

Outcome Based Business Model

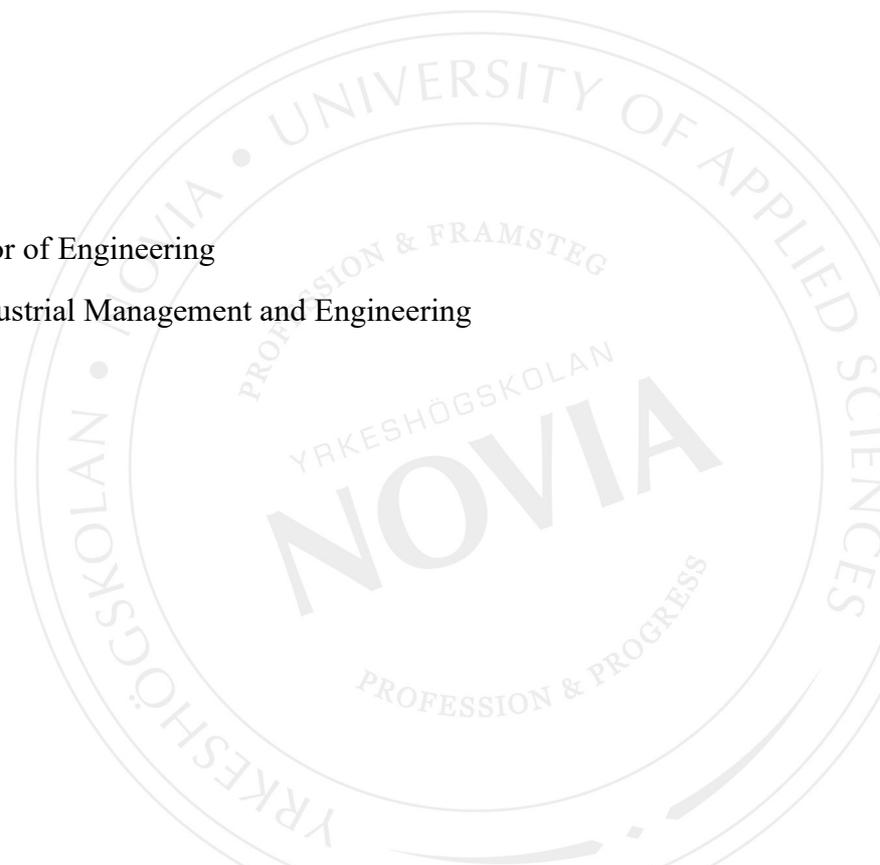
Siemens Osakeyhtiö

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BACHELOR'S THESIS

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Abstract

This is the published thesis version and do not includes financial numbers. The thesis is for Siemens Osakeyhtiö division Digital Factory and Process Industries and Drives. The thesis is a forecasting tool that measures profitability for new investment projects. It is like a decision tree for sales department (internal) and external customer. The “Outcome Based Business Model” is the headline for the thesis, but not the name of the thesis tool, which was made based on this project type.

The thesis tool forecasts future Costs, Net Incomes, Cumulative- and yearly Net Cash Flow and Key Performance Indicators. The sales managers can input investing value and make fast forecasting to budgets, that saves time and resources. Sensitivity analyses for Costs and Net Income are included in the tool and presented in tables and charts. They help the user to decide if the risk is low or high. The tool is designed for all project or investment categories.

Thesis tool equations are presented with numbers and after that in charts. The tool has been used for one ongoing project. There have been many adjustments inside the tool, after use and reconsideration, and they have resulted in changes for a better solution. They have been presented and explained in the thesis.

Language: English Key words: outcome business, investment, forecasting, management

This is the published version of the thesis.

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Tiivistelmä

Tämä on opinnäytetyön julkaistu versio ja ei sisällä taloudellisia lukuja. Opinnäytetyö on tehty Siemens Osakeyhtiön Digital Factory and Process Industries and Drives -divisioonalle. Opinnäytetyö on hyötymallityökalu, jolla mitataan uusien investointiprojektien kannattavuutta. Se on sisäiselle myyntiosastolle ja ulkoiselle asiakkaalle tarkoitettu päätöspuu. Pääaihe on suorituskyky- ja lisäarvohyötymalli teollisuuteen, mutta se ei ole itse opinnäytetyön työkalun nimi vaan se on rakennettu tämän hyötymalliprojektin avulla.

Työkalu ennustaa tulevaisuuden kustannuksia, nettotuloa, kumulatiivista ja vuosittaista nettokassavirtaa sekä KPI-avainlukuja. Myyntipäälliköt voivat syöttää investoinnin määrän ja tehdä nopeita budjettiennusteita, jotka säästävät aikaa ja resursseja. Sensitiiviset analyysit kuluista ja nettotuloista on sisällytetty työkaluun ja esitetään taulukoina ja kaavioina. Ne auttavat käyttäjää päättämään, onko riski alhainen vai korkea. Työkalu on suunniteltu kaikille projekteille ja investointikategorioille.

Työkalun laskelmat on esitelty numeroiden ja sen jälkeen kaavioiden avulla. Työkalua on käytetty yhdessä käynnissä olevassa projektissa. Työkaluun on tehty useita muutoksia käytön ja harkinnan perusteella, ja ne ovat johtaneet parempaan ratkaisuun. Ne on esitelty ja selitetty opinnäytetyössä.

Kieli: Englanti

Avainsanat: Suorituskyky, investointi, ennuste, johtaminen

Dokumentti on julkistettu versio.

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TERMS AND ABBREVIATIONS

KPI	Key Performance Indicator
KRI	Key Result Indicator
PI	Performance Indicators
RI	Result Indicator
IoT	Internet of Things
MindSphere	Open IoT operating system
Value Hacker	Siemens Sales Department
DF	Digital Factory
PD	Process Industries and Drives
BT	Building Technologies
EMV	Estimated Monetary Value
PaaS	Platform-as-a-Service
OEM	Original Equipment Manufacturers
VBA	Visual Basic for Applications
NPV	Net Present Value
IRR	Internal Rate of Return
WACC	Weighted Average Cost of Capital
AAR	Average Accounting Return

FOREWORD

I want to thank Siemens Osakeyhtiö for the opportunity to write bachelors' thesis. It has been an interesting and rewarding work with colleagues and partners. From Novia university applied of science Mikael Ehrs has been very helpful in guiding the theory of the thesis. Digital Factory division in Siemens Osakeyhtiö have helped me with many tasks and I am very thankful for that, especially to Juha Kuntanen, Lauri Korhonen, Ilmari Veijolla, Annikki Hyvönen, Markku Naumanen and Tuomas Humalajoki.

1 INTRODUCTION

Today customers in industry sectors want more flexible solutions for their business plans. Flexible business includes less risk and more opportunities for customer. This is called Outcome Based Business Model that gives more products and safer business to customer's needs. In these cases of Outcome Based Business Model, suppliers must take more risk than customers. The benefit for the customer is decrease in risks, which means that the supplier takes an increase of risks. Suppliers benefit comes from long term agreements, which guarantee a stable income.

Industry customers require more from products with long lifecycle. Normal project planning solutions in industry contraction include planning, costs, products and time. Often such solution is a onetime investment and has low effect in future perspective. In time the investment will be outdated, and customers need to make a new one with a high risk for future perspective. Production is likely to be delayed before the new solution is in full production, which means more cost and in worst case the company loses customers.

Outcome based business model has ongoing product planning, services, minimal cost and gives solutions with higher value and lower risks. The model is based on longer output and is safer for the customer. Suppliers need to take the risk in the beginning, but in the long run both sides have better solutions.

1.1 Purpose

Outcome based business model is new in the industry. Change is necessary for companies who wish to keep their competitive advantage and that is what this thesis is about. In the consumer business the use of Outcome based business model is more common. For example, Netflix uses business model innovation for customer as a long-term goal. The idea has been a successful one in the consumer business. Now it is time to use the same principle in industry.

Ramifications of The Internet of Things (IoT) are revolutionary and will be used in Outcome Economic. In the perspective of supply and demand the outcome will have profound effects on industry, organization and products. Some of the industry leaders have already jumped into the market, brawling for a foothold into what will be developed for the new business culture.

The digitalization with IoT enables manufacturing to produce better products faster for lower cost. For example, the oil and gas industries analyze sensor data for more efficient and exact process, and delivery the products. The use of data is increasing performance and safety with autonomous equipment that can produce 24 hours a day. The agriculture is using yield modeling augmented by machine learning to increase output by using data from crop sensors.

(Sinclair, 2017)

The structure for outcome based business model builds on customer needs. In normal project planning suppliers can fast forget what customers need. The purpose of the outcome based business model is to find value-based solutions for the customer. In other models finding the best solutions is important, but they do not strive for minimal risk for customer. When a customer risk is minimal, they are more willing to cooperate. There is a tendency in the business for seeking better profits without massive investments.

1.2 Structure

The working tool that has been created by thesis has many positive impacts. The tool is calculating profitability and forecasting projects. From that data Siemens and the customer can decide if the project can be implemented not. The project starts with defining data from previous cases. In new cases the data is taken from customer production costs which is used to decide what savings and changes must be made to reach predicted outcome.

The data is used in excel working tool, where there is a function able to calculate the profitability. It is also defining the cost object that Siemens invest in the project. When the cost object has been decided, the outcome analyses can be created. The energy- and raw material savings shall also be decided. This savings come from digitalization objects that Siemens products are able to provide.

The tool is making graphs where user can define the breakeven point for the project. This is important for Siemens, because they have the main risk. The graphs are presented in method chapter. The graphs describe the costs, benefit, net cash flow and breakeven point. There are interviews with the persons involved in this project. Interviews include questions about the data, management, key performance indicators (KPI), fails and success. The interviews are presented later in the method chapter.

1.3 Confidentiality

This thesis has confidential material and it is important to respect that. In the public version of the thesis the numbers are not given, instead the categories and other measurements are presented without financial data.

1.4 Disposition

The dispositions for bachelor's thesis are following:

Chapter 1 – Introduction and background

Chapter 2 – Brief presentation of Siemens AG and divisions Digital Factory, Process Industries and Drives, Building Technologies and Mobility. Mindsphere, that affects all the divisions, is also presented.

Chapter 3 – Presentation of the theory and methods used

Chapter 4 – Presentation of the Analyses Tool

Chapter 5 – Conclusions

2 SIEMENS IN BRIEF

Siemens AG is a worldwide company which provide power generation, transmission and distribution to smart solutions and efficient applications of electrical energy, areas of medical imaging and laboratory diagnostics. The company is incorporated in Germany and its headquarter is in Munich. Operations include production and manufacturing plants worldwide. Siemens corporation have around 379 000 employees in more than 200 countries (2018). The total revenue for Siemens AG is 83 044 million (2018). The business is divided in eight different divisions, namely Digital Factory, Process Industries and Drives, Building Technologies, Energy Management, Mobility, Power and Gas, Wind Power and Renewables and Financial Services. The divisions which are more connected to the subject of the thesis are presented shortly below.

Revenue by Industrial Business



Revenue by Region



Figure 1: Revenue by Industries and Regions (2018).

(AG S. 6., 2018)

Siemens Osakeyhtiö where the thesis tool is designed for and where I have worked is hundred percent owned by Siemens AG. Siemens Osakeyhtiö is active in Finland, Estonia, Latvia and Lithuania with their own country offices. Company's revenue was approximated 215 million euros in 2016.

Digital Factory

I am working in the Digital Factory division, which is the main driver for the thesis. The division Digital Factory (DF) provides hardware and software products that enable data from development, products and supplies. Under this term the DF products connect major parts of the items and production life cycle. Powerful Product Lifecycle Management (PLM) software can for example develop and optimize new products on a virtual basis. In conclusion Siemens Industry and Drives with Digital Factory division provides a large and unique portfolio of PLM software tools, industrial automation and drive technologies for customers requirement in different industry areas.

In Siemens Osakeyhtiö division Digital Factory conducts business with the largest Finnish industry companies. Some of the biggest customer partners for Siemens Osakeyhtiö in Digital Factory division are LSK Technology Oy, Insta Automation Oy and VEO Oy.

(AG S. 2., 2018)

Process Industries and Drives

The division Process Industries and Drives provide future-proof automation, drive technology, industrial software, and services based on best-in-class technology like platforms in Totally Integrated Automation (TIA) or Integrated Drive Systems (IDS). This division works to develop sustainable solutions across the entire lifecycle, from design and engineering to modernization. They are industry-specific solutions to meet customer's specific needs in all industry segments. This enables the availability of customer products, systems, and solutions over the long term. This business is one of the cores for Siemens concern.

(AG S. 5., 2018)

Building Technologies

The division Building Technologies (BT) operate with building operation, automation, comfort, fire safety and security. The division offers products, solutions and services that optimize the energy costs, reliability, comfort and performance of buildings while meeting ecological and sustainability requirements. The division has a broad customer base that includes owners, operators and tenants of public and commercial buildings as well as general contractors, system houses and original equipment manufacturers (OEM).

(AG S. 1., 2018)

Mobility

Mobility Division provides Mobility Management, Turnkey Projects & Electrification, Rolling Stock and Customer Services. These areas include modern, interconnected and IT-based mobility which is the core competence of its four business units. There is the knowledge to make road traffic flow more smoothly and quickly, make trains more environmentally friendly and efficient, make train schedules and freight shipments more reliable.

(AG S. 4., 2018)

MindSphere

MindSphere is an Internet of Things (IoT) solution for customers. It is a cloud-based open IoT operating system from Siemens that connect products, plant, system, and machines. It enables harnessing the wealth data generated by the IoT with advanced analytics. MindSphere delivers wide range of devices and enterprise system connective protocol options, industry applications, advanced analytics and an innovative development environment. Siemens Platform-as-a Service (PaaS) includes capabilities along with access to Amazon Web Services (AWS) and Microsoft Azure cloud services. With these features and capacities, MindSphere connects real things to the digital world and provides powerful industry applications and digital services to help drive business.

Using MindSphere enables the data in customer's industry to transform into productive business results. When it is connecting machines and physical infrastructure to digital world it provides industrial applications with analytics and digital services. It increases the productivity in the production and efficiency across customer's business area. With MindConnect as a part of MindAccess IoT Value Plan, MindSphere offers flexible, open connectivity solution, software and hardware to connect Siemens and non-Siemens assets.

The transformation of IoT data into meaningful information is possible with MindSphere. With the open standard and robust application programming interfaces (API) MindSphere enable developers to build applications that suit business requirements with little efforts.

With MindSphere Siemens is paving the way of business by offering their organizations and end customers new digital services. By using industry applications to leverage analytics, businesses perceive higher availability, improved productivity, efficiency in individual machines, entire plants and systems machine fleets. The MindSphere Fleet Manager offers the user quick configuring of assets and begins collecting data for monitoring.

With MindSphere user can make digital twin loop with product ideation, realization and utilization. With this action the digital twins of performance, production and product are connected. That enables driving operational efficiency and comparing simulation test results with real-world observations. Using these features in MindSphere it allows IoT connections to billions of intelligent devices generating massive volume of data, and digitalization promises lower costs, improved production quality, flexibility, efficiency, shorter response time to customer requests and market demands and opens new business opportunities and services. It is possible provided that the tool is working as planned, that is it connects with MindSphere.

