of construction implemented within corresponding branch of national economy.

Territorial estimate normative was taken into effect by state administration authorities (government) of regions of Russia. This level of normative should not disagree or duplicate federal estimate normative. Territorial estimate normative are used by companies maintaining building works or major repairs on the territory of a particular subject of the Russian Federation.

Branded estimate normative or user's own normative belongs to estimate normative covering real conditions of a specific company activities – contractor's work. As a rule, it is a normative base and it is built on the normative of state, district or territorial level with peculiarities and specialization of contractor companies.

Individual estimate normative are made with specific conditions of work performance for the most complicated situations. Individual estimate is for the cases when there is lack of estimate norms and rates for separate design, structures and work methods.

Estimate normative together with rules of preparation and application create the estimate-normative base for the price setting in construction.

4.2.5 Coding in Smeta-system

The next figure number 14 represents coding system according to Smeta –nomenclature which is used when creating cost estimations coding to the project.

№	Title	Full code of collection
1	Earthworks	ГЭЧН 81-02-01-2001
2	Rockworks, quarrying	ГЭЧН 81-02-02-2001
3	Drillingworks	ГЭЧН 81-02-03-2001
4	Boreholes	ГЭЧН 81-02-04-2001
5	Piling. Soil stabilization. Sunk wells	ГЭЧН 81-02-05-2001
6	Concrete works with reinforcement, cast in site	ГЭЧН 81-02-06-2001
7	Concrete works with reinforcement, precasted	ГЭЧН 81-02-07-2001
8	Brickwork, blockwork	ГЭЧН 81-02-08-2001
9	Metal works	ГЭЧН 81-02-09-2001
10	Timber works	ГЭЧН 81-02-10-2001
11	Floorworks	ГЭЧН 81-02-11-2001
12	Roofingworks	ГЭЧН 81-02-12-2001
13	Building structures and equipment corrosion proofing	ГЭЧН 81-02-13-2001
14	Structures in agriculture industry	ГЭЧН 81-02-14-2001
15	Finishwork	ГЭЧН 81-02-15-2001
16	Pipework internal	ГЭЧН 81-02-16-2001
17	Pipeline and sewage - internal installations	ГЭЧН 81-02-17-2001
18	Heating - internal installations	ГЭЧН 81-02-18-2001
19	Gas supply - internal installations	ГЭЧН 81-02-19-2001
20	Ventilation, air conditioning	ГЭЧН 81-02-20-2001
21	Temporary prefabricated-dismountable buildings and facilities	ГЭЧН 81-02-21-2001
22	Water pipe - external lines	ГЭЧН 81-02-22-2001
23	Sewage - external lines	ГЭЧН 81-02-23-2001
24	Heating supply and gas pipelines	ГЭЧН 81-02-24-2001
25	Main pipelines. field pipelines	ГЭЧН 81-02-25-2001
26	Heat insulation works	ГЭЧН 81-02-26-2001
27	Motor roads	ГЭЧН 81-02-27-2001
28	Railroads	ГЭЧН 81-02-28-2001
29	Tubes and metropolitan subways	ГЭЧН 81-02-29-2001
30	Bridges and pipes	ГЭЧН 81-02-30-2001
31	Airdromes	ГЭЧН 81-02-31-2001
32	Street railways	ГЭЧН 81-02-32-2001
33	Power lines	ГЭЧН 81-02-33-2001
34	Communication broadcasting and television facilities	ГЭЧН 81-02-34-2001
35	Mining workings	ГЭЧН 81-02-35-2001
36	Earth structures of waterside works	ГЭЧН 81-02-36-2001
37	Concrete and iron structures of waterside works	ГЭЧН 81-02-37-2001
38	Masonry structures of waterside works	ГЭЧН 81-02-38-2001
39	Metal works of waterside works	ГЭЧН 81-02-39-2001

40	Timber works of waterside works	ГЭСН 81-02-40-2001
41	Dampproofing in waterside works	ГЭСН 81-02-41-2001
42	Shore protection works	ГЭСН 81-02-42-2001
43	Ship staples and slipways	ГЭСН 81-02-43-2001
44	Submarine (diving) works	ГЭСН 81-02-44-2001
45	Industrial furnaces and pipes	ГЭСН 81-02-45-2001
46	Building and facilities reconstruction	ГЭСН 81-02-46-2001
47	Planting of greenery. Windbreak	ГЭСН 81-02-47-2001
48	Oil and gas wells	ГЭСН 81-02-48-2001
49	Oil and gas wells in marine environment	ГЭСН 81-02-49-2001
	Amendments and supplements to state element cost estimate norms for building works Edition 1, 2002, Edition 2, part 1, 2004.	ГЭСН 81-02-2001

Table 14: Work classification according to Smeta

Abbreviation ГЭСН stands for Государственные Элементные Сметные Нормы, which means Governmental Element Estimate Norms. These norms include coding principles of each code according to the list. When comparing the other coding systems one notices that this list is much longer and that Smeta-system also includes more unusual construction stages than the following cost accounting methods. Examples of these are submarine and diving works and shore protection works that are listed as special cases in British and Finnish Cost Accounting systems.

4.3 Finnish method of Cost Accounting in construction project

In real estate markets economical calculations are almost always calculated as a price of a square meter or sometimes even as a price of a cubic meter. This has become possible due to the fact that building developers have created simple and understandable methods of calculation for their development projects. Keep it simple is one very useful method also in construction projects. Over time improvements in methods have made economical figures more clear and comparable in real estate and construction businesses sectors. Moreover, understanding of price setting methods has been brightened up.

4.3.1 How is price of the project formed

There are several things that influence the price of real estate. General price level in construction industry is the dominating issue but also the expensiveness of design solutions also has a huge impact on prices of real estates. Nowadays the requirements for

buildings and premises are increasing all the time and this has raised prices around 2 per cent every year in the long run. (Haahtela & Kiiras, 2007).

Every new instruction from public administrative level or customs in design work leads to more expensive solutions to operate in general.

A construction project is a sum of many different decisions and many compromises needed to be done before the project is ready for handing out to a client. There are several items that influence the final result. The items which influence it most of all are: execution method, cooperation with different parties, agreements and contracts, common targets, managing in design and planning stages and also execution stage. All these items have their own special influence on the final product and stress of these items differs in different projects.

4.3.2 Building -nomenclature

In Finland house building industry has established standardized nomenclature to house building –projects which follows through the whole project. The newest version of nomenclature is Building 2000 (Talo 2000) and earlier versions are Building 70 (Talo 70), Building 80 (Talo 80) and Building 90 (Talo 90). The purpose of this nomenclature is to make concordant and/or to standardize the terms, actions, methods, design manuals, quality requirements, cost- and consumption- information, amount calculations and contract documents.

The idea of this interactive system is to operate as an integrated standard of communication between all the parties of construction projects from the beginning of the project till the very end. So this nomenclature is also a salient part in construction sites cost accounting in every project in Finland.

These Building (Talo) -documents which are published by Rakennustietosäätiö (RT) are related especially to cost accounting in building industry.

- TALO 90 Rakennuskustannusten laskentaohje, Rakennustekniset työt. 1994
- TALO 90 -nimikkeistön ja laskentamenetelmien testaus. 1991
- TALO 80 Englantilainen määrälaskentamenettely Bill of Quantities

- TALO 80 Rakennuttajan määrälaskennan kehittäminen
- TALO 80 Talonrakennusalan yksikköhintaurakka
- TALO 80 Määrälaskentaohje
- TALO 70 Kustannuslaskentaohje

(Rakennustietosäätiö, 2009)

These nomenclatures cover only the construction part of investor's costs and expenses and leaves many costs, for example, interests and arrangement of administration to cover the whole project, outside the calculations.

4.3.3 Information system for house building (ISHB)

Price level conceptualization and updating prices to Information System of House Building (ISHB) has always been challenging and time taking for construction companies. This is because the construction index is unable to describe price formation, the alteration and other factors which interact with prices in the markets.

The purpose of ISHB is to create and sustain a theory and a way of thinking which makes it possible to control economy in house building and economy of real estates which already exists. Another purpose of ISHB is to create and sustain the theories explaining how management accounting is operated in different situations and stages of building process. Also one purpose is to explain and illustrate expenses information which is used in above mentioned methods. (Haatela & Kiiras, 2007)

In ISHB system the project budgeted is based on the so called Program of needed premises which meets the demands and needs of the user of the building. This Program of needed premises is a document which includes all the detailed information about needed premises, such as number of rooms, areas, features and special equipments etc.

One part of ISHB system is cost information system which is needed to be updated continuously. Updating is necessary when:

- Feature levels of constructed projects are changed due to public authority requirements or when needed to build something which is out of common standards.

- Untypical design decisions are required when wanted to build a project with higher living quality or higher environmental requirements.
- Economical activity of business life has changed. This is connected to situation where resources in construction sector have changed more or less in comparison to needed resources.

The price of real estate is related to decisions which are causing building project and projects typical character. Without the need for real estate and the need for renovation, resources are not used and costs are not born. (Haatela & Kiiras, 2007)

4.3.4 The summary of ISHB and the Program of needed premises

With the help of information from the *Program of needed premises* and the *Cost Information System (ISHB)* a cost accountant can create the *Target price calculation*. When the project is more detailed, the cost accountant is able to create the *Estimate of structural components*. The Estimate of structural component document can operate as the budget to the whole project. This has been described in *Figure 15* and the following two paragraphs *4.3.4.1 Target price calculation* and *4.3.4.2 Estimate of structural components*.

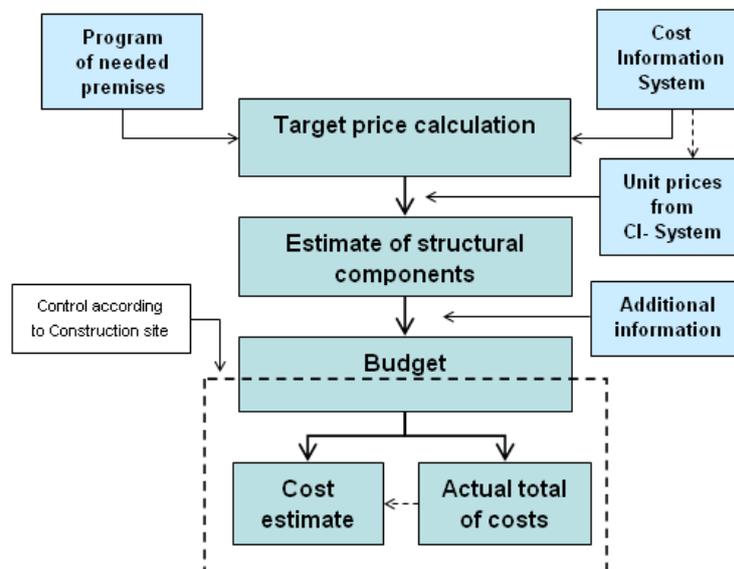


Figure 15: Formation of Cost Estimate and Actual total of costs from the source information

4.3.4.1 Target price calculation

The Target price calculation means construction project's or existing real estate's price forming according to the coding system used. The procedure is named "Target price calculation" for new projects and space calculation for existing real estates. Needed source information is the Program of needed premises which either already exists or will be created during the process.

As being described earlier, the Program of needed premises is a document which includes detailed information of needed rooms and premises. With the target price calculation the project's new price, repair & restoration price or present price can be found.

The Procedure is used when:

- Comparing alternatives of needed premises,
- Budgeting new or repairing projects
- Setting target price for project's design and construction
- Setting price for existing real estates
- Calculating financing and calculation activity for capital calculations

(Haahtela & Kiiras, 2007)

4.3.4.2 Estimate of structural components

Estimate of structural components means cost estimation by dividing the whole project into small components due to selected coding system. These components will be measured according to amount measurement guideline and priced according to unit prices of cost information system. Estimate of structural components is used among others for budgeting new projects and renovation projects, price estimates for design solutions, project's controlling mechanism, source information to procurements and also budget price for real estate. The forming of Estimate of structural components is divided into several stages:

- Measuring the amounts of construction bits,
- Pricing of construction bits,
- Pricing of interior covering, coating and equipments,
- Pricing of building services,

- Pricing of technical junctures of the project and land areas
- Pricing needed operational equipments, operational activity and financing
- project reserves.

(Haahtela & Kiiras, 2007)

4.3.4.3 Budget, Cost Estimate and Actual total of costs

Sometimes Estimate of structural components forms the projects budget itself and in some cases the Estimate of structural components needs additional details to form the budget of the project. These additional details might include more specific information about the project, managers' own additional information related to the project etc.

Based on the budget, the Cost estimate and Actual total of costs will form and reform the project's progress stages of the construction time.

4.3.5 Coding in Finnish method of cost accounting

The following figures 15 and 16 represent coding system according to Building 80 and 2000 –nomenclatures which are used when creating cost estimations coding to the project. The purpose of these coding systems is that it is used from the beginning till the end of the project.

Class	Main titles
0	Costs of building developer
1	Soil and foundation engineering
2	Foundations and external structures
3	Frameworks and roof covering structures
4	Supplementary structures
5	Surface structures
6	Furnitures, equipments, devices
7	Mechanical works
8	Sites operating costs
9	Sites overhead costs

Figure 15: Work classification according to Building 80

Building 80 nomenclature consists of four different sub-nomenclatures which are:

- Structural Component
- Execution
- Type of Cost
- Cost Item

The *Structural Component* sub-nomenclature is represented in figure X and it divides the construction object timely and constructively to coherent completeness and also separate cost accounting target. The *Execution* sub-nomenclature divides building work according to work discipline as focusing to structural components. *Type of cost* sub-nomenclature divides costs according to how they are born. *Cost Item* sub-nomenclature divides costs according to agreed contracts. After all, the budget and cost estimates are done according to the *Structural Component* sub-nomenclature.

1	Demolition works
2	Earth works
3	Areal works
4	Concrete works
5	Stone works
6	Metal works
7	Timber and woodpanel works
8	Glass works
9	Isolation works
10	Surface works
11	Equipment installation works

Figure 16: Work classification (production nomenclature) according to Building 2000

Here two different nomenclatures are represented because Building 80 system is more widely used and is more popular than the newer one due to its clearance and previous appearance. The Whole Building 2000 nomenclature is much wider and also includes different nomenclatures, such as, *list of needed premises*, *separate project nomenclature*, *building product nomenclature* and *equipment nomenclature* and *production nomenclature*.

4.4 CESMM3 British method of Cost Accounting in construction project

Bill of quantities- the method of cost accounting is regularly associated with British cost accounting in construction sites. This method is based on the publication “The Civil Engineering Standard Method of Measurement” (CESMM) which is published by The Institution of Civil Engineers in England. The first edition of CESMM appeared in 1976 as the standard for the preparation of bills of quantities in civil engineering work. “The object of CESMM is to set forth the procedure according to which the Bill of Quantities shall be prepared and priced and the quantities of work expressed and measured.”. The latest and the 3rd edition of CESMM has been published in 1991 and the information of this chapter is based on this, the latest published version. (Institution of Civil Engineers, 2009)

4.4.1 CESMM3 in general

Civil Engineering Standard Method of Measurement no. 3 (CESMM3) provides standard methods for simple building works to civil engineering works to be measured. CESMM3 does not deal with complex mechanical or electrical engineering works, or work which is complex building work of seldom encountered in civil engineering contracts. These kinds of works shall be itemized and described in the Bill of Quantities if any such work is to be included in a Contract for civil engineering work. (CESMM3, 1991)

4.4.2 Coding in CESMM3

In CESMM3 each item in the Work Classification has been assigned a code number consisting of a letter (class letters from A to Z) and not more than three digits. Letters of classes can be seen in the following figure 17. The three digits inform that each class has been divided into three different levels of divisions. Thus, digits give the position of the item in the first, second and third divisions of the class, eg.

