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ESTABLISHING A BIGGER PICTURE

Survival Scenarios for an ICT Start-up Company

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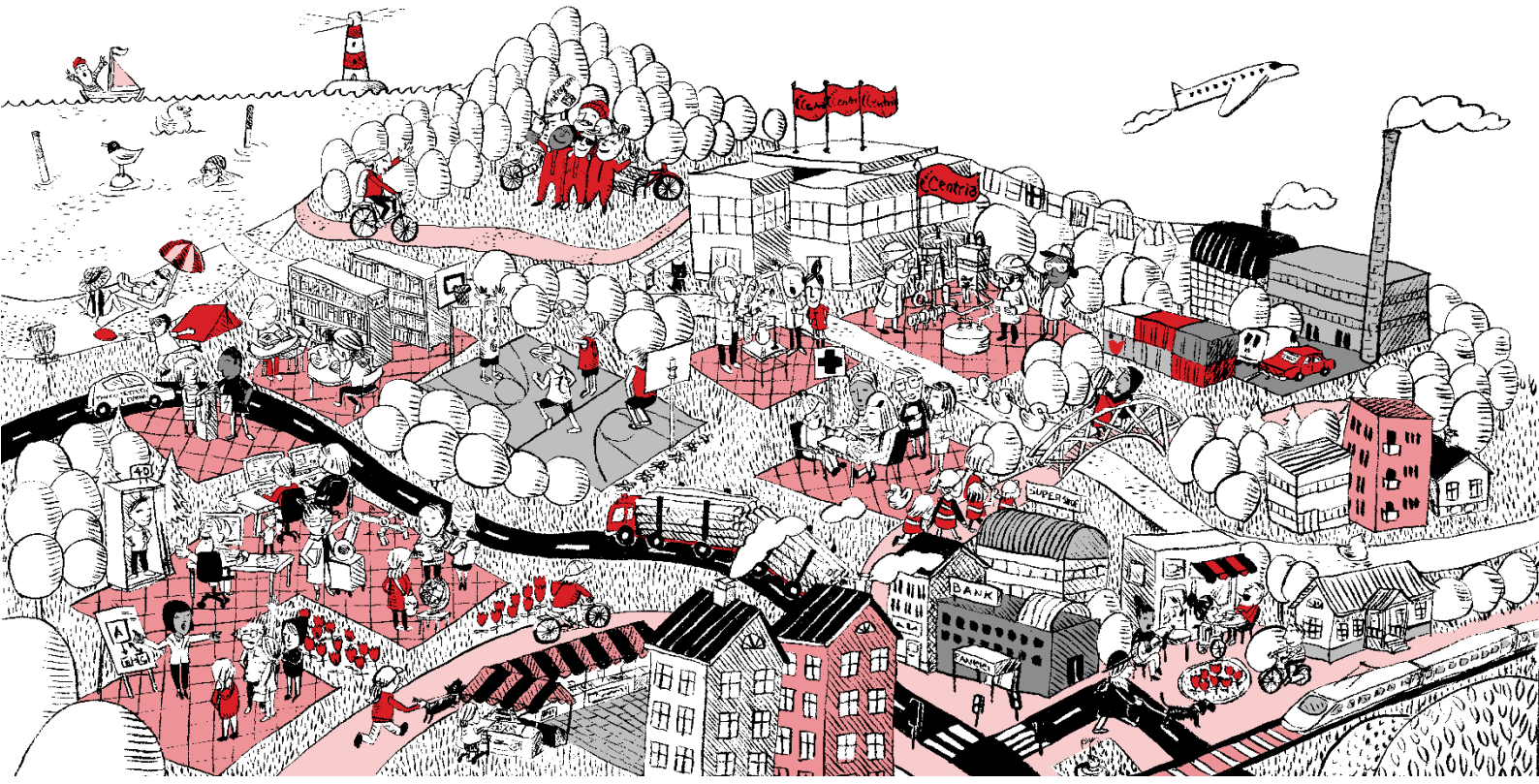

ABSTRACT

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The starting point for this thesis was the need for the commissioning company, EMPK Oy to establish a clear picture of the company's current stage of development and to receive suggestions for further strategic planning. The thesis was conducted as a case study, the object of which was to utilise no more than three relevant analysis tools to analyse the situation of the company and to draw conclusions from the analysis.

The main analysis tools used were the Business Model Canvas, Innovation Landscape Map and the Technological Readiness Level. The method of the research was document analysis, and the document material was collected from the internal notes, memos and session notes archived within EMPK Oy's internal documents.

The results of the analyses revealed that many elements in the company are already at an advanced level, whereas others need further work. For example, a flow of feedback from customers and test users would provide vital information for business development as well as product development. Finally, recommendations were made to the company management in the form of possible scenarios for future strategic ventures.

Key words
Business analysis, start-up, survival, Valley of Death

TIIVISTELMÄ OPINNÄYTETYÖSTÄ

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Tämän opinnäytetyön lähtökohtana oli EMPK Oy:n tarve luoda selkeä kuva yrityksen nykyisestä kehitysvaiheesta ja saada ehdotuksia strategisen jatkosuunnittelun toteuttamiseksi. Opinnäytetyö tehtiin tapaustutkimuksena, jonka tavoitteena oli käyttää enintään kolmea relevanttia analyysityökalua yrityksen tilanteen analysointiin ja johtopäätösten tekemiseen analyysistä.

Tärkeimmät analyysityökalut olivat Business Model Canvas, Innovation Landscape Map ja Technological Readiness Level. Tutkimuksen menetelmänä oli dokumenttianalyysi, ja asiakirja-aineisto kerättiin EMPK Oy:n sisäisiin asiakirjoihin arkistoiduista muistiinpanoista ja muistioista.

Analyysien tulokset paljastivat, että monet elementit yrityksessä ovat jo edistyneellä tasolla, kun taas toiset vaativat lisätyötä. Esimerkiksi palautteen virta asiakkailta ja testikäyttäjiltä antaisi elintärkeää tietoa liiketoiminnan kehittämisen ja tuotekehityksen kannalta. Lopuksi annettiin suosituksia yhtiön johdolle mahdollisten skenaarioiden muodossa tulevia strategisia edesottamuksia varten.

Avainsanat
Eloonjääminen, kuolemanlaakso, liiketoiminta-analyysi, start-up

CONCEPT DEFINITIONS

MVP – Minimum Viable Product.

SDG – Sustainable Development Goals.

TRL – Technology Readiness Scale. A metric used to describe the level of technological advancement in a product.

VC – Venture Capital. Funding provided to a company by an outside investor.

FIGURES

PICTURES

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1 INTRODUCTION

In the following paragraphs, an introduction will be made into the starting point of this thesis. The aims and objectives of this thesis will be introduced, and the research questions will be explained. Vital concepts for the study will be elaborated on, and the background for the case study will be illustrated.

1.1 Aims and Objectives

The aim of this thesis is to analyse specific aspects of a particular company as a case study. The objective is to determine the stage of development the company has reached up until this day by using specifically selected business analysis tools. The results of this analysis may then be used as a part of the case study company's strategic planning.

The aim of this thesis is not to make a complete in-depth analysis of every part of the case study company and its activities. It is beyond the scope of this thesis to employ more than three separate tools of analysis. Furthermore, it has been the request of the case study company's management, that the analysis tools and the detail of analysis remains on a straightforward, uncomplicated level. Striving for more results from the use of more tools would result in difficulties in the practical application of the results of this thesis.

Furthermore, it is not the objective of this thesis to illustrate a universal way of analysing the development stage of a business. This study is firstly a case study and should be viewed as research into the characteristics of an individual company. It may transpire that the results of this study are useful in examining other businesses in a similar stage of development. However, caution should be used when interpreting the results, as most conclusions in this study are not intended to describe universal outcomes.

The form of case study was selected for two reasons. There was a real demand for a broad analysis of the health of the business and the company's innovative potential from the side of the case study company. The second motivation was to investigate the development of a small company at the early stage of its life cycle, as it is not often that a company may be observed in its formative state, before the success of its business operations has been proven or disproven.

1.2 The Case Study Company: EMPK Oy

This thesis will focus on the development stage and business model development of a small technology company from Central Ostrobothnia in Finland. The company was established in 2019 and its main purpose is to develop better digital work optimisation tools for harvesting and forwarding work for the forestry industry.

The company is situated well in a part of Finland where forestry worksites are close by. The management team of the company has a good, balanced knowledge and experience of relevant industries: They have a joint experience pool from both software and hardware development and forestry contractor work as well as business administration and public funding projects. As a drawback, the company's location in Central Ostrobothnia situates them relatively far from densely populated areas in Finland, where resources of many kinds, including opportunities for investment and venture capital are more abundant.

1.3 Research Question

The motivation behind this research is the case study company's need to determine its current situation. It has become evident that EMPK Oy as a company has entered what is known as the Death Valley in the life cycle of a start-up company. After the initial phase where the company's main product was developed from an idea stage to a proof of concept and further on to an early prototype stage, some key parts are still missing before the product reaches a minimum viable product (MVP) stage. In the meanwhile, the capital investments and early financing for the company has depleted, and it has become crucial for the company to formulate a clear picture of its current situation (Where are we now?) and to find out the best scenarios according to which to proceed (What to do next?).