(AG S. 3., 2018)

3 THEORY

This section addresses the theory and methods of the thesis. Theory includes project management, KPI and economic topics. The theory starts with project management, because it is the beginning topic for a project investment. After that comes project phases, stakeholders, estimating costs, planning management, risk management, data analyses, net cash flow, project finance, key performance indicators, and last the inflation rate.

3.1 Project Management

The project management has a huge significance for the projects and this thesis. The project management is appointed when the definitions are decided with a customer and Siemens. After that the project management makes analyses to the project and uses outcome based business model tool. The outcome based business model tool is not the only analyzing method to make decisions for projects. The project management is of importance when determining the calculations. Other chapters in this thesis are built on project management.

Today, high-performing organizations are focusing on the fundamental aspects of culture, talent, and process that support successful projects. The project manager topic comes first in this theory, because a new project starts from the management. There are many subjects that are included in the thesis tool with project management. Same principle applies to the thesis tool and investment decisions. It is important with new project models for industry, and fundamental aspects must be observed. In the model organizations drive project management and meet original project goals and business intent two-and-a-half time more often than low performers. That inspires employees to work harder for project tasks.

“Dr. J. M. Juran, the late quality management guru, also defines a project as a problem scheduled for solution. I like this definition because it reminds me that every project is conducted to solve some kind of problem for a company. However, I must caution that the word ‘problem’ typically has a negative meaning, and projects deal with both positive and negative kinds of problems. For example, developing a new product is a problem but a positive one, while an environmental cleanup project deals with a negative kind of problem.”

The Outcome Based Business Model is a kind of new way for making business. The new ideas and process have their good sides and bad. It is not always easy to change business managers from old to new. Johan Heagney has written in the book of Fundamental of Project Management that projects can have three basic points to consider:

1. *Culture*. Work to create a project management mind set.

2. *Talent*. Focus on talent management, continuous training, and formal knowledge transfer.
3. *Process*. Support project management through the establishment and option of standardized project practices and process.

(Heagney, 2016)

Dennis Lock has written in the book of project management about how the Project Management should act. He states that project management must include discipline in planning, organizing and controlling people, money and cash for the purpose of finishing projects and this includes many risks. The goal of all this from the project management point of view is to satisfy the project investors and other stakeholders. In this case the investor is Siemens AG and stakeholder is the customer. The outcome is reached, if the project finishes on time, holds the budget and the result is satisfactory to everyone involved.

(Lock, 2013)

According to the book of PMBOK® Project management is the process about knowledge, skills, tools, and other techniques to finish the project. There are important process groups in projects that initiate, plan, execute, monitor, control and close the phases. The relationship between the groups means that if one of them changes, at least one other group is likely to be affected. For example, if the schedule is edited, it affects on budgeting and increases the amount of work needed. In the thesis tool user can decide in which quarter the cost impacts. In the beginning it is easy to see effects, but if there are changes the budget will change. On the other hand, if it is not possible to increase the budget the project will finish delayed.

Because of the potential project changes the project management plan is iterative and goes through progressive expansion in the project life cycle. Progressive elaboration allows a project management to manager for a better level of details when the projects evolve. This function can be adjusted by the thesis tool.

(PMBOK®, 2013)

Benefit of Project Management

Rory Burk in the Book of Project Management has described the benefits of project management. The benefits for using project management in business cases, obviously follows from addressing the needs of the project. In a project the management team is responsible for developing a plan through which the project can be tracked and controlled to ensure that the project meets preset objectives. This type of information should be supplied by a planning and controlling system. This has been discovered during the development of the thesis tool, and the controlling of calculations has been changed by management. A system with planning and controlling will incur additional management costs. When the information is inadequate, it can be more expensive for the project, and it can lead to bad management decisions, mistakes, rework and overrun. In the beginning of a project it is hard to estimate all planning cost and objects. They can be adjusted in the tool, but that will change the outcome.

(Burk, 2008)

3.2 Project Phases

This chapter is about formatting phases for the working tool in the outcome based business model. Joseph Heagney describes in the book of Fundamentals of Project Management that projects have many phases to deal with before the end is reached. He has pointed out that to start with there is always a problem that needs to be solved. It is important to define the problems and what kind of solutions can be reached. For customer it is important to understand how they can benefit from the solutions. It is also important to discuss in which ways the project can make a difference.

Joseph Heagney has given as an example a project that makes energy, material and economic savings. When these things have been on the table, the project planning can start. This includes questions like what must be done, by whom, for how much, how, when, and so on. In the cases using the outcome based business model tool the questions handle the investment objects, savings, how long, changes and when they are impacting. When these questions have been answered, it is time to plan and implement a draft. There is a risk that any plan fails, if it is not followed. Joseph Heaney describes that if some part of the plan is not working, the project must be flexible with other options to reach the expected solution. This claim can be shown in sensitive analyzing part of the thesis tool.

Plans need to be improved, if the project is going to achieve the wanted result. Unless project is monitored, there is no guarantee for success. When a deviation has been defined, it must be analyzed for a correct solution to get on success track. Finally, when the goal has been reached, the project is closed.

(Heagney, 2016)

Here the phase steps for the outcome based business model will be explained. The first steps consist of comprising formative periods that include needs or organizations to recognize the needs for project. That means understanding of customer needs such as financial requirements, the benefits and principles. It is important to check these definitions in an early phase, so that there are no misunderstandings. Dennis Lock has described in the book of Project Management that if a project has significant potential environmental or social impact, it must be customers decision when to publish, because it may influence the image of the company. In this case Siemens and the customer have decided that they publish the project when agreements have been signed. In worst case, the delay in publishing can mean serious delays or even prevent the start of the actual project.

When all parties have agreed on the project definitions, permissions have been granted and funds are available, the project can be authorized. Dennis Lock describes that authorization is often a time-consuming phase, but it should always be an instantaneous event or milestone. Often the first mentioned version is used, because the second one can take the feet off the table in some organizations. In this case the time-consuming phase is used. That can in worst case cause delays and incur costs to the customer and even to the supplier.

The project start-up period is the phase where actual processing of the project begins. Dennis Loch has listed that the phase includes appointment of the project management, provision settings and other approvals. The same principle is used in outcome based business model. Only then the real work can start in the actual project, that is arranging for detailed planning and mobilization of the workforce that has been signed to the project manager. Thereafter starts the overlapping periods of design, procurement and manufacture for the project. In these phases project managers can control the parameters and adjust them to the outcome based business model.

The contractor carries out commissioning and tests or trials to ensure that the project will fit for its purpose. This can be shown by analyzing in the thesis tool. The project is finished when it is handed over to the customer to start the operating use in the end phase. If customer

does not want more cooperation, supplier is out of the project. This means that the customer can have all benefits the new business model is producing.

(Lock, 2013)

The project phases are divisions where the extra control is needed for effectively manage conclusions. Project phases are often completed serially, because they are linked to each other. The phase structure allows the project to be segmented into logical subclass for easier planning and control. Regardless of how many phases a project has, all phases have similar characteristics. There is a good point in PMBOK® that explains the projects life-cycle: *“Because projects are unique and involve a certain degree of risk, companies performing project will generally subdivide their projects into several phases to provide better management control. Collectively these project phases are called the project life-cycle.”*

(PMBOK®, 2013)

In the outcome based business model the project phases are many and they need to be controlled from the management and stakeholders. In the thesis tool the phases are referred and can be controlled. The risk level in project phases can be seen and adjusted by management, to obtain the wanted result.

3.3 Project Stakeholders

The project stakeholders have a big role in the outcome based business model. They are the second hand that the project requires. Joseph Heagney has described in the book Fundamentals of Project Management that the project stakeholder management defines and means managing the people, organizations and groups that are involved. This include customers, managers, and financial people. Joseph Heagney describes that it is important to define stakeholders, because they are included in the lifecycle of project and can have direct impact for success or failures.

(Heagney, 2016)

According to the book of PMBOK® the stakeholders can be persons or organizations like customers, sponsors, the performing organization or public. They are actively involved in the project and their interest can be negative or positive. The internal and external stakeholders must be determined by project management in the order of requirements and expectations of all parties. To reach successful outcome the project management should

manage the influence of various stakeholders. Next figure is presenting the meaning of stakeholder and other power players, this figure is presented in PMBOK®.

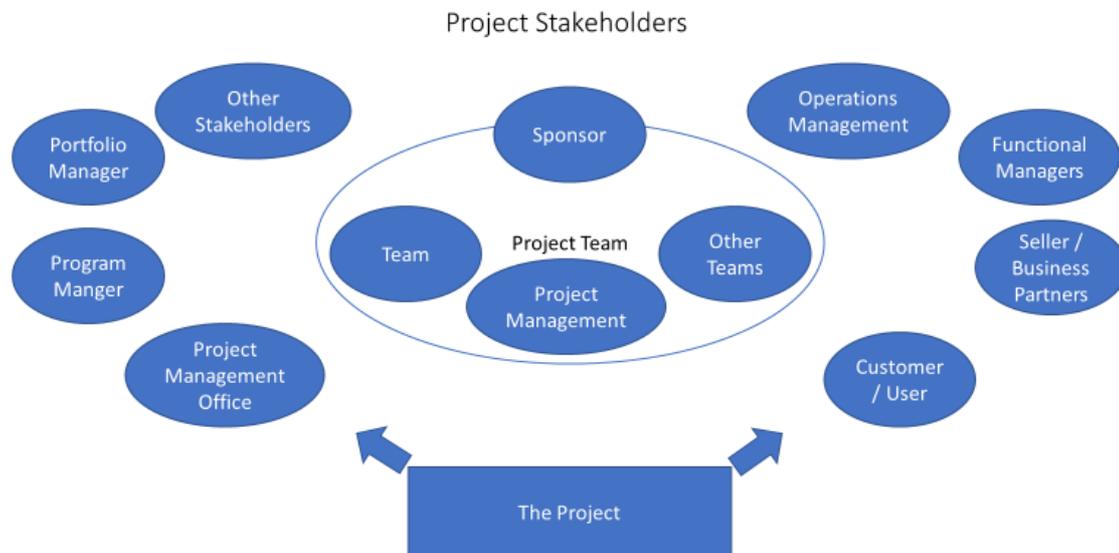


Figure 2: Project Life Cycle from PMBOOK®.

Figure one of project life cycle is similar for outcome based business model. PMBOK® describes that there can be different results from the stakeholder. Some stakeholders benefit from a successful project, while the result can be negative to another stakeholder. For example, business leaders from a community that will benefit from an industrial expansion project by positive economic growth to the community are most interested in helping the case. This means that outsiders in the project do not have similar interest. This can be other workers, that are not included in the project, for example. The interests of negative stakeholders are served by impeding the projects progress. Overlooking negative stakeholders can result in an increased likelihood for failure. One important part of a project management is to manage stakeholder expectations. This can be difficult, because stakeholders often have very different or conflicting objectives.

(PMBOK®, 2013)

Stakeholders impact in the project is important, because they are the people that measure the value of the case. The tool with calculation results is visible to stakeholders and they can see

the value. It is important to make the stakeholders satisfied by the project. Without that there are no future business cases with the stakeholders if they are disappointed.

3.4 Estimating Project Costs

The estimated project cost is necessary for calculations in this bachelor's thesis. Without estimated project cost there cannot be business planning, budgeting, control of the project cost or predication of resource requirements. In the outcome based business model there are estimated and actual costs that can be compared with each other. In the accounting principle there cannot be costs without clarification. This section shows how some of the essential terms are used in estimation and clarification of project costs. Dennis Lock has described in book of Project Management five points about costs.

Absorption costing – a method that include indirect costs.

Below-the-line-costs – a collective name for the various allowances that are added once when the total basic cost have been calculated. This can be extra demands, exchanges rate fluctuations, contingencies and provisional cost items.

Cost escalation – increase in all cost above their original calculated cost. That includes national inflations and increases in wages and salaries. In the outcome based business model the cost escalation is not included, because it would impact KPI measurements.

Direct costs – costs that can be directly attributed to project work. In this case for project beginning the supplier is the investor, in order to minimize customer risk.

Cost of sales – equivalent to the total sum of all the above-the-line costs.

(Lock, 2013)

The estimation of project cost is important and needs to be accurate. It has a large impact on the result in analyses. To obtain more accurate results a user can decide to use inflation in the calculation. That makes the result more real and reliable. In the tool the user can decide what parameters are used in the investments of the project. This means costs and the tool uses them in forecasting for net cash flow and KPI. The costs function is presented more precisely in chapter analyses tool.

3.5 Project Planning Management

Project planning on timescale includes numbers of factors, brought inside and outside the project organization. The timing is important for the phases to start on schedule as planned. Dennis Lock has described in the book of Project Management a figure that present planning scale for customer and supplier.

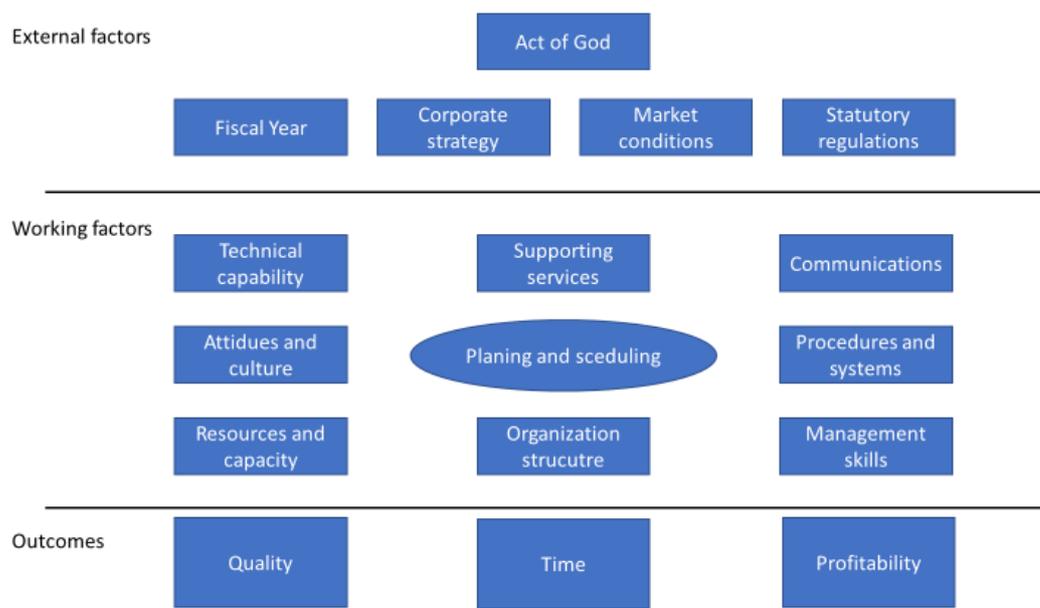


Figure 3: Project planning environment, Dennis Lock from Project Management book.

Dennis Lock says that in the section of working factors in figure two there are most likely items that affect the project manager and the project on a day-by-day basic. These factors can apply to all kinds of project organizations, which is good because there is a variety of customers and needs. That is positive for future cases in the outcome based business model, because the cases are all different. All these working factors influence the project outcome. A well-panned project stands for success meaning it is completed within time and budget. That should contribute significantly for cost effectiveness and good profitability.

(Lock, 2013)

The project planning management decides with stakeholders and Siemens what actions are taken in a project. These actions impact to the outcome calculation tool. The planning can have many impacts on what parameters have been used in project and that impact on the project planning management.