Code H 5 4 6 identifies an item as

Class	H	precast concrete
First division	5	Slabs
Second division	4	Area: 15-50 m ²
Third division	6	5-10 tons

Class	Title
A	General items
B	Ground investigation
C	Geotechnical and other specialist processes
D	Demolition and site clearance
E	Earthworks
F	In situ concrete
G	Concrete ancillaries
H	Precast concrete
I	Pipework-pipes
J	Pipework-fittings and valves
K	Pipework-manholes and pipework ancillaries
L	Pipework-supports and protection, ancillaries to laying and excavation
M	Structural metalwork
N	Miscellaneous metalwork
J	Timber
P	Piles
Q	Piling ancillaries
R	Roads and pavings
S	Rail track
N	Tunnels
U	Brickwork, blockwork and masonry
V	Painting
W	Waterproofing
X	Miscellaneous work
Y	Sewer and water main renovation and ancillary works
Z	Simple building works incidental to civil engineering works

Figure 17: Work classification according to CESMM3.

The coding system in CESMM3 is very clear and the rules, which are reported in the following paragraph give a very transparent picture of coding and cost accounting system.

4.4.3 Rules of CESSM3

In the CESSM3 there are four different kinds of rules to instruct the creation of the Bill of Quantities. These rules are:

- Measurement rules
- Definition rules
- Coverage rules
- Additional description rules.

Measurement rules set out the conditions under which work shall be measured and the method by which quantities shall be computed. Example of measurement rule for *Common brick work (thickness 150-250mm vertical straight walls)* code U.1.2.1 states "Mean dimensions shall be used to calculate the areas and volumes of walls facing to concrete and casing to metal sections and the heights of columns and piers."

Definition rules define the extent and limits of the class of work represented. Example of definition rule for *Precast Concrete elements (beams not longer than 5 m and mass less than 250kg)* code H.1.1.1 states "The mass used for classification in the third division shall be the mass of each unit."

The Coverage rules provide that the work stated is deemed to be included in the appropriate items to the extent that such work is included in the contract. Example of coverage rule for code D.1.1.1 states "Items for demolition of pipelines shall be deemed to include demolition and removal of supports."

Additional description rules are rules that shall be given where required. Example of measurement rule for *Ground water level* code B.5.1.2 which states "Item descriptions for groundwater level observations shall state when the measurements are to be taken."

These rules give limits for creating Bill of Quantities and they are necessary so that the document will be analogous even if another individual will create the same document with same initial data.

4.4.2 Short summary of the Bill of Quantities

As stated earlier the final result of CESMM is to create Bill of Quantities (BOQ) which is document itemizing the materials, parts, labor (and the labor costs) required to maintain, repair or construct a structure or device. The BOQ-document is usually used as a bidding document which is prepared by a quantity surveyor (QS).

The Bill of Quantities are needed to read in conjunction with the Instructions to Bidders, General Conditions of Contract, Conditions of particular Application, Drawings and Technical Specifications. The order of precedence of these documents is usually agreed in the main contract.

The order of precedence of our case project is following:

1. The contract
2. Contract negotiation minutes
3. Bid requested and documents provided by a contractor before submitting its tender
4. The Contract program
5. The Contract limits Appendix
6. The Unit Price List
7. The worker Safety Appendix
8. General Conditions for Building Contracts YSE 98
9. Construction an specialized work specifications and job-specific instructions
10. Contract drawings
11. General work specifications
12. Update of tender
13. The tender

(Kuutsa, 2006)

As a rule, the quantities given in the BOQ as a bidding document, are quantities estimated to provide a common basis for bidding. The payments between contract parties will be based on actual quantities of ordered according to contract and executed by the

contractor. Quantities are also measured by the Engineer who might be either Client's or Contractor's side of the contract. The prices of the payment stated in the BOQ-document might be fixed according to the contract or agreed to be related to index, for example. (Poikolainen, 2003)

The quantities of work and materials according to BOQ are not to be considered as limiting or extending the amount of work to be done and the materials or equipment to be supplied by the contractor. The rates and prices bid in the priced Bill of Quantities shall include all Constructional plant, labor, supervision, materials, erection, maintenance, temporary works, insurance, profit, taxes and duties, together with all general risks, liabilities, and obligations set out or implied in the Contract. But after all general directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bill of Quantities. The method of measurement shall specify clearly for example that the method of measurement should be in accordance with the Civil Engineering Standard Method of Measurement, Third Edition 1991 (CESMM3). Moreover, the item numbers (coding) in the BOQ are needed to be clarified for example, demonstrating that it is based on the code numbering system of CESSM3. (Poikolainen, 2003)

4.5 Typical differences in Cost Accounting methods

There are many differences in these three accounting methods and one cannot say, which one is the best or even better than the other. This question is a matter of opinion, and no unique answer to it exists.

First of all, these 3 methods have exactly the same purpose. That is: to get as accurate budget and cost estimate for the project as possible with limited resources and limited time scale.

The main differences in these accounting methods appear due to the different coding systems and work classification of each code. Figure 18 informs of the typical differences in different coding systems and example of coding.

	RUS	FIN	GBR
Number of main classes	49	10	26
Digit rules	1 st is combination of letters (*ТЕР, **ФЕР, ***ГЭСН) 2 nd code with 2 digits 3 rd code with 2 digits 4 th code with 3 digits 5 th code with 2 digits	Numbers 0 – 1 000 000	1 st is alphabet (A-Z) 2 nd digit 3 rd digit 4 th digit
Example	ТЕР 08-02-001-01	1 43 001	H 5 4 6
Meaning	- Brickwork, blockwork - Masonry work - Brickwork for the wall - Brickwork wall up to 4 m.	- Soil and foundation engineering - Rammed piles - Pile 300 x 300 mm - 13-15 meters	- Precast concrete - Slabs - Area: 15-50 m2 - 5-10 tons

Figure 18: Typical differences in Cost Accounting methods and their coding systems

*Территориальные Единичные Расценки (ТЕР), Regional unit price for construction activities.

**Федеральные сборники Единичных Расценок (ФЕР), Federal unit price book.

***Государственные Элементарные Сметные Нормы (ГЭСН), State elementary estimate standards.

The Russian method differs from Finnish and British methods mostly in a way that it includes besides all a cost calculation method for the special cases. Finnish and British methods are limited by simple and the most typical projects only. This difference can be seen, for example, in the main coding classes. Russian method includes such classes as Airdromes, Mining works, Submarine and Diving works. On the other hand, in general principles of CESMM mentioned do not deal with the preparation of BoQ for complex construction works, or tasks which are seldom occur in civil engineering contracts.

When comparing cost estimates forming procedure in figures 13 and 15, one can notice that there are differences between cost formation methods in Russian and Finnish methods. Figure 13 shows procedure of construction project's cost estimate development according to the Smeta, and figure 15 shows the same for the Finish system. In Smeta system the total cost estimate comes as a sum of three different paths. In Finish system the cost estimate is formed only throughout one path and the cost estimate becomes more and more detailed on every step of the process. In CESMM-system there was no description of cost estimate's forming procedure.

To sum it up, one can not say for sure which method is the best for each project, but after this investigation the author comes to conclusion that Finnish and British methods are more clear than the Russian method, besides they are easier to operate. A solid reason for

such a conclusion is that the author has been familiar with the Finnish method already owing to his first education. Another contorting issue might be that the British method seems to be clearer than the Russian one because it is written originally in English and that's why it is easier to handle.

5 Case project's organization and Cost Management in general

This chapter clarifies briefly case-sites operational organization and contract relations between different entities. The aim of this chapter is to describe who is responsible for different contracts and who is obligated to sign invoices and other economical documents. The chapter also clarifies the Project Management methods like Engineering, Procurement and Construction Management to the reader. The project management -part finds its way to the project cost management, control and approval of invoices of the project. The purpose of this chapter is to fasten theoretical part of this thesis to case site's operational economic activity.

5.1 Internal Project Organization of Real estate developer

The building sites organization is complicated to describe in 2 dimensional graph because contractual situation at the case site is changing all the time during the project. Next figure 19 shows case projects Internal Project organization.

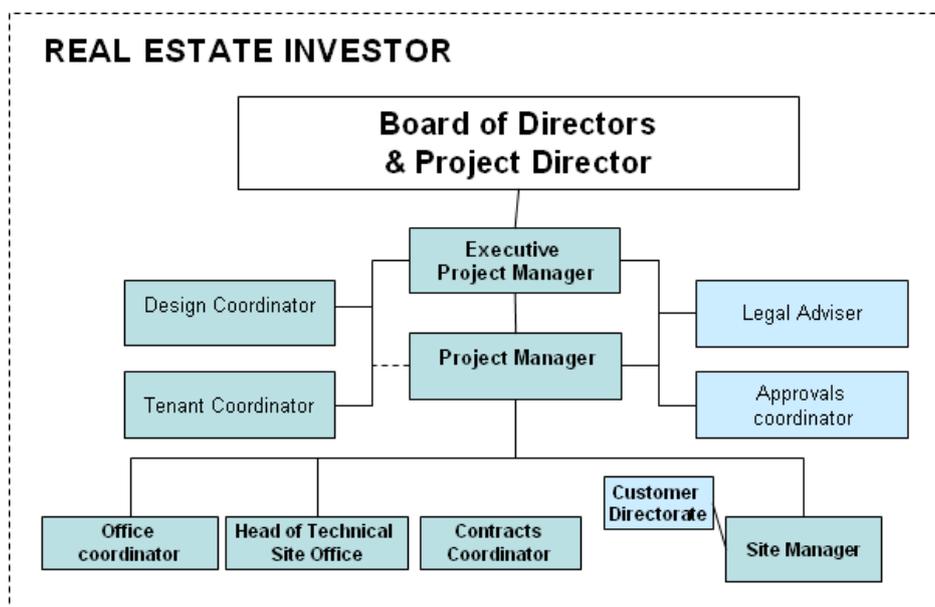


Figure 19: Real estate developers Internal Project Organization

Due to its massive size to the investor, the whole project is managed by the corporation's Board of Directors. The Board of Directors is monthly informed with the help of specific form of Project Report about the details of the project which are described in chapter *5.5.2 Project Report (PR)*.

The following part of the thesis represents the main tasks of employees of the project. The purpose is to explain to the reader the whole project's different responsibilities and to show cost estimates and how the costs are formed to budget.

5.1.1 Tasks of Project Manager

The Project Manager (PM) is the highest servant of the project operating at construction site. PM is taking care of daily project management tasks. He has the authority of approval of invoices up to 100 000 euro besides PM has to approve every invoice between 0 – 100 000 euro. PM is responsible for reporting to the Client and reports are normally prepared by the technical office. PM also takes care of emergency reporting which is assisted by the members of the technical team. Above all PM also coordinates the preparation of the overall budgets and cost estimates.

5.1.2 Task of Design Coordinator

Design coordinator's main task is to coordinate all things related to designing starting from geological design via architectural design to HPAC-design. The Coordinator is responsible for controlling design contractor's invoices which must be based on executed working hours and design works. Invoices must not overstep the agreed limits agreed in the design contracts.

5.1.3 Task of Tenant Coordinator

Tenant coordinator's task is to take care of assignments related to commercial operations of construction site according to time, technical and economical synchronization. The Task includes all the negotiations with the tenants related to possible tenant contract between the parties. This includes elaboration and agreement with related parties, tenants,

deliveries and construction. The Task also includes preparation and follow-up of the tenant's own work and warranting that the tenants' would cause no harm to other works and vice versa.

5.1.4 Task of Legal Adviser

Legal Adviser's responsibility is to ensure that contracts and agreements done under the name of Real Estate Investor are correct from the legal side. Adviser's task is to assist in contract preparation and inspection (essence and legalities), mainly with utilities, local service providers and tenants. Most of the contracts of the site have already been done and there are more than 250 contracts so far.

5.1.5 Task of Approval Coordinator

The Duty of Approval Coordinator is to take care, to follow and to complete As-build documentation. Coordinators also look after the changes in designing and secure that these changes are approved by the State Expertise.

5.1.6 Task of Office Coordinator

The Office Coordinators task is to make sure the whole organization has all facilities and equipments necessary to succeed the tasks they are given. Office Coordinator's activity includes, for examples invoice control, translation tasks, meeting arrangements, accommodation arrangements, traveling tickets just to name a few. Besides, the procurement of office supplies is also the responsibility of Office coordinator.

5.1.7 Task of Head of Technical Sites Office

Head of Technical Site Office take cares of technical support of the project. He looks after additional works and control changes in design works. It is necessary for him to work closely with Design Coordinator. Also all the project's needed permits, claims, material and equipment approval is under the responsibility of head of the office.

5.1.8 Task of Contract Coordinator

Contract Coordinator's task is to follow and to make contracts. Coordinator is mainly responsible for the relation with the main contractor and his task includes all the other contracts as well. Contract coordinator works in close relation with legal adviser.

5.1.9 Task of Site Manager

The main task of Site Manger is to control contractor's fulfillment of their contractual obligations. Following tasks also belong to Site Manager. Taking care of preparation of the site- and coordination meeting, project's daily time schedule follow-up, and also supervising the project's team work belongs to Site Manager's task. Site manager is responsible for constructional time schedule and site security, his task is also to assist in preparation of contracts and calls for tenders. Site manager also operates as a back-up of the PM if needed.

5.2 *Project's Contractual Relations*

The following figure number 20 represents Construction sites contractual relations. The head of the project is a real estate investor/developer which is seen from the white box at the figure.

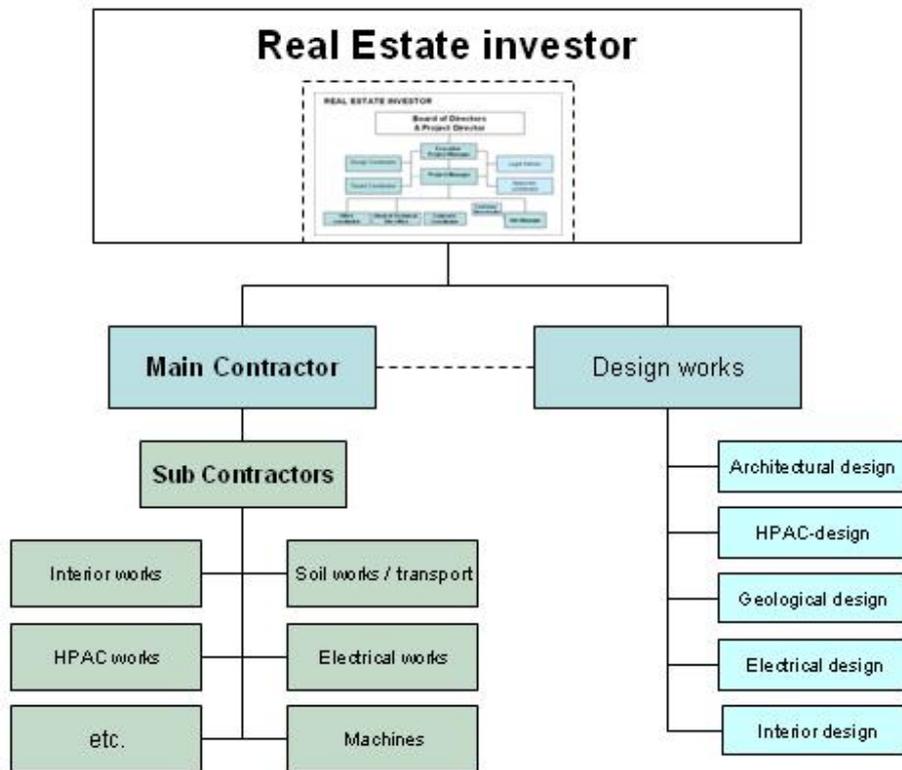


Figure 20: Construction site's contractual relations

Real Estate Investor entity includes the total Internal Project Organization, which was introduced earlier. The contract between Real Estate Investor (REI) and Main Contractor (MC) is covering about half of the total project estimate budget. All the construction site's construction works are subordinated to MC and the Design works are managed by REI with bidirectional relation with Main Contractor. REI's project organization introduced above is responsible for real estate development and administrative tasks at the site.