EMPK Oy is a small start-up company developing an innovative technology product that aims to provide a new, more efficient way for forestry machine operators to plan harvesting and forwarding work. Tools for this type of planning are currently scarce or non-existent. The key characteristics of the company therefore are a) the fact that it is an innovative start-up, b) that it is developing a technology product with a software and hardware component, and c) it is facing a heavy development phase with limited options for financing before the product is ready for the market.

The purpose of this thesis, therefore, is to compile a clear picture of the company's current health as a business, its strengths and weaknesses as an innovator, and the stage the product development has reached so far. From these findings, it is feasible to create a set of scenarios that represent best courses for the company to proceed from its current situation. The concept of creating scenarios to aid the decision-making process of a company's management arises from the ideas of Siilasmaa & Friedman in the 2018 book *Paranoidi Optimisti: Näin johdin Nokiaa murroksessa*. What Siilasmaa & Friedman suggest throughout their work, is that creating a selection of different scenarios for the strategic work of a company gives a necessary element of structure to planning and it forces management to consider possibilities that may not be very favourable for the future of the company (Siilasmaa & Friedman 2018).

1.4 What is a Death Valley Curve?

In order to better understand the starting point of this thesis, it is necessary to go through the term Death Valley Curve. The Death Valley Curve is a common term used especially in the early stages of development of a business. Fernando defines it as follows:

> The Death Valley Curve describes the period in the life of a start-up in which it has begun operations but has not yet generated revenue. The term, commonly used among venture capitalists (VCs), is derived from the shape of a start-up company's cash flow burn when plotted on a graph. During this period, the company depletes the initial equity capital provided by its shareholders. (Fernando 2021.)

The Death Valley Curve is a key term in understanding the work at hand. It is the term through which we can understand the situation of the case study company and the motivation for seeking clarity and solutions in plotting out the best courses of action and next steps on the journey out of the Death Valley. As an approach to overcoming the Death Valley Curve, Rossini suggests a better collaboration between the academia and industry representatives and illustrates this using the Technology Readiness Level scale (Rossini 2018). The Technology Readiness Level is also an important concept in this thesis. Rossini's model will be further discussed in Chapter 4.

According to Ritter & Lund Pedersen, the survival of small companies at the Death Valley Curve situation is dependent on recognising the correct challenges the company is facing. The key questions in the diagnosis, as Ritter & Lund Pedersen state, have to do with determining whether the company has

growth-potential and whether it has found the right type of business model. Following Ritter & Lund Pedersen's categorization, the case study of this company meets the criteria of a start-up: A start-up according to Ritter & Lund Pedersen is the type of company that has a clear potential for growth but is still struggling with finding the right type of business model. (Ritter & Lund Pedersen 2022.)

1.5 What is a Start-up?

A key term for understanding the starting point of this thesis is also the concept of a start-up company. In the iconic work *Lean Start-up: Kokeilukulttuurin käsikirja*, Ries defines a start-up as a human institution that is designed to create a new product or a service under extremely uncertain circumstances. (Ries 2016, 47.)

Ries goes on to point out that this definition does not comment on the size or industry of the company. Nor does it comment on the type of funding the company receives: it might be risk capital, public funding or funds received from an investment. Anyone, according to Ries, who is in the process of creating a new product or business under extremely uncertain circumstances, is a start-up entrepreneur. (Ries 2016, 47.)

According to Ries, a start-up always entails the development of a new and innovative product or service. The product in Ries' definition includes every type of value produced for the customer. Similarly, when talking about innovative, we should consider innovativeness in all areas, whether it is technological or one that pertains to a previously undervalued target audience. (Ries 2016, 48.)

The context of the start-up, however, is where most companies fall outside the definition: Start-ups are designed to function in circumstances that are very unpredictable. If the risk level and success rate of a new company can be predicted and boiled down to the effectiveness of the execution of the business plan, then the definition of a start-up does not apply. (Ries 2016, 48.)

Innovativeness is often a quality associated with start-up companies, and as an initial assumption it is a quality the closely relates to the case study company addressed in this thesis. As Hyytinen, Pajarinen & Rouvinen (2014, 2) suggest, there is a prevailing view in the empirical literature that there is a positive link between the innovativeness of firms and their subsequent survival. Hyytinen et al. have also

found, however that there is also emerging evidence that this is not the case specifically when younger companies are concerned (Hyytinen et al. 2014, 2.)

The important findings that Hyytinen et al. report are the possible reasons behind the negative correlation between innovativeness and survival of companies: An innovative start-up company is often both small in size and a new player in the industry and this, according to Hyytinen et al. reduces its chances of survival compared to its non-innovative competitors. A start-up company's innovativeness may also limit their access to external finance (due to lack of collateral) and change their overall risk profile through producing more alteration in the distribution of revenue streams and by causing delays for them scheduling. (Hyytinen et al. 2014, 13.)

2 TOOLS OF ANALYSIS

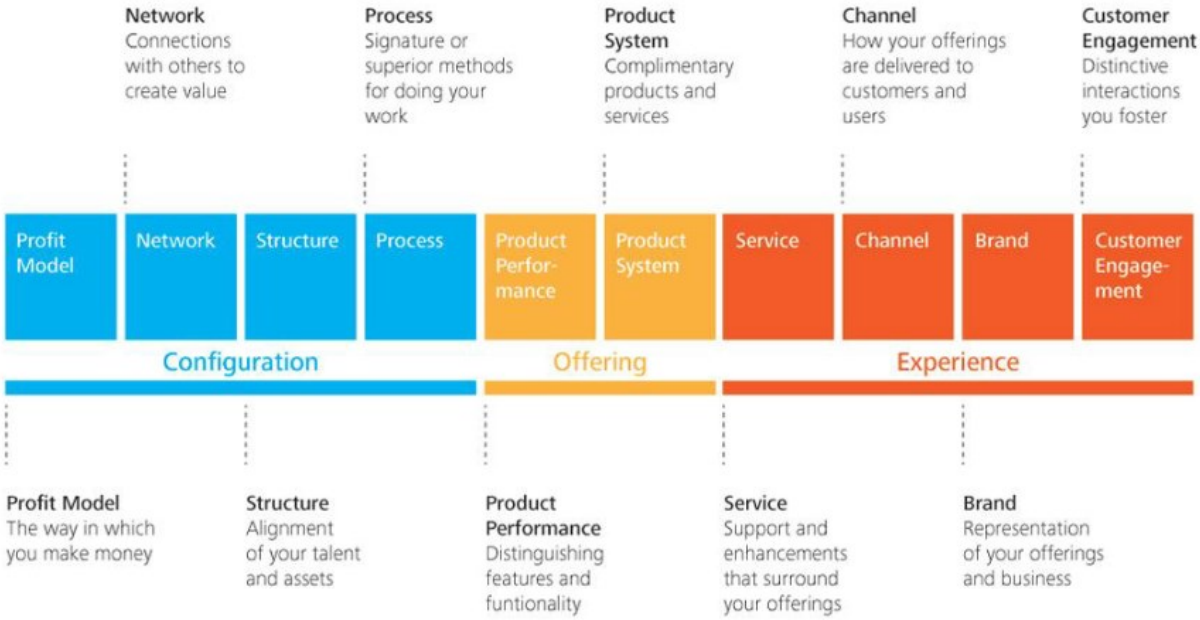
The following will introduce the key models for business and product analysis for this work. Their strengths and limitations will be illustrated and the nature of the point of view that they provide for this research will be examined.

Three analysis tools will be used as the starting point for this study: Business Model Canvas, Innovation Landscape Analysis and Technology Readiness Scale. These tools each have their own viewpoints. Business Model Canvas is a tool for examining the health of a business and its means for making a profit. Innovation Landscape Analysis gives a view into the innovative strengths of the company's configuration, offering and customer experience. Finally, Technology Readiness Level is a scale used to determine the specific stage of development of the company's main product.

2.1 Innovation Landscape Map

The Innovation Landscape Map is a tool for analysing the qualities, strengths and weaknesses of an innovative part of a business, for example a process, a product or a service. It is a method of examining innovation that originates in the work of Jay Doblin and Larry Keeley from the late 1990s to 2013 when they published the book Ten Types of Innovation: The Discipline of Building Breakthroughs.

The Innovation Landscape Map is a structure of ten elements, divided into three categories. These are illustrated in picture 1. The elements cover the parts of the underlying structure of a company, particularly from the point of view of innovation. In simple terms, the elements map out the activities of a company so that it is possible to recognise where innovation can happen or has happened. Moreover, the model enables the identification of different types of innovation in a business and helps to take steps toward utilising the process of innovation in a systemic way. (Keeley, Walters, Pikkel & Quinn 2013, 25-45.)



PICTURE 1. Ten Types of Innovation (Innovating Society, 2019)

The first category, titled configuration, contains the elements that form the foundation of a business. These are profit model, network, structure, and process. The profit model element describes the way in which the company makes revenue, network refers to the ways the business connects to parties outside to create value, structure refers to the internal setup of the company's assets and talents, and process describes the methods of working within the company that create value. (Keeley et al. 2013, 25-45.)

The second category consists of product performance and product system, and it is titled offering. Typically, this category might be the first place to look for innovation in a business as, product performance describes the functionality and features of the product itself, and product system refers to the entire combination of products offered to the customer. (Keeley et al. 2013, 25-45.)

