

Process Development in a Social Enterprise

Case Study: Egg Production Uganda Ltd.

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Abstract

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Title of the thesis Process Development in a Social Enterprise Case Study: Egg Production Uganda Ltd.		
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Name, title and organisation of the client Finn Church Aid		
<p>Abstract</p> <p>The thesis was done as an assignment for Finn Church Aid. The purpose of the thesis was to address the needs, possibilities and ways to study the logistic flows at a new start-up business Egg Production Uganda Ltd (EPL) and opportunities to develop them. EPL is a social enterprise in Uganda established and funded by the Finnish Women's Bank (WB) and owned by the Finn Church Aid. The purpose of EPL is not only to be a successful business unit but to create sustainable impact in the surrounding society. The main objective of the study was to provide practical and useful information for the EPL, but it also aimed to highlight the importance for the need of business know-how to the social enterprises and to the development sector in general. It should be noted, however, that the case study was made during the Covid-19 pandemic which made the business environment in Uganda utmost challenging.</p> <p>The theoretical framework for the study was in process theory, Porter's value chain theory and the Lean philosophy and it was studied in the context of Aid for Trade business and Bottom of the Pyramid markets (BOP). The thesis discussed the principles of the processes and their development from the point of them creating value. Lean philosophy, that is not only a philosophy but may also be understood as a more practical methodology or as a set of tools, focuses on the continuous development and improvement of the processes. Even though it started from manufacturing it has since then spread and grown into a highly popular approach that is used in a variety of areas. Implementing the Lean thinking provided opportunities to study the EPL not only in a theoretical level but also by the use of methodology based on it. The analysis was done using a Lean tool Value Stream Mapping (VSM) that is a common Lean method to describe and analyse the processes and detect the value- and nonvalue adding activities. Data for the VSM was collected by qualitative methods in online semi-structured interviews.</p> <p>Based on the collected data the current state Value Stream Map was drawn. The main functions through which the process flows were identified, and they were used as a basis to structure the opportunities for process enhancement. They were discussed jointly with the EPL and WB key personnel. The study resulted in several opportunities for process enhancement. The key findings indicate the importance of work stage standardization and process stabilization. An important issue is also to consider the markets that are currently a Red Ocean.</p>		
<p>Keywords</p> <p>Lean, Process, Development, Poultry, Aid for Trade, Uganda, Start-up</p>		

Contents

1	Introduction.....	1
1.1	Research background.....	1
1.2	Thesis Objectives, Research Questions and Limitations.....	1
1.3	Theoretical Framework and Methodology	2
1.4	Thesis Structure.....	2
2	Theory	4
2.1	Theoretical basis for the operational environment.....	4
2.2	Businesses Creating Value	5
2.3	Resource and Flow Efficiencies	6
2.4	Process thinking principles	8
2.4.1	Key aspects of a process.....	8
2.4.2	Developing a process	10
2.5	Lean philosophy.....	11
2.5.1	Key principles of Lean	11
2.5.2	Waste according to Lean	14
3	Development and research methodology.....	18
3.1	Lean tools.....	18
3.1.1	Flow Chart.....	18
3.1.2	Value Stream Mapping	18
3.2	Research Methodology and Data Collection	20
4	Business case: Egg Production Uganda Ltd Company profile.....	22
5	Current state.....	24
5.1	VSM at EPL.....	24
5.2	Customer interface / marketing and sales	26
5.3	Management and Administration	27
5.4	Supplier interface / procurement	27
5.5	Brooding	27
5.6	Chicken daily care	28
5.7	Egg handling.....	29
5.8	Delivery	29
6	Opportunities for improvement.....	30
7	Conclusion.....	38
7.1	Answers for Research Questions.....	38
7.2	Reliability and Validity	39

8	Summary	41
	References	43

List of Abbreviations

AfT Aid for Trade

BOP Bottom of the Pyramid

EPL Egg Production Uganda Ltd.

FCA Finn Church Aid

HDI Human Development Index

LDC Least Developed Countries

NGO Non-Governmental Organization

NVA Nonvalue-added

SCM Supply Chain Management

UN United Nations

VA Value-added

VAR Value-added ratio

WB Women's Bank

WTP World Trade Organization

1 Introduction

1.1 Research background

This bachelor's thesis addresses the needs, possibilities and ways to study the logistic flows at Egg Production Uganda Ltd (EPL) and opportunities to develop them. EPL is a social enterprise in Uganda established by the Finnish Women's Bank (WB). The purpose of EPL is not only to be a successful business unit but also to create lasting impact in the surrounding society.

Throughout the last decades development has been approached by various viewpoints and methods. The World Trade Organization's Aid for Trade – initiative focuses on the possibilities of trade as a means for development (World Trade Organization). In Finland the theme has been approached for example through Business Finland's Business With Impact Programme (Formin). Investing in business opportunities and enhancing trade is an interesting prospect in the global development.

However, to secure the lasting impact and sustaining growth emphasis must be laid to the continuous development of the businesses according to the best practices. Developing the flows of the three aspects of the logistics, namely the material, capital and information (Logistiikan maailma a), is of highest importance for a successful business. The lessons learned from highly developed and efficient production and logistics systems have the potential to contribute to the success of businesses in the developing countries and hence to the global development endeavors.

1.2 Thesis Objectives, Research Questions and Limitations

The main objective of the study is to provide practical and useful information for the EPL, but it also aims to highlight the importance for the need of business know-how to the social enterprises and to the development sector in general. The thesis provides a visual analysis of the processes to clarify and to be used by the enterprise as well as opportunities for development.

As the efficiency of the production plays a critical role in the profitability of the business the thesis aims to contribute to it. It aims to provide understanding of the current state of the logistical flows at the EPL as well as to point out the critical points and the parts of the processes with potential for productivity enhancement.

Although the themes of development and process efficiencies are most interesting the thesis is bound by strong delimitations due to the very limited space of the thesis. The thesis

will only concentrate on EPL and no other enterprise or business. It does not attempt to study the social impacts in depth. The thesis will acknowledge EPL's potential as a social catalyst, but it will concentrate on the production processes. The thesis will concentrate on mapping out and analyzing the logistic flows and their improvement in a concrete and practical way that serves the needs of the company.

Following the above-mentioned objectives and delimitations the research question closes up to: "What are the critical points at the process flows at Egg Production Uganda Ltd and the opportunities for their enhancement?"

1.3 Theoretical Framework and Methodology

The theoretical framework for the study is in process theory, Porter's value chain theory and the Lean philosophy and it is studied in the context of Aid for Trade -business and Bottom of the Pyramid -markets (BOP). The thesis discusses the principles of the processes and their development from the point of them creating value. Michael Porter created the value chain theory which emphasis on the creation of value is reflected in the work. Lean philosophy, that is not only a philosophy but may also be understood as a more practical methodology or as a set of tools, focuses on the continuous development and improvement of the processes. Even though it started from manufacturing it has since then spread and grown into a highly popular approach that is used in a variety of areas. Implementing the Lean thinking provides opportunities to study the EPL not only in a theoretical level but also by the use of methodology based on it.

Value Stream Mapping (VSM) is a common Lean method to describe and analyse the processes and detect the value- and nonvalue adding activities. As it is common in the Lean tools visuality is of high importance in the VSM. It provides a clear understanding of the current state functions and provides an opportunity to study them in order to detect opportunities for improvement. The data for the VSM is collected using the method of semi-structured interviews.

1.4 Thesis Structure

The thesis addresses first the theoretical framework and the methodology. First, the theoretical basis for the operational environment is discussed clarifying the discourse addressing the theme. The creation of value and the definitions of efficiency are clarified before proceeding to discuss process and its development. Then, the Lean philosophy is discussed with emphasis on its possibility to detect waste. Following that, the used methodology is

presented. VSM as a Lean tool and the principles of semi-structured interview method are discussed. In addition, the progress of this study is presented.

Next, the business case of Egg Production Uganda Ltd. is presented in its main aspects. It is then studied more closely and in detail in the created VSM. Based on the analysis and the joint discussions with the EPL representatives the opportunities for improvement are then presented. Lastly, the conclusions bring together the found main aspects. The reliability and the validity of the study are also discussed as well as opportunities for future research.

2 Theory

2.1 Theoretical basis for the operational environment

Least Developed Countries

There are many ways to describe the different kind of states in the world. The terminology is constantly changing and attempting to capture the scope of the fluctuating reality. (Salminen 2018.) States can be studied for example in light of the United Nations' (UN) Human Development Index (HDI) that highlights the people and their capabilities instead of focusing solely on the numbers of economic growth (United Nations Development Programme). The World Bank uses a classification system for the world's countries that categorizes the countries into four annually updated classes based on the Gross National Income (GNI) of the previous year. The categories are low, lower-middle, upper-middle and high-income countries. (Serajuddin & Hamadeh 2020.) This thesis holds to the widely used classification of Least Developed Countries (United Nations Conference on Trade and Development a) to which Uganda also belongs to (United Nations Conference on Trade and Development b).

Business and Development

The World Trade Organization (WTO) led Aid for Trade (AfT) initiative dates from 2005 and it aims to underline the importance of the role of trade in development. The initiative guides both the developing country governments as well as the donors to realize the potential of trade in development. Another goal of the initiative is to battle the constraints many developing countries and especially the LDCs face. (World Trade Organization.)