Project Time Management

The outcome based business model includes the process of timely completion of the project lifecycle. PMBOK® has describe six points of the project time management:

1. Define Actives
2. Sequence Actives
3. Estimate Activity Resources
4. Estimate Activity Durations
5. Develop Schedule
6. Control Schedule

These processes interact with each other and with processes in the other knowledge areas. Each process involves effort from one group of people, based on the needs of the project. Further, each process occurs at least once in every project and in one or more of the project phases, because the project is processed in phases. These six points must be decided in the begin of the project case.

(PMBOK®, 2013)

The project time management has a significant role in the outcome based business models, because it is important that the schedule and budget are on time for projects. This is referred in the analyzing tool. If they are not, then it changes the project time and budget. That is not suitable for suppliers and customers.

3.6 Project Risk Management

The project risk management and factors are important for projects. It is vital to study and analyze the risks to avoid major risks and failures. Factors that lead to risk event and failure can always be identified, catalogued, and controlled. Bruce T. Barkley in the book of Project Risk Management describes the principle that one should be able to identify what might happen, what the probabilities are, what impacts are, and how to respond for them. The missing point is the fact that businesses and projects are human, not mechanical systems. That include always risks with new project. For example, the one of the risk factors can have an effect on project calculations. With this thesis tool the calculation has changes many

times. Despite our increasing propensity to consider the study of organizational and project efforts in business to be a science rather than an art, human behavior is often unpredictable and counterintuitive. Despite the understanding of complex systems, we cannot identify all the factors that contribute to risk and success, even if we all agree on the definitions of terms. That means that the management must be prepared for surprises.

Another complication that Bruce T. Barkley describes in project risk management is the resistance to change in the project management or supplier team as well as in the customer's organization. If a complex project and its outcome triggers the need for organizational change, there is a need to understand the value of change. It is not easy and requires for project management to lead it. There is a risk that employees will resist the change and undermine new product delivery. Bruce T. Barkley has described five points to be included:

1. Top management support
2. Clear vision
3. Incentives to accept changes
4. Incentives to take risks
5. Clear communication

This project requires understanding of change within and outside of the organization. Risk applied to a business framework produces SWOT (strengths, weaknesses, opportunities, and threats) analyses and outputs that links to identification of project risks. These risks include competition, unanticipated technologies changes, markets shift, business finance, workflow issue, and changes in the customer base. It is important to understand risk as a tradeoff with benefit, opportunities, and payoffs.

Risk is the reason for investment, to seek out probability by reducing uncertainty and gaining benefit in terms of customer value and profitability. In the case of the outcome based business model customer's risk marginal is small. Supplier has the risk marginal in the project.

(Barkley, 2004)

In PMBOK® the same topic of identifying the risk object is important in project planning. There are inputs to consider that PMBOK® have listed:

1. Risk management planning

2. Activity cost estimates
3. Activity duration estimates
4. Scope baseline
5. Stakeholder register
6. Cost management plan
7. Schedule management plan
8. Quality management plan
9. Project document
10. Enterprise environmental factors
11. Organization process assets

(PMBOK®, 2013)

David L. Olson and Desheng Dash Wu in the book of Enterprise Risk Management Model describe that all projects or organizations must respond for risks and there are many alternatives for that. But the risks must be determined before proceeding. Monitoring and reviewing measurements can determine the risks, and organizations requires performance. When the risks have been determined, the process should be selected. Risk can be reduced by a tradeoff between cover and cost reductions. Most actions are available for organizations involved knowing what risk the organization can cope with. That is due to their expertise and capabilities which outscores to others at some cost. Some risk can be avoided from the start, but in some cases, they must be dealt with.

(Olson & Dash Wu, 2017)

In the outcome based business model cases there are many risks to determine such as the customer production capacity in the future calculations. There are no precise and correct calculations for that and that must be clear in the future calculations. In the thesis tool risk percent has been added for sensitive analyzing. When the risks are determined it is easy with the help of the thesis tool to respond to them in actual cases.

3.7 Data Analytics

The data analyzing is the main point of this thesis. In the thesis tool the investment and cost for a project are analyzed based on the input values of data. Shmueli, Bruce, Stephens and Pate in the book of Data Mining for Business Analytics have described that business analytics are the practice and art of bringing quantitative data bear of decision making in a project or organization. The business analytics include methods that have a range of data analytics. In the thesis tool the analyzing uses sensitive and KPI methods. With many powerful applications it involves little more than counting, rule checking, and basic arithmetic. The next level of business analytics is termed business intelligence, which is used for data visualization and reporting so that the management understands what is happening with these functions. This is presented by use of charts, tables and dashboards to display, examine and explore data. Business intelligence has been involved to a more user-friendly and effective tool, where the user can create dashboards that allow access to real-time data and directly interact with it. With an effective dashboard the results can be tied directly to company data and information directed to managers quickly.

(Shmueli;Bruce;Stephens;& Patel, 2017)

The data analytics include where the data is coming from and how it is used. Business intelligence has been used in the thesis working tool. The vision is that it is user-friendly and can show efficiently KPI for a project.

Data Quality

The data quality means the opportunity to take advantage of the data, and information resource can be taken if there is an understanding of the structure and collected information. The critical points are the recognition method for what needs to be collected, documentation, and validation of the business rules. In accordance with what David Loshin in the book of Enterprise Knowledge Management has written the data owner is accountable for maintaining the quality of the information in data quality. This can include determining and setting user data quality expectation, instituting gauges and measurements of the level of data quality and providing reports on the conformance for data quality.

(Loshin, 2001)

The data quality for this project is only taken from one source, because there are no other cases done so far with the supplier taking all risks. History data would make the calculations easier. The missing history data is making the analyzing more difficult and uncertain. The tool is designed for universal new projects.

Sensitivity Analyses

Sensitivity analyses is a way to gain more confidence in the reliability of the calculation. Dennis Lock in the book of Project Management has described that the process consists of repeating the cash flow calculation with a change value for one or more of the parameters to test the predicted calculation result. His method has been used as a sensitive analysis in thesis tool, and a user can demand the percent value. The annual cost of managing the operation should be relatively simple to estimate, because the number of the staff needed to be paid can be assessed well. Labor can be changed in the calculation by inflation. The sensitive percent can be used in NCF calculation, if it is necessary to analyze the KPI. The estimated cost of maintenance and production might be achieved with some degree by obtaining advance equation for an agreement. For forecasting the cash flow the sensitive analysis is calculated as negative or positive percent.

(Lock, 2013)

3.8 Net Cash Flow

In the project life cycle the NCF is the most important factor. If the NCF is negative, the project will stop and promises fail. David Lock has described objects that often in the project managers are occupied by short term matters like technical difficulties, design errors, the allocation of work, progress against the schedule, performance of subcontracts and expenditure against the cost budget. The subject of project cash flow can be misunderstood often, because confusing cash outflow schedules with NCF schedule and final project profit and loss statement gives a good result that does not take the NCF into account.

In the thesis work the calculations include Siemens and customer cash flows, but the bigger focus is in the Siemens NCF. Most important are the own values that managers and leaders can view. The importance factor of Siemens NCF is to determine breakeven point in profitability. After breakeven point the project is making benefit for Siemens and customer. The breakeven point must be positive before the project agreement ends. Often the breakeven point must come within two years in an investment. If the breakeven point comes too late, the benefit is small and there is no hope for a business case.

(Lock, 2013)

The income from projects is measured of the firms profit in a given period. Calculating the Net Present Value (NPV) has been used in the outcome based business model tool. It is used

with help of NCF calculation to show the benefit in projects. In practice the NPV of an investment decision is defined as following without discount rate:

$$NPV = \text{Today's value of the expected cash flows} - \text{Today's value of invested cash} \quad (1)$$

In this calculation, the net income present cash inflows and costs are the Siemens outflows. With this method any investment decision can be presented on a timescale as a flow stream where the cash outflows (investment costs) are negative cash flow and the inflows are positive cash flows.

(Berk & DeMarzo, 2017)

The NCF is important in the calculations of the analyses tool. It shows for management how the project economics are and when it will be profitable for the supplier and customer.

3.9 Principles of Project Finance

In this chapter the principles of project finance are introduced. Yescombe has described in Principle of Project Finance that the project finance is a method of raising long-term debt financing for major projects through 'financial engineering', that base on leading the cash flow generated by projects. It depends on a detailed evaluation of project structure, operating, and revenue risks. These demands are linked to the investors, lenders and other parties in the projects and arrangements.

Yescombe writes that 'Project finance' and 'Finance project' have two different meanings, because the projects can be financed with various ways. Traditionally, large scale public-sector projects in development countries were financed by debt of public-sectors. Privat-sector projects were financed by large companies raising corporate loans. In the developing countries, projects were financed by the governments borrowing from international banking markets.

Then there is a question why use project finance and that has been abstracted in Yescombes book of Principle of Project Finance. It describes that a project can be financed by a company as an addition to its exiting business rather than on a stand-alone project finance. In this case the company uses its available cash and credit lines to pay the project and can, if it is necessary raise the credit lines and new equate capital for the project provided that it can be

supported by the balance sheet and earning record. It can mean that a corporate loan to finance a project is normally relatively simple, quick and cheap to arrange. The management must be confident that they will be repaid, especially taking into account the additional risk from the debt in project finance. This requires that the project will be completed on time and budget, and that there are enough NCF from the project for covering the debts. With the thesis tool the additional risk from the debt can be defined.

(Yescombe, 2014)

Jonathan Berk and Peter DeMarzo in the book of Corporate Finance have described that the Net Present Value (NPV) rule is important to notice in project investments. The NPV rule means that the manager should decide the best value to maximize value to the firm. With this rule a decision based on the NPV can be taken for the best value. This helps to have perspective to include when deciding among alternative investment opportunities. NPV Investment rule is written as follows: *“when making an investment decision, take the alternative with the highest NPV. Choosing this alternative is equivalent to receiving its NPV in cash today.”* This can be applied if there are many projects in same calculation. For now, the thesis tool is designed for one project calculation. Improvement proposal for the thesis tool can have more projects calculated same time and compare values. For a case of stand-alone project, the managers need to choose between accepting or rejecting the project. NPV has a calculation that gives a value for the investment with discount rate. The discount rate is management decided percent value for payback.

$$NPV = -Start\ Cash\ Flow + \frac{End\ Cash\ Flow}{Discount\ Rate} \quad (2)$$

(Berk & DeMarzo, 2017)

Frank J. Fabozzi and Carmel F. de Nahlik in the book of Project Finance have described that one principle of project finance is underpinning other financial activities such as venture capital, leveraged buyouts and other restructuring finance. It is important that management is willing to look initially for the cash flows of a project as the source funds for repayment of the loan. The management must also feel comfortable that the loan is in fact paid back in time or in worst case not. The independent economic unit that qualifies for a viable credit to

a project financing must make criteria and characteristics. For the outcome based business model the criteria is that NCF is positive after two years from the start of the project. If the project finance would fail to satisfy any of the applicable criteria, both managers and stakeholders need to resolve the problem before proceeding.

There are project risks that are important areas. Frank J. Fabozzi and Carmel F. de Nahlik have written that the project finance can be divided to three major grouping reflecting key time frames for a project in which the elements of credit exposure assume different characteristics. The major areas are engineering and construction phase, star-up and operations according to planned specification. If these criteria are good, the project has a future value.

(Fabozzi & de Nahlik, 2000)

Like Rod Morrison has written in book of Principles of Project Finance, the principle of project financing is financing something real, clearly visible and hopefully good for society and wider economic growth. This is one reason why loan providers are financing the projects and hope for long lasting partnership. Financing the project that is debatable economically and relies on subsidies can be fraught with risk. There are many expectations for a project, like the renewable regime, social infrastructure, where there is widespread political and social acceptance of the need to a project.

There are two distinct risks for the project finance that Rod Morrison has abstracted. One deal that goes wrong involves a long-term chronic work-out or losing money. The project motivation takes on a subtler tone in this context as the deal might otherwise stack up from a risk perspective.

(Morrison, 2012)

For the outcome based business model the project finance is important in the start-phase of project. If there is no finance, the project is not be possible. For investor the outcome based business model is a success in longer perspective, when the supplier takes the investment risk. There are always risks for this area and management must insure the stakeholders and supplier that the business case is successful in the end.

3.10 Key Performance Indicator

The KPI are measurements in business strategies and organizations. In this outcome based business models KPI measurements are NPV, internal rate of return (IRR), average

accounting return (AAR), profitable index, payback time and euro divided with production capacity in kilogram. The KPI has many indicators to be considered before the reader can understand the measurement. First Key Result Indicator (KRI) tells what has been done in a perspective or critical success factor to begin with. KRI is for example today's production costs and production capacity in kilogram. The Result Indicator (RIs) describes what has been done. RIs are the forecast cost of production and production capacity in kilogram. They have been calculated passed on digitalization changes, that give percent improvement that are Performance Indicators (PIs). The PIs describes what to do. The KPI tells to increase performance dramatically if necessary. Below is a figure that explains these four measurements.

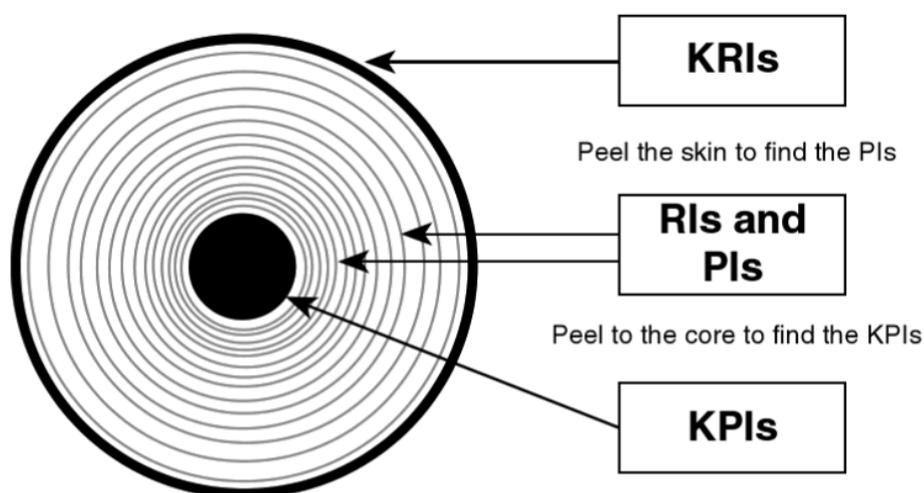


Figure 1: Four different Performance measures.

It is important that the KPI as a performance measurement is ensuring it creates the desired behavior outcome. The principle is to make benefit for companies and controlling the measurements. There are cases where performance measurements have led to dysfunctional behavior and distortion. There is a rule that David Parmenter in book of Key Performance Indicators has described that of 10/80/10 when the performance measurement is done or that is the one used. That includes 10 KRIs, 80 RIs and PIs and 10 KPIs in a performance organization measurement. It can be more KPI performance, but the recommendation is not to have less than 10. In this case the 10/80/10 rule can apply to each diverse business, providing it is large enough to warrant its own KPI rollout. The working tool is expected to be used with future customer analyses.

(Parmenter, 2010)

The key performance show the key factors and effect in the projects. These factors and goals are measured with customer and Siemens to determine what the final KPI should be. They are different in all cases and they are shown in the analyzing tool. There are eight different KPI: s used in the thesis tool. Next headlines explain the KPI measurements that have been used in the thesis tool.