The third category is titled experience. This category goes into the aspects of the business that are visible to the customer. Service describes the level and quality of support and enhancements that surround and are available for the customer. Brand is the element that outlines the company's representation of their products and how they are viewed by the customer. Channel describes the ways in which the customer receives the products or services, and customer engagement defines the ways in which the business interacts with the customer and the types of interactions that it fosters. (Keeley et al. 2013, 25-45.)

2.1.1 Innovation Landscape and the Business Model Canvas

The elements in the Innovation Landscape Map have a lot of similarities to the segments on the Business Model Canvas. For instance, the Profit model element closely resembles Revenue Streams on Business Model Canvas, and Channels and Customer Engagement seem to equal to Channels and Customer Relationships on the Business Model Canvas. They certainly pertain to the same areas of the business, but these two models differ in significant ways.

The purpose of the Business Model Canvas is to paint a full picture of the way the business works, and to find a description for each of the elements on the canvas. Empty or conflicted boxes may indicate a lack of clarity on one area, but the Business Model Canvas is not designed to measure the quality of a particular area as such. The Innovation Landscape on the other hand aims to give an element of structure to innovating within a business, and a disciplined way to identify where the strengths, competitive edges and superior qualities of a business and its innovative potential lie. (Keeley et al. 2013, 17.)

2.1.2 Why Innovation Strategy?

The Innovation Landscape Map is not just a system for analysing the current situation of a company's potential for utilising innovation. The use of the Innovation Landscape in the strategical planning of a company begs a shift for a more permanent way of thinking: a company that leans on innovation in their business, is sure to need an innovation strategy.

> The problem is that an organization's capacity for innovation stems from an innovation system: a coherent set of interdependent processes and structures that dictates how the company searches for novel problems and solutions, synthesizes ideas into a business concept and product designs, and selects which projects get funded. Individual best practices involve trade-offs. And adopting a specific practice generally requires a host of complementary changes to the rest of the organization's innovation system. A company without an innovation strategy won't be able to make trade-off decisions and choose all the elements of the innovation system. (Pisano 2015.)

It appears that Pisano's message is that an innovation strategy is not just another attempt to make the best of innovative efforts in the company, but rather a way to ensure that the company is able to utilise and develop the innovation (Pisano 2015). This thesis would agree and further argue that without an innovation strategy, new and innovative ideas may spring up in various corners of the company, but

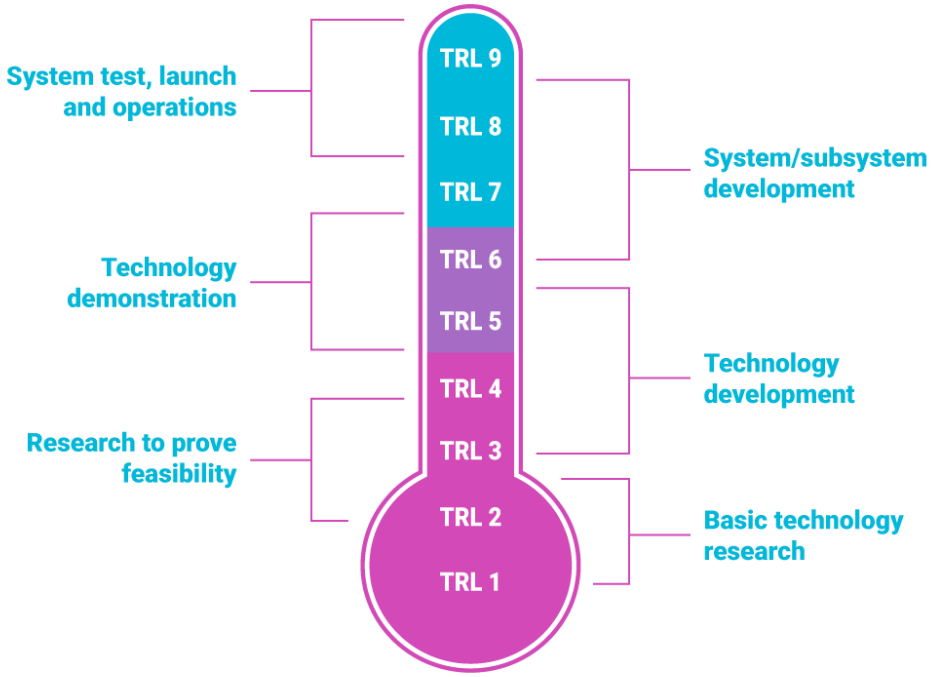
they will not necessarily be cultivated further. The smaller the company and the scarcer the resources, this will be the case even more.

2.2 Technology Readiness Level

In the following part, the Technology Readiness Level (TRL) scale will be introduced. A short background for this scale will be provided and its relevance to the thesis at hand will be established.

2.2.1 Technology Readiness Level Scale

The Technology Readiness Level is a scale for determining the stage of development of a new technology. The system provides a way to measure the maturity of a particular technology or a product. In nine levels, it goes through the stages a new technology, or a product goes through, from the idea stage through to a proof-of-concept, and to "flight readiness". Furthermore, the system enables a reliable comparison between the readiness levels of different technologies or products. (Mankins 1995, 1.)



PICTURE 2. Technology Readiness Scale (EU Funding Playbook 2021)

As Ristinen summarises, the success of research and development efforts with a new technology product is crucial for the development of new system capabilities. The main challenges any development project faces inevitably are related to performance, schedule and budget. (Ristinen 2010, 6.)

The TRL system originates in the 1970s, when the National Aeronautics and Space Administration (NASA) introduced "technology readiness levels" (TRLs) as a discipline-independent way to enable more effective assessment and communication on the maturity of new technologies being developed. (Mankins 2009, 12-17.)

According to Ristinen, in addition to space organisations such as NASA and European Space Agency ESA, many national defence organisations use TRLs as a tool for managing their research and development efforts. These include UK Ministry of Defence, NATO, Australian Defence Organisation and the Turkish defence industry. Organisations that use TRLs have found benefits in project management, business development, intellectual property strategies and resources allocation as well as safety assurance, asset protection and supply diversity. (Ristinen 2010, 6-7.)

2.2.2 Relevance of the TRL

The motivation for selecting the Technology Readiness Level as an analysis tool for this study lies in the necessity to examine the stage of development of the product and technologies used in it. Further, if the product or technology being developed is intended as an add-on or an integration to a larger system combining different technologies, a measurement system is necessary to ascertain stage of development of the new technology in relation to the intended host system. Similarly, having a metric for discussing the maturity of the development is helpful with ensuring financing for the development.

Schildorfer, Aigner & Hasenauer confirm that the use of the TRL scale has evolved in the recent years with publicly funded European Research Programmes and projects and that it is increasingly being used to measure how technically ready an innovation is (Schildorfer, Aigner & Hasenauer 2017, 2). It seems therefore that the TRL scale is not just one of the possible measurements for technical advancement, but rather a very common and widely applicable one. Schildorfer et al. go on to examine the use of measurement tools related to TRL, such as Demand Readiness Level and Marketing Readiness

Level (Schildorfer et al. 2017, 2-7). Unfortunately, it is beyond the scope of this thesis to explore further into the differences and uses of these tools.

2.3 Business Model Canvas

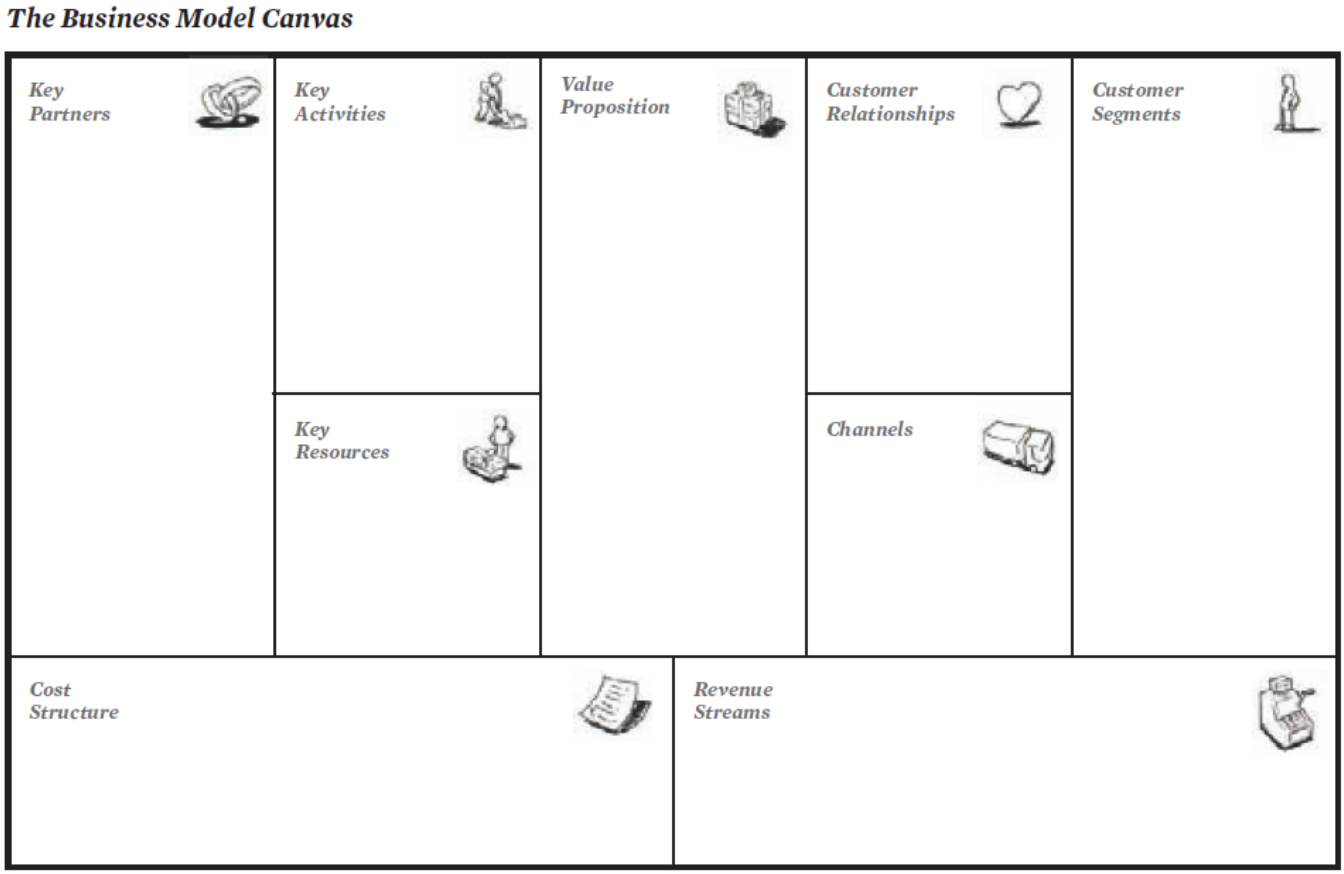
The following part will introduce the Business Model Canvas as an analysis tool, and explore some of the business model examples suggested by the creator of the Business Model Canvas in dialogue with some of the real business models relevant to the forestry industry and the business environment the case study company in this thesis operates in.