Since the launch of the AfT development co-operation and development financing have been becoming ever more complex. The bilateral development co-operation is decreasing whereas new agents, such as businesses, private grand donors, free networks as well as the former aid recipients are gaining foothold and becoming increasingly prominent in the field. Many NGOs have started to search for alternative, market-based financing solutions as the traditional funding is decreasing. They are also adapting operating models from other industries and adapting more agile ways of working. The changes create a demand for novel organizational structures. (Ylikoski, T. & Rekola, S. 2019.)

The businesses' and NGOs' collaboration has also found new forms. In addition to the customary financial sponsoring, it may now include for example different kind of investments with expectation on profit. The NGOs may receive funding for a project and execute it but

then return the profit to the investor. In collaboration with businesses the NGOs may decrease the risks by offering their experience on the operational environment. The collaboration has its risks for the NGOs as it may prove to be difficult not to be influenced by the businesses' agenda. On the other hand, collaboration may offer an opportunity to influence a wider public. (Ylikoski, T. & Rekola, S. 2019.)

An example of the new trend is the FCA Investments. It is an impact investor that invests in SMEs in developing countries and fragile states. (FCA Investments 2021.)

Bottom of the Pyramid (BOP) business refers to business activities that are economically viable and reduce poverty (Linna 2019). C.K. Prahalad addresses in his paper Bottom of the Pyramid as a Source of Breakthrough Innovations the possibilities and untapped potential that lie at the bottom of the economic pyramid where are the highest segmentation of people. He claims that instead of the traditional 4Ps of marketing the focus must be on 4As to achieve success. (Prahalad 2011,6–7.) The 4Ps is a commonly used marketing mix that is based on the promotion of product, price, place and promotion (Ammattijohtaja, 2021). On the contrary, according to Prahalad the basis in marketing should be in creating awareness, enabling access, ensuring the affordability of the product or service and focusing on the availability (Prahalad 2011, 7). In regard to EPL, for example, availability would mean a constant and reliable flow of eggs. Prahalad claims the supply must be uninterrupted and that it also requires trust (Prahalad 2011, 7).

2.2 Businesses Creating Value

Supply chain management (SCM) is defined as the management of the flow of goods and services. It encompasses every process that is needed for converting raw materials into ready products. (Fernando 2021.) The purpose of good supply chain management is to bring added value to the customer with as low expenses as possible. In this kind of value chains every piece of the supply chain adds more to the value. The increasing value is easy to notice but the challenge is to detect the factors that do not add to the value. Examples of these are overlapping tasks and time spent in waiting. (Logistiikan maailma b.)

Need and Value

Value is defined by the customer's need. It is of highest importance to note that the viewpoint is that of the customer's. There are immediate and indirect needs that can be found in a process. The former refers to concrete outcomes whereas the latter emphasizes the experience. Their importance is defined by the company's strategic choices. In case the company concentrates on the satisfaction of the immediate needs it may only concentrate on

producing the very basic. If, however, the company's strategic choice is to fulfill the customer's indirect needs as well it must focus on the entire experience the customer receives. (Modig & Åhlström 2019, 24-25.) Once the customer's need is clear value can be defined accordingly and the creation of value can then be studied.

Michael Porter approached the topic by creating a model in the 1980s that defines the company's competitive advantage as the value it creates for its customers. Porter used the term "value chain" to describe the functions of the interconnected networks where the value is created. The networks consist of suppliers, the company and the customers. (Porter 1985, 10.) Sakki (2009, 14) notes that a value chain may be considered as the chain comprised by various value-adding companies but also as the value-adding chain within one company. The VSM, that is described in more detail in chapter 3, concentrates on finding out and eliminating the factors where no value is added (Lucidchart). Value Chain Theory, on the other hand, concentrates on pointing out where the value is created (Porter 1985, 10). Value is only being created when the flow unit is being refined. Therefore, time spent in waiting does not add to the value, few exceptions, such as wine and cheese, excluded. (Modig & Åhlström 2019, 23-24.)

The supply chains must be considered as processes instead of concentrating only on certain aspects. Therefore, also the key element of SCM development is collaboration between the different stakeholders. Some of the most important aspects of SCM and its development are shortening of the lead time and the simplifying of the processes. (Logistiikan maailma b.) Process theories and Lean philosophy offer tools for this.

2.3 Resource and Flow Efficiencies

There are two forms of efficiency: resource efficiency and flow efficiency. The former concentrates on the effectiveness of the resources and the latter on the flow unit. (Modig & Åhlström 2019, 7).

Resource efficiency

Resource efficiency explains how efficiently a company's resource is being used. The resource efficiency of a certain tool, an employee or even a department may be calculated as follows:

$$\frac{\text{Resource Operating Time}}{(\text{Relevant}) \text{ Period of Time}} \times 100 = \text{Resource Efficiency}$$

(Modig & Åhlström 2019, 10.) Resource efficiency is of highest importance in light of the opportunity cost. Opportunity cost is used to explain the lost value of an unchosen option.

As only one option can be selected opportunity cost defines the loss that is paid to achieve a profit. (Kennon 2020.) As the opportunity cost is always present the decision of the investments must aim to a maximum high resource efficiency. Otherwise the allocated funds could be used for another purpose. (Modig & Åhlström 2019, 11.) Resource efficiency has indeed succeeded in becoming widespread and many organizations use it as their form of efficiency. However, the undisputed pursuit of resource efficiency may lead to the efficiency paradox. It explains the new needs that in turn require new resources. (Modig & Åhlström 2019, 47.) High resource efficiency leads to long lead times, multiple flow units and the need to begin anew and they all require resources that would not be needed in a flow efficient company (Modig & Åhlström 2019, 47–55).

Flow efficiency

Concentrating on the flow efficiency offers an entirely different viewpoint to the efficiency discourse. Instead of concentrating on the organization's resources flow efficiency concentrates on the unit that flows through the organization and analyses how the flow unit will be developed during a certain time period. It measures the percentage of the value adding time of the entire process. (Modig & Åhlström 2019, 13.)

Lead time is an indicator of flow efficiency. It is the time it takes for one flow unit to go through the process. In order to determine the lead time of the process the start and the end must be determined. They can be freely chosen in a way that suits the current purposes best. This is, however, a key aspect of the analyzing process, as the different start and finish may open completely new possibilities. Considering the lead time, the emphasis is on the flow efficiency instead of the resource efficiency. (Modig & Åhlström 2019, 22.) The calculating of the lead time and the related value and non-value adding activities will be discussed in more detail in the next chapter.

A short lead time is generally a reliable and accurate indicator of value (Modig & Åhlström 2019, 26). There are few exceptions when there are indirect needs of the customer (Modig & Åhlström 2019, 26) but in relation to production such as EPL a short lead time is a valid indicator. Flow efficiency does not focus on the value-adding activities *per se* but on the density of their occurrence and on the elimination of the non-value adding activities (Modig & Åhlström 2019, 28).

Resource vs. Flow efficiencies

As resource efficiency ensures profitability and flow efficiency customer satisfaction a lucrative option for a successful business would be to pursue both. However, the two approaches are almost mutually exclusive (Modig & Åhlström 2019, 16) but concentrating on

the flow efficiency the company may eliminate the secondary needs derived from the efficiency paradox. (Modig & Åhlström 2019, 65).

2.4 Process thinking principles

2.4.1 Key aspects of a process

A process can be used to explain everything that is achieved in a business (Bradley 2015, 4) and all organizations have processes (Modig & Åhlström 2019, 17). A process is an entity of interconnected functions that begins with the customer's demand and ends when that demand is fulfilled (Logistiikan maailma c).

As the work in an enterprise is commonly divided according to their functions, there is a threat of the different parts of work seen as detached from each other. Process thinking simplifies and streamlines the different functions and thus serves the needs of the customer better. (Logistiikan maailma c.)

Olli Lecklin (2006, 124) describes a process as a “black box” (figure 1) that absorbs the input and turns it into the output that the customer wants. According to Lecklin the input may come from an internal or external supplier.

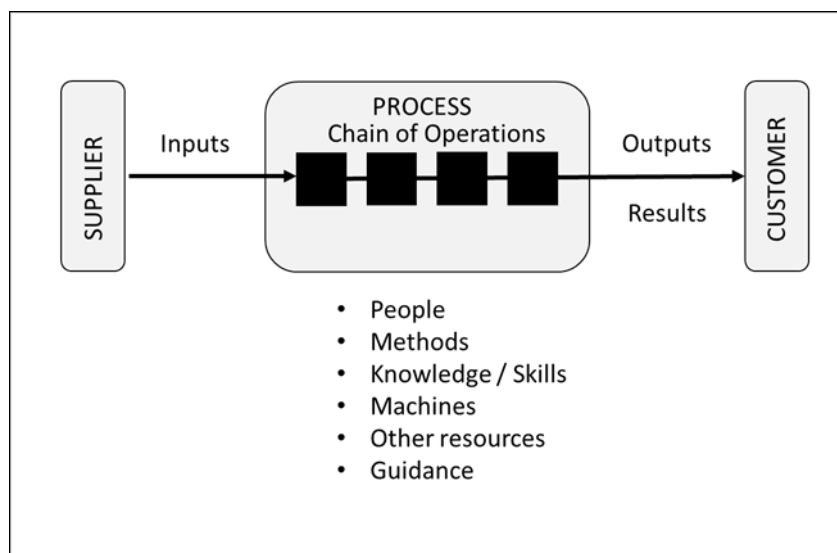


Figure 1. Business Process (Lecklin 2006, 124). Translated by author.