Net Present Value

Net present Value (NPV) is the difference between present value of cash inflows and the present value of cash outflows in a period of time. In NPV the KPI is used in capital budgeting and investment planning for analyzing the profitability of a project investment. The formula for NPV is following:

$$NPV = \sum_{t=0}^n \left(\frac{C_t}{(1+i)^t} \right) - C_0 \quad (3)$$

The C_t represents net cash inflow-outflow during a period, i represents the weight average cost of capital (WACC), t is the number of time period and C_0 is the total initial investment cost.

A positive result of NPV indicates that the projected earning generated by project investment exceeds the anticipated costs. This means that an investment with positive NPV will be profitable and negative result is net loss.

(Investopedia, Investopedia, 2018)

Weighted Average Cost of Capital

WACC is a calculation of a company's cost of capital in which each category of capital is proportionately weighted. Examples where the WACC calculation is used are all sources of capital, including common stock, preferred stock, bonds and long-term debt. In the thesis tool the WACC is percent value in NPV calculation. There is no need for formula to get the WACC in the tool.

(Investopedia, Investopedia, 2018)

Internal Rate of Return

IRR is a measurement that is used in capital budgeting for estimating the profitability of an investment. The IRR is a discount rate that makes the NPV of all cash flows from a project

equal to zero. The higher a project investment internal rate of return, the more desirable it is to undertake. IRR measurement is a uniform measurement for investments for varying types. For example, IRR can be used to rank multiple prospective investments on a relatively even basis. The formula for IRR is following.

$$0 = P_0 + \frac{P_1}{(1 + IRR)} + \frac{P_2}{(1 + IRR)^2} + \frac{P_3}{(1 + IRR)^3} \dots + \frac{P_n}{(1 + IRR)^n} \quad (4)$$

Where $P_0, P_1 \dots P_n$ equals the cash flows in period 1,2 ...n, respectively and IRR equals the projects internal rate of return.

(Investopedia, Investopedia, 2018)

Profitability Index

The profitability index is a measurement index that attempts to identify the relationship between the cost and benefits of a proposed project investment. The formula for profitability index is following.

$$\text{Profitability Index} = \frac{\text{Present Value of Future Cash Flow}}{\text{Initial Investment}} \quad (5)$$

The rule for result is that a profitability index of 1.0 is lowest acceptable value on the index. If the index is lower, it indicates that the projects present value (PV) is less than the initial investment. Profitability index is a value of measurement for potential capital outlays. The technique divides the projects capital inflows by the investment projects capital outflow to determine the profitability of the investment.

(Investopedia, Investopedia, 2018)

Average Accounting Return

The AAR is an accounting method used for the measurement of comparison with other budgeting equations, like NPV and IRR. ARR shows a quick estimate of investing projects value over its useful life. ARR is calculated by finding a capital investments average

operating profit before interest and taxes. It is also after depreciation and amortization and dividing with the book value of average amount invested. The formula for ARR is:

$$ARR = \frac{\text{Average Profit}}{\text{Average Investment}} \quad (6)$$

The result of ARR is presented as percent, and the higher ARR, the better is the amount of investment profit earned over the projects life.

3.11 The Inflation Rate

The inflation is a sustained rise in the general level of prices. It means that the inflation rate is the rate at which the price level increases. There is also deflation that is a sustained decline in the price level. Oliver Blanchard in book of Macroeconomics has described that there are two inflation measures of the price level, those are the Gross Domestic Product (GDP) deflator and the Consumer Price Index (CPI). The GDP has been used because the goods are sold to firms, governance or foreigners. Next formula is presenting the GDP deflator in year t , P_t is defined as the ratio of nominal GDP to real GDP in year t .

$$P_t = \frac{\text{Nominal GDP}_t}{\text{Real GDP}_t} = \frac{\$Y_t}{Y_t} \quad (7)$$

For observing in the formula, in the year in which, real GDP is equal to nominal GDP, this definition implies that price level is equal to 1. The GDP deflator is called an index number. If there is no data to calculate, future inflation is π_t , it gives the rate at which the general level of prices increases over time. In the thesis tool the user can decide whether inflation rate is used or not. In long-term investment it is recommended to use inflation rate, because it makes the result more trustworthy.

(Blanchard, 2017)

The GDP measurement index is important for the thesis working tool, because the calculated outcomes must be precise, and they come with help of inflation index. If there is no inflation

index calculated, the summary can show wrong numbers for net income to Siemens and customer. There are cases where the index is not calculated due to different agreements with Siemens and customers.

4 METHOD

In the thesis there are many different methods used for prediction and classifications. It can be questioned why these methods have been used. The answer is that each method has advantages and disadvantages. The usefulness of a method can in some cases depend on factors like size of the dataset, the type of data, underlying assumptions of the method, how noisy the data is, and the goal for analytics.

The point of the methods is to develop new services, effect changes in organization, construct a production and implement a new business process. This includes digitalization that makes savings in longer perspective. In this chapter the function and different methods that have been used for the outcome based business model are described. All meetings are explained in here and decisions taken.

4.1 Outcome Based Business Model

The main point of the working tool is to estimate the future outcomes for new business cases. To start with there was an analysis about a business case. The analyses method was good, but a better version which suits different kinds of cases was needed. The idea was to have such outfit of the analyzing tool that can be easily changed by project demands. In the first version of the analyses tool the function could only be used by demands of one project. It was difficult to change commands fast and easy.

The method of the outcome based business model that shows the predicted way of the case will be shown later. First the data is collected from customers present production numbers for making calculations. When the arrangement of implementing new business process with customer and Siemens has been discussed, the scenario calculation can start. In the calculation the ground data is important for the predicting tool to be able to estimate future scenarios.

The savings with raw material- and energy savings must be clearly discussed before calculations, because they are the key functions for future scenarios in the outcome result in the tool.

4.2 Steps for Analyses Projects

In the first version of analyses tool all the KPI and other diagrams were in the same sheet. The base line calculation was also different. There was similar calculation with base cost,

but the equation was harder to understand. It is possible that there are two methods to calculate, but we have decided to use the new calculation method for future cases.

The energy saving calculation was different with the old method, which decreased the savings by two percent annually, for example year one two percent and year two four percent. That was not a right method for the calculation function. The right approach is two percent savings per year, because the agreement with customer states the energy savings percent. But this applies only in this case, for other business cases the savings percent can be different. Under here is an example of that.

Generated benefits:	Year 1	Year 2	Year 3	Year 4
Energy savings	4,0 %	6,0 %	8,0 %	10,0 %
Raw material savings	0,5 %	1,0 %	1,5 %	2,0 %

Figure 4: First Version of Saving Percent.

The project cost parameters were differently formatted in the previous analyses tool. They were in the same table and it was hard to separate them from each other. In the new analyses tool the parameters are divided for individual calculation, which makes the calculation easier for the user and the invested total summary can be calculated. Under here is an example of the first version of investment parameter sheet.

Preactor				
Calculated quartely cost (EUR)				
150 000,00				
2018 [EUR]				
Q1	Q2	Q3	Q4	
Not include	Not include	Include	Not include	
		150 000,00		
Total Cost [EUR]				
150 000,00				

Figure 5: First version of investment parameter sheet.

There was a big problem to show all cost in one sheet and the commandos were not easy to understand.

In the older version there was no Macros used in Excel. It is not necessary to use Macros, but in the new version they are implemented. The Macros make the analyzing faster and easy for the user, meaning that a new user without knowledge about the functions can make analyses for the project.

4.3 The New Analyses Tool

The fundamental idea was to create a decision tree tool that guides management for new business projects. It will help the management to adjust right parameters for investing in a project and deciding outcomes. Under here is a picture of first meeting from PowerPoint with a mockup and the numbers are artificial.

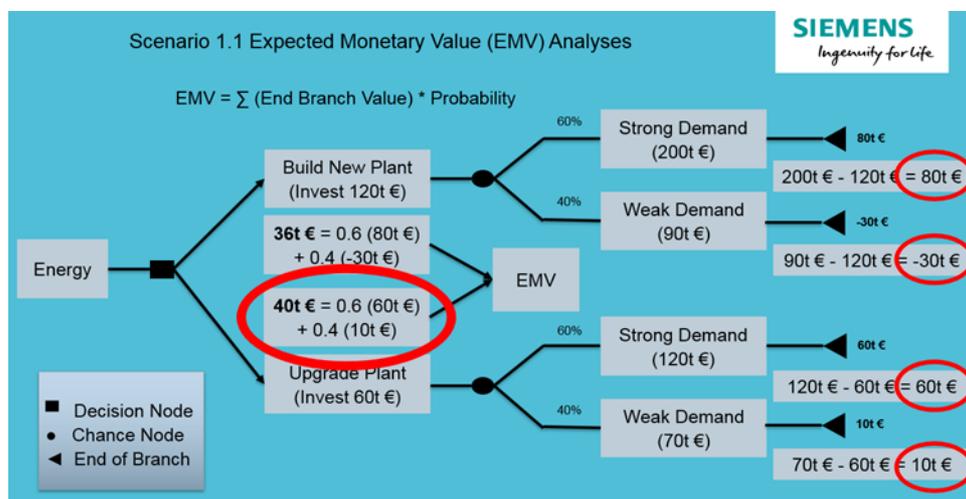


Figure 6: First Meeting Mockup for Thesis Tool.

Before this tool there was the older version for analyzing the business cases. It is a good tool for that and works fine with the project it was designed for. The problems arise when there is a new case with different agreement years which requires manual redesign of the tool. It is easy if creator of the older tool is available to do the changes, but if a new user uses it and tries to change the tool, it will take time.

Because of that the new analyses tool is made with a user-friendly vision. The user does not have to make changes or formulas for the analyzing tool. It is build with help of Macro charts that show future scenarios and can be shown to customer as well. The analyzing tool produces more precise scenarios. With the method it is easy for the user to see the breakeven point when the NCF changes to positive. It is presented by colors in tables and charts. Using NCF the user can decide by different buttons if Siemens takes all investing cost or if the cost is split with customer. All these functions are presented in the chapter analysis tool.

4.4 Pros and Cons

If we start with the pros for the tool, it is user-friendly for the user. The equations have been automatically calculated and the user needs to fill in only the investment objects, customer values and future savings percent. It calculates the agreement years automatically after the data has been inserted. There are clear instructions for every commando that the user needs to fill in to be able to make the required analysis.

For the cons the working tool is not flexible with the commandos. It has some flexibility, but if the user wants for example other charts the tool cannot provide them. The user needs to manually build such charts. If extra investing objects are needed, they must be coded by Macros and if the user has no skills in coding, it takes time. When the investing object changes, it will change all other functions in analyzing tool. Sometimes there are problems with Macro coding, when some adjustments are done, and if they do not fit properly, the Excel will bug.

4.5 Why Use Excel As Analyze Tool

This has been a big question for the thesis tool. In Siemens there are many different analyzing tools used. There are probably many outside programs that can be used for this purpose. The decision to use Excel was based on the fact that Excel is a program that all most everybody have skills to use. That makes the analyzing tool easy to design in familiar program. There was a vision to first have the raw data in Excel and then use analyses in Tableau Desktop. The Tableau analyzing tool is good when the Excel data is correctly organized and user can use it. Problems arise when the data was not easy to organize, and there are only few users in the Siemens that can use Tableau.

One of the most popular models for making prediction is the multiple linear regression model. This model is used to fit with outcome, target or response variables. The assumption is that following function approximates the relationship between the input and outcome variables. This have been used in Excel and presented charts.

Excel is also easy to modify for future perspective and it is cheaper to use for analyses. In the future the tool can have more functions, for example it can produce contracts directly when the values are correct. With the help of Macros this is fast and easy when the codes are right. In Excel the user can see better the parameters and adjust them.

4.6 Excel Macros

In the thesis tool Excel is supported by Microsoft Visual Basic for Applications (VBA). The VBA programming allows spreadsheets in excel faster than without. The programming codes are written in Visual Basic Editor (VBE) which enables writing codes, debugging, and code module organization environment. Implementing numerical methods and automating tasks with formatting and data can be done in VBA. One easy way to make Macros is using Macros Recorder. The Macros Recorder records actions and generate VBA code in the form of a Macro.

(Wikipedia, 2018)

The path to Excel VBA programming starts with the need to perform some task or problem that cannot be done with standard method with Excel. It can be a task that automatically create separate workbooks for all the rows in a dataset. For coding with Excel VBA, the user does not need to be an expert to start solving problems.

(Alexander & Kusleika, 2016)

In the thesis tool lots of Macros has been used to make processing faster and convenient for users. The VBA is built for many different projects in the future cases. The vision is that user does not need to fill out every calculation separately. This action makes the analysis faster and more correct. There are screenshots that explain the function of the Macros.



```

Sub Start_To_BaseInfo()
' Start_To_BaseInfo Macro
'
'
    Sheets("Base info").Select
End Sub
  
```

Figure 7: From sheet to next sheet function.

This code is used when user wants to move to another sheet like in this example from start sheet to Base Info sheet in the excel tool. The same function is used in all sheet changes in the analyses tool.

```

Sub ResetCosts_24_7()
Dim answer As VbMsgBoxResult

    answer = MsgBox("Do you want to Reset Costs?", vbYesNo, "Run Reset Costs")

    If answer = vbYes Then
        Range("C508:F523").Select
        Selection.ClearContents
        Range("C505").Select
    End If
End Sub

```

Figure 8: Reset Function.



Figure 9:Reset bottom.

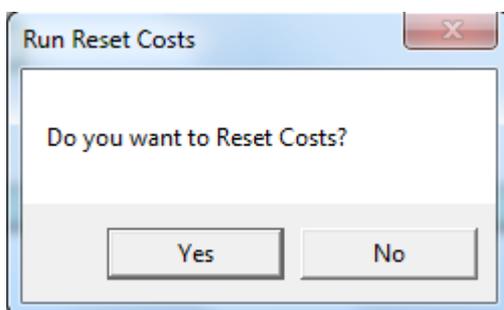


Figure 10: Run Reset Costs Message Box.

This Macro code makes the investing sheet calculation field to reset. This is made by a button that user can use if the field is needed. It is easy if all calculations are wrong and the user need to reset fast. This is also duplicated to all other parameters with reset buttons in the tool. When the user pushes the reset button, a message box appears: "Do you want to Reset Costs". If user push yes, then the function reset, and if no, nothing happens.

```

(Sub) SameCostAll_PreactorLicenses
' SameCostAll_PreactorLicenses Macro
'
'
Range("C43").Select
Application.CutCopyMode = False
ActiveCell.FormulaR1C1 = "=R40C2"
Range("C43").Select
Selection.AutoFill Destination:=Range("C43:C58"), Type:=xlFillDefault
Range("C43:C53").Select
Range("C43").Select
Selection.AutoFill Destination:=Range("C43:F43"), Type:=xlFillDefault
Range("C43:F43").Select
Range("D43").Select
Selection.AutoFill Destination:=Range("D43:D58"), Type:=xlFillDefault
Range("D43:D53").Select
Range("E43").Select
Selection.AutoFill Destination:=Range("E43:E58"), Type:=xlFillDefault
Range("E43:E53").Select
Range("F43").Select
Selection.AutoFill Destination:=Range("F43:F58"), Type:=xlFillDefault
Range("F43:F53").Select
Range("C37").Select
End Sub

```

Figure 11: Same Cost Function.