5.3 Project Management on the whole

First of all, here are a few definitions of Project management field to clarify some differences between executing methods according to their risky level.

Engineering Procurement Construction (EPC)

EPC is a project management method to managing turn key projects where the engineering contractor is fully responsible for the construction of the project until mechanical completion. On the other hand this means that the engineering company has direct contracts with the construction contractors. This means that risks are higher for the engineering company and the profit rate is also higher due to compensation of a higher risk.

Engineering Procurement Construction Management (EPCm)

EPCm is a project management method to managing turn key projects where the engineering contractor is responsible for the construction of the project from the managerial point of view. Engineering contractor offers only construction management services on behalf of the owner which has the contracts with the construction companies. This means that risks of the contracts belong to the owner of the project and engineering contractor's profit rate is lower than in EPC-method.

The case site is executed using EPCm-management method according to mandate and contract signed with the Client and Project Management company.

5.3.1 Engineering (E)

Engineering has been described of the creative application of scientific principles to:

- Design or develop structures, constructions, machines, apparatus, or/and manufacturing processes, or works utilizing them singly or in combination.
- Construct or operate the same with full cognizance of their design or/and
- Forecast their behavior under operating conditions.

All as respects an intended function, economics of operation and safety to life and property. (American Engineers' Council for Professional Development, ECPD)

Engineering in construction project includes construction design connected to architectural design, structural design, HVAC design, interior design, usability design,

detail design, production design, operational method design and all the others technically related designs. All these issues together represent construction engineering.

Engineering, in Project Managers eyes, means controlling all above mentioned design issues so that all is being executed and finished according to schedule and budget.

5.3.2 Procurement (P)

Project procurement management includes all the processes which are required to acquire goods and services from outside the performing organization. Project Procurement Management is normally divided according to the following figure 21.

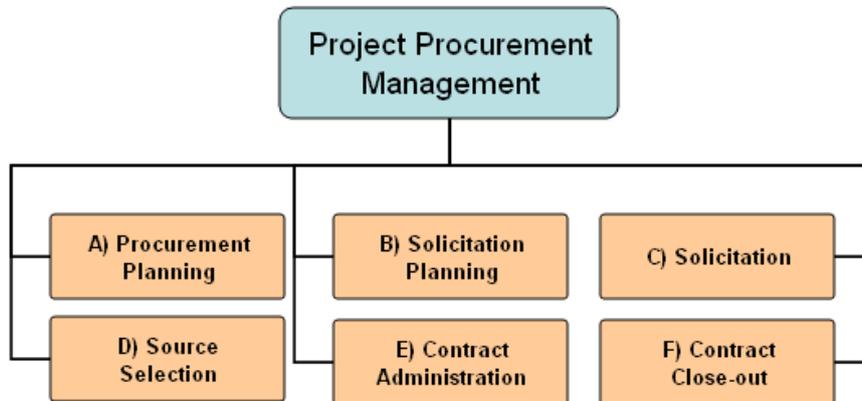


Figure 21: Project Procurement Management Overview

Procurement planning includes Make-or-buy analysis, Expert judgments and Contract type selection. The output of this stage is Procurement management plan and Statement or Statements of work. Solicitation planning is the next stage which uses planning stage's output information and the results are procurement documents, evaluation criteria and updates of statements of work. Solicitation stage's task is to collect procurement proposals according to procurement plan. Source selection stage's aim is to hold contract negotiations, weigh and screen different contract possibilities and to make independent estimates of the proposals. The output of this stage is Contract Assignment.

The next stage is Contract Administration and tools to administrate are Contract change control system, performance reporting and payment system. This stage is closely connected to cost control which has been issued in many spots of this thesis. As an output, this stage creates Correspondence, Contract changes and Payment requests. The final stage is Contract Close-out. Input information is all the contract documentation, an

output of which is completed contract file and formal acceptance and closure of the whole procurement process.

5.3.3 Construction Management (CM)

Construction management is a professional field of management that focuses on the construction process of built environment.

Typically construction management encompasses commercial building sites or multi-unit residential sites. During a typical project, CM-company personnel are responsible for overseeing each phase of construction and resolving any discrepancies in original blueprint design and actual implementation. CM personnel are also accountable for the cost of a project and must control material and labor cost according to Procurement plan which was mentioned before. CM personnel need to operate in cooperation with architects, designers and site-specific superintendents, and often both in an office and construction site simultaneously. Construction managers must also be familiar with design and construction laws including governmental regulations and building codes etc. for serving all the details of Construction management contact. Equally important is delivering each phase of a project within a given time frame and budget.

5.3.4 Cost formation profiles in Project Management

The following figure number 22 informs of the cost formation profiles on different stages of the project. Engineering works start at full blast at the beginning of design stage and reduces till the beginning of the design stage or maybe a little longer than the end of design stage.

Procurement tasks start already during the designing stage before construction stage has started. The form of procurement task is that it starts gradually, gets its highest top during the construction time and decreases gradually so that the procurement task is over when the object is handed over to the client.

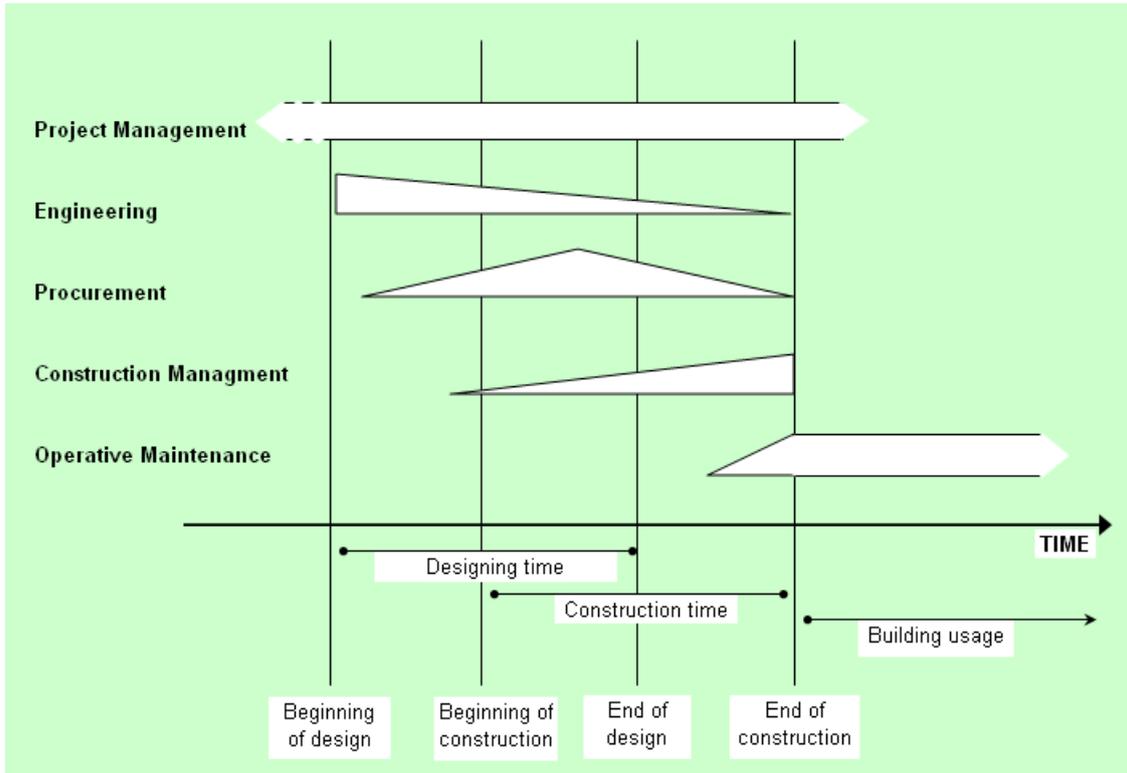


Figure 22: Cost formation profiles in Project Management

Construction Management tasks start gradually just before construction time and the volume increases till the end of construction period until the construction is handed over to the client.

Operative Maintenance tasks start also gradually already during the final part of construction time and it will reach the full operative run at the end of construction period. These cost formation profiles are just suggestive and actual cost formation might differ from these profiles according to different details and features of the project.

5.4 Project Cost Management

The purpose of Project Cost Management (PCM) is to ensure that the project is completed within the approved budget. PCM includes the processes that make these actions possible and PCM is primarily concerned with the cost of the needed resources. PCM should consider the information needs of the project's different stakeholders. It is also very important that project cost management consider the effect of decisions' whole

life-cycle costing as well. Not just the viewpoint of reducing the costs of construction time (Duncan, 1996). The main areas of Project Cost Management are represented in following figure number 23.

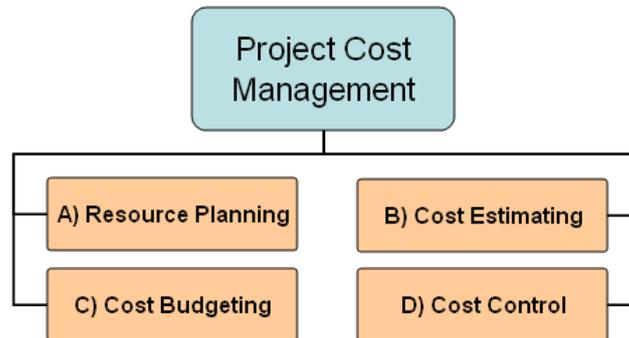


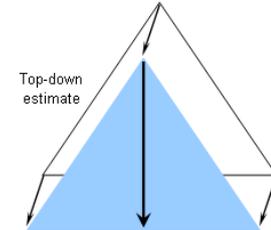
Figure 23: Project Cost Management Overview (Duncan, 1996)

This chapter concentrates Project Cost Management and case sites cost accounting methods in general. Special focus is aimed at Cost Estimating, Cost Budgeting and Cost Control. Also Resource Planning will be handled on a smaller scale. The main interest is focused on the methods used, the starting data, the way cost control was planned to implement and cost estimations are instructed. The end of this chapter contains descriptions of case-site's other economical control systems. What other economical control systems does the entity have to support in case site, how cost accounting systems are connected to bookkeeping systems and what bookkeeping systems does the entity have and how systems are communicating together.

5.4.1 Cost estimating in project management

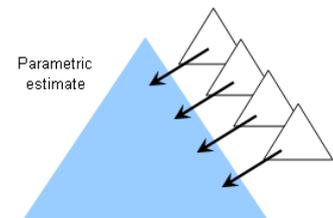
The target of cost estimating is to develop an approximation or an estimate of the costs of resources needed to complete project activities. The outputs of cost estimating are *Cost estimate*, *Supporting detail* and *Cost Management plan*. If project is performed under contract, the interest should be concentrated on how to distinguish cost estimating from pricing. Cost estimating covers the development of an assessment of the likely quantitative result e.g. how much does it cost to provide the product. Pricing is a business decision instead, which informs how much will the organization charge for the product.

Cost estimating covers considering and identifying various costing alternatives. In some cases additional work during the design phase reduces cost of the production phase but the focus should aim at product's life-cycle costs.



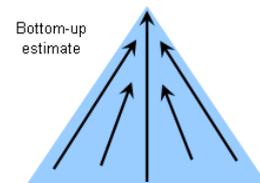
5.4.1.1 Top-down estimating or analogous estimating

Top-down technique means that the costs of the current project will be estimated using the actual cost of a previous and similar project as the basic information. This type of technique is generally less costly than others but it is also less accurate. Technique is most reliable when the previous projects are similar in fact and the managers preparing the estimates have the needed expertise.



5.4.1.2 Parametric modeling

This technique involves using project characteristics parameters in mathematical model to predict project costs. Example of this type of approach is cost of a construction operation per square meter. Techniques of cost estimate and accuracy vary widely resulting in the accuracy of the individuals or groups preparing the estimates.



5.4.1.3 Bottom-up estimating

This technique involves estimating cost of individual work items and summarizing or rolling-up then to get a project total. In this technique smaller work items increase both accuracy and cost of the estimate. It is project management team's decision to weigh the additional accuracy against the additional cost.

5.4.2 Cost Budgeting in project management

“Cost budgeting involves allocating the overall cost estimates to individual work items in order to establish a cost baseline for measuring project performance.” (Duncan, 1996)



Figure 24: The inputs, tools & techniques and outputs of cost budgeting

The target of cost estimates has been described in section 5.4.1 *Cost estimating in Project Management* and the work breakdown structure identifies the project elements that costs will be allocated to. Cost estimating tools and techniques are also described in the same section 5.4.1. The cost baseline is a time-phased budget which has been described in figure 25. The cost baseline will be used to monitor and measure cost performance on the project. (Duncan, 1996)

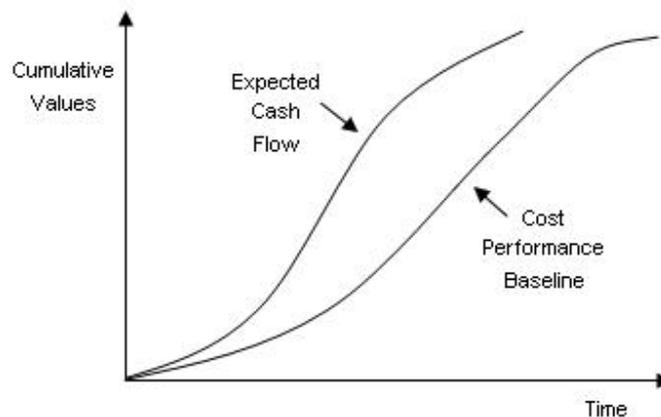


Figure 25: Illustrative Cost Baseline Display

Cumulative expected cash flow will be displayed usually in the form of an S-curve and that cash flow accumulates normally in advance of Cost Performance. Especially larger projects may have multiple cost baselines to measure and control different aspects of cost performance.