Processes can be for example a procurement, production or a supply process (Modig & Åhlström 2019, 17). A key element to a business process is that it must be beneficial from

the business' viewpoint and that it gives added value either to an internal or to an external customer (Lecklin 2006, 123).

As Modig and Åhlström point out, flow efficiency originates in processes (Modig & Åhlström 2019, 16) and therefore a process must be defined from the flow unit's perspective (Modig & Åhlström 2019, 19). The functions add value to the flow unit (Modig & Åhlström 2019, 16, 19) and they are repetitive and can be defined as well as measured (Lecklin 2006, 123). This is also a prerequisite for the development purposes that will be addressed in the next chapter. In contrary to a process, a project is nonrecurring (Lecklin 2006, 124).

All companies have processes, but their appropriate number is relative varying greatly. In case the processes are considered on a highly abstractive level only few main processes may be sufficient to describe an entire company. However, the main processes may in turn be divided into subcategories until the process is divided into singular functions. (Modig & Åhlström 2019, 30.)

Business processes may include control points that are needed to provide quality implementation. They are defined points to which other areas are subordinate. They can even be used to stop the progress unless specified requirements are filled or to observe them. (Crocotime, 2021.)

A good process secures the production with the promised quantity and quality. It is therefore also connected to the company's goals. A good process is quick and efficient and has a small dispersion in the lead time. It ensures the quality by being simple and making the deviations visible so that they can be addressed. (Logistiikan maailma c.)

Process laws

There are three different laws that are applicable to all processes and that explain the difficulties in reaching optimum flow efficiency and combining the flow and the resource efficiencies. The main problem is that all processes have variation. The first law is that of Little's. Little's Law points out that two separate things contribute to the lead time. These are the number of flow units and the throughput. The growth of the latter indicates a lack of resources or that it is not possible to work faster. The second law is the law of the Bottle Necks. It states that the lead time depends most importantly on the process phase that has the longest throughput. The third law is the connection between the variation, resource efficiency and the lead time. All processes have variation, but the key factor is its impact on the flow efficiency and on the possibilities to combine flow and resource efficiencies. (Modig & Åhlström 2019, 31-40.)

2.4.2 Developing a process

Developing business is vital for the competitiveness of the enterprise (Logistiikan maailma c). Most processes consist of 10 % value adding activities and of 90 % waste (Tuominen 2010a, 7) and therefore the potential for growth is substantial.

Process thinking focuses on developing the functions as an entity instead of optimizing each one of the individual steps of the processes. (Logistiikan maailma c.) Development of a process may have very different outcomes. It may result in the increase of productivity or speed, where the former refers to the decrease of resources and the latter to the decrease of elapsed time for the same outcome. Process development may also aim to answer better to the customer's needs and hence to better customer satisfaction. (Tuominen 2010b, 13.)

According to Lecklin development of a process may be divided into three categories. The first step is to survey the current state. The mapping provides data for choosing the processes that will be developed. It will also provide information of the functionality of the current state and charts to describe it. The next step is the analysis which main functions are to define the problems and to find a suitable development method. The development may consist of anything between quitting and outsourcing the entire process, making changes to the process or even to integrate new functions to it. The third step is the improvement of the process. (Lecklin 2006, 134-135.) It consists of first preparing a plan for the improvement that may, for example, contain the new process mapping and the aimed goals. Major changes may be tested in a pilot project and there must be an initialization plan for them before implementation. (Lecklin 2006, 191-193.) However, according to the principles of quality improvement once the three steps are done the cycle will always be repeated (Lecklin 2006, 135). Therefore, the process must contain a monitoring system to measure performance and the reaching of objectives. This produces data for future improvements. (Lecklin 2006, 196.)

The improvement of a process may not be immediately visible in the process charts as the changes may happen within a certain stage. All in all, the development often transpires by minor steps. (Lecklin 2006, 150.)

Standardizing work returns the efforts by making the management of it faster, easier and economically more beneficial (Liker 2010, 125). Instead of perceiving standardizing as a management tool Toyota uses it as a basis for employee participation. From this angle it can then lead to innovation that is done jointly with all the employees and management in a spirit of collaboration. Standardization is also a key to securing quality in the process. (Liker 2010, 142-143.)

Liker points out that instead of finding a best production procedure and holding on to that standardization should be approached as Imai describes it (Liker 2010, 142). Imai states that no process can be developed before it is standardized and that the stabilization of a process is a prerequisite for the improvements (Imai 1986, according to Liker 2010, 142).

2.5 Lean philosophy

2.5.1 Key principles of Lean

Lean philosophy was born in manufacturing at the Toyota Production System but has since then been applied to various areas (Bradley 2015, 3). It grew out of the necessity to produce despite the limited resources. Using as little resources as possible but aiming to maximize the production has since then led to a philosophy of continuous improvement. (Bradley 2015, 3). Taiichi Ono, the founder of the Toyota production system, summarises the essence of Lean that they only concentrate on the time from when the customer places the order until they collect the money and to the reducing of that time by eliminating the non-value adding factors (Ohno 1988 according to Liker 2010, 7).

Lean is a term commonly used for various purposes that represent different levels of abstractiveness:

- 1) Lean as a philosophy, way of thinking or culture
- 2) Lean as a quality- or production system
- 3) Lean as a method or tool.

(Mådig & Åhlström 2019, 89)

According to Liker most important is that Lean is an overall structure that must be an integral part of the entire company. It is not merely a set of tools such as 5S or Just In Time (JIT)-principle, but it must reach all the areas of the enterprise. (Liker 2010, 7.) He also reminds that Lean as a company-wide leadership philosophy makes the use of Lean tools much more efficient. It is important to note that the tools used in Lean are merely the operative part. (Liker 2010, 87.)

Lean is often described in the form of a house (figure 2) that was first introduced by Toyota's Fujio Cho. He chose to combine the ideas that were developed at Toyota to the form of a house because it also is a structure that is weakened if only one part, the floor, the roof or a wall is unstable. Since Cho's original house there have been many versions of it, but the main principles remain the same. (Liker 2010, 32). Liker and Morgan's (2006, 7) version is shown in figure 2 that presents well the key elements. The goal is presented in the roof. The

outer pillars present the Just-In-Time and the Jidoka principles. The former aims at reducing inventory and the latter preventing the mistakes in quality at moving onwards to the next phase of production. At the core of the house there are people that aim for continuous improvement. That secures the necessary stability. The house is built on levelled production and stable and standardized processes that provide a steady ground. Most importantly, as Liker points out, the key element of the house is that all the elements contribute to each other. (Liker 2010, 33-34.)



Figure 2. The Lean House. (Liker and Morgan 2006, 7.)

Lean is often viewed from the point of the customer (Bradley 2015, 2). A customer in a Lean oriented agriculture may mean either the end-customer that buys the product at the supermarket but also the next step in the process. Each step has the previous step as a supplier and the following step as an internal customer. (Nielsen & Pejstrup 2018, 14.) Besides the customer, executing Lean philosophy in a company may have many, very different, outcomes for the various actors involved (Holt 2019, 1.1.). The shareholders, the managerial level, the employees, the suppliers and the customers will all benefit from the Lean philosophy in a different way (Holt 2019, 1.1.). Lean philosophy activates and motivates employees because it requires people involvement (Nielsen & Pejstrup 2018, 17). It also enables the discovering of waste without having to blame anyone (Nielsen & Pejstrup 2018, 14).

Jeffrey K. Liker has studied the Toyota Lean manufacturing and categorized the success contributing factors to four categories that are the long-term thinking, right processes, people and partners and the problem solving. The first category, the long-term thinking, emphasizes a philosophy that aims to responsible and sustainable decision making even at the expense of short-term economic targets. The second category, the right processes, states that right processes will lead to right results. It emphasizes the elimination of waste and utilizes many TPS-tools. The third category emphasizes the importance of creating added value by developing people and partners. The final category aggregates the different aspects of constant learning and development. According to Liker the constant solving process of the background problems promotes organizational learning. In order to receive a full understanding of the problem it is important to go physically to the place. Once a decision must be made all the options must be studied carefully but once the decision is reached the implementation must be done promptly. However, even then, the process of continuous learning must not stop but the company must aim to be a learning enterprise. (Liker 2010, 36–40.)

Lean focuses on optimizing entities – not on sporadic cases (Six Sigma). Bradley also reminds the importance of processes in the Lean philosophy. He defines a process as sequential steps of action to reach an objective and highlights the possibilities of the graphical illustration of the process. (Bradley 2015, 3.) Creating a flow in one of the key processes is a starting step to Lean. It will shed light to other problematic areas of the process and will then, in turn, enforce to start using other Lean tools and ideas. (Liker 2010, 87–88.) A flow is created by bringing together operations that used to be apart. As a consequence, there will be more teamwork and the process is in control. The quality problems will be noted earlier and there will be more pressure for the individuals to come up with solutions to the problems. Continuous flow brings forth the problems whereas storages help hide the problems and reduces the urgency to solve them. According to the TPS each problem must be addressed immediately once it arises. (Liker 2010, 101.)