2.3.1 Business Model Canvas Segments

The Business Model Canvas is a method for analysing the key aspects of a business. It illustrates the key elements of a healthy business and gives a basis for ensuring everything is in place within the company to effectively conduct its business activities.

As Osterwalder & Pigneur put it, the Business Model Canvas is a way of defining the nine basic building blocks that illustrate the logic of how the business in question makes money. Furthermore, understanding of the business model enables deeper discussions and strategical thinking that aims for development. Having a common structure of the necessary building blocks of a business is also important in a situation where something is not working in the business model and an innovative change is needed. (Osterwalder & Pigneur 2010, 15.)

The nine segments of the Business Model Canvas are: customer segments, value proposition, channels, customer relationships, revenue streams, key resources, key activities, key partnerships and cost structure (Osterwalder & Pigneur 2010, 17-18).



PICTURE 3. Business Model Canvas (Osterwalder & Pigneur 2010)

The Business Model Canvas is comprised of two sides, the left side with the elements that make up the effective, logical parts of business activity, and the right side with the parts that have to do with value and how it is created. For example, Key Activities and Key Resources are on the left, and Customer Relationships and Revenue Streams are on the right. The idea of the Business Model Canvas is that all the activities and elements of a business can be categorised into these nine elements. Many businesses may have a similar business model, and within the Business Model Canvas these can be identified as similar dynamics between different elements. Osterwalder & Pigneur call these business model patterns (Osterwalder & Pigneur 2010, 55).

For the purpose of illustrating how the Business Model Canvas can be used to describe the operation of different business models, Osterwalder & Pigneur go through a number of common business model patterns (Osterwalder & Pigneur 2010, 77-112). Key business model pattern to identify for the purposes of this thesis is the Multi-Sided Platform.

2.3.2 Multi-Sided Platform

> Multi-sided platforms bring together two or more distinct but interdependent groups of customers. Such platforms are of value to one group of customers only if the other groups are also present. The platform creates value by facilitating interactions between different groups. (Osterwalder & Pigneur 2010, 77.)

Osterwalder & Pigneur explain that the multi-sided platform is a pattern that has existed for a long time, but that development in information technology has made it an even more common occurrence. These types of businesses bring together two groups of customers that are different from each other but still interconnected one way or another. These businesses function as intermediaries between these groups of customers. An example of this would be computer operating systems who bring together hardware manufacturers, application developers and users. In order to serve their customers in an ideal way and to create value, these businesses must serve all its different customer groups simultaneously. Also, a multi-sided platform must attract customers on all its sides in order to function well. For example, a computer operating system requires both users and application developers as customers in order to attract hardware manufacturers. Therefore, as Osterwalder & Pigneur note, these types of businesses often face a chicken and egg –type of dilemma. (Osterwalder & Pigneur 2010, 78.)

One way a multi-sided platform business may decide to tackle the issue of attracting enough customers on all its sides may be to subsidise one group of customers. By offering free or inexpensive value for one group it may balance its customer numbers, but often the question is whether the business succeeds in subsidising the right customer group and at what cost (Osterwalder & Pigneur 2010, 78).

2.3.3 Multi-Sided Platform Pattern in Forestry Machine Manufacturing

Large manufacturers of forest machines offer a comprehensive selection of machines and tools for a forest machine fleet. Forest machine manufacturers compete over fleet owning customers. Their business model seems to meet the hallmarks of a multi-sided platform approach as they are serving several customer groups within the forestry value chain. An example of this can be seen in the products and services offered by Finnish forestry machine manufacturer Ponsse. Ponsse offers harvesters and forwarders and many integrated management tools within them so that whenever a whole fleet is using the same manufacturer’s products, it benefits the worksite management and the landowner for example. (Ponsse. 2022.)

These customers benefit from all these tools working together, and it is logical that similarly a mix of different machines and products used in the harvesting and forwarding work would make reporting and management is somewhat more cumbersome. Furthermore, as Väätäinen, Lamminen, Ala-Ilomäki, Sirén & Asikainen state, regardless of the machines in use, there is a scarcity of tools and work methods available for harvester and forwarder operators for making their work more efficient. (Väätäinen, Lamminen, Ala-Ilomäki, Sirén & Asikainen 2013, 17.)

It is challenging to create a fleet of equipment that works well together if the fleet is comprised of mixed brands of machines. Still, since forestry machines are very expensive, and the margins of wood are thin in the raw material end of the chain, the machinery used on actual worksites can include a mixture of machinery, some of which very old. As it is not possible for contractors to update their machines very often, any new work management and work planning tools cannot easily be used with old machines from mixed manufacturers.

2.3.4 Forestry Process and Value Chain

The following is a general description of how the supply chain in forestry work functions, especially in the early part where the raw material, or the trees are harvested and moved out of the forest for transport. This is useful in understanding the environment and the types of customer issues EMPK Oy aims to solve through its product.

Forestry supply chain is made up of a multitude of phases with a large amount of technically advanced solutions for making the various types of end products. Throughout the value chain, a highly refined processes and metrics are used to make sure no time or resources are wasted along the way. The location, speed and fuel consumption of logging trucks can be tracked and the journey a single log makes can be traced thoroughly. Before a tree becomes a log, however, is the part of the process that is subject to many unpredictable factors in the forest, such as weather, frost and snow conditions. (Asikainen, Björheden, Moffat & Spinelli 2014, 59-63.)

Tree harvesting in the Nordic countries is usually done using the cut-to-length method (Nordic Forest Research 2000). The harvesting is performed by a harvesting fleet that is comprised of one or more harvesters and one or more forwarders. The harvesting machine goes through the worksite, felling

trees, debranching them and placing them into small piles according to the type of the tree. A forwarder then comes along and collects the piles and carries them out of the forest and loads them onto bigger piles close to a road where a logging truck will then come and pick them up. (Asikainen et al. 2014, 59-63.)

2.3.5 Flow and Use of Information in the Value Chain

There is a lot of information being created and tracking going on during these first phases of the forestry work. A great majority of the information is created for the benefit of the following phases of the value chain. The properties of the felled trees and the progress of the work gets reported to landowners and worksite management. Between the harvester operator and the forwarder operator, working methods or information with which the operator may improve the efficiency of their work is scarcer. The information that gets collected is not always efficiently passed on between the operators working in the forest, and due to the unpredictable nature of working conditions in the forest, it is not easy for the drivers to keep each other informed of important information pertaining to the worksite. (Väätäinen et al. 2013, 17.)

The reason forestry machine operators are not able to utilize information about the worksite conditions or make their working methods more effective has to do with a key factor: there simply are not sufficiently advanced working methods or tools for optimising the work of the harvester and forwarder operators available (Väätäinen et al. 2013, 17). On the worksite, operators may exchange information face-to-face or on the phone to exchange information and alleviate the issues concerning a particular worksite, but conditions (weather, scheduling issues and darkness) make information exchange difficult. Furthermore, certain parts of the information reported is sensitive in nature and only landowners and management may share it. (Räsänen 2019, 8.)

2.4 Positioning the Company with PESTEL

The analysis tools covered above give a good overview of a company's status at a given time in their life cycle. The following paragraphs will provide further background to the case study in the form of a PESTEL analysis. The motivation for this analysis is to include a view of the external factors and environment where the company exists.

2.4.1 How Does PESTEL Work

The analysis tools covered above give a good overview of a company's status at a given time in their life cycle. It is often beneficial also to include a view into the external factors and environment where the company exists.

PESTEL analysis is a tool particularly for recognising macro, or external forces surrounding a business. The letters stand for Political, Economic, Social, Technological, Environmental and Legal. (Oxford College of Marketing 2016.)