5.4.3 Cost Control

5.4.3.1 Cost Control in general

The main purpose of cost control is to find out both negative and positive changes in actual cost compared to budgeted costs. Cost control must be thoroughly integrated with

the other control processes like scope change control, schedule control, quality control and other control processes. Cost Control consists of:

- Cost performance monitoring to detect variances from plan
- Ensuring that appropriate changes are recorded in the cost baseline
- Preventing incorrect or other way inappropriate changes from being included in the cost baseline
- Informing stakeholders of authorized changes

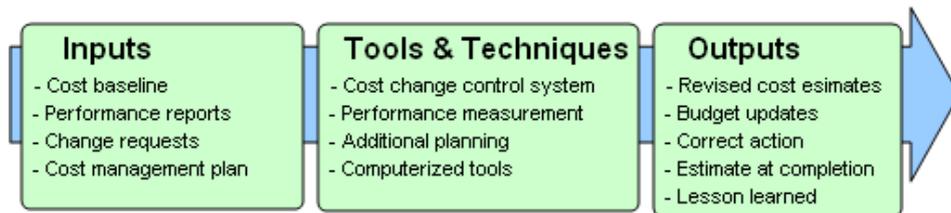


Figure 26: The inputs, tools & techniques and outputs of Cost Control

Revised cost estimates are needed to be done only in special cases. Revised cost estimates are modifications to the cost information used to manage the project. Making revised cost estimates does not require revising other aspects of the overall project plan. Budget updates are representing special category of revised cost estimates. These are changes to an approved cost baseline. The numbers in budget are generally revised only in response to scope changes. Sometimes cost variances may be so severe that budget update is needed in order to provide a realistic measure of performance. (Duncan, 1996)

An Estimate at Completion (EAC) is a forecast or estimate of total project costs based on project performance. The three most common estimating techniques are:

- $EAC = \text{Actual to date plus the remaining project budget modified by a performance factor, which is often the cost performance index. Approach like this is often used when current variances are seen as typical of future variances.}$
- $EAC = \text{Actual to date plus the latest estimate for all remaining works. Approach is most often used when past performance shows that the original estimating assumptions were fundamentally flawed. Or that the assumptions are no longer relevant due to a change in conditions.}$

- EAC = Actual to date plus remaining budget. Approach is used often when current variances are seen as atypical and the PM-team's expectation is that similar variances will not occur in the future.(Duncan, 1996)

The choice between above mentioned approaches need to be done according to prevailing circumstances.

Lesson learned should be documented so that they become part of the historical database for this particular project or other projects to use. Lesson learned should include information about the causes of variances, the reasoning behind the corrective action chosen and all other remarkable actions and reasons for these actions made concerning cost control.

5.4.3.2 Cost control of design and consulting contracts

At the beginning of the project and during the project cost control of design and consulting contracts can be done at a large-minded scale. This does not mean that all the requested invoices can be approved without controlling but that controlling of cumulative money amount is not necessary to be under strict control, if the invoices are agreed to be approved according to working hours spent on project. This also means that in the contract there have not been agreed of milestone payment schedule. When the contract agreement begins to be at the end side of the agreed time span and near enough the target price the invoices and cumulative costs of the design or consulting contractor need to be controlled strictly. This work has not been done in our case project at the beginning. For this kind of purposes following table number 9 has been created to control design contracts.

Control of Design Contract

J. Keisala paid
 30.4.2009 under control
estimate

090430JK:
 Additional information
 related to specific cell.

	explanation	date of inv.	€ (0%VAT)	Cum.€	additional information
2008	Design works in Jan	31.1.2008	18 500	18 500	approved
	Design works in Feb	28.2.2008	17 500	36 000	approved
	Design works in Mar	31.3.2008	35 000	71 000	approved
	Design works in Apr	30.4.2008	50 000	121 000	approved
	Design works in May	31.5.2008	95 000	216 000	approved
	Design works in Jun	30.6.2008	90 000	306 000	approved
	Design works in Jul	31.7.2008	70 000	376 000	approved
	Design works in Aug	31.8.2008	85 000	461 000	approved
	Design works in Sep	30.9.2008	100 000	561 000	approved
	Design works in Oct	31.10.2008	110 000	671 000	approved
	Design works in Nov	30.11.2008	108 000	779 000	approved
	Design works in Dec	31.12.2008	115 000	894 000	approved after 5 000e subtraction
2009	Design works in Jan	31.1.2009	145 000	1 039 000	approved
	Design works in Feb	28.2.2009	120 000	1 159 000	approved
	Design works in Mar	31.3.2009	150 000	1 309 000	still under approval process
	Design works in Apr	30.4.2009	132 000	1 441 000	still under approval process
	Design works in May	31.5.2009	134 000	1 575 000	mean of last 3 months invoice
	Design works in Jun	30.6.2009	134 000	1 709 000	mean of last 3 months invoice
	Design works in Jul	31.7.2009	134 000	1 843 000	mean of last 3 months invoice
	Design works in Aug	31.8.2009	134 000	1 977 000	mean of last 3 months invoice
	Design works in Sep	30.9.2009	134 000	2 111 000	mean of last 3 months invoice
	Design works in Oct	31.10.2009	134 000	2 245 000	mean of last 3 months invoice
	Design works in Nov	30.11.2009	134 000	2 379 000	mean of last 3 months invoice
	Design works in Dec	31.12.2009	134 000	2 513 000	mean of last 3 months invoice

090105JK:
 Orig. invoice 120 000€,
 5 000€ subtracted
 because some
 executed work invalid.

Table 9: Chart of controlling design, consulting and other contracts, which do not have milestone payment schedule but cost ceiling

This table 9 is connected to graphic figure 27 which shows that if the costs continue as estimated in table 9, the total result will overstep the ceiling for target price in October 2009 and the realized costs will gain more than 2.5 million euro at the end of the project according to estimate.

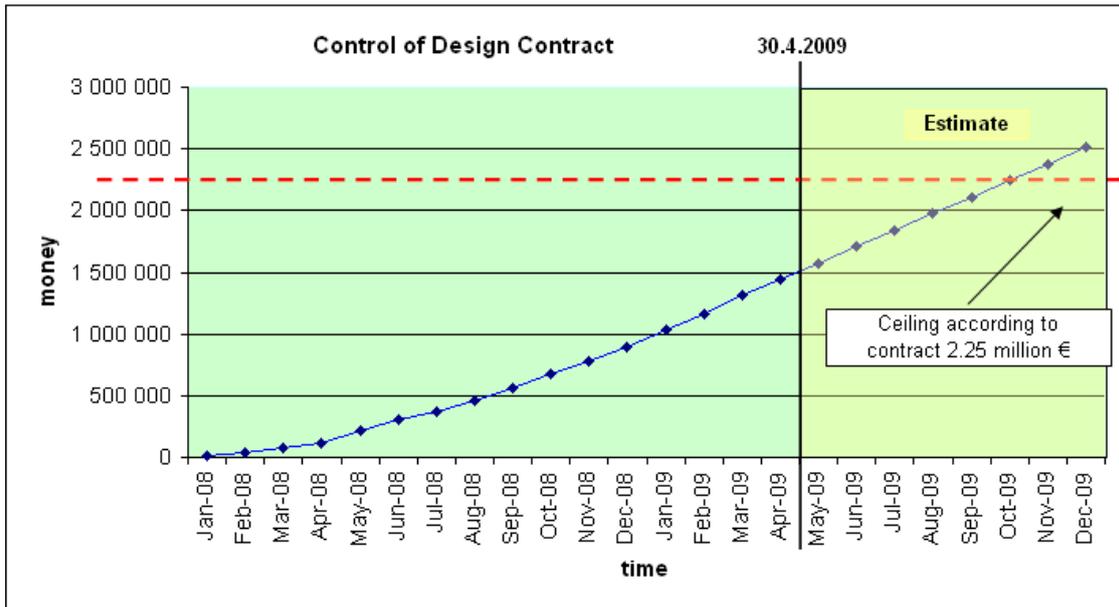


Figure 27: Graphic figure of Control and estimate of Design Contract

The purpose of this table 9 and figure 27 is to inform the managers what is the difference between estimated price and target price. If estimated price is much higher and over the budget, steering actions are needed to keep the realized costs under the target price in the future.

5.4.3.3 Cost control and cash flow with the main contractor

The main contract is covering considerable amount of whole investment and that's why the cash flows concerning the main contract is followed separately in comparison to other contracts. The cash flow has been divided into 2 different types which are advance payments and progress payments. The purpose of advance payments, or simply an advance, is the sum that is paid in advance for construction work and the reason is usually to finance the contractor in the beginning of construction work. The amount of advance and the reason for it to take place is agreed on the contract. The purpose of progress payment is to pay according to the progress of work which is done.

When the contract sum has been agreed to be fixed or directly related to index the contract includes also milestones of the project and progress payments are related to these milestones according to the contract. This connection will secure both parties background

and makes the cash flow and execution of production easily to estimate. Figures 28 and 29 represent the relation between estimated production and cash flow during time span. At the beginning of the project the cash flow was around 12% ahead of production and during the last months of the project the gap will be reached so that cash flows become as agreed on contract. (Bozrikova, 2009)

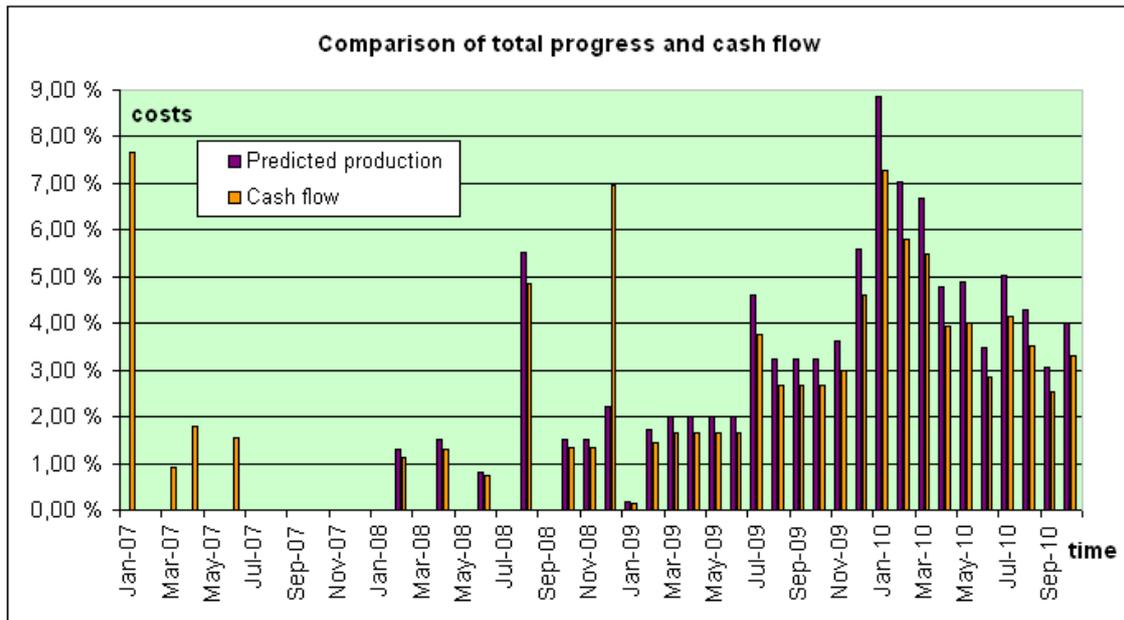


Figure 28: Predicted production and cash flow on monthly basis

It can be seen from the figure 28 that first four cash flow columns represent advance payments because production column is still on 0 % level. At the end side of the project the purple columns for predicted production are higher because gap between cash flow and predicted production has to be equalized.

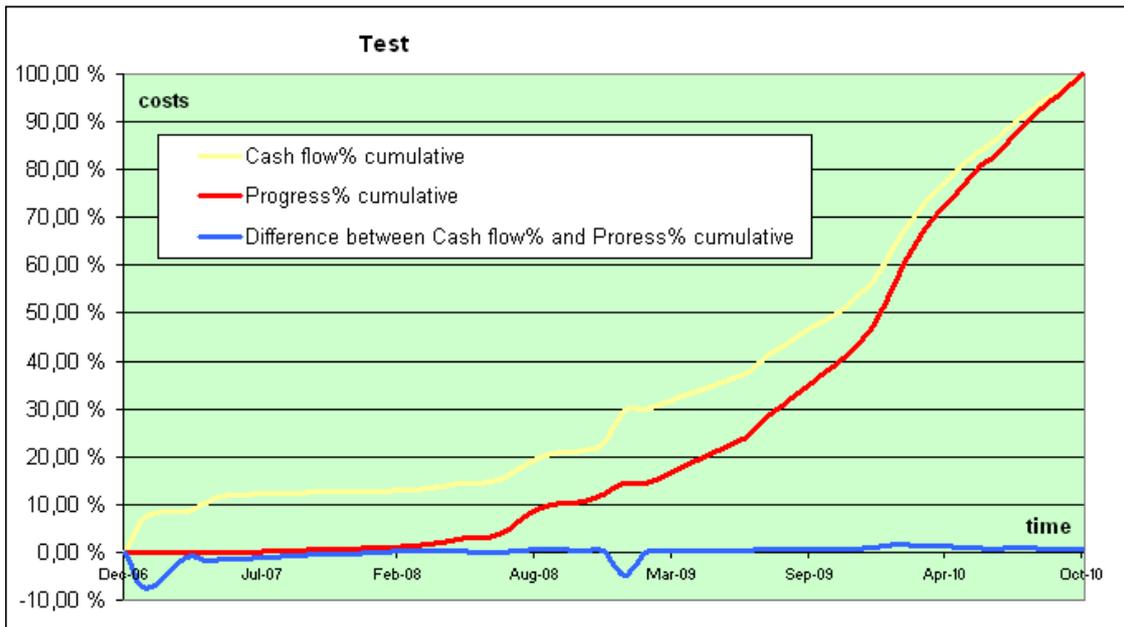


Figure 29: Cumulative predicted production and cumulative Cash Flow

Figure 29 represents the same situation with cumulative curves. At the beginning of project the cumulative cash flow from the Client has been paid but the cumulative predicted production hasn't yet started. That's why the blue difference curve dives to negative side and becomes positive only at the end of the project when this gap is agreed to minimize.

5.4.3.4 Cost control and cash flow estimate with the other contractors

As mentioned before there are more than 250 contracts in the case project, but the main contract is covering about half of the project budget. Because of these circumstances the detailed cash flow estimate follows quite strongly the main contract and smaller contractors are added to cash flow estimate to complete the whole estimate. The TOP10 biggest subcontractors cover about 80 per cent of the project budget, so if only these TOP10 subcontractors are taken into account and the rest of the subcontractors are taken to complete calculations as fixed prices the cash flow estimate is accurate enough.

It is obvious that short time cash flow estimate is the most necessary, that is why the PM concentrates only to the following half year and the rest of the estimate is given on a more inaccurate level.

Table 10 shows how to create the cash flow estimate for the ten biggest companies as an example. Horizontal axes represents time. Green background informs of realized cash flow. Yellow background demonstrates the following six months estimated cash flow and the red background shows a more inaccurate cash flow estimate. On the vertical axis there are companies and their total contract sum.