Production can be approached either from the pull or from the push point of view. According to Liker, push-production has built-in challenges because it assumes the customers' demands and those can in fact change rapidly. The production based on assumptions relies on a fixed production schedule and may therefore lead to large inventories. In case there are separate departments in mass production with no general collaboration but each working according to their own schedule there will be inventories between them to secure the continuation of work for all departments. In contrary to this, demand-based production responds to the demand of the customer that may be the end customer or the following production phase. It is therefore responsive to the actual and current consumption and as

such expresses the Just in Time - production. It means the customer receives what they need in the right quantity and time. Producing a one-piece flow with no inventories would be entirely demand-based production. However, as there are always natural outages in the process flow some inventory must exist. Toyota has responded to this by creating the Kanban system that uses small inventories. However, even then, the overall purpose of removing all inventories instead of only controlling them must stay in focus. (Liker 2010, 105–110.)

2.5.2 Waste according to Lean

Nielsen and Pejstrup remind that each step of the process must only contain actions that add to the value to the next step in the process. All non-value adding is considered waste. (Nielsen & Pejstrup 2018, 15.) In Lean waste is often referred to by its Japanese term, *muda*. There are eight different kinds of muda (Liker 2010, 27) that have been categorized. The categories are widely used among the Toyota Manufacturing as well as Lean methodology in general. In addition to these “seven deadly wastes” there is also an eighth category of waste that is sometimes used. The categories are waiting, overproduction, inventory, defects, transportation, over processing, wasted motion and underutilized worker and equipment resources. (Bradley 2015, 40-41.)

Waiting may occur in numerous situations. An employee, a machine or material may all have to wait for the continuation of the process. In production the manufacturing in batches has many risk components that can cause waiting. In a process waiting can be caused by material waiting to be enrolled in the process, the process waiting for the material or the process waiting for an employee. Unbalance between different stages in a process may lead for the material to wait for the machine to finish with the previous item. This could be remedied by the Just In Time- principle (JIT), where the stage downstream pulls the required amount of material at the required point of time from the previous stage upstream. Many things may cause the material to be late which in turn requires the process to wait. There may be issues in the delivery such as a broken machine or quality deficits. The process may have to wait for the employee in case the production is understaffed, or the employee must shift between different stages at the process. The solution could be, for example, to balance the production line as well as the capacity but also to produce the products in the same production line. (Tuominen 2010a, 31-33.)

Overproduction is the contrary to the above-mentioned JIT-principle. Overproduction happens without an internal or external order and when the production is unnecessary, higher than necessary or before it is necessary. The reasons for overproduction are manifold. It may be caused by shortcomings in planning or balancing the production. It may also derive from the attempt to prepare oneself for many scenarios such as a large order or absence.

Overproduction may also happen to cover for another muda, deficiencies, by replacing quality by quantity. Overproduction may be avoided by for example developing the production planning and applying the JIT-principle. (Tuominen 2010a, 16-17.)

Inventories may include items from all stages of the production process: raw-materials, process inventories and ready products. Overproduction leads to their growth, but there are many other factors contributing to it as well. Like overproduction, extensive inventories may derive from the attempt to prepare for unforeseen circumstances. They may also be caused by the attempt to purchase cheap batches. Large facilities may enhance the excessive growth of inventories, but insufficient facilities may also cause the growth in case items cannot be transferred directly to the next process phase due to the lack of space but a transfer inventory must be used. The analysis of the inventories is of highest importance to distinguish the difference between the truly necessary and the unnecessary inventories. (Tuominen 2010a, 18-19.)

The muda of defects is easily noticeable by the customer complaints. It may, however, become visible already at the production facility in the composites or the materials. Defects also cause the additional workload of checking and sorting the products. The customer interface requires attention also. According to the Lean principles it is most important to address the defects immediately before they reach the next process stage. A good process with minimum defects requires quality standards that are adhered to, that each employee controls one's own work and that the operability of the process and machinery is monitored. (Tuominen 2010a, 22-23.)

The need for transportation may originate in case there are long distances, material is transported back and forth to provide space for something else or the production machinery is far apart from each other and in a wrong order. Increasing the employees' capability to manage more different work stages helps to decrease the amount of movement. Also setting up the workstations for the different work stages according to the process flow is of highest importance. (Tuominen 2010a, 20-21.)

Overprocessing happens when there are unnecessary work stages or product qualities. It may happen when the process is not analysed, kept up to date and when no-one is responsible for the process planning. (Tuominen 2010a, 24-25.)

Wasted motion is related to performing a singular work stage in a non-efficient way. It may include performance that is not necessary, not meeting the set timeframes or performing the same task in altering ways. The root causes may be the lack of introduction to work, insufficient guidance, or expertise to perform the work. Therefore, creating standards and training the staff is of highest importance. (Tuominen 2010a, 26-27.)

In addition to the seven original wastes an eighth waste has now been generally accepted. It is the waste of human potential, unused human talent and ingenuity. It is caused when the employees' and the managers' work is separated to those that perform and those that do the planning and controlling of the work. In case § the knowledge of the frontline experts of the work is not acknowledged much potential is wasted. This could mean for example not challenging the employees to impart their ideas, giving a wrong tool for a specific task, or not training the employees properly. (Skhmot, 2017.)

Muda at farms

Nielsen and Pejstrup have listed examples of waste that may occur in agriculture at dairy farms. Overproduction may happen when there is more production or preparing of feed than what is necessary. There are many cases when there may happen waste in transportation. It may occur if the logistics are not efficient at the farm or if there is transportation of animals one way but nothing on return. The third waste, waiting, may also occur frequently. It can be caused by the search for a lost tool or waiting the water to run. Over quality may occur for example in case unnecessary items are cleaned excessively or in case the animals' needs are fulfilled disproportionately. Challenges in storing may have many forms in agriculture. Naturally purchasing equipment may cause problems like in any other field of business in case they have been purchased not corresponding to the actual need. However, in agriculture a major challenge is to estimate the needed amount of feed and purchasing accordingly. Excessive feed may get spoiled and it requires more storage facilities. It may also weaken the farm's solvency. Mistakes in agriculture may be caused for example by the unclear work stages that also waste time when the employees must ask for instructions. Also, the varying working methods of the employees may cause uneven results and therefore waste. Waste in movement is seen for example when the employees must look for items that have not been put to their place. The eighth waste, the unused potential of the employees, is visible in agriculture for example when an employee is in the wrong position and their skills for example in animal care are not taken into use. Waste occurs when only the deeds of the employees are considered and not their ideas as well. Each employee should be taken into the making of the improvements. (Nielsen & Pejstrup 2018, 32-37.)

Muri and Mura

Despite that the concept of muda is the most popular and well known, equally important are the concepts of muri and mura. As muda describes the non-value adding activities muri, on the contrary, concentrates on the overload of employees and machines. In case the employees' workload is too much it will result in problems in quality and safety. Overloading machines may lead to damages. Mura refers to the variability of production that is caused

by internal factors such as damages or by varying production schedules. Mura will then cause muda, but mura can also be seen as a consequence of the waste and on the other hand, overload. (Liker 2010, 114.)

In order to achieve sustainability varying production must be balanced. It will then, in turn, eliminate mura, which will cause reduction of muda and muri. (Liker 2010, 115.) Fujio Cho, the general director of Toyota Motor Corporation stated that when the production rate is even it is possible to stabilize the assembly line and to use the pull system. (Liker 2010, 113). Balancing the production schedule in regard to volume and selection is called heijunka. In case some items are produced excessively it will cause deficit in others in case there are no large inventories. (Liker 2010, 32.)

3 Development and research methodology

3.1 Lean tools

There are over 50 tools in Lean (Nielsen & Pejstrup 2018, 160). For the purposes of this thesis in use were the flow chart and value stream mapping. They are commonly used, visual and highly practical tools for the analysis and development of processes. The tools provide an opportunity to first define the current state and to find out the actual procedures that are in use at the moment but then also to analyse the processes and to find out opportunities for improvement.

3.1.1 Flow Chart

A flow chart is an excellent visual tool to describe a complex process. It is used for many different purposes and it has also been modified to specific purposes as well. The diagram consists of usually rectangular blocks that cover one step of the process. The blocks are connected by arrows that visualize the direction to take steps of the process. However, for specific purposes there are informative standards and rules to provide specific information of the process. The flow chart is done starting from the major steps and then filling in the remaining details. The flow chart must also be tested and sent for feedback to be of value among the intended users. (Zen Flowchart.)

3.1.2 Value Stream Mapping

Value Stream Mapping (VSM) is based on the Lean principles. It is a flowchart method, and it is used to analyse and improve the steps of the entire production cycle in an illustrated way. Principles of VSM have been in use since the early 20th century and it has been called for example material and information flow mapping and process mapping, all capturing important aspects of the process. VSM was associated with the Lean philosophy and the Toyota Production System. By the 1990s Value Stream Mapping had become the dominant term. (Lucidchart.)

Value stream means all of the actions that are taken to create the finished product and vice versa – all of the actions should add to the value (Lucidchart). VSM focuses on describing the overall picture of the process bringing forth the flow of process steps. Bradley adds that people may know their individual tasks, but a value stream map provides the overall picture. It also challenges everyone to become more actively aware of the sequence of one's own tasks. (Bradley 2015, 27-28.)

A key component to VSM's success is the customer-oriented approach and the clear understanding of what is value from the customer's point of view. VSM acknowledges that both the internal and the external customers only care about the value they receive. Generally speaking, *"value is something a customer is willing to pay for"*. From the customers' point of view there is no weight in the efforts that have been put to the product but only the end result from their perspective matters. Once that is clear each process may be detailed and studied if they add to the value. This in turn adds to the company's competitiveness when the customer gets most value as efficiently as possible. (Lucidchart.)