PESTEL analysis was developed in the 1960s by Francis Aguilar, in a book called Scanning the Business Environment. In his book, Aguilar used the PESTEL analysis for the same purpose it has been used ever since, to support fact finding and decision-making for businesses. (Reding 2021.)

The elements of a PESTEL analysis are as follows: Political factors are related to political environment, government policies on things such as taxes, labour laws and foreign trade. Economic factors include interest rates, employment rates, raw material costs and foreign exchange rates. Social factors include changes in demography and for instance educational levels, attitudes and trends. Technological factors include changes and advancements in technologies that have an effect on a market or industry. New technologies may crop up in many different areas, from manufacturing to distribution. Environmental factors pertain to the surrounding environment and ecological issues. Legal factors include the legal limitations within the environment the business operates in, for example, employment legislation, consumer law, health and safety regulations, international and trade restrictions. (Oxford College of Marketing 2016.)

2.4.2 EMPK PESTEL Analysis

The figure below illustrates the key external challenges that EMPK Oy faces. The PESTEL framework analysis is summarised in the paragraph below.

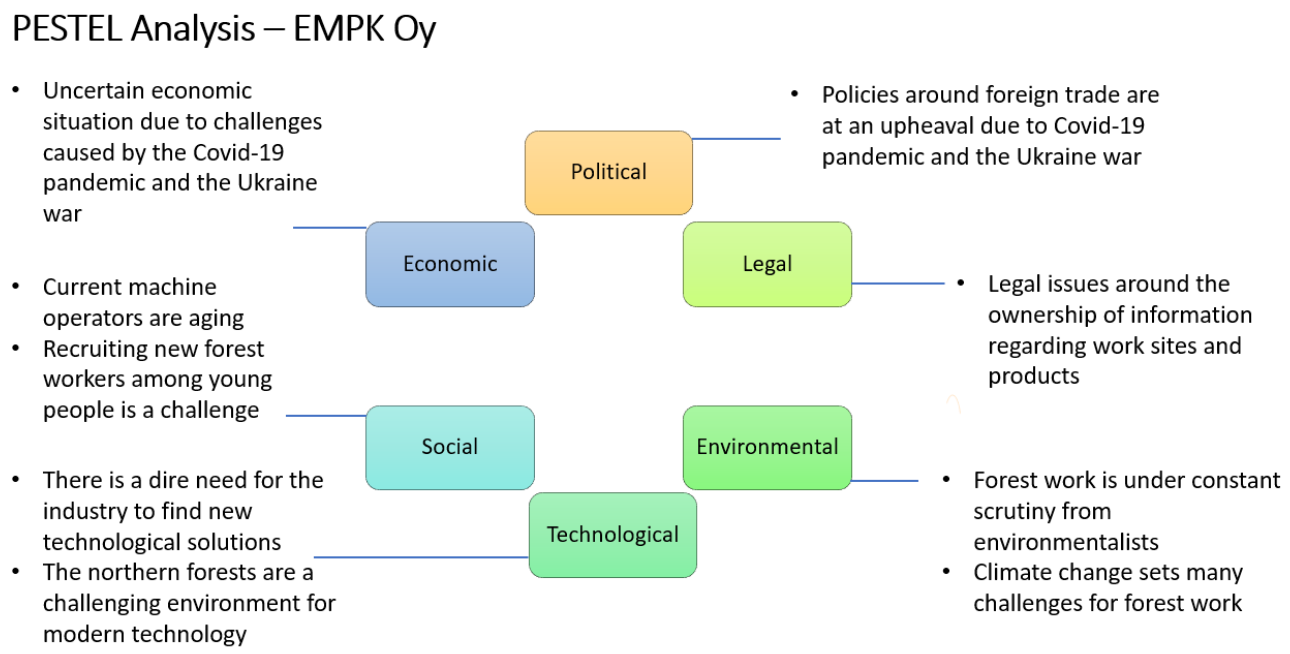


FIGURE 1. PESTEL Analysis on EMPK Oy

Examining the political atmosphere in Finland and in the closest target markets abroad for EMPK Oy, it seems that the current situation - where policies around foreign trade are at an upheaval due to Covid-19 pandemic and the Ukraine war – is rather an opportunity than a threat for EMPK Oy. These events tend to increase the demand for more efficient forestry work.

On the economic aspect, there is uncertainty in the economic situation due to challenges caused by the Covid-19 pandemic and the Ukraine war, but one might see this as an opportunity for EMPK Oy, as a small innovative start-up company is in a good position to react quickly to changes in the market.

In the forestry industry currently, the harvester and forwarder machine operators are aging and recruiting new forest workers among young people is an increasing challenge for forestry work contractors. This bodes challenges in the social aspect of the analysis.

The technological dimension is current and interesting: There is a clear and immediate demand and need in the industry to innovate and employ new technological solutions to make the forestry work more efficient. The northern forests are a challenging environment for modern technology, as cold temperatures, frost, snow, darkness, and long distances make it difficult to ensure data transfer and uninterrupted communication.

Forest work is under constant scrutiny from environmentalists, and changes that come with the climate change present even more challenges. There is a demand for Sustainable Development Goals (SDGs) to be utilised as a development instrument, and for work methods to be developed that diminish the impact for the environment.

The possibility of legal issues around the ownership of information regarding work sites, felled trees and wood products presents challenges for technological development of work optimisation that partially requires the use of the information in question.

2.5 Document Analysis Method

Document analysis is a type of research that uses a systematic procedure to analyse documentary evidence and answer research questions. It is one of many methods of qualitative analysis. Typically document analysis requires repeated review and examination of the document data to gain insight into the subject being studied. (Frey 2018.)

Document analysis was chosen as the method for this research because it enables gaining insight into EMPK Oy as a business. Document analysis is a window into the steps the company has taken in the recent past. By examining the journey the company has taken in its first years, it is feasible to create a balanced view of its situation now and draw conclusions as to what types of scenarios may be helpful in further strategic planning.

Document analysis was also chosen because it enables an examination of the business over a longer period of time. Similar information is often collected through other methods such as interviews or questionnaires. These were not seen as beneficial for this research due to them being confined to a certain point in time.

2.5.1 Collecting the Document Material

The document material for this research has been collected from the internal strategic planning documents, memos, group session notes, and project documentation created during 2019 to 2021. The company was founded in 2018, so its first years have included a great deal of strategic development and planning. It has been during the years 2019 to 2021 when the initial steps into product development were realised and the critical step from a theoretical idea of a product was developed into a proof-of-concept.

This first leg of development essentially also used the early resources of the business and brought it to a critical point in its life cycle that bears all the hallmark symptoms of a Death Valley Curve.

2.5.2 Document Material

The documents selected for the material of this work consist of a range of planning memos, brainstorming documents and strategic meeting notes from various meetings EMPK Oy's management team has held over the first years of the company's existence.

EMPK Oy management opened the company's internal documents available for viewing and the specific documents included in the material were selected on the basis of their relevance to the research questions. It was evident, for example, that there was no need to include documents going into much technical detail on the side of product development. Versions of business plans, board brainstorming session notes and any documents and memos containing planning or analysis around aspects of the business, financing or customer interaction were considered relevant, however.

The documents selected focused on these issues as their main topic. Although significant revelations often appear in unexpected contexts, it was beyond the scope of this study to identify small, more scattered fragments of strategic planning among the documents. The appendices of this thesis contain the full list of documents in the material.

3 CASE STUDY – WHERE IN THE WORLD IS EMPK

In the chapter above, the theory basis and analysis tools selected for this thesis have been introduced, and their typical uses and relevance for this thesis have been discussed. A PESTEL analysis has been provided to give a better perspective in to the environment the case study company operates in. In addition, the method of this thesis has been introduced. The following chapter will delve into the document material and examine their contents using the analysis tools.

The analysis in the following subchapters will comprise of all the documents within the material as a larger timeline analysis. To maintain a progress of discourse and for an uninterrupted dialogue between the documents, this part will not include individual references to documents.

The focus of this case study is to establish a clear picture of the current situation EMPK Oy from three different points of view: Firstly, the stage of the company's business model planning, secondly the level of recognition of their innovative potential and thirdly, the main product’s technological level of maturity.

3.1 Background for the Analyses

EMPK Oy is an early-stage technology company developing digital tools for the forest industry. The company, founded in 2019, is in the stage where reflection on potential innovation strategy is a step forward. Most of EMPK Oy's operations focus on product development, and over the recent couple of years the product has progressed from a theoretical idea to a coded and tested prototype phase. The company has not yet reached a point where results can be observed in, for example, changes in turnover, such a large turnover that reliable conclusions can be drawn from the figures.

The company is currently developing a product for sale to help optimize the work of forest machine operators, especially forwarders. The solution is based on the use of location data as well as data generated by the harvester in the planning of local timber transport. That is, the product allows the driver to have a better knowledge of how many timber loads from the forest can be brought to the loading area during the shift. To support its operations, EMPK Oy also provides website implementations and other marketing services for small businesses.

3.2 Business Model Canvas Analysis

To start off with, the document material was examined with the Business Model Canvas segments in mind. The key question was to find out whether the document material indicated that the segments of the Business Model Canvas have been planned to even a preliminary degree or even to the level of implementation.