Cash flow estimate		2009									
realized	Contract sum										
next 6 months estimate	%	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
more inaccurate estimate											
Company	%										
Sum	181 631 023 €	2 589 320 €	2 096 320 €	4 107 320 €	3 053 320 €	2 816 320 €	2 829 320 €	3 199 320 €	4 831 320 €	6 763 649 €	5 353 649 €
Company 1	61 565 000		1 555 000	3 546 000	2 500 000	2 500 000	2 500 000	2 810 000	4 321 000	6 849 000	5 440 000
%	97 %		3 %	6 %	4 %	4 %	4 %	5 %	7 %	11 %	9 %
Company 2	3 204 000		176 000	145 000	117 000	155 000	167 000	178 000	164 000	150 000	143 000
%	94 %		5 %	5 %	4 %	5 %	5 %	6 %	5 %	5 %	4 %
Company 3	900 000		225 000	225 000	225 000						
%	75 %		25 %	25 %	25 %						
Company 4	770 000		40 000	40 000	60 000	60 000	60 000	60 000	60 000	55 000	55 000
%	92 %		5 %	5 %	8 %	8 %	8 %	8 %	8 %	7 %	7 %
Company 5	638 400		31 920	31 920	31 920	31 920	31 920	31 920	31 920	31 920	31 920
%	95 %		5 %	5 %	5 %	5 %	5 %	5 %	5 %	5 %	5 %
Company 6	392 000		11 000	22 000	22 000	22 000	22 000	22 000	22 000	17 000	22 000
%	94 %		3 %	6 %	6 %	6 %	6 %	6 %	6 %	4 %	6 %
Company 7	222 000		14 000	14 000	14 000	14 000	14 000	14 000	14 000	14 000	14 000
%	88 %		6 %	6 %	6 %	6 %	6 %	6 %	6 %	6 %	6 %
Company 8	250 000			50 000	50 000			50 000	60 000		
%	100 %			20 %	20 %			20 %	24 %		
Company 9	125 000								125 000		
%	100 %								100 %		
Company 10	68 000		3 400	3 400	3 400	3 400	3 400	3 400	3 400	3 400	3 400
%	95 %		5 %	5 %	5 %	5 %	5 %	5 %	5 %	5 %	5 %
Rest of the companies	1 420 000		40 000	30 000	30 000	30 000	30 000	30 000	30 000	60 000	60 000
%	66 %		3 %	2 %	2 %	2 %	2 %	2 %	2 %	4 %	4 %
Budgeted savings	-4 583 377									-416 671	-416 671
%	100 %									9 %	9 %
Employers supplies	20 000 000										
%	100 %										

Table 10: The basic Cash flow estimate at subcontractor level

The Table is used so that only estimated percentages of the total contract sum are added to the table (grey background). Consequently the table will calculate the monthly cash flow estimate to this particular company and the *Sum*-row will represent the monthly sum of all the contracts in its own row.

The last line of the table is a summary line for the rest of the contracts which do not fit into TOP10. This assumption was made to simplify the whole table because if it included more than 250 rows with the smallest contract sums it would make the creation and updating of the table quite laborious.

The following table has been created by adding the cash flow figures from the previous table and the cash flow from the main contract. So it shows the cash flow calculation for the whole project.

Cash flow calculation realized
 J. Keisala next 6 months estimate
more inaccurate estimate

explanation	date of inv.	Budgeted	realized & estimate	Cum. I	additional information
		I (0%YAT)	I (0%YAT)		
2008	Cash flow January	30 000 000	30 200 000	30 200 000	realized
	Cash flow February	3 000 000	4 300 000	34 500 000	realized
	Cash flow March	4 000 000	5 544 000	40 044 000	realized
	Cash flow April	4 000 000	4 550 000	44 594 000	realized
	Cash flow May	4 000 000	6 450 000	51 044 000	realized
	Cash flow June	5 000 000	4 540 000	55 584 000	realized
	Cash flow July	5 000 000	5 124 000	60 708 000	realized
	Cash flow August	5 000 000	5 345 000	66 053 000	realized
	Cash flow September	4 000 000	4 312 000	70 365 000	realized
	Cash flow October	4 000 000	3 230 000	73 595 000	realized
	Cash flow November	3 000 000	2 310 000	75 905 000	realized
	Cash flow December	2 000 000	3 212 000	79 117 000	realized
2009	Cash flow January	2 000 000	3 230 000	82 347 000	realized
	Cash flow February	2 000 000	5 874 000	88 221 000	realized
	Cash flow March	3 000 000	4 530 000	92 751 000	realized
	Cash flow April	3 000 000	3 905 000	96 656 000	realized
	Cash flow May	3 000 000	2 589 320	99 245 320	6 months estimate 15.2009
	Cash flow June	4 000 000	2 096 320	101 341 640	6 months estimate 15.2009
	Cash flow July	4 000 000	4 107 320	105 448 960	6 months estimate 15.2009
	Cash flow August	4 000 000	3 053 320	108 502 280	6 months estimate 15.2009
	Cash flow September	4 000 000	2 816 320	111 318 600	6 months estimate 15.2009
	Cash flow October	4 000 000	2 829 320	114 147 920	6 months estimate 15.2009
	Cash flow November	4 000 000	3 199 320	117 347 240	rest project estimate 1.1.2009
	Cash flow December	4 000 000	4 831 320	122 178 560	rest project estimate 1.1.2009
2010	Cash flow January	4 000 000	6 763 649	128 942 209	rest project estimate 1.1.2009
	Cash flow February	5 000 000	5 353 649	134 295 859	rest project estimate 1.1.2009
	Cash flow March	5 000 000	5 097 649	139 393 508	rest project estimate 1.1.2009
	Cash flow April	4 000 000	3 629 649	143 023 157	rest project estimate 1.1.2009
	Cash flow May	4 000 000	3 703 649	146 726 807	rest project estimate 1.1.2009
	Cash flow June	3 000 000	3 609 649	150 336 456	rest project estimate 1.1.2009
	Cash flow July	3 000 000	5 720 649	156 057 106	rest project estimate 1.1.2009
	Cash flow August	3 000 000	6 153 649	162 210 755	rest project estimate 1.1.2009
	Cash flow September	3 000 000	5 217 649	167 428 404	rest project estimate 1.1.2009
	Cash flow October	4 000 000	7 024 649	174 453 054	rest project estimate 1.1.2009
	Cash flow November	4 000 000	5 318 320	179 771 374	rest project estimate 1.1.2009
	Cash flow December	4 000 000	1 859 649	181 631 023	rest project estimate 1.1.2009

Table 11: Cash flow calculation for the whole project

This table uses the same color coding as previous tables: Green for realized cash flow, yellow for short run estimated cash flow and red for longer than 6 months inaccurate cash flow. The short run cash flow estimate (next 6 months) is based on on-going contracts and estimated works which have to be executed during this period. The longer cash flow estimate is based on the whole project's cost estimate.

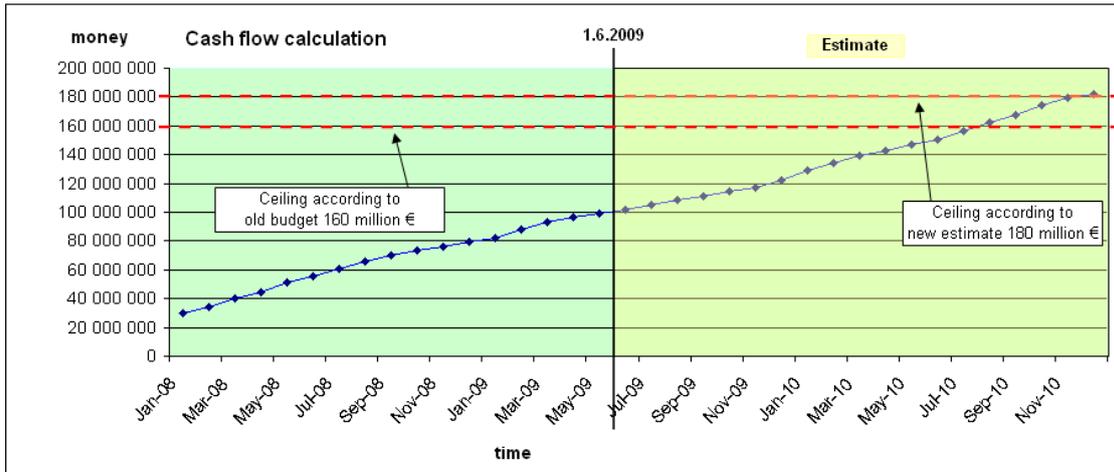


Figure 30: Cash flow calculations of the whole project in graphical format

Figure 30 reveals the Cash flow calculation in the graphical format, which makes it easier for the reader to see the predominant situation now. The previous cost ceiling and ceiling according to new estimate have been added to this table to clarify the situation for a decision maker.

5.5 Control and Approval of Invoices and Project Report

5.5.1 Control and Approval of Invoices

Controlling and approving of invoices is a vital element of well operating construction site. If the payments aren't running smoothly to contractors and subcontractors, even if the work is done as agreed, this causes troubles between the relations between parties. Some times this might delay even the whole project. If the control and approval of invoices operates well the negative impacts concerning this issue are absent.

The path of project's invoice controlling is described in the following text and figure 30. Invoices arrive first to the Project Secretary (step 1 at figure 31) who takes care of the first control step. The Secretary stamps every needed paper with the company's control stamp and lets the company behind the invoice know if something required is missing. The Secretary delivers invoice papers to the Invoice Controller (step 2) who checks that the following points in the invoices are correct:

- Organizations name

- Juridical addresses (not required)
- ИИИ is correct (not required)
- КИИИ is correct (not required)
- Invoice includes signature and stamp of the firm
- Invoice follows the contracts and amendments
- Invoices are dated on valid date
- Comparing with contract (amount of payment)
- Calculates per cent amount of how many percent of contract sum are paid after this invoice and informs % to Responsible manager
- Check scope of work
- Marks the invoice to the cost control document (.xls)
- Signs the control stamp and sends forward.

If something is not correct the Invoice Controller asks for a new corrected invoice from the contractor. When the invoice is the last payment to this contractor, the controller informs of this the Approvals Coordinator who is responsible for As Build –drawings. After the ACs approval the invoice can be forwarded to the next step of the process. The Invoice Controller and Approval coordinator are responsible for the last payment should not be paid until As build-pictures are delivered to the Project Managers.

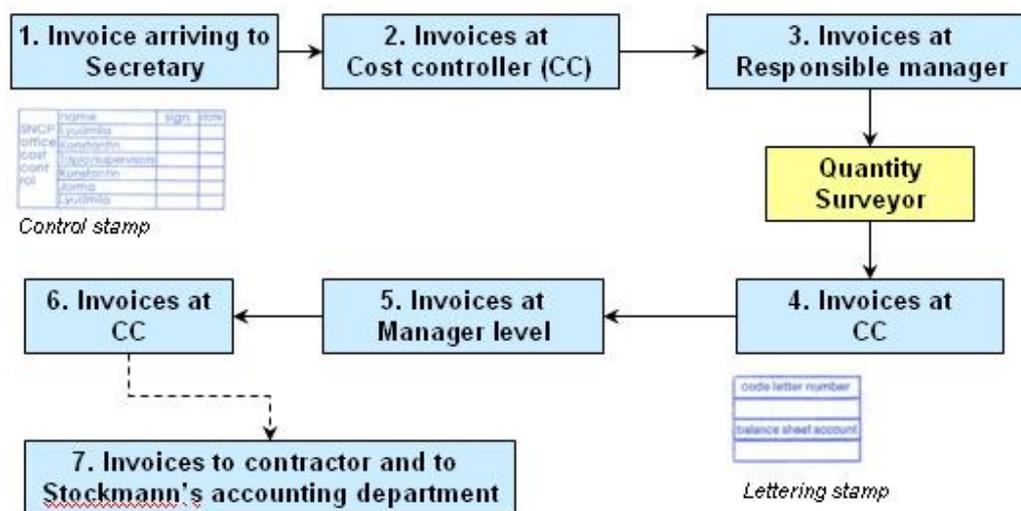


Figure 31: Internal Invoice Control

After Invoice Controller's inspection the invoice IS delivered to the Responsible manager for approval (step 3). In the case project there are more than five Responsible managers for approving different field of invoices: Site manager, approves finished work and

delivered material at the site; Head of Technical Site Office, approves technical related invoices like designing works; Contracts Coordinator, approves invoices closely related to contracts like main contract etc.; Legal adviser, approves invoices related to real estate management and contractual issues.

Contractors which have agreed their contract with unit prices have to deliver accurate KS2 and KS3 documents as an appendix of invoice for Project Manager's approval. It is contractors' responsibility to measure the amounts and mark used unit prices which are agreed in the contract. Project Managers Quantity Surveyor and Production Supervisor confirm that the measured amounts are correct and unit prices are as agreed. These operations happen also in step 3.

After the approval of responsible manager-level the invoices return to Invoice Controller (step 4) who stamps lettering stamp only to invoice document. Then the Controller fills *code letter number* and *balance sheet account* places in the stamp.

At the next step the invoices are delivered to Managerial level for the approval (step 5). All the invoices have to be approved by the project manager with their personal signing. After PM's approval the Invoice Controller takes copies of all the necessary documents (step 6) and delivers the papers to the Project Secretary. The Project Secretary takes care of delivering the documents to the correct parties of the contract. It is the Secretary's responsibility to send the documents to proper contractor and to accounting department to execute payments to contractor.

5.5.2 Project Report (PR)

When operating on construction site the individual does not easily see the site's Cost Accountings connections to bookkeeping. Instead the individual had to make one step closer to economical department and only from the viewpoint of Invoice Controller the connection becomes apparent. Actually, Invoice Controller is operating in the junction of Cost Accounting and bookkeeping. The most important report concerning both Cost Accounting and bookkeeping is the Project Report. The purpose of the project report is to inform Clients' board of directors about how this project is proceeding and how project

has managed to reach milestones which have been set at the beginning of the project. The Project Report includes information taken from the following areas:

1. General
2. Design
3. Design and Construction Contracts
4. Approval / Inspection
5. Procurement
6. Construction
7. Tenants
8. Budget

PR will be released to the Client's Board of Directors once in a month. The report is under discussion and decision making in separate monthly meetings.

5.5.2.1 Project Report in General

General part of PR document informs of the main works which are under execution or are already executed at the site. The purpose of this part is just to give overall point of view on what is happening in the project.

5.5.2.2 Design in Project Report

The Design part of project report show the design issues of the project. The questions that design part gives answers to are:

- What areas of design have been finished
- What parts are on the process and
- What parts are still not touched

All the difficulties of design process are also being discussed in this part of PR.

5.5.2.3 Design and Construction Contracts in Project Report

This part of PR describes contractual situation of design and construction contracts. PR answers the following questions:

- What kinds of new contracts have been agreed

- What contractual working stages have been finished and
- What contracts are under agreement process.

The purpose is to give detailed information about project's contractual situation.

5.5.2.4 Approval / Inspection in Project Report

The approval and inspection issue handle all the approval points which differs from the preliminary design. This part of the project report also handles inspection problems at the site related to site management and approval of used working methods and materials.

5.5.2.5 Procurement in Project Report

Procurement area of the project report handles major procurement at the project. This theme concentrates on the main issues of procurement plan. These issues answer the following questions:

- What materials or equipments have passed procurement process
- What issues are still in the process and
- What issues will come under process.

The purpose of this sphere of the project report is to give detailed information about needed procurements and their vital schedules.

5.5.2.6 Construction in Project Report

This issue handles the progress of construction project in a more detailed way than the general part of project report. The Construction part of the project report answers the following questions:

- What working stages have been finished at the site
- What stages are in the process right now and
- What stages will be in the process in the near future.

5.5.2.7 Tenants in Project Report

The project report's tenant part informs about the rental-agreement situation of the case project. The Issue answers the questions:

- what agreements have been achieved
- What are in the process and
- What are possible tenants which might be of interest to our project.