VSM's greatest strength is its ability to discover and eliminate waste (Lucidchart). VSM goes beyond the surface in its analyses. It not only finds the waste, but it also sheds light to the source and cause of it. (Lucidchart.) As discussed earlier, Lean philosophy recognizes eight different types of waste. Considering that waste is everything that does not add value, and value is defined from the customer's point of view, so therefore also a VSM must be started bearing the customer in mind. The VSM is begun by drawing a visual representation starting from the end customer and working the entire production process upstream (Skhmot, 2017.)

A value stream map projects the entire process and divides the steps to value-added (VA) and nonvalue added (NVA) steps. The value-added steps consist of procedures adding value from the customer's point of view. The rest, the nonvalue-added steps in the lead-time, are considered as waste and present an opportunity for improvement. By addressing those steps, the lead-time may be shortened. The time spent in the VA and the NVA steps make up to the total lead time of the process. In addition to the total process lead time another highly beneficial figure is the value-added ratio (VAR). VAR is the percentage of the lead time when something value-added is being done and is computed

$$\frac{VA}{VA + NVA} = VAR$$

(Bradley 2015, 36-37.) The most common NVA-activities are the eight wastes discussed above (Bradley 2015, 40-41).

In practice the first step of creating value and eliminating waste is to analyse the current state of the value stream. By a map it is easy to illustrate complex entities. A value stream analysis is conducted by creating a current state map. Then it is possible to separate the value adding and non-value adding steps and to develop the future and ideal state maps. According to Skhmot in the VSM after drawing the VSM (bearing the end user in mind) one has to document instances of the eight muda and develop a plan to eliminate them (Skhmot 2017). Due to the visual aspect of the VSM it serves well the purposes of communication

and collaboration. The current state and the points where the waste are taking place can be easily shown. A future state model may also be drawn. (Lucidchart.)

The Six Sigma aim to develop the systems to become more efficient and to eliminate waste like VSM also. However, the two approaches differ in methods. The former concentrates on process variations and the latter in non-value adding activities that are both considered waste. As they are mutually complimentary and have both been successful in different kind of situations, they have been used together in a combined Lean Six Sigma approach. (Lucidchart.)

3.2 Research Methodology and Data Collection

Hanna Vilkkä (2015, 143) describes that participatory observation is a common method to study the human action. Interviews is a method that can be chosen to respond to areas that are only little known (Hirsjärvi, Remes and Sajavaara 2007, 200). However, as doing research on the spot was not possible alternate ways had to be implemented.

The study was first begun by defining the needs and purpose of the thesis with the WB. The literal sources, such as the market analysis, provided by the WB about the EPL were studied. Also an EPL board member was consulted regarding the general processes at EPL. The purpose of the thesis was presented in more detail to the chairman of the board of the EPL and to the general manager of the EPL.

The next step in the process of acquiring empirical data was visiting a local poultry farm that has the same functions and resembles EPL in the production entity, although being more automatized. The visit and the thorough explanation of the farm's processes contributed to a general understanding of the processes. The process was first analysed in the form of a flow chart to provide a general outline and then drawn to a VSM. This was a basis that supported forming relevant interview questions for the EPL to map the current state processes.

The empirical data for current state was acquired in collaboration with employees of EPL in three online meetings during the spring 2021 by semi-structured interviews. It is a qualitative research method that can be used at all stages of the project, from the beginning whilst exploring new subjects to the later stages when more in-depth information is needed. Semi-structured interviews may also provide a space for mutual information sharing, learning and reflections. (Wageningen, 2021.)

A semi-structured interview relies on prepared questions but on the contrary to a closed survey, is not fixed on those. Instead, the method provides the opportunity for new questions

to arise based on the answers and observations during the interview. It is hence between a fully structured survey and unstructured conversation. The method also allows the interviewer to decide on how much time and attention is given to the various issues. (Wageningen, 2021.)

The meetings were executed using Microsoft Teams. They lasted approximately 30-60 minutes each. Bradley (2015, 164) recommends that several people are needed to create a full picture of an entire process. Regarding the work at EPL four persons were consulted: the general manager, the farm manager, the accountant/administrator representing the administrative functions and a poultry assistant. The interviewed persons represent 40 % of the total number of staff at EPL. Only a maximum of two people were consulted at a time in order to ease the chance for everybody to take the floor and to provide sufficiently time.

The guideline for a semi-structured interview may not necessarily have to rely entirely on questions but also on visual aids to which the questions are built around (Wageningen, 2021). The Finnish poultry farm's VSM was first shown at the interviews to provide an understanding what will be done about EPL. Succeeding that the interviews were then conducted by using open questions with the purpose of acquiring detailed information of the step-by-step actions at the enterprise. The questions created a structure but according to the principles of semi-structured interview method, as new questions arouse, they were asked. The screen was shared the entire time so that the interviewees could confirm that the answers were understood and written correctly. Minutes of the meetings were sent to the attendees afterwards as well. Following this, as the study progressed two further semi-structured phone interviews were made to the general manager to provide information to questions that had risen during the study.

Based on the collected data a VSM was drawn. The current state VSM was first studied and preliminary findings for the opportunities for improvement were made. These were then discussed jointly with the general manager and EPL board members in online meetings. Comments were also received per email. As the opportunities for improvement do not change the main functions in the VSM presented in chapter 5, a future state VSM was not drawn but the jointly formed results are presented in a matrix and discussed in more detail following that.

4 Business case: Egg Production Uganda Ltd Company profile

The business case of the thesis is Egg Production Uganda Ltd., a social enterprise established by the Women's Bank (WB). WB is connected with the Finn Church Aid (FCA), Finland's largest aid organization.

Finn Church Aid (FCA) is an international Finnish aid organization that aims to make a permanent change in the lives of those most in need. It works to ensure human rights as well as to reduce poverty and works with all people regardless of their political convictions, ethnic background or religious beliefs. (Finn Church Aid 2020.)

Women's Bank (WB) is a development fund and network of volunteers working together with FCA. WB is supporting female entrepreneurship and livelihoods in the Middle East, Asia and Africa. WB shares FCA's values of helping people from all backgrounds. The projects and the methods of action are chosen in collaboration with the FCA. They are then executed by the FCA and its local partners. WB works according to the principles of sustainable development. (Women's Bank.)

Egg Production Uganda Ltd (EPL) is a social enterprise established by the WB in Mityana, South-Eastern Uganda. Prior the establishment there was a careful market analysis and the planning of the business and the investments carried out by WB. EPL was then established in May 2019 and the first 7500 hens have started laying eggs in the late 2020. The entire process has been done in close collaboration between the different stakeholders in Uganda and Finland. The full running capacity will be approximately 3.5 mil. eggs per annum produced by 15 000 laying hens. The registered trademark of the EPL eggs is Chiggi. At the time of the interviews EPL employed ten people:

- general manager
- farm manager
- accountant/administrator
- salesperson/driver
- two poultry attendants
- two security guards
- feed mill operator
- cleaner/cook.

(Mehtälä 2020.)

According to the vision of the WB the EPL aims to benefit women, families and the community and create socially, economically and environmentally sustainable business. Once fully

running, EPL will create earning opportunities for hundreds of people in the value chain. It will happen partly by contract farming. Selling eggs is the main business but later also chicks and chicken feed will be sold for smallholders. EPL aims to act as a model poultry farm and to spread not only the substance know-how but business experience as well. (Mehtälä 2020.)

5 Current state

5.1 VSM at EPL

The current state of the processes and functions at EPL is presented in the following Value Stream Map (figure 3). The drawing of the value stream map began from the customer and followed the process addressing the different functions needed in the production. The triangles are marked for inventory. Thick arrows represent the flow of materials and narrow ones the flow of information. More detailed information of the brooding house, laying house and egg handling is presented in the boxes below.