This commando makes all fields in investing parameter to cope with the price in all quarterlies. If the cost is the same every quarter, it is easy to push the button and the cost emerges automatically by Macros to all cells. This function is applied to all investing parameters.



Figure 12: Siemens Has All Costs and Costs Are Split Bottoms.

```

(Sub) SiemensHasAllCosts()
Worksheets("Siemens NCF").Range("C22").Formula = "=SUM(-'Summary of Costs'!$G$51)"
Worksheets("Siemens NCF").Range("C23").Formula = "=IF('Business Model'!C29>=1,SUM(-'Summary of Costs'!H51),0)"
Worksheets("Siemens NCF").Range("C24").Formula = "=IF('Business Model'!C29>=2,SUM(-'Summary of Costs'!I51),0)"
Worksheets("Siemens NCF").Range("C25").Formula = "=IF('Business Model'!C29>=3,SUM(-'Summary of Costs'!J51),0)"
Worksheets("Siemens NCF").Range("C26").Formula = "=IF('Business Model'!C29>=4,SUM(-'Summary of Costs'!K51),0)"
Worksheets("Siemens NCF").Range("C27").Formula = "=IF('Business Model'!C29>=5,SUM(-'Summary of Costs'!L51),0)"
Worksheets("Siemens NCF").Range("C28").Formula = "=IF('Business Model'!C29>=6,SUM(-'Summary of Costs'!M51),0)"
Worksheets("Siemens NCF").Range("C29").Formula = "=IF('Business Model'!C29>=7,SUM(-'Summary of Costs'!N51),0)"
Worksheets("Siemens NCF").Range("C30").Formula = "=IF('Business Model'!C29>=8,-SUM('Summary of Costs'!O51),0)"
Worksheets("Siemens NCF").Range("C31").Formula = "=IF('Business Model'!C29>=9,-SUM('Summary of Costs'!P51),0)"
Worksheets("Siemens NCF").Range("C32").Formula = "=IF('Business Model'!C29>=10,-SUM('Summary of Costs'!Q51),0)"
Worksheets("Siemens NCF").Range("C33").Formula = "=IF('Business Model'!C29>=11,-SUM('Summary of Costs'!R51),0)"
Worksheets("Siemens NCF").Range("C34").Formula = "=IF('Business Model'!C29>=12,-SUM('Summary of Costs'!S51),0)"
Worksheets("Siemens NCF").Range("C35").Formula = "=IF('Business Model'!C29>=13,-SUM('Summary of Costs'!T51),0)"
Worksheets("Siemens NCF").Range("C36").Formula = "=IF('Business Model'!C29>=14,-SUM('Summary of Costs'!U51),0)"
Worksheets("Siemens NCF").Range("C37").Formula = "=IF('Business Model'!C29>=15,-SUM('Summary of Costs'!V51),0)"

```

Figure 13: Siemens Has All Costs.

The function makes equations in the case that Siemens has all costs and customer none. These actions with formulas are shown in sheets Siemens Net Cash Flow, Siemens Net Percent Value, Sensitive Analyses Costs, Sensitive Analyses Net Income, Customer Net Cash Flow, Customer Net Percent Value, Customer Sensitive Analyses Cost and Customer Sensitive Analyses Net Income. In the thesis this case has been used and presented in chapter analyses tool.

```

Sub CostsAreSplitt()
Worksheets("Siemens NCF").Range("C22").Formula = "=SUM(-'Summary of Costs'!$G$51)/2"
Worksheets("Siemens NCF").Range("C23").Formula = "=IF('Business Model'!C29>=1,SUM(-'Summary of Costs'!H51)/2,0)"
Worksheets("Siemens NCF").Range("C24").Formula = "=IF('Business Model'!C29>=2,SUM(-'Summary of Costs'!I51)/2,0)"
Worksheets("Siemens NCF").Range("C25").Formula = "=IF('Business Model'!C29>=3,SUM(-'Summary of Costs'!J51)/2,0)"
Worksheets("Siemens NCF").Range("C26").Formula = "=IF('Business Model'!C29>=4,SUM(-'Summary of Costs'!K51)/2,0)"
Worksheets("Siemens NCF").Range("C27").Formula = "=IF('Business Model'!C29>=5,SUM(-'Summary of Costs'!L51)/2,0)"
Worksheets("Siemens NCF").Range("C28").Formula = "=IF('Business Model'!C29>=6,SUM(-'Summary of Costs'!M51)/2,0)"
Worksheets("Siemens NCF").Range("C29").Formula = "=IF('Business Model'!C29>=7,SUM(-'Summary of Costs'!N51)/2,0)"
Worksheets("Siemens NCF").Range("C30").Formula = "=IF('Business Model'!C29>=8,-SUM('Summary of Costs'!O51)/2,0)"
Worksheets("Siemens NCF").Range("C31").Formula = "=IF('Business Model'!C29>=9,-SUM('Summary of Costs'!P51)/2,0)"
Worksheets("Siemens NCF").Range("C32").Formula = "=IF('Business Model'!C29>=10,-SUM('Summary of Costs'!Q51)/2,0)"
Worksheets("Siemens NCF").Range("C33").Formula = "=IF('Business Model'!C29>=11,-SUM('Summary of Costs'!R51)/2,0)"
Worksheets("Siemens NCF").Range("C34").Formula = "=IF('Business Model'!C29>=12,-SUM('Summary of Costs'!S51)/2,0)"
Worksheets("Siemens NCF").Range("C35").Formula = "=IF('Business Model'!C29>=13,-SUM('Summary of Costs'!T51)/2,0)"
Worksheets("Siemens NCF").Range("C36").Formula = "=IF('Business Model'!C29>=14,-SUM('Summary of Costs'!U51)/2,0)"
Worksheets("Siemens NCF").Range("C37").Formula = "=IF('Business Model'!C29>=15,-SUM('Summary of Costs'!V51)/2,0)"
    
```

Figure 14: Cost Are Spliced Function.

In this function the equation with cost is split with Siemens and customer. These actions with formulas are shown in sheets Siemens Net Cash Flow, Siemens Net Percent Value, Sensitive Analyses Costs, Sensitive Analyses Net Income, Customer Net Cash Flow, Customer Net Percent Value, Customer Sensitive Analyses Cost and Customer Sensitive Analyses Net Income. The function is not used in this case in the thesis, but it is a good commando for other business cases in future.

Agreement Details	
Contract years	4
Contract begin	2018
Contract ends	2022

Figure 15: Agreement Details.

```

(General) (Declarations)
Private Sub Worksheet_Change(ByVal Target As Range)
Application.DisplayAlerts = False
Application.ScreenUpdating = False
Application.Calculation = xlCalculationManual
If Range("C27").Value <= 1 Then
Rows("45:58").EntireRow.Hidden = True
Rows("76:89").EntireRow.Hidden = True
Rows("107:120").EntireRow.Hidden = True
Rows("138:151").EntireRow.Hidden = True
Rows("169:182").EntireRow.Hidden = True
Rows("200:213").EntireRow.Hidden = True
Rows("231:244").EntireRow.Hidden = True
Rows("262:275").EntireRow.Hidden = True
Rows("293:306").EntireRow.Hidden = True
Rows("324:337").EntireRow.Hidden = True
Rows("355:368").EntireRow.Hidden = True
Rows("386:399").EntireRow.Hidden = True
Rows("417:430").EntireRow.Hidden = True
Rows("448:461").EntireRow.Hidden = True
Rows("479:492").EntireRow.Hidden = True
Rows("510:523").EntireRow.Hidden = True
Rows("541:554").EntireRow.Hidden = True
Rows("572:585").EntireRow.Hidden = True
Rows("603:616").EntireRow.Hidden = True
Rows("634:647").EntireRow.Hidden = True
Rows("665:678").EntireRow.Hidden = True
Rows("696:709").EntireRow.Hidden = True
Rows("727:740").EntireRow.Hidden = True
Rows("758:771").EntireRow.Hidden = True
Rows("789:802").EntireRow.Hidden = True
Rows("820:833").EntireRow.Hidden = True
Else

```

Figure 16: Agreement Year Calculation Function.

This function demands the rows and columns that are showed in sheets. The commando comes from agreement years and shows in sheets Base Info, Summary of Costs, Business Model, Project Saving, Summary of Equity and Summary of Net Income. The commando is created because it inserts automatically years and quarterlies for analyzing and enables the user to see the right fields.

Agreement Details	
Contract Years	4
Extra Years For Calculations	2
Total of Years	6

Figure 17: Agreement Details with extra years.


```

Sub Outcome_Based_Business_Model()
'Siemens
Worksheets("Summary of Net Income").Range("C23").Formula = "=SUM('Summary of Equity (OBBM)'!G25*('Business Model'!C21)*(1-'Business Model'!C21))"
Worksheets("Summary of Net Income").Range("C24").Formula = "=SUM('Summary of Equity (OBBM)'!G26*('Business Model'!C21)*(1-'Business Model'!C21))"
Worksheets("Summary of Net Income").Range("C25").Formula = "=SUM('Summary of Equity (OBBM)'!G27*('Business Model'!C21)*(1-'Business Model'!C21))"
Worksheets("Summary of Net Income").Range("C26").Formula = "=SUM('Summary of Equity (OBBM)'!G28*('Business Model'!C21)*(1-'Business Model'!C21))"
Worksheets("Summary of Net Income").Range("C27").Formula = "=SUM('Summary of Equity (OBBM)'!G29*('Business Model'!C21)*(1-'Business Model'!C21))"
Worksheets("Summary of Net Income").Range("C28").Formula = "=SUM('Summary of Equity (OBBM)'!G30*('Business Model'!C21)*(1-'Business Model'!C21))"
Worksheets("Summary of Net Income").Range("C29").Formula = "=SUM('Summary of Equity (OBBM)'!G31*('Business Model'!C21)*(1-'Business Model'!C21))"
Worksheets("Summary of Net Income").Range("C30").Formula = "=SUM('Summary of Equity (OBBM)'!G32*('Business Model'!C21)*(1-'Business Model'!C21))"
Worksheets("Summary of Net Income").Range("C31").Formula = "=SUM('Summary of Equity (OBBM)'!G33*('Business Model'!C21)*(1-'Business Model'!C21))"
Worksheets("Summary of Net Income").Range("C32").Formula = "=SUM('Summary of Equity (OBBM)'!G34*('Business Model'!C21)*(1-'Business Model'!C21))"
Worksheets("Summary of Net Income").Range("C33").Formula = "=SUM('Summary of Equity (OBBM)'!G35*('Business Model'!C21)*(1-'Business Model'!C21))"
Worksheets("Summary of Net Income").Range("C34").Formula = "=SUM('Summary of Equity (OBBM)'!G36*('Business Model'!C21)*(1-'Business Model'!C21))"
Worksheets("Summary of Net Income").Range("C35").Formula = "=SUM('Summary of Equity (OBBM)'!G37*('Business Model'!C21)*(1-'Business Model'!C21))"
Worksheets("Summary of Net Income").Range("C36").Formula = "=SUM('Summary of Equity (OBBM)'!G38*('Business Model'!C21)*(1-'Business Model'!C21))"
Worksheets("Summary of Net Income").Range("C37").Formula = "=SUM('Summary of Equity (OBBM)'!G39*('Business Model'!C21)*(1-'Business Model'!C21))"

'Customer
Worksheets("Summary of Net Income").Range("D23").Formula = "=SUM('Summary of Equity (OBBM)'!G25*('Business Model'!C22)*(1-'Business Model'!C22))"
Worksheets("Summary of Net Income").Range("D24").Formula = "=SUM('Summary of Equity (OBBM)'!G26*('Business Model'!C22)*(1-'Business Model'!C22))"
Worksheets("Summary of Net Income").Range("D25").Formula = "=SUM('Summary of Equity (OBBM)'!G27*('Business Model'!C22)*(1-'Business Model'!C22))"
Worksheets("Summary of Net Income").Range("D26").Formula = "=SUM('Summary of Equity (OBBM)'!G28*('Business Model'!C22)*(1-'Business Model'!C22))"
Worksheets("Summary of Net Income").Range("D27").Formula = "=SUM('Summary of Equity (OBBM)'!G29*('Business Model'!C22)*(1-'Business Model'!C22))"
Worksheets("Summary of Net Income").Range("D28").Formula = "=SUM('Summary of Equity (OBBM)'!G30*('Business Model'!C22)*(1-'Business Model'!C22))"
Worksheets("Summary of Net Income").Range("D29").Formula = "=SUM('Summary of Equity (OBBM)'!G31*('Business Model'!C22)*(1-'Business Model'!C22))"
Worksheets("Summary of Net Income").Range("D30").Formula = "=SUM('Summary of Equity (OBBM)'!G32*('Business Model'!C22)*(1-'Business Model'!C22))"
Worksheets("Summary of Net Income").Range("D31").Formula = "=SUM('Summary of Equity (OBBM)'!G33*('Business Model'!C22)*(1-'Business Model'!C22))"
Worksheets("Summary of Net Income").Range("D32").Formula = "=SUM('Summary of Equity (OBBM)'!G34*('Business Model'!C22)*(1-'Business Model'!C22))"
Worksheets("Summary of Net Income").Range("D33").Formula = "=SUM('Summary of Equity (OBBM)'!G35*('Business Model'!C22)*(1-'Business Model'!C22))"
Worksheets("Summary of Net Income").Range("D34").Formula = "=SUM('Summary of Equity (OBBM)'!G36*('Business Model'!C22)*(1-'Business Model'!C22))"
Worksheets("Summary of Net Income").Range("D35").Formula = "=SUM('Summary of Equity (OBBM)'!G37*('Business Model'!C22)*(1-'Business Model'!C22))"
Worksheets("Summary of Net Income").Range("D36").Formula = "=SUM('Summary of Equity (OBBM)'!G38*('Business Model'!C22)*(1-'Business Model'!C22))"
Worksheets("Summary of Net Income").Range("D37").Formula = "=SUM('Summary of Equity (OBBM)'!G39*('Business Model'!C22)*(1-'Business Model'!C22))"

```

Figure 20: Outcome Based Business Model Code.

Figure 19 and 20 are codes that works with two different buttons. The commando makes formulas from equity to the NCF tables in the tool. This function is better explained in chapter analyses tool. Under here is the buttons presented.



Figure 21: Business Model Buttons.

4.7 Payback Method

The payback investment rule means that the firm should only accept business cases if its cash flow pays back its initial investment within a prespecified period. The rule of the outcome based business model is that projects should have a positive NCF in two years after the project have started.

In some cases, the user knows the present value and cash flow of an investment opportunity, but the interest rate is missing. This is called the IRR that define the interest rate that sets the

NPV of the NCF calculation to zero. If there are multiple investments in a project case, IRRs rule is good to have. The IRR is a measurement of the expected return of investing in the project. The measurement means that the object having highest value is decided.

(Berk & DeMarzo, 2017)

For customers and suppliers, the payback and payoff are the major questions in projects. With outcome based business model the principle is based on long-term investment. Costs and income savings are analyzed over consecutive periods like months, quarters and years until a breakeven point is reached. The breakeven point often comes after a couple of years and that means supplier demand for several years contract for profitable business with customer. Where the forecast cumulative cost of the new project is balanced like payback for the investment, the project is expected to generate the digitalization savings.