The purpose of tenant part is to give the reader an overall view of how project has proceeded in negotiating with new coming tenants about the contract, design and adjustment works which have to be executed before the business starts to run in real estate.

5.5.2.8 Budget in Project Report

Budget issue and cost estimates are discussed in the previous parts of this thesis such as *5.4.2 Cost Budgeting in Project Management* and *5.4.3 Cost Control*.

5.5.2.9 Summary of Project Report

The purpose of project report is to inform about the proceedings of the project and the reached milestones. The project needs to be as informative as possible, and not too long that it can give clear picture of proceeding in short period of time. All the given information need to be correct and easily understandable and also the more detailed information of the report needs to be available when and if needed.

6 Regime to enforce discipline in Cost Accounting

In many cases profits are created when goods are bought, not when goods are sold even if the positive cash flow occurs at the moment of selling. There are few keys points for economic success of construction project. These key points are:

- Project's economical goals need to be clear and executable
- Cost estimate and project budget need to be done as good as possible
- Cost forecasts and cost control need to be strict enough.

All above mentioned points are described in the following *Figure 32*.

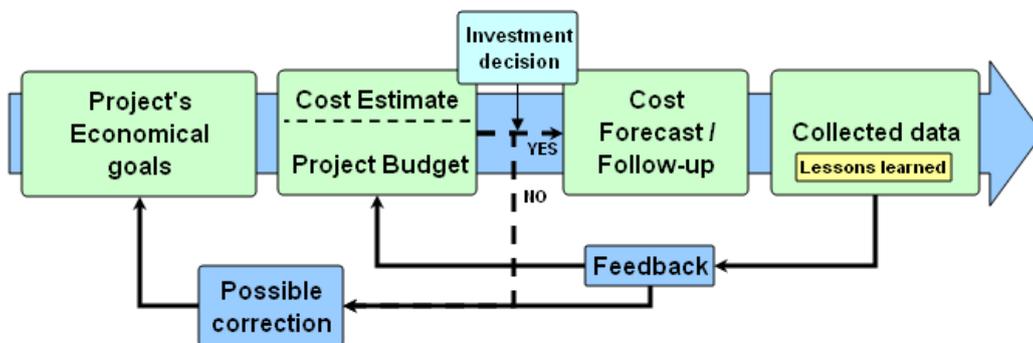


Figure 32: The path from economical goals to investment decision and feedback data

This chapter discusses and analyzes how these issues have been managed in the case project and what operations managers need to do to maintain order in costing. This chapter discusses also the research problems and two possible ways to implement ABC-accounting in case project.

6.1 The Significance of Considerable Deviation in Cost Controlling

This chapter discusses the deviation in project's cost management from three different points of view, which are:

- Value of deviation compared to its main cost code
- Risk rate of the project.
- Lessons learned about the project.

6.1.1 Comparison of deviation's value to value of main cost code

The amount of deviation needs to be compared to the total amount of the project, total amount of the main cost code and total amount of sub cost code. These comparisons will give the magnitudes of the deviations and express the need for specific inspection of deviation if necessary. If the deviation is, for example, 20 per cent of the certain sub cost code, but the value of the sub cost code is less than 5 per cent of the whole project, then the deviation is only one per cent of the whole project. But on the other hand in the big projects this one per cent might be one or two million Euros, which is quite a big amount of money. The policy of deviation size is a matter of the Project Manager, and the aim is to keep deviation as small as possible.

6.1.2 The risk rate comparison

The deviation is needed to be compared also with the project risk rate. The risk rate informs about the possibility of the risk to happen. Normally, when the risk rate expands, the profit rate expands to, because no one wants to coordinate a more risky project without bigger profits. It is common that in a more risky project the deviations among the cost codes occur more often. One of the solutions of risk management is to sell a more risky project to another company, but in many cases this solution appears to be more expensive.

When operating in Russia it is obvious that risk rate is higher and the expected profit in the profit calculations is higher too. This happens often due to unexpected decision making on the cities authorities level and due to business culture differences. The policy of risk rate is also a matter of the Project Manager. Chapter 2.5.1 *Business sectors risk types in Russia and risk management* discusses more of the risk types and risk management.

6.1.3 Lessons learned

At the final stage of the project it is necessary to create a "Lesson learned" document. This document should be neither long nor short enough, so that it can easily be applied

for the databank of the projects. This document needs to include the following information:

- The item which has been under or over estimated
- The main reason for cost overrun of the cost item
- What was the unexpected event that caused overrun of the estimate
- Which level of organization approved the contract or expenses, which caused overrun
- Were there any other options to execute works than the chosen ones

The information documented should be as neutral as possible and it should be stated in a clear way. It is obvious that negative things occur in every project, so the purpose of this document is to learn from mistakes that took place during other projects realization. It is wise to learn from one's own mistakes, but it is even wiser to learn other negative experience.

6.2 Main cost code information of previous projects

This chapter gives the picture of the budget and realized costs of the previous projects. The following table has been collected from previous four retail store projects around Saint Petersburg and one project from Jaroslavl. The table shows the per cent shares of the main letter codes which have been used in the projects.

Projects from 1 to 5 Main cost code	Project 1		Project 2		Project 3		Project 4		Project 5		Mean	
	Budget	Realized	Budget	Realized	Budget	Realized	Budget	Realized	Budget	Realized	Budget	Realized
Land area	31,8 %	28,2 %	31,0 %	26,9 %	30,0 %	30,1 %	27,0 %	26,3 %	16,8 %	25,6 %	27,3 %	27,4 %
Utilities & Permits	9,6 %	2,9 %	9,2 %	3,4 %	22,2 %	21,0 %	10,4 %	12,7 %	8,6 %	8,9 %	12,0 %	9,8 %
Project Management & Administration	2,4 %	1,4 %	2,3 %	1,4 %	1,4 %	0,9 %	1,4 %	0,9 %	2,4 %	2,1 %	2,0 %	1,4 %
Engineering design	3,6 %	3,2 %	3,1 %	2,7 %	0,3 %	0,0 %	0,2 %	0,1 %	0,3 %	0,0 %	1,5 %	1,2 %
Construction	52,6 %	64,4 %	54,4 %	65,6 %	46,1 %	47,9 %	61,0 %	60,1 %	71,9 %	63,4 %	57,2 %	60,3 %
Total	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Cost per square meter	1 327 €	1 471 €	1 127 €	1 305 €	2 629 €	2 492 €	1 947 €	1 881 €	1 984 €	1 993 €	1 803 €	1 828 €
Area of the project	8 600 m ²		10 500 m ²		7 600 m ²		10 270 m ²		8 100 m ²		9 014 m ²	
Handed over to the Client	September 2006		December 2006		December 2007		December 2008		March 2009			

Table 12: Average per cent share of investment cost

All above mentioned projects are commercial real estates which do not have any specific construction solutions and expensive design solutions. The above table helps to clarify the formation of main cost breakdown of project in the North-West Russia. An appendix

number 3 includes more detailed information about these projects and their cost formation.

Deviation between budgeted and realized	Project 1	Project 2	Project 3	Project 4	Project 5	Mean
Main cost code	deviation	deviation	deviation	deviation	deviation	deviation
Land area	-11,5 %	-13,4 %	0,2 %	-2,8 %	52,3 %	5,0 %
Utilities & Permits	-70,0 %	-63,6 %	-5,2 %	21,4 %	3,4 %	-22,8 %
Project Management & Administration	-41,0 %	-37,2 %	-34,9 %	-33,7 %	-9,9 %	-31,3 %
Engineering design	-12,1 %	-12,2 %	n/a	-34,1 %	n/a	-19,4 %
Construction	22,3 %	20,6 %	4,0 %	-1,6 %	-11,8 %	6,7 %
Whole project	10,9 %	15,8 %	-5,2 %	-3,4 %	0,4 %	3,7 %

Table 13: Deviation between budgeted and realized costs

Table 13 informs about the deviation between budgeted costs and realized costs. When the figure in the cell is negative, it says that the budget for this main cost code was bigger than realized costs, in other words, the budget was overestimated. The biggest deviations in this sample occur most often in the main cost codes *Project Management & Administration* and *Utilities & Permits*. This can be noticed in green background in table 13.

The biggest deviation between the budget and realized costs is main cost code *Land area* for project 5. This is explained by procurement of additional land area for the parking area of the project. In projects 1 and 2 the construction costs have overrun about 20 per cents due additional works which were underestimated at the time of budget creation.

Usually overall costs per square meter decrease when the project becomes larger. This can be seen especially in the main cost code *Utilities & Permits*. The development can be seen in figure 33. As the sample is quite small, the curve does not follow the sample quite well.

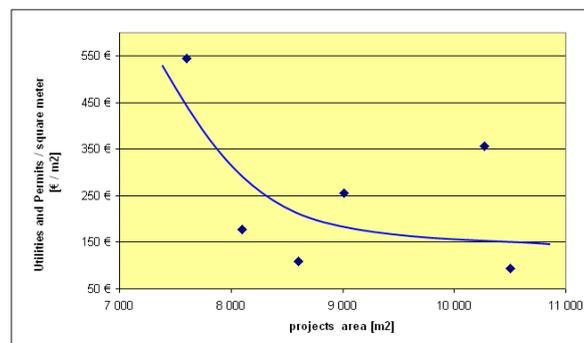


Figure 33: Utilities & Permits costs per square meter in relation to total project area

The shape of the figure can be explained by the fact that in the normal case the costs of certain location of the project the *Utilities & Permits* are fixed on certain range. When the investment is expanded by square meters the fixed price of *Utilities & Permits* are divided by bigger amount of square meters. This causes the decrease of the costs per square meter of *Utilities & Permits* when the constructed area will increase.

6.3 Answers to research problems

This part of the thesis gives answers to the problems under research.

6.3.1 Proper Estimation of the Project Costs

The easiest way of creating cost budget is to find similar executed project for the cost estimation purposes. The information should include cost estimation, realized costs and document of lesson learned of this particular project. This is one way to forecast the most problematic things related to cost accounting and cost control of the new coming project.

In the view point of this thesis one could not find a similar project close enough to estimate project's costs or budget. This is partly because this particular project is so much different from previous constructions due to its underground parking area, foundation structures, location, working order at the construction site and difficulties in logistics. All the above mentioned problems and many other variables have made the creation of the project budget and cost estimates very challenging. On the other hand, some parts of the previous projects still can be used when dividing this case project into smaller parts and estimating each smaller part of the puzzle.

The key point of success in Project Management is a project budget which is prepared at the highest possible level. With the updated project's cost forecasts and well operating cost control the project has better chances to reach the targets which were defined at the beginning of the project (cf. *Figure 32*).

6.3.2 Organization of Cost Accounting and Cost Control

In bigger projects one individual should be responsible for both cost controlling and updating cost estimate. At this moment in the case project cost controlling and cost estimate updating tasks are divided between few persons who are operating these tasks together with other tasks.

During the execution of this thesis there have been some changes and enhancement of cost control and cash flow estimates of the project. For example, the strict control of design contracts and project management contracts was not executed until the moment this thesis was begun. Control documents are introduced in chapter 5.4.3.2 *Cost control of design and consulting contracts*.

Consequently previously mentioned examples of cost accounting and cost control organizing are found to be workable and effective in this project. Now the whole organization is operating effectively as it has been planned. Example of an effectively operating issue is internal cost control which is described in chapter 5.5.1 *Control and Approval of Invoices*.

6.3.3 Reaching the Gap between Budget and Realized Costs

The gap between the budget and realized costs should be considered when taking into account the size of the whole main code letter. This consideration tells us how remarkable the deviation is under surveillance. When the gap becomes remarkable, then all the employees who have participated in creation of cost estimate and the budget, should be informed about it. This certain cost code should be taken under surveillance for the longer period also. This means that realized costs and remaining budget should be recalculated or re-estimated. Also project managers should interact to the becoming costs as effectively as they can to lower the level of remaining costs.

In the case project the cost estimate is not divided into small enough codes as it should be for the purpose of the Cost Control. That is why significant deviations do not exist in the case project so far. But in the finishing stage of the project there might be problems to avoid cost overrun. The main reason that cost estimate has done only high level of cost

codes is that it is impossible to create cost estimate for lower level and with limited resources with good predictability.

When the duration of the project is rather long, for more than one year for example, the cost estimate should also be fastened to the project's time scale. In the case site this has been done via cash flow estimate. Connection between the main cost code and the cash flow estimate increases the possibilities to interact possible cost overruns.

One way of reacting to the deviation beforehand is represented in table 9 and figure 27. The aim of the table and the figure is to react towards deviation before it even starts its existence. Table 9 demonstrates the control of the contracts which target price or cost ceiling is agreed in the contract. Figure 27 demonstrates the same in graphic format.

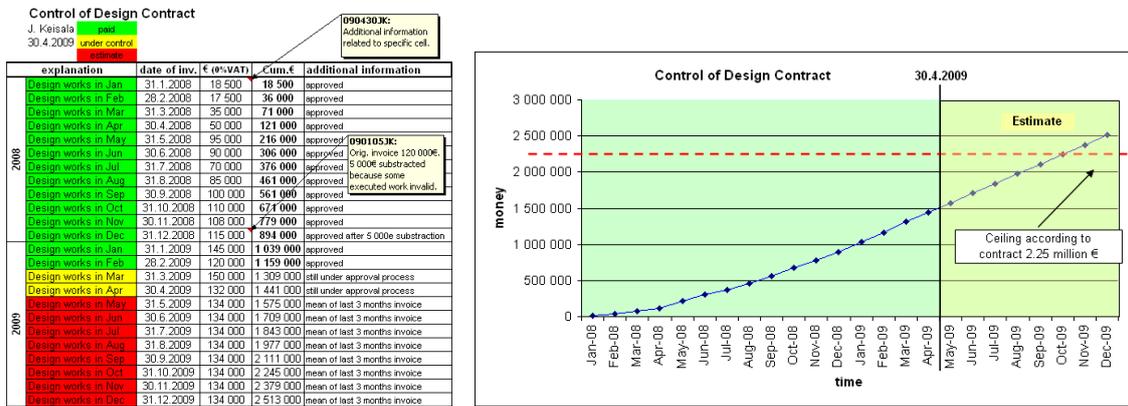


Table 9: Chart of contracts controlling. Contracts have cost ceiling or target price

Figure 27: Graphic figure of the same chart

The cases when the cost overrun has already occurred, need to be handled separately, and the remaining costs need to be re-estimated. This particular letter code should be taken under special surveillance and measures should be taken to find out all the possibilities for savings.

6.3.4 The main problems and reasons for cost overrun in the projects

Every project is a unique object, especially the case site, so it is impossible to predict all coming costs in cost estimate at the project budget stage. As this would require massive analyses, and in the long run the cost estimate or the budget would not be strict enough

because of numerous variables. Another issue is that costs are divided only high level of cost codes in cost estimate and budget. When costs are rolled only at main cost code level, costs inside this main cost codes are challenging to control and it is sometimes almost impossible to react to smaller differences between realized and estimated costs. In this case only per cent figures of used cost of a certain main cost code can be calculated and these numbers informs only about the amount of money of this main cost code which has been spent. In the worst case it says nothing about the relation between the progress of the site and realized costs.

Cost break down is quite easy to estimate and to divide to main cost codes in simple structure projects. One and the easiest example of estimating main cost code is *Land area*. This is because normally the budget is created only after the purchase of the land and that is why there are seldom differences between budget and realized costs of this main letter code.