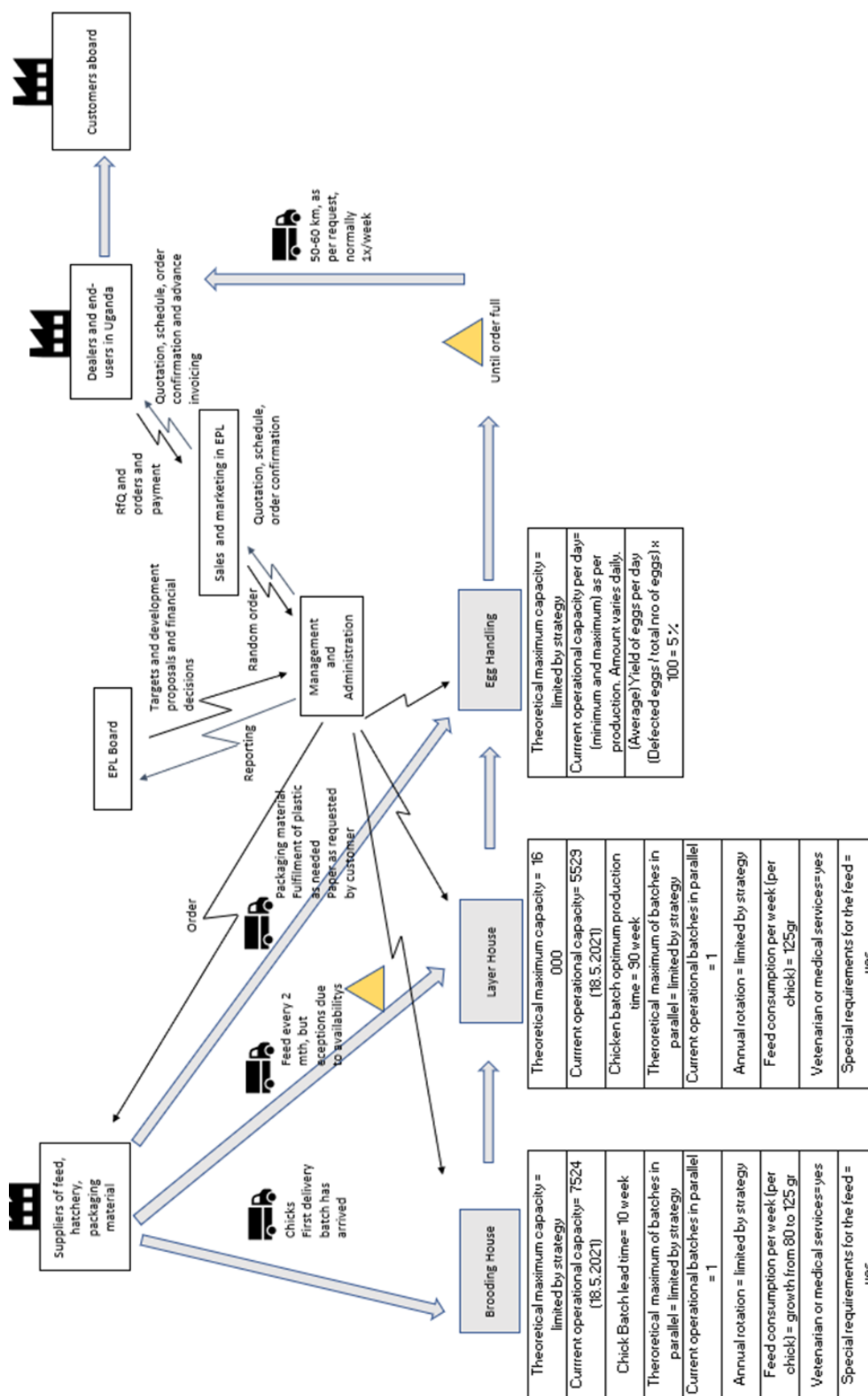


Figure 3. EPL VSM as of spring 2021. Based on the model by Payongyam, P., Sopadang A. and Holimchayachotikul P. 2010.

The main functions at EPL, through which the process flows, were identified in the VSM as:

1. customer interface / marketing and sales
2. management and administration
3. procurement
4. egg production
 - a. brooding
 - b. chicken daily care
 - c. egg handling
5. delivery.

Followingly, all the functions will be presented in more detail.

5.2 Customer interface / marketing and sales

As discussed earlier; value stream mapping begins from the customer. At EPL the customers represent both wholesale and retail and they are also purchased for export overseas. Typically, the entire order is for one customer only. The minimum delivery amount has been set to 500 trays each holding 30 eggs. Currently the customers change every week and as a new enterprise EPL is still searching for new customers. Currently there is no organized possibility for the customers' feedback.

The sales are handled through the sales-driver. The customers call to the sales-driver with a request for quotation. The sales-driver will first check the availability with the farm manager and then provide the quotation and order confirmation to the customer with advance invoicing. The size of the order effects the delivery time.

At EPL there is no special marketing department or a person responsible for it only but marketing is done by the general manager and the sales-driver. Marketing is done as is common in Uganda by networking, presenting and introducing the company to potential clients and then exchanging phone numbers. Usually it is more common that the customers reach out to EPL but in case EPL has surplus or the customers haven't been coming so then EPL reaches out.

5.3 Management and Administration

The management and administration functions control the general business processes at EPL. They handle strategic planning, managing the operations, the record keeping, book keeping and annual reporting, governance practices and manuals, finances, personnel and also the contact keeping with the EPL board. The function management and administration includes also the planning of the egg production and the planning and management of facilities maintenance. In addition to the above discussed administration and planning procedures these actions are connected to the EPL board.

Once the prices are negotiated the purchase form provided by the sales-driver is saved to the backlog at the office. Administration also keeps records of the delivery notes of the egg deliveries.

EPL holds weekly meetings to the staff that include updates on topical issues and training on varying relevant topics such as finances at a poultry farm, chicken health, sanitation or security.

5.4 Supplier interface / procurement

The main suppliers are those of day-old chicken, chicken feed and the trays. Also medicines and vaccination are procured. The current two batches of day-old-chicken have been procured from the same supplier. The feed is procured through a standard procurement system. The feed consists of a mixture supplied by several suppliers. It consists of 20 % concentrate by a supplying company, broken maize from local community, maize brand from local community and lime by a supplying company. Finnish poultry expertise, one of EPL advisors, was used for choosing the concentrate. The concentrate is imported and the usual delivery quantity is for 2 months. Hence it will be procured 10-11 times for a batch. Upon receiving the shipment is checked in quantity and quality and the information is recorded. There are 2 types of trays at use: plastic and paper. Plastic is reusable and the inventory of it is fulfilled as needed. The paper trays are only purchased as per the request by the customer.

5.5 Brooding

When the chicks first arrive their quality is visually observed. There is a quarantine area but that is used for detected cases of illness and not as a recurring routine step in the delivery process. The chicks are brought to a brooding house where they grow for ten weeks before

they are moved to the laying house. At the brooding house there is someone present all the time up to one month. Only then staff will be absent for short period of times.

5.6 Chicken daily care

The chickens are transferred to the laying house after they have spent approximately ten weeks in the brooding house. EPL is a free-run poultry farm where the laying hens may roam freely within the laying house. The chicken lay eggs in wooden nest boxes. In comparison, vast majority of the poultry farms in Uganda use cages.

There is no pre-determined schedule for the monitoring of the chicken's wellbeing, but employees are constantly close by or performing duties in the laying house. Duties are in the daily performance order: cleaning feeders and drinkers, manual feeding, checking the chicken in case of sick birds and removing sick birds to quarantine as needed. The chicken are monitored daily and symptoms and sickness are reported manually to notes and transferred to Excel-format once a week. Currently there is a guideline of "Do's" and "Don't's" for the laying house to be followed by the employees. The guideline for example reminds to wash hands, provide disinfectants on every entrance and to use protective clothing before accessing the chicken house. It reminds for example not to introduce new birds into the flock, not to re-use the litter for another batch or flock and not to enter the flock house when being sick.

The different components of the feed are mixed only for a short time, approximately one week, to prevent the feed from becoming clumpy. The waste is transferred to the waste yard and it will then be sold to local maize farmers at a low cost.

The KPI information is written daily by the poultry attendant to a physical notebook that is kept in the laying house. The data is transferred to an Excel-sheet once a week by the farm manager. The KPIs that are currently measured or followed in the chicken daily care and the next function of egg handling on a Flock Performance sheet are:

- number of birds
- daily mortality
- transfer to quarantine
- feed intake / day / flock (kgs)
- number of eggs collection / day
- total number of trays / day
- egg production percentage
- egg damages / trays
- cause of death

- treatments.

The causes of death are cannibalism, piling, pecking, infection, stress and dampness due to heavy rains. The causes of stress have been stress by wild dogs due to unfinished fencing and opening up the roof top to improve aeration.

5.7 Egg handling

The poultry attendants collect the eggs from the nest boxes to buckets three times a day. They are then carried over the yard to the veranda of the storage house. The eggs are handled one at a time. They are first cleaned with a rough cloth and then put to trays. The eggs are not graded to different size classes but according to a visual estimation different sizes are put to trays to equally. The quality control of the eggs is done by a visual check when they are put to trays. Each tray holds 30 eggs. The defect eggs are put to separate trays. The trays are then carried to the storage facility and stored until the ordered amount is full. The maximum time the eggs can be stored is set to one week.

There are both plastic and paper trays. The former ones are merely for delivery and they will be brought back to the EPL and re-used. The paper trays are disposable and only for a one-time-use. The plastic trays are the norm and paper trays are only used when specifically required.

A poultry attendant writes daily on a manual stock bin card the number of laid eggs, the damaged eggs and the eggs that are ready for delivery. The farm manager confirms what the poultry attendant has written by counting the trays every day. The numbers are transferred to an Excel form everyday by the farm manager. Inventory takes place once a month.

5.8 Delivery

Usually the delivery of the entire truck is for one customer only. Deliveries are usually to the capital, Kampala, at a distance of 60-70 km. The delivery trip takes a whole working day. Currently there are about five deliveries each month. The return journey is normally used for bringing chicken feed or other supplies.

Before shipment the sales/driver fills another stock bin card to document the number of outgoing eggs. The administrator, the farm manager and the security guard all count and confirm the number of the delivery as the truck is leaving. The driver/salesperson receives a delivery note signed by the customer that is then returned to the office. Empty trays are also brought back to the farm.

6 Opportunities for improvement

Based on the joint discussions and comments, as explained in greater detail in chapter 3.2., the following opportunities and their respective improvement ideas are proposed (table 1).

All the topics are situational and only studied at the present situation at the business in question. The contributing factors to the situation include i.a. the current status as a new start-up with limited resources.