4.8 Prototype

Prototyping is a method of obtaining early feedback on requirements by proving a working model of the expected product before actual tool. Prototype support the concept of progressive elaboration, because this is used in interactive cycle of mock-up creation, user experimentation, feedback generation, and prototype revision. When enough feedback cycle has been performed, the requirements obtained from the prototype model are sufficiently completed to use the working tool.

This thesis tool is a prototype that tests for new business cases in Siemens. The vision is to make the decisions for management and customer easy. There has been no such analyzing tool in use before and I hope it improves the decision making for new business cases. It also shows the key figures for projects that can be measured.

5 Analyses tool

In this chapter the thesis Excel tool is presented step by step. There are many screenshots that explains process. First sheet is presenting the agreement details for the project. The following screenshot presents it. No calculations are needed in this part.

SIEMENS
Ingenuity for life

 Next

Please fill out start information under the ranges.

Agreement Details	
Offer number	
Version number	

Customer	
Company	
Contact person	
Address	
Address 2	
City	
Post number	
Post Box	
Telefonnumber	
Email	

Sales Information	
Company	Siemens Osakeyhtiö
Division	Digital Factory
Contact person	
Address	Tarvonsalmenkatu 19
Address 2	
City	Espoo
Post number	02600
Post Box	
Telefonnumber	
Email	
Customer Center	

Figure 22: First sheet.

Under here the main tables in sheet one are showed.

Table 1: Agreement Details Part 1.

Agreement Details	
Offer number	
Version number	

Table 2: Customer Information.

Customer	
Company	
Contact person	
Address	
Address 2	
City	
Post number	
Post Box	
Telefonnumber	
Email	

Table 3: Supplier Information.

Sales Information	
Company	Siemens Osakeyhtiö
Division	Digital Factory
Contact person	
Address	Tarvonsalmenkatu 19
Address 2	
City	Espoo
Post number	02600
Post Box	
Telefonnumber	
Email	
Customer Center	

There is no need to fill out all the fields in this sheet. Its purpose is to make it easy for the user to organize the customer cases. Next step is to define how long the agreement with customer is. The red field must be filled by the user. The Macros will automatically calculate sheet outfit correctly. Thereafter the calculation with investing objects in the project can be proceeded. In this chapter management must decide with the customer what objects are included in the project. The following picture present the calculation field.



Base Details

Here in Base Details please fill out the calculations for the project. The summary is presented in next page. All fields with **red marks** are possible to change or fill out.



Agreement Details	
Contract years	4
Contract begin	2018
Contract ends	2022

Preactor Licenses and Additional Modules



Calculated Quarterly Cost [EUR]
5 410,00

Year	Q1	Q2	Q3	Q4
2018				
2019				
2020				
2021				
2022				

Total Cost [EUR]
0,00

Figure 23: Second sheet.

Table 4: Agreement Details Part 2.

Agreement Details	
Contract years	4
Contract begin	2018
Contract ends	2022

When agreement details have been decided, Excel tool automatically select fields to show for the user. Next picture presents the investing object calculations.

Table 5: Object Calculations Field.

Sinema RC				
Reset Costs		Same Cost All Quarterly		Top
Calculated Quarterly Cost [EUR]				
350,00				
Year	Q1	Q2	Q3	Q4
2018				
2019				
2020				
2021				
2022				
Total Cost [EUR]				
0,00				

Here the user sees the calculated quarterly cost for the investing object. The user can only write in the red field cells. When the user has inserted a value in the red field cell, it changes the color to green. But if it is negative, the color changes to dark red. The colors have been inserted for the user to be able to detect, if there is something wrong in the calculations. The years are automatically calculated from agreement details chapter. There are two buttons “Reset Costs” and “Cost All Quarterly”. With the “Reset Costs” user can reset the calculations field. The “Cost All Quarterly” button is used to automatically fill all cells at the same time. That makes the calculations faster and easier for the users. In the yellow field “Total Cost [EUR]” the total cost for object will be calculated. With the “Top” button user can go up to top of the sheet.

This action is repeated to every investing object with same outfit, because this way the user can easily fill with same function calculations. When the investing objects are calculated user can go to the next sheet where the summary of parameters are presented.



Summary of Costs

The Summary of costs is presented here. Please select Include or Not include for Demand and Inflation Category. Please fill out the red cells.

Inflation	
Item	Percent [%]
Product	4,0 %
Labour	4,0 %
Empty	0,0 %

Costs Are Split

Siemens Has All Costs

Project Services							
Parameter	Demand	Inflation Category	2018	2019	2020	2021	2022
Preactor Licenses and Additional Modules	Include	Product	0,00	0,00	0,00	0,00	0,00
Preactor	Not include	Product					
Sinema RC	Include	Product	0,00	0,00	0,00	0,00	0,00
Automation Maintenance	Not include	Product					
Cyber Security	Not include	Product					
Network Monitoring	Not include	Product					
Asset Intensity	Not include	Product					
Energy Analytics	Not include	Product					
Predictive Maintenance	Not include	Product					
Plant Simulation Licenses Work Requirement	Not include	Product					
Patch Management	Include	Empty	0,00	0,00	0,00	0,00	0,00
Whitelisting	Include	Empty	0,00	0,00	0,00	0,00	0,00
MindSphere IoT Licenses	Not include	Product					
Profitbus-DP Channel Measurement	Include	Product	0,00	0,00	0,00	0,00	0,00
Sales Phase Expenses (6 manmonth work, SG&A deducted)	Not include	Labour					
24/7 on Call Service	Not include	Labour					
PM	Not include	Labour					
Travel Expenses	Not include	Labour					
Prio Customer Car Center	Include	Product	0,00	0,00	0,00	0,00	0,00
Simatic Remote Service	Include	Labour	0,00	0,00	0,00	0,00	0,00
PCS 7 Maintenance Service	Include	Product	0,00	0,00	0,00	0,00	0,00
Maintenance Preview Services	Include	Product	0,00	0,00	0,00	0,00	0,00
Knowledge Development	Include	Product	0,00	0,00	0,00	0,00	0,00
Other	Include	Product	0,00	0,00	0,00	0,00	0,00
Other	Include	Product	0,00	0,00	0,00	0,00	0,00
Other	Include	Product	0,00	0,00	0,00	0,00	0,00
Total Cost Year [EUR]			0,00	0,00	0,00	0,00	0,00

Figure 24: Sheet three “Summary of Costs”.

Table 6: Inflation Category.

Inflation	
Item	Percent [%]
Product	4,0 %
Labour	4,0 %
Empty	0,0 %

Here the user can see all parameters that have been calculated in figure 24. The sheet also calculates the years automatically based from agreement details. In select field the user can decide if the parameter “include” or “not include” for outcome calculations. In inflation category the user can decide what the object is for inflation category. The inflation categories can be filled out in table 6. If user sees something wrong or weird numbers in parameters, it is easy to return to the previous sheet. The yellow fields present the total calculations of years in the project. Under this table the parameter percent of total summary is presented.



Figure 25: Cost are split, and Siemens has all costs buttons.

These two buttons decide how the cost is measured in the NCF. If user push the “Costs are split”, the cost is split with customer and Siemens in the NCF. The button “Siemens has all costs” sets all costs to Siemens and zero for customer in the NCF.

Table 7: Percent Summary of Parameters.

Percentage Difference to Sumtotal					
Parameter	2018	2019	2020	2021	2022
Preactor Licenses and Additional Modules	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Preactor					
Sinema RC	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Automation Maintenance					
Cyber Security					
Network Monitoring					
Asset Intensity					
Energy Analytics					
Predictive Maintenance					
Plant Simulation Licenses Work Requirement					
Patch Management	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Whitelisting	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
MindSphere IoT Licenses					
Profibus-DP Channel Measurement	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Sales Phase Expenses (6 manmonth work, SG&A deducted)					
24/7 on Call Service					
PM					
Travel Expenses					
Prio Customer Car Center	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Simatic Remote Service	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
PCS 7 Maintenance Service	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Maintance Preview Services	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Knowledge Development	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Other	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Other	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Other	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Here the user can see percent value of parameters. The percent values are calculated automatically from figure 24. This helps management to see which parameter has considerable or small impact. When the calculations are crystal clear, the user can proceed to next sheet. In the next sheet the user needs to fill out customer production values with different parameters. Next table is presenting the page.



Business Model

Please fill out the red cells Base Line Cost, Inflation Category, Production Capacity, Customer Interest and Siemens Interest. The Share and Risk Factor, Agreement Details and WACC affects on both models.

Shares and Risk Factor	
Siemens Share	0 %
Customer Share	0 %
Risk Factor	0 %
Total	0 %

Agreement Details	
Contract Years	4
Extra Years For Calculations	2
Total of Years	6

Weighted Average Cost of Capital (WACC)	
Siemens	0 %
Customer	0 %

Outcome Based Business Model

To use this please push "Use OBB model" button.

Customer Production					
Item	Base Line Costs		Inflation		
	Cost [EUR]	Saving Category	Inflation Category	Item	Percent [%]
Raw materials	0,00	Raw Material	Material	Material	3,0%
Packaging materials	0,00	Raw Material	Material	Labour	3,0%
Labour	0,00	Empty	Labour	Cost	3,0%
Energy	0,00	Energy	Cost	Empty	0,0%
Other (are part of variables)	0,00	Empty	Cost		
Fixed Factory Over Head Costs	0,00	Empty	Cost		
Depreciations	0,00	Empty	Empty		
	0,00	Empty	Empty		
	0,00	Empty	Empty		
	0,00	Empty	Empty		
Total Cost [EUR]	0,00				

Customer Production Capacity		
Years	Production	Sensitivity [%]
	Production Capacity [kg]	[%]
2018	0,00	0 %
2019	0,00	0 %
2020	0,00	0 %
2021	0,00	0 %
2022	0,00	0 %



Normal Project Model

This Model calculates the equity to Net Cash Flow Calculation For using this please push "Use Normal Project Model" button. Please fill out the red calls only. The Calculations are transferred directly to Summary of Net Income.



Equity	
Year	Equity [EUR]
2018	0,00
2019	0,00
2020	0,00
2021	0,00
2022	0,00

Figure 26: Sheet four "Business Model".

Table 8: Share Percent, Agreement Details and WACC.

Shares and Risk Factor	
Siemens Share	0 %
Customer Share	0 %
Risk Factor	0 %
Total	0 %

Agreement Details	
Contract Years	4
Extra Years For Calculations	2
Total of Years	6

Weighted Average Cost of Capital (WACC)	
Siemens	0 %
Customer	0 %

In table 8 the user decides percent share with supplier, customer and risk factor. The agreement details command the years, columns and rows with help of VBA code. WACC commands the formulas in KPI: s. Only the red marked cells can be filled in.

Outcome Based Business Model

To use this please push "Use OBB model" button.

Customer Production					
Base Line Costs		Inflation		Inflation	
Item	Cost [EUR]	Saving Category	Inflation Category	Item	Percent [%]
Raw materials	0,00	Raw Material	Material	Material	3,0%
Packaging materials	0,00	Raw Material	Material	Labour	3,0%
Labour	0,00	Empty	Labour	Cost	3,0%
Energy	0,00	Energy	Cost	Empty	0,0%
Other (are part of variables)	0,00	Empty	Cost		
Fixed Factory Over Head Costs	0,00	Empty	Cost		
Depreciations	0,00	Empty	Empty		
	0,00	Empty	Empty		
	0,00	Empty	Empty		
	0,00	Empty	Empty		
Total Cost [EUR]	0,00				

Customer Production Capacity		
Years	Produktion	Sensitivity [%]
Year	Production Capacity [kg]	[%]
2018	0,00	0%
2019	0,00	0%
2020	0,00	0%
2021	0,00	0%
2022	0,00	0%



Figure 27: Customer Parameter Value.

In the outcome based business model the user needs to fill in the red marked cells. The user can decide the cost names by project in table of “Customer Production”. In this case they include customers raw material, packing material, labor, energy, other, fixed factory over head costs (FFOH) and depreciations. The “other” parameter is part of variables that are the cost of our cooking waste bones plus vegetable after cooking in this case. In other business cases it can be something else that suits the project. The saving category column decides what percent category the item affects in the equity calculations. The percent are described in sheet of “Saving in Outcome Based Business Model” (Table 11). Inflation rate can be adjusted here, and it uses same method than in the sheet “Summary of Costs”.

Table 9: Customer Production Capacity.

Customer Production Capacity		
Years	Produktion	Sensitivity [%]
Year	Production Capacity [kg]	[%]
2018	0,00	0%
2019	0,00	0%
2020	0,00	0%
2021	0,00	0%
2022	0,00	0%

Use Outcome Based Business Model

Here the customer’s production capacity is measured. The numbers are taken from the customer and the sensitivity column is for each year. The sensitivity percent affect in the outcome based business model’s calculation of equity. If the user wants to use this business model, the green button needs to be push.

Table 10: Normal Project Model.**Normal Project Model**

This Model calculates the equity to Net Cash Flow Calculation. For using this please push "Use Normal Project Model" button. Please fill out the red cells only. The Calculations are transferred directly to Summary of Net Income.

Use Normal
Project Model

Equity	
Year	Equity [EUR]
2018	0,00
2019	0,00
2020	0,00
2021	0,00
2022	0,00

In the normal project model, the user can use direct equity for NCF calculations. This function has been inserted, if user does not want to use the outcome based business model. Here is the same principle that is, if user want to use this model, the green button needs to push. The next two sheets in the tool are calculations for outcome based business model, the normal model is not affected there.

Table 11: Project Savings in Outcome Based Business Model.**Project Savings in Outcome Based Business Model**

The savings are defined in **red cells**. The savings are based on equity for the production in Outcome Based Business Model. Please fill out **the red cells**.

Savings		
Year	Parameter	Percent [%]
2018	Energy	0,0 %
	Raw Material	0,0 %
	Empty	0,0 %
2019	Energy	0,0 %
	Raw Material	0,0 %
	Empty	0,0 %
2020	Energy	0,0 %
	Raw Material	0,0 %
	Empty	0,0 %
2021	Energy	0,0 %
	Raw Material	0,0 %
	Empty	0,0 %
2022	Energy	0,0 %
	Raw Material	0,0 %
	Empty	0,0 %

In the table 11 the user must decide the increase in saving by percent in future years. There is also "empty" in every year, and that is because the formula needs it to each year. The years in white cells are automatically calculated by agreement details.

Summary of Equity for Outcome Based Business Model

Here is the Baseline Cost, Production, Benefit and Key Performance Indicator Calculations. The calculations are automatically calculated.

Years	Base Cost Calculation	Produktion			Net Income	Key Performance Indicator
Year	[EUR]	Production [kg]	Difference [kg]	Difference Percent [%]	[EUR]	[EUR/kg]
2018	0,00	0,00	0,00	0,0 %	0,00	0,00
2019	0,00	0,00	0,00	0,0 %	0,00	0,00
2020	0,00	0,00	0,00	0,0 %	0,00	0,00
2021	0,00	0,00	0,00	0,0 %	0,00	0,00
2022	0,00	0,00	0,00	0,0 %	0,00	0,00

Figure 28: Equity Calculations to Outcome Based Business Model.