3.2.1 Analysis Score System

In order to establish a measurement system to help evaluate the depth of planning within the company, a score system was established and used alongside the analysis of the documents. In the Business Model Canvas analysis, EMPK Oy's business operations are examined as different segments, and in the diagram, the development stages of the segments are scored as follows:

- 0-5 points = Little or no thought has been given to this business segment.
- 5-10 = initial ideas have emerged, but not concrete vision of what this segment contains.
- 10-15 = there is a concrete vision of how this segment would work in the business, but some aspects still need further investigation.
- 15-20 = A working model has been formed and implemented to a degree.

3.2.2 Business Model Canvas Analysis

During its first years of existence, the EMPK Oy management team has gone through several rounds of strategic discussions and brainstorming sessions. These have aimed to gain a better understanding of different options of how the business should be organised to begin creating customer relationships and creating profit.

In table 1, the segments of the Business Model Canvas have been analysed and scores have been given to reflect the advancement stage of the segment in question, according to the system introduced in subchapter 3.1.1.

TABLE 1. Business Model Canvas Segment Analysis

Business Model Canvas Segment	Score	Comment
Customer Segments	11	Customer segments have been a central topic in several strategic discussions and relevant segments have been identified, but this segment is also an area where lots of further information needs to be gained. The top three potential customer segments identified for EMPK Oy's optimisation tool were forest machine contractors, forest machine manufacturers and forest machine operators.
Value Proposition	16	What EMPK's innovation does for forest machine work is to enable better work planning and exchange of information between machine operators, regardless of which manufacturer's equipment they are using. The optimisation tool helps to plan the work done by the operator of the forwarder so the operators may estimate how many loads there are for the forwarder on the work site, and what is the optimal order for processing them. Further benefits to the operator and customer lie in faster and safer data transfer, easier communication within the operators on a work site, and the ability to collect data to allow better optimisation in the future.

(Continues)

TABLE 1. (continues)

Channels	**5**	The test user network of the product can become a committed customer network when the product is ready for production. The physical product can be delivered by post or courier, otherwise the sales channels and communication through the website and through personal communication will be utilized.
Customer Relationships	10	Expanding the customer base by expanding the test user network. The aim would be to create regional customer groups, and possibly international customer groups. A centralized point of contact would need to be established. Communication with the customers can be enabled through the product itself, and monitoring of increased profitability using the optimisation tool creates further mutual trust between EMPK Oy and the test customers. First key development is to expand the test user network and increase continued interaction and development of deeper relations with the test users. This segment has received lots of attention, but most of it is focused on the initial phase of early sales, and further planning is needed for established users once the product is fully ready for worksite use.

(Continues)

TABLE 1. (continues)

Revenue Streams	**13**	Once the product is ready to market, the strategy is to sell it to customers at a one-time sales cost for the product plus a monthly license fee per machine or a fleet of machines. Before reaching the point where the product is ready to market, the company has to cover the development costs one way or another. Possible solutions for this include finding an outside investor and possibly a partner company with whom it is possible to create a development project with a development grant. A bank loan for the company owners is also a possibility, although not a preferred one. The details of this segment need more planning, but solutions have been formulated for before and after the product is ready for the market.
Key Resources	8	The management team is the central human resource necessary for the company to move forward toward a more profitable business. Also, the knowledge the management team has of the industry and the technology required to improve the experience the customers have of their work are a key resource. At the current situation, investment capital is also a key resource to bring product development to the point where the business may start creating turnover. This segment has some initial ingredients, but a lot of questions also remain.

(Continues)

TABLE 1. (continues)

Key Activities	**6**	The key activities necessary to keep the most important activities running in the business are sales and customer support. Their task is to take care of existing customers and strive to get more. Administration and back-office support is also key component in maintaining business activities in the long run. Attempts to identify the key components in this segment have been made, but more is still necessary in the future.
Key Partnerships	17	To bring forward the product development efforts, the company has key partners in the private sector, in the public as well as in the RDI sectors. Private sector partners include forestry machine contractors and other companies developing tools for this sector of the forestry industry. Without this network, it would be difficult to acquire test users, plausible feedback from the field and potential development partners for public grant projects. Public sector partners on the other hand include organisations such as Business Finland. Business Finland is major Finnish public organisation focused on the development of Finnish businesses through, for example, public funds for innovation. This segment has some solid components already, and progress has been made with securing these partnerships.

(Continues)

TABLE 1. (continues)

Cost Structure	**6**	The key components of the business cost structure are management salaries, sales and marketing expenses, cost of the software development and other investment costs for product development. After the initial batch of test products have been distributed, there is a cost of maintenance for the test products to consider as well. More information is still needed for this segment to take shape.

3.3 Innovation Landscape Analysis

The following subchapters review the elements of the Innovation Landscape Analysis as they manifest in the material of this study. In chapter 2 of this thesis the elements have been introduced and are described in more detail, including their division into three main categories: configuration, offering and experience.

3.3.1 Analysis Score System

In the following analysis of the innovation landscape, EMPK Oy's operations are examined as different elements of the Innovation Landscape Map, and the development stages of the elements are scored as follows:

- 0-5 points = little or no thought has been given to the realisation of this element.
- 5-10 = initial ideas have been raised concerning this element, but not concrete vision of how it would work for the company.
- 10-15 = there is a concrete vision of how this element would work in this business, but there are no practical results to corroborate.
- 15-20 = A working model has been formed into a concept, developed, and implemented to a degree.

3.3.2 Innovation Landscape Map: Configuration Element Analysis

In table 2, the configuration elements of the Innovation Landscape Map have been analysed and scores have been given to reflect the advancement stage of the segment in question, according to the system introduced in subchapter 3.3.1. The configuration elements describe the functions of the company in terms of how the business itself is structured.

TABLE 2. Configuration Element Analysis

Configuration Element	Score	Comment
Operating Profit Model	6	EMPK Oy's plan is that the developed optimization tool will be sold as a software service involving a physical device. The customer first buys the physical device, and then pays a low monthly price for using the software. This is not an exceptional model universally, but in the forestry industry it is, because most of the tools are very expensive and heavy.
Network	7	The functionality of the product is based on the next step in the collection, transfer, processing, analysis, and application of information to the chain. It is clear that not all these steps need to be solved by EMPK Oy’s solution, but it might be beneficial to look for partners who would either have the right solution for EMPK Oy’s chain, or whose chain EMPK’s product is suitable for.

(Continues)

TABLE 2. (continues)

Structure	**11**	EMPK Oy's team is made up of people who strive for excellent performance only when it pays off and are ready to fail quickly. They also only create internal company structures only to the extent that they are absolutely needed and focus on the results of actions and open flow of communication. Structural solutions are small in the early stages of a business but may prove to be very important in the future.
Process	3	A special component of EMPK Oy's products and development processes is, on the one hand, the background of the team members in the software industry and, on the other hand, practical experience of key problems in the forest industry. Combining these, it is feasible that the company has the ability to find agile solutions for the forestry industry, however not much experience has emerged yet of an innovative process.

3.3.3 Innovation Landscape Map: Offering Element Analysis

In table 3, the offering elements of the Innovation Landscape Map have been analysed and scores have been given to reflect the advancement stage of the segment in question. The offering elements pertain most closely to the attributes around the company’s main product.

TABLE 3. Offering Element Analysis

Offering Element	Score	Comment
Product Performance	15	The most important competitive advantages of EMPK Oy's forest machine work optimization tool related to product performance are related to its very easy usability and implementation and functionality in areas of even a weaker mobile network. There is even a working prototype to prove these strengths.
Product System	18	Perhaps the most significant competitive advantage of an optimization tool product is that it works in all forestry machine chains, regardless of the brand of the forest machine. This is a rare feature in the forest sector, and it is even possible to become a disruptive factor in the sector's product range. Development efforts so far have provided concrete evidence to corroborate this.

3.3.4 Innovation Landscape Map: Experience Element Analysis

In table 4, the experience elements of the Innovation Landscape Map have been analysed and scores have been given to reflect the advancement stage of the segment in question. The Experience elements pertain most closely to the manner in which the company interacts with its customers.

TABLE 4. Experience Element Analysis

Experience Element	Score	Comment
Service	18	EMPK Oy is at a stage where the optimization tool is not yet sold directly to customers. However, the plan is to gather a team of beta testers that will also allow testing current theories related to the service. The goal is that the product is not only very reliable in performance, but also a clear service package: a physical product is delivered to a customer who does not have to worry about compatibility issues in their forest machine chain. Deployment is minimal, as no actual installation is required, and all actions required of the user are intended to be simple, and they can be performed with gloved hands, without interrupting the work itself.
Channel	2	This Experience element is an important factor for the customer as well as the provider of the service or product. Today, the customer is presented with a wide array of options for buying a number of products online with easy access to support, with as few clicks as possible. The actual sales channel for EMPK Oy's main product is very much in an initial stage of planning.

(Continues)

TABLE 4. (continues)

Brand	9	In building EMPK Oy's image and customer image, the owners consider it important to tell their customers what their most important motivator is for making the product: facilitating the work of the forwarder and its owner. It is further important to identify concrete ways for communicating this motivation and the understanding the company has of the issues its customers are facing.
Customer Interaction	13	It is also important that the company has ways to listen to customers' concerns about work, and that they can also provide channels for operators and forestry professionals to exchange messages and communicate about anything, not just about subjects concerning the product. A necessity to be present in the same social media channels the forestry machine operators are using has been identified.