Nr.	Opportunity for improvement	Risk	Information source	Function	Muda (Against Lean's basic principles. Defined as a muda in Lean)	Improvement idea
1	Still unstable working methods and processes of a new enterprise (Risk of mistakes due to incomplete instructions, training or non-standardized working methods)	a. Decrease of egg production b. Cash flow and bottom-line impact	Interview, Production figures	All	Defects Motion Transport	<ul style="list-style-type: none"> - Process stabilization in prioritized order (most critical processes first) - Creation of set standards and work stage guidelines (standardization) in illustrative forms - Visual KPI follow-up with staff - Increase of visibility in the work stage control - Recording the topics of trainings for systematized use - Maintenance of equipment
2	Chicken health and safety	a. Decrease of egg production and possible increase in bird mortality b. Cash flow and	Production figures	Chicken daily care	Defects	<ul style="list-style-type: none"> - Creation of secure environment - Stabilization of chicken daily care processes to prevent unexpected incidents - Creation of set standards and work stage

		bottom-line impact				guidelines (standardization)
3	Secure the laying rate and if possible, increase it	a. Decrease of the current laying rate b. Cash flow impact and bottom-line impact	Production figures	All	N/A	Targets for laying rate Long-term plan to increase and maintain the target laying rate
4	Inventory of eggs	a. Risk of spoilage during long storing c. Reputation	Interview	Egg handling	Waiting Inventory	- Enhance specified KPI for more precise follow-up and to enable development - Securing the maximum time of storing before shipment to 1 week and the use of FIFO even with larger production quantities
5	Delivery quantities	Delivery becoming the bottleneck ¹	Interview	Delivery	Inventory	- Flexible quantity sizes must be studied or must be kept open - Increase the agility to meet the market demand
6	Marketing and sales improvement	a. Variation in demand b. Cash flow and bottom-line impact	Interview	Marketing and Sales	N/A	- Surveying markets with possibility for higher margins - Branding - Encourage long-term customer relationships
7	Erosion of market prices / Red ocean (competition and decline in market prices)	Cash flow impact and bottom-line impact	Interview	Sales	N/A	- Marketing to Blue ocean (customer segmentation and branding)
8	Sales planning	a. Missing sales opportunities	Interview	Sales	Motion	- Current online data on the availability

¹ Egg production must be the control point that dictates the sub-processes (i.a. deliveries, procurement)

		b. Cash flow and bottom-line impact				
9	Feed ordering in bulks	a. Risk of spoilage during long storing b. Cash flow and bottom-line impact c. Quality risk	Interview	Procurement	Inventory	Suitable delivery agreements and terms Suitable delivery quantities Quality control (Note: Seasonal variability of pricing)
10	Increase engagement of the frontline workers to create more improvement ideas	Limited progress	Interview	All	Unused potential and skills	Encouragement to participate to continuous improvement, utilization of weekly meetings
11	Improve visibility (i.a. set places for all equipment)	a. Inefficiency b. Risk of missing tools c. Biosecurity risk	Interview	All	Motion	- Continue creating places for the tools and equipment with the people using them - 5S - Color marking the equipment as per to their respective houses
12	Not enough man power / High work load	a. Decrease in efficiency productivity b. Cash flow and bottom-line impact	Interview	Chicken daily care and egg handling	Defects (not possible to meet customer expectation)	Finding new (Lean) methods to streamline work processes or hire new employees ²

Table 1. Opportunities for improvement.

² Cash flow and bottom-line impact must be followed when considering recruitment

1 Still unstable working methods and processes of a new enterprise (Risk of mistakes due to incomplete instructions, training or non-standardized working methods)

As a new enterprise the processes and working methods are still unstable at the EPL. As it was discussed in chapter 2, Imai states that stabilizing processes is a prerequisite and a first step for their development (Imai 1986, according to Liker 2010, 142).

Incomplete instructions, training or non-standardized working methods contribute to a risk of mistakes and create instability in the working methods and the processes in general. They may possibly lead to decrease in the egg production and consequently have a cash flow and bottom-line impact. Standardization of the work stages and the stabilization of the processes throughout the company in all its functions would contribute to mitigating this risk.

As process stabilization requires resources it would be beneficial to prioritize strongly the order in which order to execute it. This would provide the opportunity to receive maximum gain.

The creation of set standards and work stage guidelines would contribute to the standardization of the work stages. In the Lean philosophy the importance of visibility is often emphasized. Creating visual, illustrative guidelines would also respond to the operational environment, as there is a risk of not all being literate or having the same language. Therefore highly visual guidelines for each work stage would be beneficial.

As there are trainings in the weekly meetings at the EPL on varying topics, the trainings could also contribute to create systematized procedures.

Visibility may also be used to monitor the execution of tasks. For example, for repetitive tasks a common procedure is to have a list on a wall or another easily seen place where the execution of a task is marked by the employee's name or initials. This provides current knowledge on when and by whom the task is lastly done.

Visibility would also be of use in sharing the KPI data to the entire staff. Visual KPI follow-up, such as presenting the accomplishing of the targets in a visual way, would provide opportunities for clear communication.

2 Chicken health and safety

Chicken health and safety provide another opportunity for continuous improvement. The risk is the decrease in egg production and even a possible increase in bird mortality. The main function where this opportunity for improvement is, is the chicken daily care. Much emphasis has been laid to the careful analysis of nutritious feed and the chicken health is

also improved by vaccination and medication as necessary. However, as it was discussed in the previous chapter, there have been challenges such as infections and unforeseen situations such as a pack of wild dogs or the removal of the roof causing stress to the chickens. As in regard to the first opportunity for improvement, stabilizing the processes and standardizing the work stages have the potential to mitigate the risks. Creation of a secure environment contributes to reduce the number of defects.

3 Secure the laying rate and if possible, increase it

There has been dispersion in the laying rate. Its decrease would impact both the cash flow and the bottom line. There are currently targets for the laying rate. Long-term plan to increase and maintain the target laying rate would contribute to the secure growth of the enterprise. However, implementing and carefully following the relevant KPI is of highest importance as well as to act according to the information provided by the KPI.

4 Inventory of eggs

The most important non-value adding step in the process is the inventory before shipment. Inventory, *per se*, is also one of the mudas. During the time of the inventory there is tied-up capital without the possibility to expect gain. According to the opportunity cost every decision must be considered also in the light of what will be missed due to the made decision. Inventory has a cash flow impact and it also creates the risk of spoilage during the storing. Spoiled eggs would then create a risk of reputation. Egg prices seem to vary quite a lot because of sudden disturbances in the market. For example, borders were closed and export stopped because of Covid-19 restrictions. Due to that domestic egg supply grew remarkably and egg prices went down. Sometimes waiting could be considered as an option to let the situation stabilize and to wait for better selling prices. However, due to the spoilage of eggs this can only be considered and optimized within the one-week timeframe that has been defined to secure the quality.

Enhancing the use of specified KPI would contribute to the possibilities of more precise follow-up and to enable development. Securing the maximum time of storing before shipment to 1 week and the use of FIFO even with larger production quantities is an important aspect in mitigating the potential risks.

5 Delivery quantities

The delivery quantities present a challenge of them becoming the bottleneck of the process. Instead, egg production should be the control point that dictates the sub-processes (i.e. deliveries and procurement). Distance to Kampala, where the customers are, creates a requisite that must be noted when considering the feasibility of deliveries. As mentioned in the

previous chapter, currently there has been a specified minimum quantity for the deliveries. As the production and the delivery volumes grow and new markets may open studying or keeping open flexible quantity sizes may provide opportunities. Also increasing the agility to meet the market demand may provide competitive advantages. In any case, emphasis on careful optimization for the maximum gain is of highest importance.

In case the deliveries would be to numerous customers the principles of the Milk Run method would be beneficial for the egg distribution. A milk run refers to distribution on a predefined distribution route. It consists of four steps that are the collecting of the items, traveling to the unloading points, management of the items and in some cases waiting. It is generally used at Lean manufacturing facilities to optimize the just-in-time delivery. (Lynch 2018.)

6 Marketing and sales improvement

Marketing and sales present an opportunity for improvement. The eggs are produced at a steady rate that cannot be altered on a short-term basis. Altering the egg production rate or implementing the pull factor would require a lengthy time span to execute. Therefore, in case demand is not strong enough inventories are inevitable. Variation in demand creates a risk as do the cash flow and the bottom-line impact. Encouraging long-term customer relationships would mitigate the risk of variation in demand and make the demand more even.

As it was discussed in chapter 2, there are two different kinds of needs that a process responds to: the immediate and the indirect (Modig & Åhlström 2010, 24-25). At EPL the immediate need is to full fill the need of the eggs but the indirect is produced by the experience the customer gets when the eggs are delivered. As Modig and Åhlström remind (2019, 23-24) the need must first be clear and only then value can be defined and studied accordingly. Strengthening the branding of the eggs would provide opportunities for differentiation as would the surveying of the markets with a possibility for higher margins.

7 Erosion of market prices / Red Ocean (competition and decline in market prices)

Uganda has experienced erosion of market prices. One reason is Covid-19 and the closing of the borders. The market is currently a Red Ocean, based on the definitions of the Blue Ocean – strategy. Red Ocean markets refer to markets where there is fierce competition over the limited demand. On the contrary, the Blue Ocean represents the unknown market spaces where there is potential for opportunity and growth. A Blue Ocean strategy ventures to create new demand. (Blue Ocean.) Marketing to Blue Ocean would possibly create opportunities for EPL.