Figure 28 shows the customer's production costs each year in the future. The yellow cell shows functions production capacity [kg], difference [kg] and difference percent [%]. The difference [kg] is the increase or decrease in kilogram from last year. The following formula shows the calculation:

$$\text{Kilogram Difference [kg]} = \text{Last Year Production [kg]} - \text{New Year Production [kg]} \quad (8)$$

The last formula is different in percent that is used for base production cost calculation. The equation is following.

$$\frac{\text{New Year Production [kg]} - \text{Last Year Production [kg]}}{\text{Last Year Production [kg]}} = \text{Percent Difference [%]} \quad (9)$$

Table 12: Base Cost Calculation in the Outcome Based Business Model.

Base Cost Calculation
[EUR]
0,00
0,00
0,00
0,00
0,00

The cost calculation is calculated with the following equation:

$$\begin{aligned}
 \text{Base Cost Calculation} &= (\text{Raw Material Cost} * \text{Percent increasing \%} \\
 &* (\text{Rawmaterial Saving \%})) \\
 &+ (\text{Packing material Cost} * \text{Percent increasing \%}) + \text{Labour Cost} \\
 &+ (\text{Energy Cost} * \text{Percent increasing \%} * (\text{Energy saving \%})) \\
 &+ \text{Other Cost} + \text{FFOH Cost} + \text{Depreciations Cost}
 \end{aligned}
 \tag{10}$$

Table 13: Key Performance Indicators [EUR/kg]

Key Performance Indicator
[EUR/kg]
0,00
0,00
0,00
0,00
0,00

The KPI measurements are calculated with equation:

$$\text{KPI} \left[\frac{\text{EUR}}{\text{kg}} \right] = \frac{\text{Total sum of Base Cost Calculation [EUR]}}{\text{Production [kg]}}
 \tag{11}$$

Next step in the outcome based business model is calculating the NI. The next table is presenting the data and the NI is each year.

Table 14: Net Income Calculation.

Net Income
[EUR]
0,00
0,00
0,00
0,00
0,00

Here the user can see the benefit in the yellow cells. The last two years are summed from last year's figures due to future calculations with the project. The NI measurement is calculated with equation:

$$\text{Net Income [EUR]} = \left(\text{Base line KPI} \left[\frac{\text{EUR}}{\text{kg}} \right] - \text{Demand Year KPI} \left[\frac{\text{EUR}}{\text{kg}} \right] \right) * \text{Demand Production [kg]}
 \tag{12}$$

Summary of Net Income

Net Income calculation is presented in the table. The share comes from business model sheet.

Net Income		
Year	Siemens [EUR]	Customer [EUR]
2018	0,00	0,00
2019	0,00	0,00
2020	0,00	0,00
2021	0,00	0,00
2022	0,00	0,00

Figure 29: Summary of Net Income.

In the “Summary of Net Income” sheet the equity is calculated for Siemens and the customer. These values are calculated based on the share percent in sheet of “Business Model” (Figure 26). The equities are moved directly to the NCF and separately to Siemens and the customer. After this comes the NCF sheets. First the Siemens NCF sheet is presented and then the Customer NCF in the tool. In this thesis are only Siemens sheet presented, because the customers sheets have same structure.

Siemens Net Cash Flow Calculation

The Net Cash Flow Calculations are presented here.
The table Siemens NCF calculation execute automatic calculations, there is no need to fill out numbers.

Siemens Net Cash Flow Calculation					
Year	Costs [EUR]	Net Income Siemens [EUR]	Net Cash Flow Siemens [EUR]	Present Value With WACC [EUR]	Cumulativ Net Cash Flow Siemens [EUR]
2018	0,00	0,00	0,00	0,00	0,00
2019	0,00	0,00	0,00	0,00	0,00
2020	0,00	0,00	0,00	0,00	0,00
2021	0,00	0,00	0,00	0,00	0,00
2022	0,00	0,00	0,00	0,00	0,00
2023	0,00	0,00	0,00	0,00	0,00
2024	0,00	0,00	0,00	0,00	0,00

Figure 30: Siemens Net Cash Flow Calculation.

The years are automatically calculated from table 8 to the NCF calculation. The cost [EUR] is produced from the sheet “Summary of Costs” (Figure 24). The function is calculating each year summary to the cells. The Siemens NI column is calculated from equity each year and multiplied by Siemens share and risk factor. Following equation presents that:

$$\text{Siemens Net Income[EUR]} = (\text{Equity [EUR]} * \text{Siemens Share[\%]} * (1 - \text{Risk Factor[\%]})) \quad (13)$$

The normal NCF column is calculated by cost minus NI. The formula is following.

$$\text{Net Cash Flow} = \text{Cost [EUR]} - \text{Net Income [EUR]} \quad (14)$$

Then the PV with WACC is calculated by following formula.

$$\text{Present Value [EUR]} = \frac{\text{Future Value [EUR]}}{(1 + r)^t} \quad (15)$$

The r is WACC and t period. The Siemens Cumulative NCF is calculated by the summary of costs, NI and previews years NCF. The following equation will present that:

$$\begin{aligned} \text{Siemens Net Cash Flow[EUR]} & \quad (16) \\ & = \text{Cost [EUR]} + \text{Siemens Benefit [EUR]} + \text{Last Year Net Cash Flow[EUR]} \end{aligned}$$

The equity in the calculation changes to right year in the function. There is a color rule in the cells that shows the outcome in cumulative NCF. If the summary is negative it shows red cell, and green cells when it is positive. The next chart presents the NPV profile and it shows a table value with WACC and NPV.

Table 15: NPV profile for Siemens.**NPV Profile Siemens**

The table present the Net Present Value (NPV) and Weighted Average Cost of Capital (WACC). Here you can see when the NPV goes Negative or Positive depending on WACC. You must fill out the formula manual from Net Cash Flow.

WACC	Scenario Normal Value	
	+NPV: Accept	-NPV: Reject
5 %	0,00	0,00
6 %	0,00	0,00
7 %	0,00	0,00
8 %	0,00	0,00
9 %	0,00	0,00
10 %	0,00	0,00
11 %	0,00	0,00
12 %	0,00	0,00
13 %	0,00	0,00
14 %	0,00	0,00
15 %	0,00	0,00
16 %	0,00	0,00
17 %	0,00	0,00
18 %	0,00	0,00
19 %	0,00	0,00
20 %	0,00	0,00
21 %	0,00	0,00
22 %	0,00	0,00
23 %	0,00	0,00
24 %	0,00	0,00
25 %	0,00	0,00
26 %	0,00	0,00
27 %	0,00	0,00
28 %	0,00	0,00
29 %	0,00	0,00
30 %	0,00	0,00
31 %	0,00	0,00
32 %	0,00	0,00
33 %	0,00	0,00
34 %	0,00	0,00
35 %	0,00	0,00
36 %	0,00	0,00
37 %	0,00	0,00
38 %	0,00	0,00
39 %	0,00	0,00
40 %	0,00	0,00
41 %	0,00	0,00
42 %	0,00	0,00
43 %	0,00	0,00
44 %	0,00	0,00
45 %	0,00	0,00

In this table the user can see the breakeven point for NPV. There is a chart that present better than in the KPI sheet. The formulas need to be insert manually for calculations.

Under here the chart is presented.



Figure 31: NPV profile Siemens Chart.

In this chart we can see that the WACC percent can be high which means that the investment is profitable. The NPV is measured in the y-axel and WACC present in the x-axel. The green color presents a positive NPV and the red color a negative NPV. Next sheet shows the sensitivity analyses cost.



The Sensitivity Analysis Siemens Cost Calculations are presented here. The table Siemens NCF calculation makes automatic calculations, there is no need to fill out numbers.

Sensitivity Analysis Siemens Cost

Scenario Cost [-%]					
Siemens Net Cash Flow Calculation					
Year	Costs [EUR]	Net Income Siemens [EUR]	Net Cash Flow Siemens [EUR]	Present Value With WACC [EUR]	Cumulativ Net Cash Flow Siemens [EUR]
2018	0,00	0,00	0,00	0,00	0,00
2019	0,00	0,00	0,00	0,00	0,00
2020	0,00	0,00	0,00	0,00	0,00
2021	0,00	0,00	0,00	0,00	0,00
2022	0,00	0,00	0,00	0,00	0,00
2023	0,00	0,00	0,00	0,00	0,00
2024	0,00	0,00	0,00	0,00	0,00

Scenario Cost [+%]					
Siemens Net Cash Flow Calculation					
Year	Costs [EUR]	Net Income Siemens [EUR]	Net Cash Flow Siemens [EUR]	Present Value With Interest [EUR]	Cumulativ Siemens Net Cash Flow [EUR]
2018	0,00	0,00	0,00	0,00	0,00
2019	0,00	0,00	0,00	0,00	0,00
2020	0,00	0,00	0,00	0,00	0,00
2021	0,00	0,00	0,00	0,00	0,00
2022	0,00	0,00	0,00	0,00	0,00
2023	0,00	0,00	0,00	0,00	0,00
2024	0,00	0,00	0,00	0,00	0,00

Figure 32: Sensitivity Analyses Costs.

This sheet is similarly to the original NCF but there are inserted percent values that changes costs. These are presented better in the KPI sheet with charts. The used percent error is plus 20 percent and minus 20 percent (Table 17). The next sheet is similar to the sensitivity analyses cost, but there the NI is adjusted with percent value.



Here is the Sensitivity Analysis Siemens Net Income Calculations presented. The table Siemens NCF calculation make automatic calculations, there is no need to fill out numbers.

Sensitivity Analysis Net Income Siemens

Scenario Net Income [-%]						
Siemens Net Cash Flow Calculation						
Year	Costs [EUR]	Net Income Siemens [EUR]	Net Cash Flow Siemens [EUR]	Present Value With WACC [EUR]	Cumulativ Net Cash Flow Siemens [EUR]	
2018	0,00	0,00	0,00	0,00	0,00	
2019	0,00	0,00	0,00	0,00	0,00	
2020	0,00	0,00	0,00	0,00	0,00	
2021	0,00	0,00	0,00	0,00	0,00	
2022	0,00	0,00	0,00	0,00	0,00	
2023	0,00	0,00	0,00	0,00	0,00	
2024	0,00	0,00	0,00	0,00	0,00	

Scenario Net Income [+%]						
Siemens Net Cash Flow Calculation						
Year	Costs [EUR]	Net Income Siemens [EUR]	Net Cash Flow Siemens [EUR]	Present Value With WACC [EUR]	Cumulativ Siemens Net Cash Flow [EUR]	
2018	0,00	0,00	0,00	0,00	0,00	
2019	0,00	0,00	0,00	0,00	0,00	
2020	0,00	0,00	0,00	0,00	0,00	
2021	0,00	0,00	0,00	0,00	0,00	
2022	0,00	0,00	0,00	0,00	0,00	
2023	0,00	0,00	0,00	0,00	0,00	
2024	0,00	0,00	0,00	0,00	0,00	

Figure 33: Selectivity Analyses Net Income.

In here the same principle is used than in the previous sheet. The selectivity present value is minus 20 percent and plus 20 percent (Table 18). These actions are also presented better in KPI sheet. Next comes the Cumulative NCF chart.

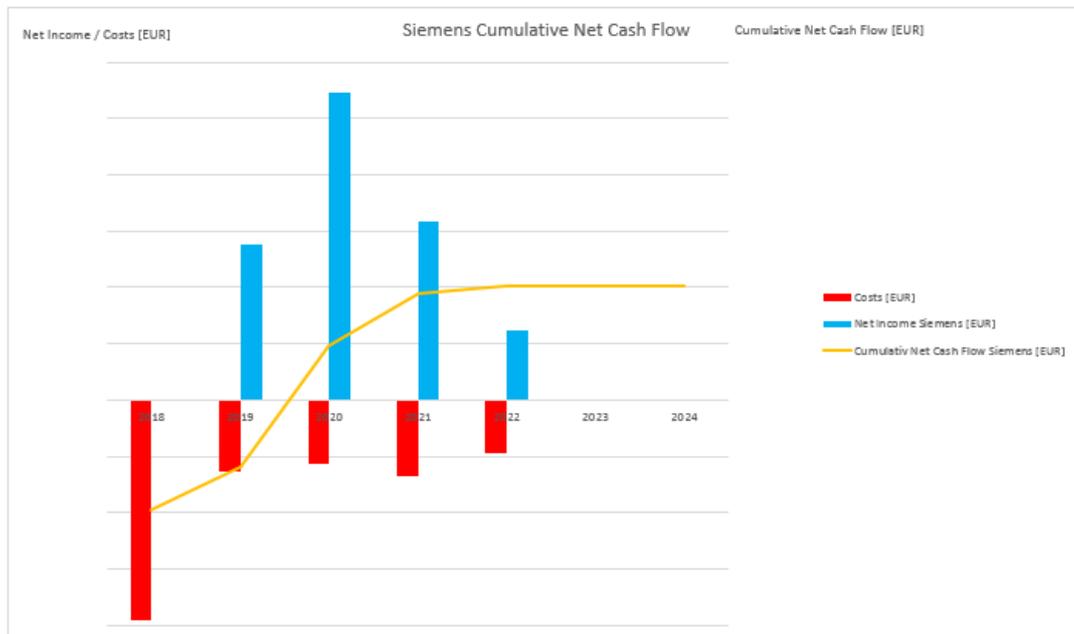


Figure 34: Cumulative Net Cash Flow Siemens Chart.

In the chart on the left-side is NI / cost [EUR] and on the right-side cumulative NCF [EUR]. The NI / cost measurements are presented in clustered columns and Cumulative NCF in lines. The costs are the red colored clustered columns and Siemens net income blue cluster columns. In this chart after 2022 we can see that cumulative NCF line goes vertical,

cost and NI stops. This means that the agreement with Siemens ends and customer has all advantage for the project. With this chart the breakeven point can be pointed with Siemens cumulative NCF and that shows when the line became positive.

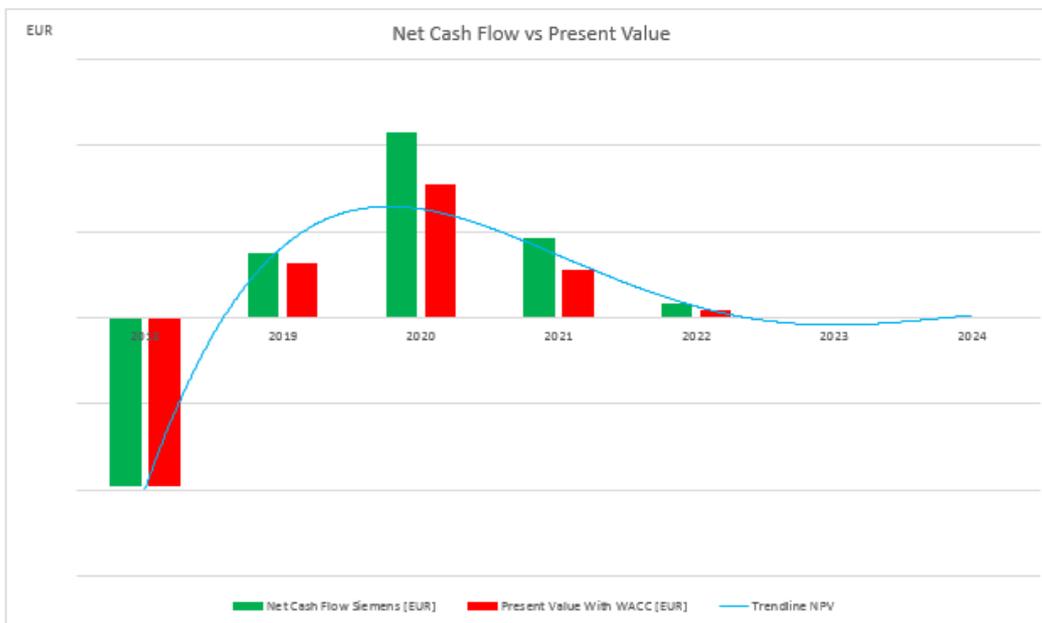


Figure 35: Net Cash Flow vs. Present Value.