3.4 Technology Readiness Level Analysis

In the following paragraphs, the level of technological development of EMPK Oy's main product is examined through the scale specified in the Technological Readiness Level analysis. The scale enables determining the state of advancement as a numerical value on a scale of one to nine. This gives a balanced approach to the results of all the analyses in the form of both numerical values as well as content analysis.

3.4.1 Starting Point

EMPK Oy is built on the idea that forwarding work in forestry could and should be done more efficiently, using digital tools for work planning. When the company was established, the product was nothing more than an idea. It was evident that the first leg of development toward a minimum viable

product was to develop a proof of concept. The product idea consisted of combining a few different technology solutions and algorithms. These had to be tested separately first, in a laboratory environment.

After the initial phase of researching the possible technologies necessary to begin developing a proof-of-concept level product, EMPK Oy decided to apply for a development grant with the Regional Council of Lapland. The HIA funding programme was a new type of programme for funding product development in connection with digital solutions for forestry industry (Regional Council of Lapland 2019). Funding through the HIA grant was secured, and the project came to be known as the Unifoma project. The funding type allowed for product development for the forestry industry, and it enabled collaborating with forestry entrepreneurs and a major research and development provider in the Central Ostrobothnia area, Centria University of Applied Sciences.

3.4.2 Progress in the Unifoma Project

When the Unifoma project started, the starting point was identified in the funding application as follows: The TRL level of the technological solution was identified as two in the beginning of the project. EMPK Oy had developed algorithms that are completely exceptional and innovative for optimizing forest machine operations, but these have not yet been tested in practice. The basic principle had beenfound to work at the level of theory. The project enabled the system to be tested and piloted in a relevant environment. The target TRL level at the completion of the project was six, which would also mean significantly better opportunities for further commercialization.

In July 2020, the Unifoma project was completed, and the final report notes that the project reached its goals very well. The project consisted of two main phases: 1) Creating specifications and software code for the optimisation tool and testing its different components in a laboratory environment. 2) Finding hardware components for the optimisation tool and performing comprehensive testing of these tools in a relevant environment.

The key activities and working methods in the project used were identified as follows: Creating documentation and specifications for coding the software, code creation and testing in a laboratory environment. Furthermore, actual harvesting data was acquired for testing and further research and develop-

ment and iterations of discussions and meetings were had with the project partners about project requirements and possible solutions. After this, solutions were compared for hardware for the end product, and testing worksites were found and permissions for using them were acquired. Before testing, the worksite was also cleared for the purposes of testing and comparing estimates with relevant worksite data.

Both phases of the project were completed successfully, and a physical prototype of the product was created in the process. The prototype went through a testing period in a relevant environment, on a forwarding worksite in the forest, and even though the user interface of the prototype is still very much a working progress, the crucial technologies and algorithms in the product could be tested.

4 RESULTS

In the above chapters, the background for this case study has been established and some key concepts have been introduced to enable a better understanding of the case study company's situation. The main business analysis tools relevant for this study were introduced and used to analyse the document material collected from the case study company's internal materials.

The following will go through the key findings from the document analysis and based on these findings, suggest some alternative scenarios for the company to consider as they are moving forward with their business.

4.1 Research Findings

During this research, three different analyses, using three tools, were made. The analysis tools selected all establish a different type of picture of the business and the main product being developed. Each tool has the potential to reveal strengths and weaknesses in the business. The following will go through the findings from these three analyses. In the Recommendations for Managers subchapter the findings are further combined and formulated into some possible scenarios for the company's future.

4.1.1 Business Model Canvas Analysis

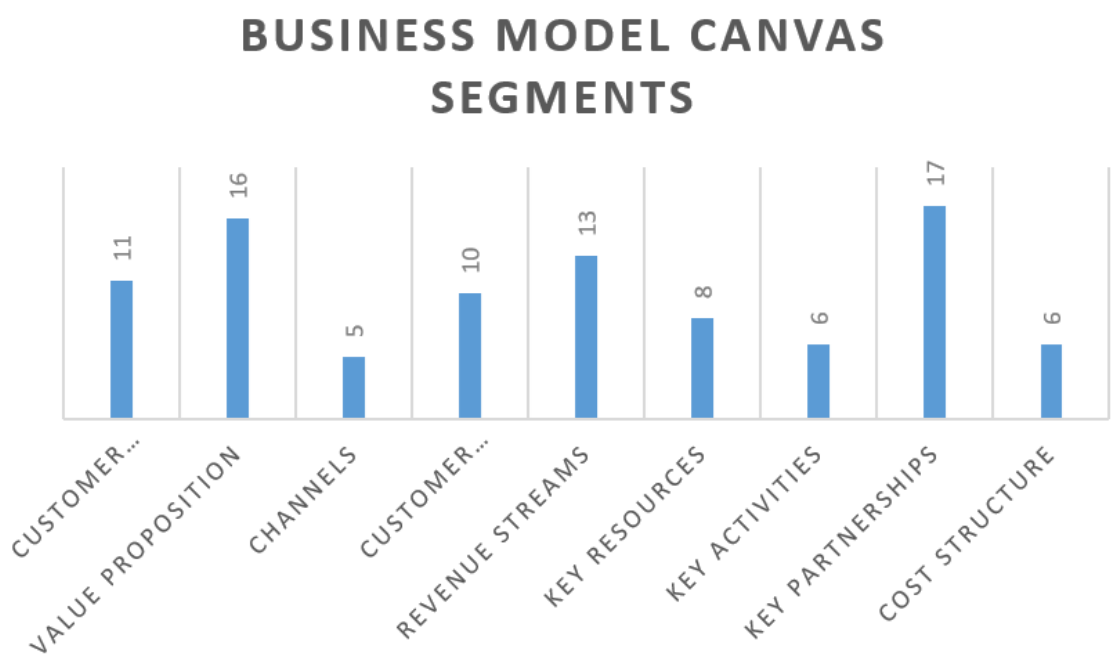


FIGURE 2. Scores on the Business Model Canvas Analysis

Business Model Canvas is, as stated in chapter 2, a model for mapping out the segments that need to be functional to ensure the business operates on a solid basis. The segments in the Business Model Canvas do not require a new or innovative product and the results speak only to the health of the business. In the case of EMPK Oy, the Business Model Canvas analysis reveals that more than half of the segments are still in need of further information and development.

Key partnerships and value proposition segments were the strongest segments in the analysis. The contents of these segments were well formulated and actual experience already exists to corroborate them. Customer segments, customer relationships and revenue streams also contained a great deal of potential, but concrete results and some further development is still necessary.

For channels, key resources, key activities and cost structure, only initial thoughts really exist for how these segments would function in the business. The practicalities around these segments have a great deal to do with how the final product is distributed to the customers and what their main requirements are for the best possible usability. At the final stages of product development, as the product's user interface is being developed, these segments in the business also have to take a more solid shape.

4.1.2 Innovation Landscape Analysis

When examining the results of the Innovation Landscape analysis, it is clear that many aspects of this analysis overlap with the segments of the Business Model Canvas analysis. It is helpful to keep in mind that these two analyses have a different perspective, but certainly design and development in a certain area enhances both the business model segment and the innovation elements. The key difference to consider when comparing the results of these two analyses is that with Business Model Canvas it is pivotal for the business to have a clear idea of how all the different segments work together for the benefit of the business. The results of the Innovation Landscape Analysis however rather reveal strengths in the company and not all elements necessarily need to gather a high score in innovativeness.

Many elements of the Innovation Landscape Analysis have already been considered at length in the EMPK, but there is still work to be done at both ends of the landscape. A typical mistake a start-up company makes is to put too much emphasis on the Offering elements, and to neglect the other elements entirely.

In EMPK Oy's case however, there is an argument for having a strong innovative approach in the Offering elements. This is because the product development in the forestry industry has not offered a lot of innovativeness in product systems or performance in relation to work planning.