8 Sales planning

In the sales process the sales-driver has been first confirming the availability with the farm manager and has then come back to the customer with the possible date of delivery. This requires excess movement of information, one of the mudas. It also wastes time and has the risk of missing sales opportunities and cash flow and bottom-line impact. Improving communication or possibly providing current data online on the availability would help the sales-driver to provide fast answers to the customer and to expedite the sales and order process. This could potentially contribute to the saving of employees' time and also to enhance greater customer satisfaction by a flowing customer service. The experiment of a first digital solution has been initialized.

9 Feed ordering in bulks

Feed ordering in bulks presents both an opportunity and a threat. Long storing creates the risk of spoilage. It also impacts the cash flow and bottom-line and contains the risk of quality at procurement. On the other hand, seasonal variability of pricing presents an opportunity for financial savings.

Feed consists of different components, as was discussed above. As opposed to maize, the concentrate is imported and has therefore more potential risks in the securing of its secure availability. According to Lean, JIT is a key principle regarding inventories, as was discussed above. However, the current global situation provides plenty of examples that too stretched JIT-theorem may prove to be very challenging and have far-reaching consequences once the companies no longer have inventories. An example is the Ever Given container ship that blocked the Suez-canal for several days at the end of March 2021 (Hakala, 2021). The scrutinising and enhancing for the best possible options for the delivery agreements, terms and quantities should be considered continuously in regard to the different components of feed. Improving suitable quality control methods should be done regularly, too.

10 Increase engagement of the frontline workers to create more improvement ideas

Lean philosophy emphasizes the importance of using all the potential and skills. Without the engagement of the frontline workers to create more improvement ideas EPL is subject to limited progress. Once the start-up phase of the business has been stabilized, the weekly meetings at EPL provide an opportunity to continue encouraging the frontline workers to participate in continuous improvement.

11 Improve visibility (i.a. set places for all equipment)

The risk of inefficiency and the risk of missing tools when needed as well as the biosecurity risk may be prevented by improving visibility and creating set places for all equipment. Using the same shoes, equipment or other items in different houses could increase the risk of diseases spreading. Creating places for the tools should be in the order they are needed. The places may be marked for example with tape. Color marking the equipment as per to their respective houses would provide a clear understanding to which house each equipment belongs.

Presenting the Lean-tool of 5S would provide further opportunities to the use of visibility and to the increase of the flow in the processes. Väisänen describes that 5S increases the productivity as well as the quality. The method is based on sorting, storing, shining, standardizing and sustaining. However, it is noteworthy, that 5S is not merely an independent tool for a single use but it is a way of working that must be inherent in the work. (Väisänen, 2013.) EPL could include 5S to its daily operating procedures in its different functions.

12 Not enough manpower / High workload

Currently the lack of manpower presents a challenge in the daily chicken care and the egg handling functions and consequently it creates a risk in the decrease in efficiency, productivity and profitability as well as the risk to a cash flow and bottom-line impact. As it was discussed in chapter 2, this kind of muri, overload of employees may result in problems of quality and safety (Liker 2010, 114). Finding new methods to streamline the processes would provide an opportunity of response. Cash flow and bottom-line impact must be followed when considering recruitment.

During the writing of this thesis improvements have already been made for the purposes of streamlining. In the beginning of the production the eggs were graded into three different weight classes that each had their own price. This required working time from the employees and it also made the pricing more complicated. However, the grading and sorting of the eggs was left out and the eggs are now dealt to the trays approximately evenly. This saves the employees' time and simplifies the pricing. While considering the improvement from the Lean-perspective it responds to the muda of over-processing. Currently the eggs are only processed to a generally accepted level. This provides an excellent example of opportunities for streamlining and avoiding the muda of over-processing.

7 Conclusion

7.1 Answers for Research Questions

As it was presented in the beginning, the objective of the study was to provide an understanding of the current state of the logistical flows at the EPL and to explore the opportunities for their improvement. The current state mapping was presented in chapter 5 and the identified main functions were stated. Following that, the opportunities for improvements were discussed.

The most important presented opportunities for improvement are the following:

- 1) Process stabilization
- 2) The work stage standardization

These two represent the main issues that would require the focus of a new start-up business. As it has been discussed earlier, process stabilization is the prerequisite for other development endeavors. As a new enterprise EPL is still searching for the stabilization of the processes and the standardization of work stages. As a new company addressing the issues of work stage standardization and process stabilization would provide a stable basis for growth. There is also potential for contributing to a business with strong institutional memory that would in turn mitigate the risk of challenges in case of employee turnover. Creating strong and efficient production processes is significant because they respond to the market demand. The operative side should be such that it is able to respond to the market demand.

A few of the presented opportunities for development respond to the market situation that is currently a Red Ocean with competition and erosion in market prices. Due to Covid-19 borders have been closed which has affected to the decrease of domestic selling prices and increase in production prices. This has also affected the construction work. Addressing the market related issues is of highest importance.

This thesis has approached value from a traditional viewpoint that is similar to any other poultry farm. However, effectivity of a social enterprise considering Porter's value chain theory may be seen in a broader sense. Porter uses the term value chain to describe the functions that bring value to the customer. The case study in the thesis is of a social enterprise and there value may be seen using a wider definition. Creating employment, training, capacity building, and networking may all be considered as added value.

EPL is ready for agile action. This can be seen for example in that currently all the staff including the guards and the manager participate to the egg handling to secure the attaining of the targets. Innovative approach is visible in producing a daily mini-report to the farm's WhatsApp-group. These are strong indicators that there is volition and potential for continuous development.

As discussed in chapter 2, Lean philosophy is based on the principle of constant learning and development. Therefore all the suggestions of this thesis are only one step on the way, not the final outcome. Nawras Skhmot (2017) reminds that Lean is about continuously improving the processes and encourages to engaging with the front-line workers and bringing forth their ideas of improvement.

7.2 Reliability and Validity

Validity and reliability are used to assess the quality of a research. A study can be reliable even though it would not be valid. On the contrary, a valid measurement is usually reliable as well. (Middleton 2019.)

As a concept to measure the quality of a research reliability means the consistency of a method to measure something. Measurement is defined reliable in case the same outcome can be achieved repeatedly if measured with the same methods in the same circumstances. (Middleton 2019.) The study was done in an exceptional context. Two factors contributed to it: case company's status as a start-up and the pandemic caused by Covid-19. This study was executed at a specific point of development of a certain start-up enterprise and therefore created a unique study. Some similar topics may rise at other similar start-up companies but then the influence of the pandemic must be taken into consideration.

Online-meetings are commonly used at EPL to connect with the Finnish WB advisors. Therefore, using them as a method to gather information in the semi-structured interviews did not present a novel situation for the interviewees. Also in general, online meetings as a platform have become more common during the pandemic and they have become increasingly common for various purposes. However, according to the Lean philosophy being on the place and visually observing would be the preferred option. Being on the spot at EPL would have provided more reliable data for the study.

Validity reflects how well the research method measures that what it is intended to measure. Good validity requires that the target group and the questions are suitable. (Hiltunen 2009.) VSM provides a good method to analyse the processes. However, the status of EPL as a new start-up must be noted. When the VSM is applied to a new start-up compared to long-running, highly developed companies with long traditions in Lean, results in the outcomes

are inevitable. In a new start-up the usability of a VSM is highly different compared to long-running enterprises. However, in this study it was used to provide an overall picture that may be used as one step in the process of company development. Later on, it may also provide a basis for future assessments.

Semi-structured questions provide the opportunity to describe the process flow at the interviews more freely. For the purposes of this study 40 % of the employees at EPL were interviewed but an interesting opportunity would have been to interview the sales-driver as well. Visiting the local poultry farm in Finland aided in forming suitable interview questions and hence contributed to the validity of the study.

8 Summary

The main purpose of the thesis was to analyse the current state of the process flows at EPL and to investigate the opportunities for process enhancement. As discussed in the beginning, providing efficient production is essential for a successful business and the thesis aimed to contribute to this.

Based on the representation of the theoretical and methodological basis and the business case presentation the main functions through which the process flows were identified, and they were used as a basis to structure the opportunities for improvement. This responded to the first half of the thesis objective. The functions were discussed in detail in chapter 5. The presentation of the opportunities for improvement discussed in chapter 6 respond to the second half of the research objective. The further conclusions were then continued in chapter 7.

Many opportunities for improvement were identified but out of them rose two main issues to focus. In a new start-up the process stabilization and the work stage standardization are of highest importance. As it has been discussed, standardization precedes the process development and process stabilization is a prerequisite for improvements (Imai 1986, according to Liker 2010, 142). It is important to understand that Covid-19 and the case enterprise's status as a new start-up created very exceptional and demanding context for EPL and thus for the study.

Suggestions on further research

As mentioned earlier, the thesis was bound by strong delimitations leaving many potential aspects for future studies. However, below are mentioned three suggestions on further research.

Value Stream Mapping could still be used at EPL to study certain aspects of the processes. To break down the processes and study in more detail for example the process of egg handling could provide vital information. As egg handling is on a daily basis the most time-consuming function studying and possibly streamlining it would be of highest importance. This would, however, require research onsite.

Implementing the Lean Six Sigma methodologies is a possible case for future studies. Lean is often recommended to be used before the Six Sigma methodologies that addresses the quality issues (Bradley 2015, 5). Studying the implementation of Six Sigma methodologies at EPL would provide an opportunity for possible future growth.

As discussed earlier, Lean philosophy may be used in a variety of different fields despite its roots in manufacturing. Some of the elements discussed in regard to the EPL are the same also in small-scale farms in Finland. Implementing VSM in Finnish poultry farms would provide opportunities for development.

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