The most challenging cost code to predict is *Utilities & Permits*. This has caused troubles to many companies which have invested in Russia. This main letter code includes all kinds of permits like design permits, building permits etc., and also water connections, sewage connections, electricity connections, gas connections and information connections. The preliminary price estimate for municipal engineering can be received with preliminary drawings but this price level deviates sometimes a lot from the realized price. (Laakso, 2009)

In commercial real estate all these municipal connections are not necessary when starting operational usage of the real estate. Commercial building could for operate short periods of time quite independently. This means that lack of electrical connection can be replaced by the generator, lack of heating connections by heating container, lack of water and wastewater connections by outsourcing the service etc. But in the long run this comes more expensive than fixed connections to public utility services. (Laakso, 2009)

Previously mentioned arrangements are also possible for production facility, but due to larger amounts of needed electricity, water and gas, the production profitability is negative in many cases. Often it is more profitable to pay more for these connections than to try to organize all needed facilities or hold the start of production. (Laakso, 2009)

Main cost code *Management and Administration* is easy to predict according to tender bids which have been done to companies offering these services. Also *Engineering Design* –cost code seems to be easy to estimate with this method.

The budget estimated to the main cost code *Construction works* is related closely to market situation, moreover, these costs are easily available. Construction works can be specified with construction indexes which are released monthly (Laakso, 2009). The indexes are published in the document “Ценообразование и сметное нормирование в строительстве”, which can be translated as “Price Development and Calculation Norms in Construction Sites”. This document includes monthly construction indexes for 89 different areas of Russia (Gorjatskin, 2009). The price level of construction works can be estimated with fault marginal $\sim \pm 5\%$ in Leningrad oblast area. The need for expense reserve for additional construction works in the budget is around 7-10 per cents of *Construction works* cost code. For comparison the level of expense reserve from 5 to 7 per cent is quite enough in Finland. (Laakso, 2009)

6.3.5 Use of Activity Based Cost Accounting in Construction Projects

There is a possibility to raise strictness in case projects cost accounting by Activity base cost accounting. Normally the problem at the project is that there is not enough information about the work that has been executed at the site and which costs could be adjusted to correct cost code. This chapter represents two variants in which ABC accounting was adapted and the results received.

6.3.5.1 Method 1: ABC Accounting for Project Management tasks

First method which was under surveillance was to divide Project Manager’s tasks in to the sub cost codes to reach better productivity. In this case sub cost codes were decided to be Engineering (E), Procurement (P) and Construction Management (CM). The rough estimate of time consumption according to E, P and CM division is represented in the lower *Table 12*. After this table had been formed it was found out that a more accurate table can be created if it is stressed with billing rates of the Project Management team.

Higher table represents more accurate calculation of the division into E, P and CM services.

		Task	Stressed with Billing rate		
			E	P	CM
		1 Executive Project Manager	45 %	15 %	40 %
1	E	2 Project Manager	38 %	14 %	43 %
2	F	3 Project Secretary	9 %	5 %	9 %
3	F	4 Site manager	0 %	0 %	91 %
4	S	5 Head of Supervision, Off-site (mall)	0 %	0 %	85 %
5	F	6 Head of Supervision, On-site, structures	0 %	0 %	85 %
6	F	7 Head of Technical Site Office	90 %	0 %	0 %
7	F	8 Approvals coordinator	30 %	0 %	30 %
8	A	9 Assistant CW Supervisor	0 %	0 %	51 %
9	A	10 Civil Works Supervisor	0 %	0 %	61 %
10	C	11 Contracts Coordinator	18 %	37 %	6 %
11	C	12 Design Coordinator	26 %	15 %	10 %
12	C	13 Director of Customer's Directorate	5 %	5 %	16 %
13	C	14 Electrical Engineer	20 %	20 %	21 %
14	E	15 Interpreter	3 %	3 %	3 %
15	lr	16 Office Coordinator	5 %	5 %	5 %
16	C	17 Project Engineer	44 %	0 %	44 %
17	F	18 Project Engineer	18 %	57 %	13 %
18	F	19 Quantity surveyor	0 %	0 %	61 %
19	G	20 Secretary (Document Controller)	8 %	8 %	8 %
20	S	21 Senior Interpreter	4 %	4 %	4 %
21	S	22 Senior Project Engineer	0 %	6 %	23 %
22	S	23 Senior Project Lawyer	0 %	30 %	0 %
23	S	24 Tenant Coordinator	22 %	66 %	0 %
24	T	Costs of different tasks	27,8 %	20,9 %	51,3 %
Time used to different tasks			26,5 %	24,4 %	49,1 %

Table 12: Rough time consumption estimate of the Project Management team in the lower table and the billing rate weighted time consumptions in the higher table

The main difficulty in construction project when comparing to industrial production of a unique product, is constantly changing situation, while in industrial production the process of production never changes within long periods of time. Constantly changing circumstances form the situation when the previous table needs to be calculated every month due to the time consumption changes within the progress of the project. Time consumption change is represented in *figure 22: Cost formation profiles in Project Management*.

In conclusion, it should be kept in mind that while using the ABC-Accounting method by dividing Project Management into smaller services, it is necessary first of all to record time consumption by Project Management team throughout the whole Project as if is seen from Figure 33.

January		Stressed with Billing rate		
		E	P	CM
1	Execu			
2	Project			
February		Stressed with Billing rate		
		E	P	CM
3	Project			
4	Site m			
5	Head			
March		Stressed with Billing rate		
		E	P	CM
6	Head			
7	Head			
8	Appro			
9	Assist			
10	Civil V			
April		Stressed with Billing rate		
		E	P	CM
11	Contr			
12	Direct			
13	Direct			
14	Elect			
15	Interp			
16	Office			
17	Project			
18	Project			
19	Quant			
20	Secre			
21	Senio			
22	Senio			
23	Senio			
24	Tenar			
25	Costs			
May		Stressed with Billing rate		
		E	P	CM
1	Execu			
2	Project			
3	Project			
4	Site m			
5	Head			
6	Head			
7	Head			
8	Appro			
9	Assist			
10	Civil V			
11	Contr			
12	Direct			
13	Direct			
14	Elect			
15	Interp			
16	Office			
17	Project			
18	Project			
19	Quant			
20	Secre			
21	Senio			
22	Senio			
23	Senio			
24	Tenar			
25	Costs			
June		Stressed with Billing rate		
		E	P	CM
1	Executive Project Manager	45 %	15 %	40 %
2	Project Manager	38 %	14 %	43 %
3	Project Secretary	9 %	5 %	9 %
4	Site manager	0 %	0 %	91 %
5	Head of Supervision, Offsite (mall)	0 %	0 %	85 %
6	Head of Supervision, On-site, structures	0 %	0 %	85 %
7	Head of Technical Site Office	90 %	0 %	0 %
8	Approvals coordinator	30 %	0 %	30 %
9	Assistant CW Supervisor	0 %	0 %	51 %
10	Civil Works Supervisor	0 %	0 %	61 %
11	Contract's Coordinator	18 %	37 %	6 %
12	Design Coordinator	26 %	15 %	10 %
13	Director of Customer's Directorate	5 %	5 %	16 %
14	Electrical Engineer	20 %	20 %	21 %
15	Interpreter	3 %	3 %	3 %
16	Office Coordinator	5 %	5 %	5 %
17	Project Engineer	44 %	0 %	44 %
18	Project Engineer	18 %	57 %	13 %
19	Quantity surveyor	0 %	0 %	61 %
20	Secretary (Document Controller)	8 %	8 %	8 %
21	Senior Interpreter	4 %	4 %	4 %
22	Senior Project Engineer	0 %	6 %	23 %
23	Senior Project Lawyer	0 %	30 %	0 %
24	Tenant Coordinator	22 %	65 %	0 %
Costs of different tasks		27,8 %	20,9 %	51,3 %

Figure 33: Time consumption calculations for every month of the project

Only this way ABC Accounting might be useful and profitable for the project. Another choice for an individual is to model the time consumption of Project Management team during the whole project. This issue is a suggestion for further study.

The problem in this viewpoint is that the Project Management task is not the main cost code where the massive costs exist. This can be perceived from *Table 12: Average per cent share of investment cost*. In this table, for example, the average cost of Project Management tasks is budgeted to be around 2.0 per cent and the realized costs are 1.4 per cents of the whole project's costs.

Normally Engineering, Procurement and Construction Management services constitute only about 2 to 10 per cent of the budget and realized costs. (Poikolainen, 2009).

6.3.5.2 Method 2: ABC Accounting for Additional works

The second method for ABC accounting was elaborated in the case project for allocating additional works. The challenge is to control additional works between the main contractor and Project Management team. During work on earlier project the author noticed lack of additional works recording between the contractor parties. So there is an urgent need in this recording as early stage as possible.

As a rule additional works are stated in a separate document with agreement of price, completion period and the additional works effect on the building contract period. It needs written agreement before the work is begun. (YSE 1998)

In the case site the documentation of additional works is divided into two different situations according to which each party is responsible for compensating the expenses on additional works to each other. The Situation is described in figure 34.

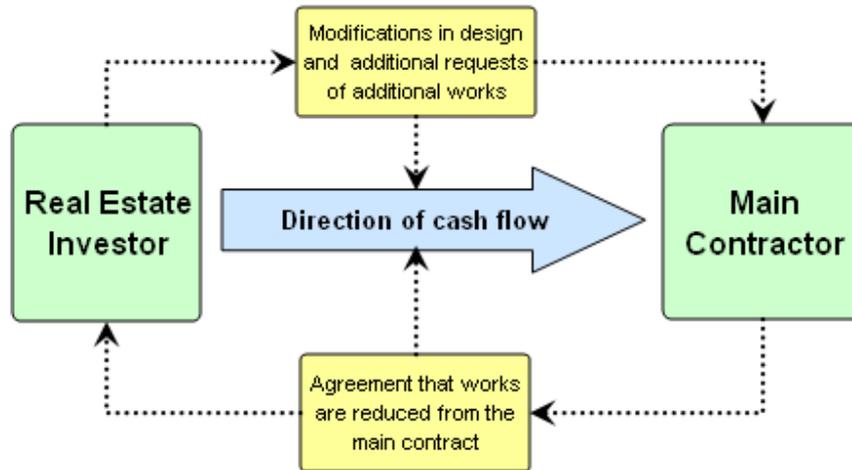


Figure 34: Issues which infect the amount of cash flow

Modification in design and additional requests for additional works are increasing the cash flow from the Real Estate Investor to the Main Contractor. On the other hand, when some works are reduced from the main contract the costs of these works are deductible from the cash flow.

One result of the thesis is that the ABC Accounting is useful to calculate these deductible works. These works are mainly born when the Project Manager is taking care of the works which are used to be included in the main contract but are reduced as separate agreement. Examples of such kinds of agreements at the case site are: temporary roads at construction site, sheet pilings, measurement works related to site inspection etc. These works include following listed expenditures:

- Time used to create invitation for tenders of the works to be done
- Payments to contractor for executed works
- Work executions supervision
- Work acceptance
- General costs

Also Value Added Taxes are appended to the final sum of the invoice of this work. Table 13 clarifies the usage and the need for ABC Accounting in this particular project.

No.	Item	Unit	Quantity	Unit price (Euro)	Amount (Euro)	Remarks	Init.
1.	Invitation tender documentation	h	2,00	60,00	120,00	2 hours of work by JK at 1.3.2009.	JK
2.	Payments to contractor					Contract were selected according to best price-quality ratio and approval of the main contractor.	JK
2.1.	Labor cost						
2.1.1.	Wages or immediate supervisors	h	3,50	15,00	52,50		
2.1.2.	Construction labor cost	h	30,00	6,00	180,00		
2.2.	Material cost						
2.2.1.	Material I	kg	216,00	1,20	259,20	JK: 15.2009 Unit prices from the companies invoicing	
2.2.2.	Material II	m ³	3,00	300,00	900,00		
2.2.3.	Material III	m	115,00	0,50	57,50		
2.3.	Machinery cost						
2.3.1.	Auxiliary machine I	h	2,00	120,00	240,00		
2.3.2.	Auxiliary machine II	h	4,00	60,00	240,00		
2.4.	Cost of construction equipments	unit	1,00	200,00	200,00		
2.5.	Other direct cost						
2.5.1.	Temporary water & electricity costs	m ³	2,00	10,00	20,00		
2.	Subtotal of payments to contractor				2 149,20	According to selected contract	JK
3.	Work executions supervision	h	3,00	60,00	180,00	3 hours of supervision by ML 3.4.2009.	ML
4.	Work acceptance	unit	1,00	120,00	120,00	Separate acceptance as agreed in the contract	JK
5.	Subtotal	€			2 569,20		
6.	General costs	8 %			205,54	General costs of 8% according to contract	JK
7.	VAT	18 %			499,45	VAT according to Russian law.	JK
8.	Total				3 274,19	€	

Table 13: Chart of collecting deductible works from the main contract

Actually the usage of cost drivers, which belong commonly to ABC Accounting, has not been so far applied in the case project. The main used element of ABC Accounting was the information recording and processing of time consumption and the expenses from that. These are the expenses which one can deduct from the contract and the cash flow. The recorded information in table 13 processes the hours spent on each different task named in the grey back ground color. The unit prices were collected from the agreements between the parties. With the help of ABC accounting the Project Management organization can create calculation of deductible costs more accurately and effectively.

6.3 Conclusions

Construction project is always a unique process and that is why only some parts of previous project's production plans can be applied for the new project. This is the reason why the benefits of mass production can't be gained in full scale in construction projects. Despite this there are some small stages of the project which can be executed based on the principles of mass production, that is why similarities are expedient to seek.

One of the main results of the thesis is that a lot of useful and important tables for Cost Control have been elaborated by the author, including a table about previously executed construction projects. The author hopes that these tables will be of great use for future projects of the company, for example, when main cost codes are estimated in the budget forming stage.

The First question under research is how to estimate project costs properly. The universal answer is to find as similar project as possible and to use the budget and realized cost documents of this project when estimating and creating the budget. Besides, lessons learned document from the previous project could be helpful in understanding the possible faults of cost estimation if only the documents are made and available.

The Second question under research is how cost accounting and control should be organized. This thesis contains fairly good instructions for organizing these processes and they have been introduced quite clearly. In cost accounting the basic principles form the base for the whole counting system and these needs to be followed. In cost controlling the basic regulation is strictness.

The Third research question under discussion is how to react to cost overrun of the project and no unique answer can be given to it. This is because every cost overrun needs to be recorded and investigated separately. The most important thing is to do Lessons learned of these cost overruns to avoid similar situations in the future.

The Fourth question discussed the main problems and reasons for cost overrun. The most problematic main cost code to estimate in Saint Petersburg area seems to be *Utilities & Permits*. All other main cost codes are easier to predict but anyway they possess their own difficulties.

The Fifth question under research handled the implementation of ABC accounting in the case project. Two different possible methods of using ABC Accounting were elaborated and introduced beneficially in this research.

The first one was to divide the Project Management costs into Engineering, Procurement and Construction Management services. The result of this research is that the cross section of Engineering, Procurement and Construction Management services are changing during the whole project. This caused another important problem to be solved. Issue is that the time profile consumptions of E, P and CM –services have to be recorded

or estimated before any further investigation. Without solving this problem, the ABC accounting cannot find the benefits to the case project with the first method, but this is a question for further study. One more problem is if there is a possibility to reduce costs by ABC Accounting even if the time consumptions profiles are recorded.