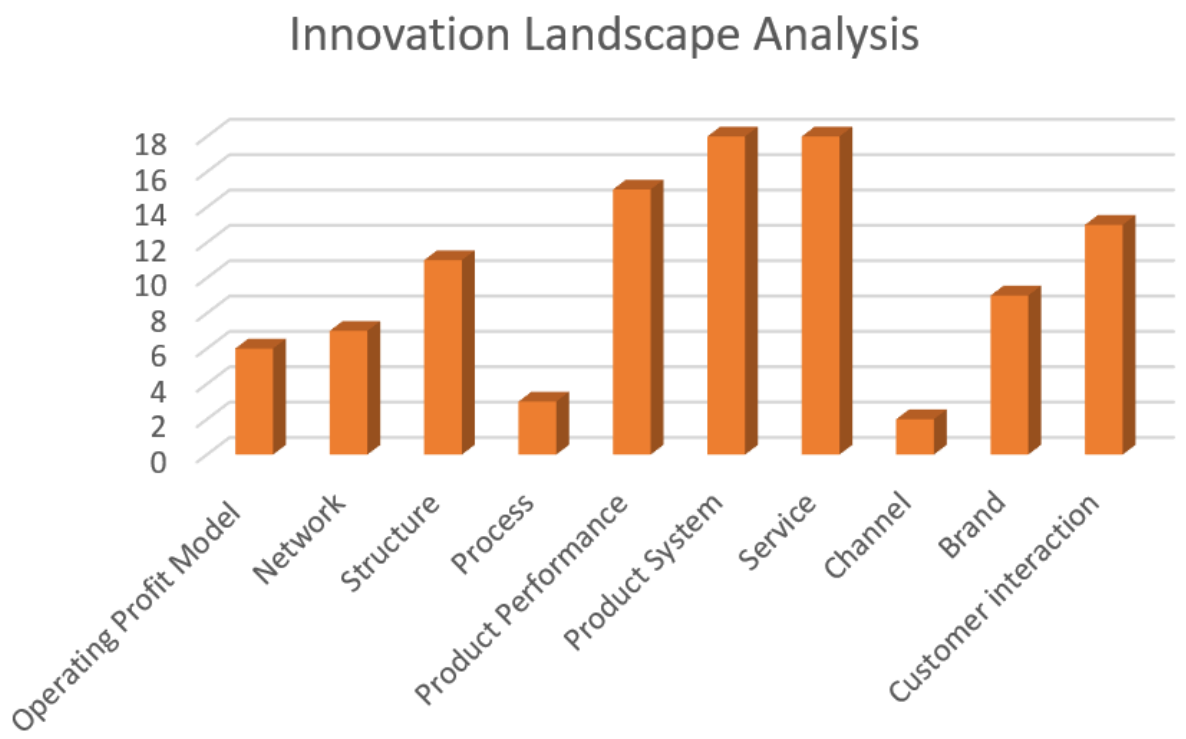


FIGURE 3: Innovation Landscape Analysis Scores

4.1.3 Technology Readiness Level Analysis

The comparison of the product development at EMPK Oy against the Technology readiness level scale it is evident that the steps taken in the UNIFOMA project efficiently proved the workability of the product at a demo stage.

The UNIFOMA project was completed successfully, and a physical prototype of the product was created in the process. The software code and the algorithm needed to make the work optimisation calculation were created and tested in a laboratory environment. The prototype was then tested in a relevant environment, in this case on an actual forwarding worksite in the forest. The definitions of the TRL scale have been introduced in chapter 2. All the results of the project meet the criteria for Technology Readiness Level six.

This finding is in dialogue with Rossini's explanation of the relationship between the Technology Readiness Level stages and the Death Valley Curve, illustrated in figure 4:

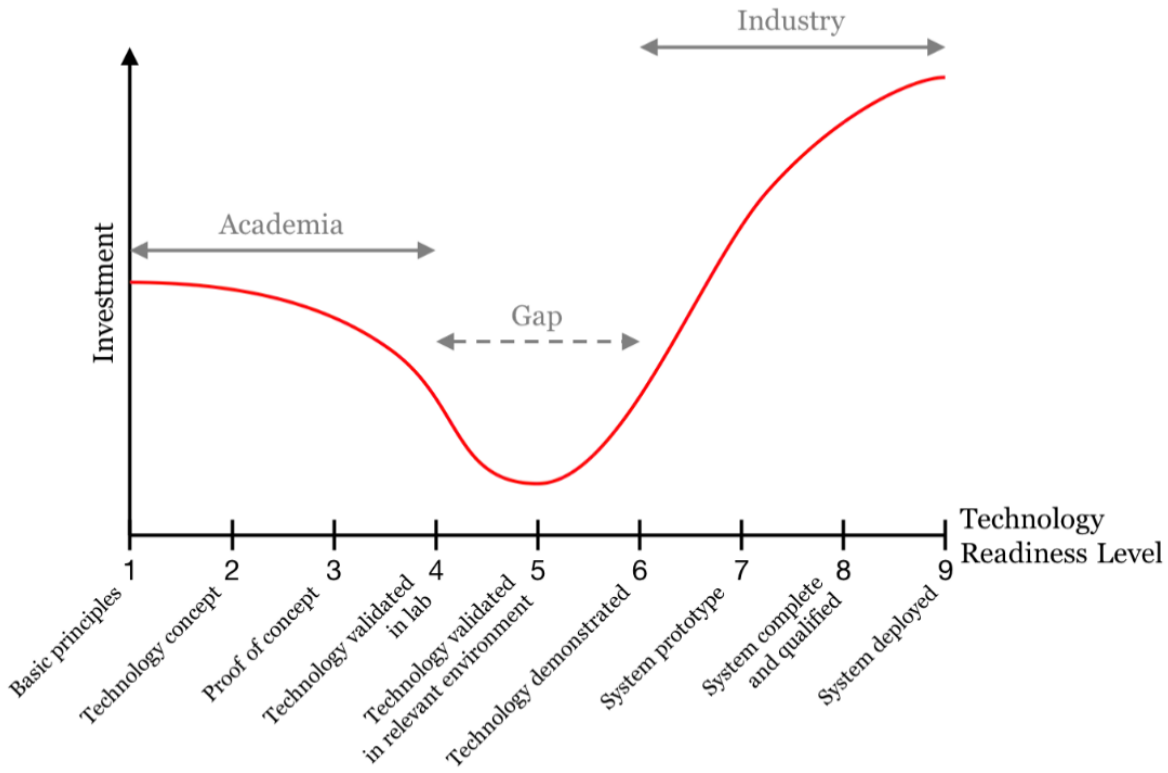


FIGURE 4. Technology Readiness Level meets Death Valley Curve

Rossini argues that it is typical for a technology or product to reach TRL stage six and find that there is a lack of interest from the side of both academia and industry to get involved in advancing the product development at this stage. The findings of this case study seem to corroborate Rossini's view. (Rossini 2018.)

4.2 Recommendations For Managers

When this study was at its early stages, the management at EMPK Oy requested that these specific types of analysis should be made and among the results, the research would include practical recommendations to support the management's future strategical work. In the following, a series of different scenarios have been outlined. These are based on the challenges and strengths observed through the examination of the document material.

4.2.1 Scenarios for Growth

The number one challenge that repeatedly arises from the analysis revolves around the need for further financing before the product is ready to market. The following scenarios give possible options for resolving this challenge.

4.2.2 Scenario 1: Test User Pool

It is evident from the research that in addition to creating a working user interface for the product and creating workable channels for delivery and customer relationship management, the successful launch of a market ready product still requires a great deal of customer feedback. Collecting a pool of test users can also be leveraged financially. Therefore, the first scenario that EMPK management may consider is inviting a group of forestry entrepreneurs to collaborate as test customers and get involved in the development process. Test customers can be offered a chance to put down a prepayment for the product against delivery after a given time.

4.2.3 Scenario 2: Outside Investor

The research also suggests that during the first years of operation, EMPK Oy has been successful in creating a network of connections to potential customers, research and development collaborators and other actors who may find it beneficial to be invested in an innovative effort within the forestry industry. The company has also been successful in securing the HIA funding and meeting the requirements of the funding is further proof of the fact that EMPK Oy is working on a credible solution to increase the efficiency in real-life harvesting and forwarding work. Therefore, the second scenario that EMPK management may consider, is finding an outside investor. It is feasible that a number of potential investors may be interested in investing in the company and its development at this early stage.

4.2.4 Scenario 3: Owner's Investment

The third scenario that EMPK management may want to consider is financing the product's continued development through a business loan or the business owners' own investment. A similar solution would be to gather revenue from providing other services to customers thereby gathering capital for

financing the last steps of development. This scenario would ensure the development keeps going at a pace that may be slower but still ensuring progress. It is recommendable that this scenario is combined with still collecting a pool of test customers to take part in the development, even if they are not required to put down a prepayment, like in the first scenario.

5 CONCLUSIONS

The above study has been a case study of a small technology start-up company operating in the Central Ostrobothnia region of Finland. With only a few years of operation behind it, the company has been struggling with what is called the Death Valley Curve. This is a situation where initial investment of the company has run out, and lack of finances is a major slowing factor for the last part of product development.

The management of the company requested that this study was made, partially to gain a better view of the situation the company is in, but also to receive solid advice for further strategic planning going forward. Their request was also that the analysis was kept at a simple level and only a few relevant analysis tools would be used.

Three analysis tools were selected as the starting point for the case study: Business Model Canvas, Innovation Landscape Analysis and Technology Readiness Scale. These tools each have their own viewpoints. Business Model Canvas is a tool for examining the health of a business and its means for making a profit. Innovation Landscape Analysis gives a view into the innovative strengths of the company's configuration, offering and customer experience. Finally, Technology Readiness Scale was selected to determine the specific stage of development of the company's main product. These analysis tools were introduced in chapter 2.

The analysis tools were employed in examining a selection of document material from the company's strategic planning meetings, workshops and brainstorming sessions from the first years of operation. This document material, and the method of collecting it has been described in chapter 2.

The analysis tools chosen were used in examining the document material. In conjunction with the Business Model Canvas and Innovation Landscape analyses, a numeric score system was used to map out where planning and insight was strongest and weakest in the different parts of the analyses.

The results of the research were presented as visual graphs illustrating the scores identified for each analysis element. The qualities of the results were also examined as a summation of the most and least advanced segments the analyses revealed. After the results were analysed, further conclusions were

drawn from the results and formulated into recommendations EMPK Oy's management may use in further strategic planning for the company's future.

It has been a challenge throughout this study to find the correct balance between conducting thorough analysis and maintaining a useful, practical view of translating the results into a discussion that may help the company's management in the decision-making process in the future. A broader view of literature around business analysis tools as well as a more in-depth analysis of the document material would both have been possible, but they would have ventured out of the scope of this thesis, and in addition, out of the scope of resources the company in question currently commands.

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APPENDIX 1

List of EMPK Oy Internal Documents (Confidential)