This chart shows in green NCF, red PV and in blue trendline the cumulative NCF. It is similar chart to figure 34 and this chart is important for showing the PV with the NCF. The next sheet has the sensitivity analyzing for costs and NI. In the NPV formula the decided WACC percent from sheet “Business Model” has been used for analyses. The analyses for the chart shows that the values of the first year negative, because of the investment that has been made, and the net incomes has not started. We can see that after the second year the values are changing to positive and that is good.

Table 16: Siemens KPI: s Scenario.

Scenario Normal Value	
NPV with WACC	0,00 €
NPV without WACC	0,00 €
IRR	#NUM!
Payback Year	#DIV/0!
Profitability Index	#DIV/0!
Average Accounting Return	#DIV/0!

This table tells all KPI measurements that are needed in a project investment. First there is the NPV with WACC which is calculated by formula (3). The NPV without WACC has

the same formula as NPV but without WACC. The IRR is calculated by formula (4). The payback year is calculated by year when the last negative cumulative NCF is minus, then the last cumulative NCF negative value divided with next NI value to cumulative NCF. The profitability index is calculated by a formula (5). The ARR is calculated by a formula (6).

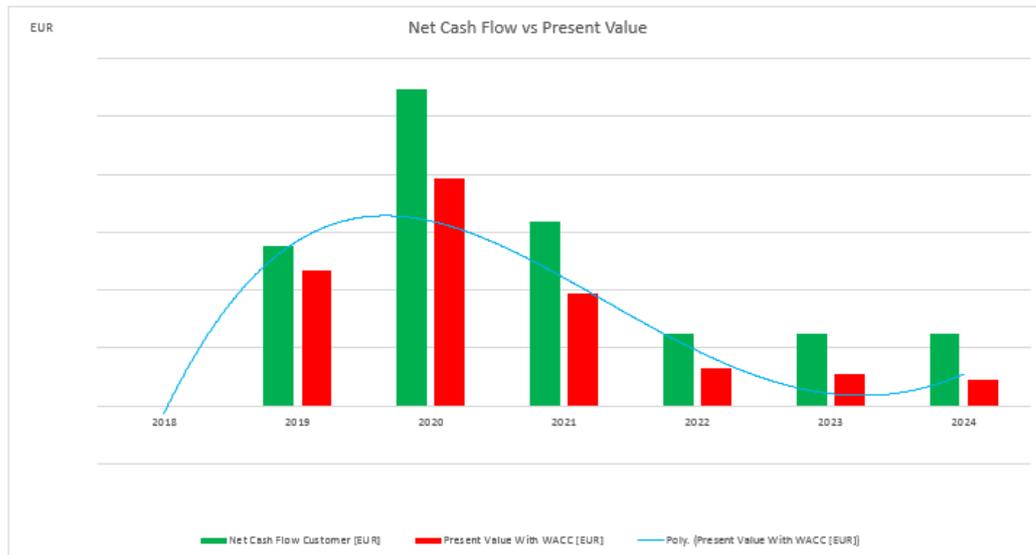


Figure 36: Customer Net Cash Flow vs Present Value and Trendline.

Here is the customer's chart with NCF vs PV and trendline. It is like the Siemens chart with same values. The difference is that the columns and trendline is positive during the whole project timeline. This is because customer has not invested in the project. The customer's KPI: s are not presented in here, because the formulas need a negative value. That means an investment, but in the outcome based business model customers do not have any investments. The KPI: s are useless in this case for a customer.

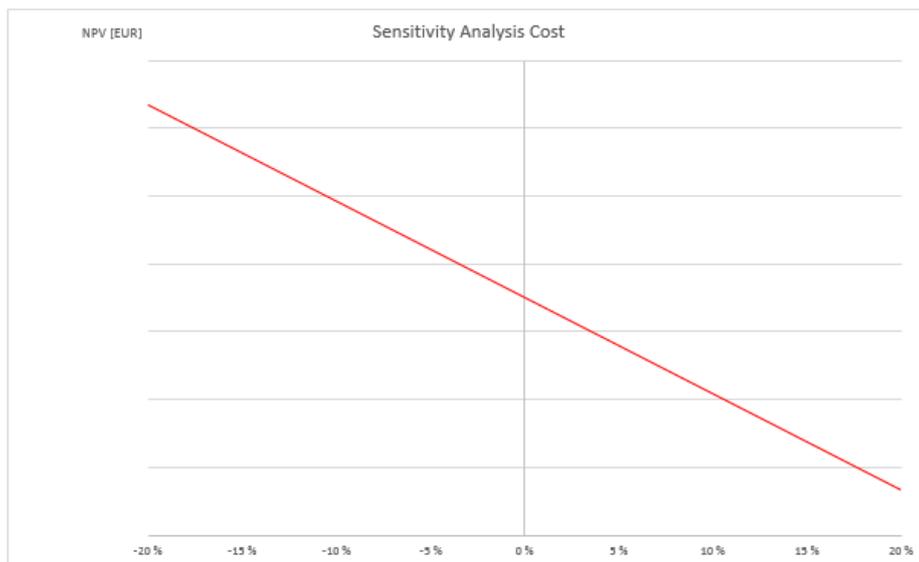


Figure 37: Sensitivity Analysis Costs Chart.

This chart presents the sensitivity analyzing of costs with a value of -20 percent and +20 percent error. Next the KPI: s are presented of that calculations.

Table 17: Sensitivity Analyses Costs KPI: s.

Sensitivity Analysis Cost

Sensitivity Analysis Cost [-%]	
Sensitive Precent	-20 %
NPV with WACC	0,00 €
NPV without WACC	0,00 €
IRR	#NUM!
Payback Year	#DIV/0!
Profitability Index	#DIV/0!
Average Accounting Return	#DIV/0!

Sensitivity Analysis Cost [+%]	
Sensitive Precent	20 %
NPV with WACC	0,00 €
NPV without WACC	0,00 €
IRR	#NUM!
Payback Year	#DIV/0!
Profitability Index	#DIV/0!
Average Accounting Return	#DIV/0!

With these analyses we can see that cost percent error has a considerable impact on NCF. When the costs are -20 percent, the KPI: s are very good, and the project is a profitability investment. But with the +20 percent cost the KPI: s is bad and show that the project is sensitive.

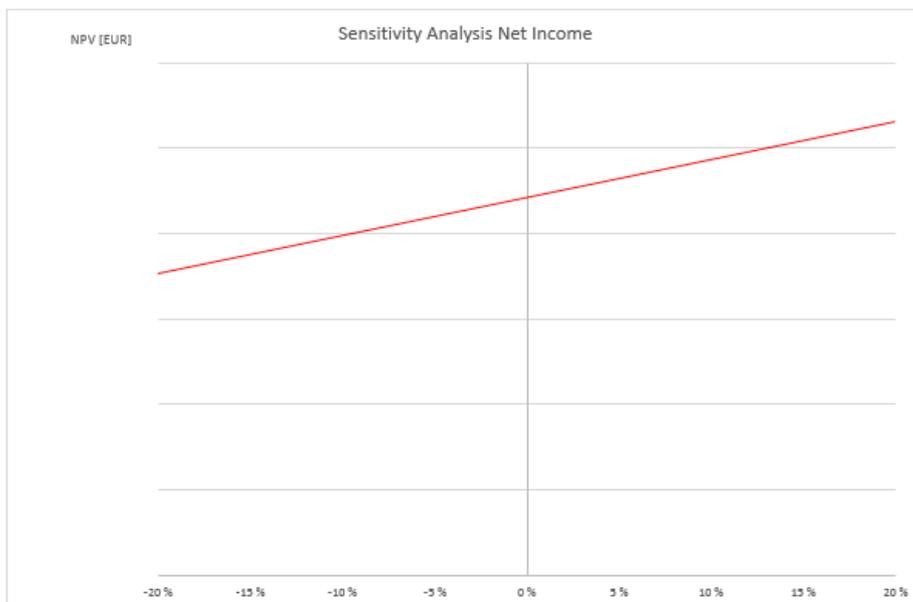


Figure 38: Sensitivity Analyses Net Income.

Here are the sensitivity analyses of NI and the next figure present the KPI: s.

Table 18: Sensitivity Analyses KPI: s.

Sensitivity Analysis Net Income

Sensitivity Net Income [-%]	
Sensitive Precent	-20 %
NPV with WACC	0,00 €
NPV without WACC	0,00 €
IRR	#NUM!
Payback Year	#DIV/0!
Profitability Index	#DIV/0!
Average Accounting Return	#DIV/0!

Sensitivity Net Income [+%]	
Sensitive Precent	20 %
NPV with WACC	0,00 €
NPV without WACC	0,00 €
IRR	#NUM!
Payback Year	#DIV/0!
Profitability Index	#DIV/0!
Average Accounting Return	#DIV/0!

The analyses of the net income shows that it is really sensitive if the net income is -20 percent. The NPV value is minus which is a sign that it is not a good investment. With the 20 percent plus value the KPI: s are good, and the user can see that the project investment is profitable. There are also some parameters and sheets for customer, but in this case when they are not investing, it is not possible to have values with KPI: s.

6 Interviews

Like it is mentioned in PMBOK®, the interviews must be done both internally and externally. The interviewed internal persons have worked in the case. With the interviews there is a formal approach to discover information internally from the supplier and stakeholder point of view. The questions are prepared for people who are experienced project participants, stakeholders, and subject matter experts that can identify and define the features and functions of the thesis tool.

(PMBOK®, 2013)

The thesis tool has been only used internally and because of that the interviews were made for people who have worked with the project. The following question has been sent for the interviews. I have interviewed my superiors Juha Kuntanen and Markku Naumanen. First comes Juha Kuntanen's answers. Same questions were used for both. The answers have been given before the incorrect designs were corrected. The sheet names are not the same in the final tool, so here the old terms were used:

1. Question: Has the thesis tool given the expected result?

Answer: Yes, with the outcome tool we can do economical analyses and measure the risks for project investment better. This business model is of course one of the kind and unique.

2. Question: Should the outlook be different?

Answer: The tool has a bit too much of measurements.

3. Question: Is the tool user-friendly for people who do not have knowledge about the KPI: s?

Answer: The topics in the tool have to be well known for the user to be able to use the tool and measurements. It is useful when these things are known.

4. Question: Should the thesis tool have more KPI measurements or something else?

Answer: The measurement group should be changeable. With these actions it is possible with more KPI: s in the tool.

5. Question: Do you think this tool will be used in the future business cases?

Answer: I believe it is useful in the future projects perspective. We can calculate from the Outcome Based Business Model the equity.

6. Question: Are the diagrams easy to understand or should they be modified?

Answer: The charts are easy to read and understand.

7. Question: Some other comments about the thesis tool?

Answer: Empty.

Under here are Markku Naumanen's answers to the interview.

1. Question: Has the thesis tool given the expected result?

Answer: After the bug, yes.

2. Question: Should the outlook be different?

Answer: The outlook is clear, navigation is easy, but in sheet base info there should be better specified users input cells. For example, with xxx = free input value.

3. Question: Is the tool user-friendly for people who do not have knowledge about the KPI: s?

Answer: There should be better defined "costs" and "incomes" with different sheets. One part in sheet "Project calculation" the values should be good to move to "Base Info" sheet. "Summary of Parameters" costs, this sheet is easy to understand the calculation. The equity is more difficult to understand.

4. Question: Should the thesis tool have more KPI measurements or something else?

Answer: Yes, the equity should be directly defined with month/quarterly/year (This comes up with 19/20 cases, the outcome based business model is unusual.

5. Question: Do you think this tool will be used in the future business cases?

Answer: Absolute, after the problems have been fixed that have been measurements in the preview's answers.

6. Question: Are the diagrams easy to understand or should they be modified?

Answer: Diagrams are clear and easy to understand.

7. Question: Some other comments about the thesis tool?

Answer: "Basic rule" simple is beautiful, all is not needed to be visible meaning that some parts of the basic calculations could be hidden (for example using drop down menu)

It was good to send the questions for the users, because then I had the feedback from the tool. All the problems mentioned in the answers have been fixed and in the final presentation all partners were happy with the final version of the tool.

7 CONCLUSION

In this section the conclusions are presented. The best conclusion has been offered in the thesis tool. The creation of the thesis tool has been interesting, and I have learned many new things about project investments. In the beginning of the thesis work there was a vision of a decision tree function for new project. This supports better decisions in the sales department of Siemens and saves resources. There have been many steps back and forward when the thesis tool has been made. First there was no straight plan of what kind of program is suitable for the decision tree or what it should do. First, we used Excel and then Tableau and then again Excel.

We decided with the managers in Siemens that Excel is the best working tool for the thesis work. That was decided because it is user-friendly, and most employees can use it. It is also easy to make changes in the tool functions with Excel. With Tableau program it could be possible to make similar analyses, but the data had to be structured in a different way. When I tried to reorganize the data for Tableau, it took a lot of time and was not regarded as needed for now. In the future it can be possible to use Tableau and Excel in parallel.

As a final observation for the thesis to Siemens, it is a good analyzing tool for future business cases. When users use the tool, they gain an understanding what the KPI:s are and how to use them. This is supported by the amount of KPI:s in the tool that need to be inserted manually for calculations. That can also be seen as the biggest negative part in the thesis tool, but it gives the users a better understanding. The thesis tool can save about 10 000-50 000 euros, depending of the project size and agreement length.

I think the price is right, because without this tool the analyses are uncertain in regard to the result. The tool is not the only one used for project calculations, but it is used together with other programs.

For future improvement of the thesis tool it can be modified to have similar other functions beside with the actual costs and net incomes in a project. With this the project management can see the predicted and actual result. This makes more value for the tool and gives better results. For example, the management can see if the project value increase. With the tool, the management can change future investments and see if they reach the wanted result. The sensitivity analyses can have both NI and costs in same diagram. That's shows the breakeven point for both values at the same time with NPV.

Challenges and success

In the beginning of the bachelor's thesis the outcome based business model was new technique. There are quite low amounts of information available in the theories and articles. That makes the thesis interesting and motivating. The main working tool for analyses is Excel and calculations have been successfully working so far. There have been minor problems in defining the coding and graphs determination. On the other hand, it has been a success when the difficult calculations give the wanted result.

In my opinion, the thesis work has been a successful way of learning project investment. I have learned how to make VBA codes with Excel, how to manage the tool structure, communicate with different managers in Siemens and make analyses with different KPI: s. The learning of all the skills have required time, made the project interesting and created many new ideas. There are also many ways for designing the tool. First, it was good to have all opportunities and ideas for making the tool. In the end of the thesis project, I have made own decisions that support best the purpose, like the outfit and calculation formulas. The thesis tool is designed for many projects with different agreements, length, investments and benefits.

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