The second possible method of using ABC accounting is related to the main contract. There are works that are first agreed to be executed according to the main contract, however, by additional agreement these works have been done by Project Management team. The costs of these works can be reduced from the cash flow between the Project Manager and the Main Contractor. The ABC accounting is the method which is applied to calculate these costs. The unit prices which are used in the calculations are collected by the company's own Quantity Surveyor and with the help of methods of Smeta calculation system.

The information and the know-how which the Author has reached and received while writing this thesis have been useful and important and undoubtedly will be helpful in managing future projects more efficiently.

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Interviews

The interviews of this thesis were carried out during the spring 2009 in Helsinki, Finland and Saint Petersburg, Russia. The interviewees were selected on the basis of their profound knowledge of and experience from operating in the construction business in Russia or their knowhow of business life in Russia.

The interviewees were the following persons:

Medvedeva, Olga, Cost Accountant, ODU Severo-Zapada "Objedinennoe Dispetcherskoe Upravlenie Energosistemami Severo-Zapada", Saint Petersburg, Russia, February 2009

Müller, Tapio. Site Manger, Pöyry CM Oy, Saint Petersburg Russia, March 2009.

Poikolainen, Jorma. Project Manager, Pöyry CM Oy, Saint Petersburg Russia, March 2009.

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Solovjova, Julia. Prof. Dr. Saint Petersburg State University of Economics and Finance. Saint Petersburg, Russia, April 2009. (Also business life expertise for reviewing the chapter 2 *General information of Russia and its Economy*).

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APPENDICES

Project report	2 pages
List of SNIIP-document	1 page
Cost information of the previous projects in N-W Russia	1 pages

<p>Prepared by: JK Date: 07.05.2009 Document Code: SNCP_PR_0112 Distribution: X. YYYYY X. YYYYY X. YYYYY X. YYYYY</p>		<table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="2">2008</th> <th colspan="7">2009</th> </tr> <tr> <th>11</th> <th>12</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> </tr> </thead> <tbody> <tr> <td>Design</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td> Architectural</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td> Structural</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td> Substructures</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td> HVAC</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td> Electrical</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td> Facades</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td> Gas Supply</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>Contracts</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>Construction</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td> Concrete 0 -slab</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td> Excavation under 0</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td> Concrete -4.20 -slab</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td> Excavation under -4.20</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td> Concrete -7.20 -slab</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td> Upper structures</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td> Structures below 0</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </tbody> </table> <p>Site picture from date: 30.4.2009</p>			2008		2009							11	12	1	2	3	4	5	6	7	8	9	Design												Architectural												Structural												Substructures												HVAC												Electrical												Facades												Gas Supply												Contracts												Construction												Concrete 0 -slab												Excavation under 0												Concrete -4.20 -slab												Excavation under -4.20												Concrete -7.20 -slab												Upper structures												Structures below 0											
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<p>A. General</p>	<p>Target for handing over: 10.2010 Works currently executed at site: Concreting slab and columns at level -4.20, excavating under level -4.20, monitoring of inclinations of sheet piles, concreting of ramp between levels 0.00 and -4.20 and concreting columns at level 0.00.</p>																																																																																																																																																																																																																																			
<p>B. Design</p>	<p>Architectural. Finalization of Door and room schedules. Finalization of layouts due to fire changes and holes and voids coordination. Facades and windows design. GAP (Z&K): Review of architectural WD, adaptation of AR layouts to Russian norms.</p> <p>Structural underground: Elaboration of structural underground drawings for -4.20 / -5.40 slab and structures between 0.00 and - 1. At the moment about 95% of the -1...0 structures completed. The rest should be completed by the first half of May. Preliminary layouts for -2, -3, -4 floors provided for review to architects.</p> <p>Boiler design: Boiler design was submitted for review to POYRY in the end of December, Poyry's remarks are corrected. Approval of KGA is in process.</p> <p>Structural superstructure: Design is going on well, no problems at the moment.</p> <p>Design of Facades: Architectural design for all facades has been provided to the parties for review. Structural design is two-three weeks late, has been provided for review on 30/04.</p> <p>HVAC, Electrical, Mechanical . The design is going according to the schedule. No major problems at the moment.</p> <p>Fire Consultants: New fire consultant OPB has completed Fire Technical Conditions; currently these are under approval of MinRegionRazvitija (Ministry of Regional Development).</p>	<p>Submission of working drawings delaying for about 1-2 weeks.</p> <p>Contractor and Poyry are working with KGA approval.</p> <p>About two-three weeks delay from the latest agreed schedule.</p>	<p>Poyry is monitoring closely performance of Peter-GIB, many solutions are accepted at site to avoid delay in construction works.</p> <p>Contractor will keep final agreed dates.</p>																																																																																																																																																																																																																																	

C. Design and Construction Contracts	<p><i>Design Contracts:</i> All needed contracts signed.</p> <p><i>Construction Contracts:</i> All needed contracts signed.</p>										
D. Approvals / Inspections	<p>Currently Diesel generator is approved in special technical conditions and will be submitted to State Expertise.</p>										
E. Procurement	<p>Nothing to be delivered at the moment.</p>										
F. Construction <i>For detailed information on design progress see attachment 1 "Construction progress report. March 2009"</i>	<p>The ramp area is still under construction because of complicated working order.</p> <p>The tests of jet grouting (core samples) are on going and samples are under analysis.</p> <p>Excavation below -4,20 level slab has been started and 5% have been excavated. Formwork, reinforcement works and concreting of -7.2 slab will be started in the middle of May.</p> <p>Now 95% of -4.20 level slab has been cast and 5% is under excavation, formwork</p>										
G. Tenants	<p><i>Negotiations with following tenants are currently ongoing:</i></p> <p>Dry-cleaning "Apetta" – power supply issue is finalised; preparing Amend. 6 for signing.</p> <p>Ginza project – 1st floor sewage issue. Agreement is signed.</p> <p>Teremok (foodcourt) - preparing to sign the Agreement.</p> <p>Garson Café – zoning plane, electrical power confirmation.</p> <p>Tenant's capacities table update.</p>										
H. Budget	<table border="1" data-bbox="331 1088 1441 1149"> <thead> <tr> <th data-bbox="331 1088 810 1122">THE TOTAL INVESTMENT</th> <th data-bbox="810 1088 1007 1122">Budget (Euro)</th> <th data-bbox="1007 1088 1241 1122">Actual total (Euro)</th> <th data-bbox="1241 1088 1441 1122">Estimate (Euro)</th> </tr> </thead> <tbody> <tr> <td data-bbox="331 1122 810 1149"></td> <td data-bbox="810 1122 1007 1149">170 000 000</td> <td data-bbox="1007 1122 1241 1149">92 604 134</td> <td data-bbox="1241 1122 1441 1149">179 699 838</td> </tr> </tbody> </table> <p>Possible savings:</p> <ul style="list-style-type: none"> - Investment costs 4.9 million euro - Yearly lease income 0.16 million euro - Main contract 2.2 ... 3.2 million euro 	THE TOTAL INVESTMENT	Budget (Euro)	Actual total (Euro)	Estimate (Euro)		170 000 000	92 604 134	179 699 838		
THE TOTAL INVESTMENT	Budget (Euro)	Actual total (Euro)	Estimate (Euro)								
	170 000 000	92 604 134	179 699 838								

Attachments:

XXXXX

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Stroitelnye Normy i Pravila, SNiP

Строительные нормы и правила, СНиП

Name of the norm or regulation	additional information	СНИП
СНИП 10-01-94	(revised 1 1997, 2 1998)	СНИП 10-01-94
Инструкция о порядке разработки согласования утверждения и составе проектной документации на строительство предприятий зданий и сооружений (взамен СНиП 1.02.01-85)	(instead of СНиП 1.02.01-85)	СНИП 11-01-95
Инженерные изыскания для строительства. Основные положения (взамен СНиП 1.02.07-87)	(instead of СНиП 1.02.07-87)	СНИП 11-02-96
Безопасность труда в строительстве. Часть 1. Общие требования (взамен разделов 1-7 СНиП III-4-80, ГОСТ 12.1.013-78, Правил по технике безопасности и производственной санитарии в промышленности строительных материалов (часть 1))	(instead of sections 1-7 СНиП III-4-80, ГОСТ 12.1.013-78, Safety requirements and industrial health in building materials industry (part 1))	СНИП 12-03-99
Основные положения создания и ведения государственного градостроительного кадастра РФ		СНИП 14-01-96
(1999) Пожарная безопасность зданий и сооружений	(1999)	СНИП 21-01-97
Стоянки автомобилей		СНИП 21-02-99
(1996) Геофизика опасных природных воздействий	(1996)	СНИП 22-01-95
Строительная климатология (взамен СНиП 2.01.01-82)	(instead of СНиП 2.01.01-82)	СНИП 23-01-99
Естественное и искусственное освещение		СНИП 23-05-95
Планировка и застройка территорий садоводческих объединений граждан, здания и сооружения (взамен ВСН 43-85)	(instead of ВСН 43-85)	СНИП 30-02-97
(СТН Ц-01-95) Железные дороги колеи 1520 мм (взамен СНиП II-39-76, III-38-75, СН 468-74)	(instead of СНиП II-39-76, III-38-75, СН 468-74)	СНИП 32-01-95
Аэродромы		СНИП 32-03-96
Тоннели железнодорожные и автомобильные (взамен СНиП II-44-78 и СНиП III-44-77 в части железнодорожных и автомобильных тоннелей, исключая приемку)	(instead of СНиП II-44-78 and СНиП III-44-77 in part of railway and highway tunnels, except acceptance)	СНИП 32-04-97
Подземные хранилища газа, нефти и продуктов их переработки (взамен СНиП 2.11.04-85)	(instead of СНиП 2.11.04-85)	СНИП 34-02-99
Разработка и применение норм и нормативов расхода материальных ресурсов в строительстве Основные положения		СНИП 82-01-95
Федеральные (типовые) элементные нормы расхода цемента при изготовлении бетонных и железобетонных изделий и конструкций		СНИП 82-02-95
Дома жилые многоквартирные	(one living room)	СНИП 31-02-2001
Безопасность труда в строительстве.		СНИП 12-03-2001

Cost information of the previous projects in N-W Russia

Project 1, Type: retail		AREA		8 600		m2		
Location: 20 km from the center (SPb)		BUDGETED COSTS			REALIZED COSTS			Overrun
Handed over to the client: Sep. 2006		TOTAL	PER M2	%	TOTAL	PER M2	%	%
a	Land	3 633 000 €	422 €	31,8 %	3 562 988 €	414 €	28,2 %	-2 %
b	Utilities & Permits	1 090 000 €	127 €	9,6 %	362 781 €	42 €	2,9 %	-67 %
c	Project Management & Administration	270 000 €	31 €	2,4 %	176 545 €	21 €	1,4 %	-35 %
d	Engineering design	410 000 €	48 €	3,6 %	399 759 €	46 €	3,2 %	-2 %
e	Construction	6 005 000 €	698 €	52,6 %	8 145 218 €	947 €	64,4 %	36 %
f	Total	11 408 000 €	1 327 €	100 %	12 647 291 €	1 471 €	100 %	11 %

Project 2, Type: retail		AREA		10 500		m2		
Location: 15 km from the center (SPb)		BUDGETED COSTS			REALIZED COSTS			Overrun
Handed over to the client: Dec. 2006		TOTAL	PER M2	%	TOTAL	PER M2	%	%
a	Land	3 670 000 €	350 €	31,0 %	3 679 957 €	350 €	26,9 %	0 %
b	Utilities & Permits	1 090 000 €	104 €	9,2 %	459 802 €	44 €	3,4 %	-58 %
c	Project Management & Administration	270 000 €	26 €	2,3 %	196 447 €	19 €	1,4 %	-27 %
d	Engineering design	365 000 €	35 €	3,1 %	371 219 €	35 €	2,7 %	2 %
e	Construction	6 440 000 €	613 €	54,4 %	8 996 807 €	857 €	65,6 %	40 %
f	Total	11 835 000 €	1 127 €	100 %	13 704 232 €	1 305 €	100 %	16 %

Project 3, Type: retail		AREA		7 600		m2		
Location: 10 km from the center (SPb)		BUDGETED COSTS			REALIZED COSTS			Overrun
Handed over to the client: Dec. 2007		TOTAL	PER M2	%	TOTAL	PER M2	%	%
a	Land	6 000 000 €	789 €	30,0 %	5 700 000 €	750 €	30,1 %	-5 %
b	Utilities & Permits	4 435 000 €	584 €	22,2 %	3 986 263 €	525 €	21,0 %	-10 %
c	Project Management & Administration	280 000 €	37 €	1,4 %	172 884 €	23 €	0,9 %	-38 %
d	Engineering design	55 000 €	7 €	0,3 %	0 €	0 €	0,0 %	-100 %
e	Construction	9 212 967 €	1 212 €	46,1 %	9 079 371 €	1 195 €	47,9 %	-1 %
f	Total	19 982 967 €	2 629 €	100 %	18 938 518 €	2 492 €	100 %	-5 %

Project 4, Type: retail		AREA		10 270		m2		
Location: 15 km from the center (SPb)		BUDGETED COSTS			REALIZED COSTS			Overrun
Handed over to the client: Dec. 2008		TOTAL	PER M2	%	TOTAL	PER M2	%	%
a	Land	5 400 000 €	526 €	27,0 %	5 071 628 €	494 €	26,3 %	-6 %
b	Utilities & Permits	2 085 000 €	203 €	10,4 %	2 446 313 €	238 €	12,7 %	17 %
c	Project Management & Administration	280 000 €	27 €	1,4 %	179 334 €	17 €	0,9 %	-36 %
d	Engineering design	30 000 €	3 €	0,2 %	19 097 €	2 €	0,1 %	-36 %
e	Construction	12 200 000 €	1 188 €	61,0 %	11 601 599 €	1 130 €	60,1 %	-5 %
f	Total	19 995 000 €	1 947 €	100 %	19 317 971 €	1 881 €	100 %	-3 %

Project 5, Type: retail		AREA		8 100		m2		+4 000 m2 warehouse	
Location: x km from the center (Jaroslav)		BUDGETED COSTS			REALIZED COSTS			Overrun	
Handed over to the client: Mar. 2009		TOTAL	PER M2	%	TOTAL	PER M2	%	%	
a	Land	2 700 000 €	333 €	16,8 %	4 129 626 €	510 €	25,6 %	53 %	
b	Utilities & Permits	1 385 000 €	171 €	8,6 %	1 437 945 €	178 €	8,9 %	4 %	
c	Project Management & Administration	380 000 €	47 €	2,4 %	344 031 €	42 €	2,1 %	-9 %	
d	Engineering design	55 000 €	7 €	0,3 %	0 €	0 €	0,0 %	-100 %	
e	Construction	11 550 000 €	1 426 €	71,9 %	10 230 599 €	1 263 €	63,4 %	-11 %	
f	Total	16 070 000 €	1 984 €	100 %	16 142 201 €	1 993 €	100 %	0 %	

Summary (projects from 1 to 5)		Budget	Realized
a	Land	27,3 %	27,4 %
b	Utilities & Permits	12,0 %	9,8 %
c	Project Management & Administration	2,0 %	1,4 %
d	Engineering design	1,5 %	1,2 %
e	Construction	57,2 %	60,3 %
f	Total	100 %	100 %

Reason:
Procurement of
additional land area for
the warehouse.