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Blockchain and Entrepreneurial Value Creation in the Textile Industry

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by

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Master of Science Thesis INDEK TRITA-ITM-EX 2018:349

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Approved 2018-06-13	Examiner Terrence Brown	Supervisor Gregg Vanourek
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Abstract

This thesis examines a process of innovation within a Swedish early-stage start-up company in the textile industry. The thesis describes and analyzes the case company's intentions to create entrepreneurial value by reconfiguring its supply chain as one of its resources. Theories of dynamic capabilities, entrepreneurial value creation and supply chain management are applied for analysis of the case company's process of investigating how Blockchain technology can be applied to the company's supply chain to create and enhance value for the company, its customers and suppliers. Topics of digitalization, Blockchain technology, supply chain management, entrepreneurial value creation and dynamic capabilities are covered as part of the discourse.

The work in this thesis is qualitative and explorative and based on the study of one case company and its quest for creating entrepreneurial value by reconfiguring its supply chain. The study explores several potential ways for how entrepreneurial value can be created through process of innovation, e.g., by the application of Blockchain to a company's supply chain.

Although Blockchain has potential to create entrepreneurial value for the case company, it is not possible to predict if the benefits outweigh the costs, if the project is feasible in practice, if it is suitable for one company to undertake the project on its own or if collaboration and alliances are the way forward.

Key-words

Entrepreneurship | Entrepreneurial Value Creation | Process of Innovation | Dynamic Capabilities
Supply Chain Management | Textile Industry | Blockchain | Sustainability | Digitalization

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1 Introduction

This is a Master of Science thesis within the Entrepreneurship and Innovation Management program at the Department of Industrial Engineering and Management at the Royal Institute of Technology KTH in Stockholm, Sweden.

1.1 Background

The author has been in contact with several Swedish start-up companies for this thesis. Most topics suggested by these companies and the areas of research they suggested were too close to their respective area of business to serve as a topic or basis for this thesis. One company, however, stood out. The object for the case study chosen for this thesis is a Swedish start-up company within the textile industry (the “**Case Company**”). Due to reasons described below, the Case Company has asked to be anonymous in this thesis. The management of the Case Company has been directed by their board of directors to find support in academic theories for all new projects that are not part or an extension of their core business. Due to this, an interesting project has been paused on, pending the time to find support for the project in academic theory.

For this thesis the author has also been researching topics in business and industry concerning digitalization and has been looking at the relatively new concept of *Blockchain* technology.

Blockchain was initially most widely known for its use as the technology that cryptocurrencies such as Bitcoin are based on. Blockchain has since become widely known as a prospective new technology that is predicted to disrupt or revolutionize everything from finance to agriculture.

When the Case Company mentioned that they wanted to investigate Blockchain as a prospective new technology to enhance the value proposition in a specific part of their business, their supply chain and the management of their supply chain, it seemed like an interesting subject to research.

Blockchain technology is part of the wider theme of digitalization of business and everyday life that the world is currently undergoing. Internet and mobile communication has enabled people and things to interconnect in interesting new ways and we are at the advent of what has been called the *Internet of Everything*. (Case, 2016) This “third wave of the internet” is predicted to massively change not only the way we live our lives and how we do business, but also the economy and the world at large. (Case, 2016) The First Wave of the Internet was all about building the infrastructure and foundation for an online world. (Case, 2016) The Second Wave of the Internet was about building on top of the internet with services such as Google’s search engine and online merchandisers such as eBay and Amazon. (Case, 2016)

We are entering an era where the internet is integrated into everything we do. This presents endless opportunities, but also challenges, including, security and dependability, e.g., methods to avoid fraud and misuse.

Digital technologies have eliminated the physical constraints on the transfer of data. Trust may be the last major obstacle before the flow of information that market economies thrive on can be optimized. Blockchain's potential ability to remove this obstacle may allow us to unlock the real economic potential of our hyper-connected age. (Ganeriwalla et al., 2018)

The Case Company wants to explore whether the use of Blockchain technology for their supply chain can enhance their value proposition in relation to suppliers and customers. The Case Company also wants to explore the possibility to create barriers to entry and proprietary intellectual property in relation to competitors. This thesis will examine issues associated with these aims and possibilities.

1.2 Research Aims and Objectives

This thesis and its process of inquiry and investigation are based on the below described system and method, with the overarching purpose of increasing knowledge within the fields of industrial engineering, management, entrepreneurship and innovation. This research project will hopefully present an opportunity to apply theory to a real business scenario and to explore and analyze certain issues and phenomena in relation thereto. Hopefully it will also enable the application of techniques and procedures to contribute to greater understanding and to possibly generate solutions.

This thesis aims at fulfilling the objectives of research and to generate new knowledge, explain a new phenomenon, construct or create a new procedure or system and to provide solutions to a problem by investigating an existing situation and problem (Collis & Hussey, 2014) in the form of a case company and its process of innovation.

1.3 Research Question

The research question has been constructed from the author's personal interest in a topic, input from the Case Company, and from preliminary research on the topic, chosen and narrowed down with input from the Case Company.

Combining the opportunity presented in relation to the Case Company and applying an academic context with the aim to research novel concepts and apply theories within entrepreneurship, value creation, innovation and innovation management to an incumbent industrial process, the following overarching research question has been formulated:

How can the application of Blockchain to a supply chain in the textile industry create entrepreneurial value?

1.4 Delimitations

The research is focused on one case company, rather than many sample companies, and on one main process of that company, rather than several processes or phenomena, to be able to investigate and analyze that company and the particular process thoroughly. Due to limitations in access to or knowledge of other companies, no investigation will be made into other companies or their comparative processes.

The case company is a Swedish early-stage start-up and no research has been made into companies in other stages of development or in other parts of the world. The case company is active in the textile industry and this thesis does not cover any other industries.

The research is focused on reviewing literature on Blockchain, supply chain management and entrepreneurship since these are topics that have been found relevant during the work with this thesis. Other literature has been disregarded due to its lack of relevance for this thesis.

Although Blockchain technology is described and analyzed in this thesis, the technical details of this technology have not been covered.

2 Literature Review

2.1 Review and Selection

A customary literature review has been conducted for this thesis where initially theories on entrepreneurship, value creation and innovation management have been reviewed and where the Theory of Entrepreneurship and the Entrepreneurial Value Creation Theory (Mishra & Zachary, 2014) and dynamic capabilities have been chosen, analyzed and applied.

Both the Entrepreneurial Value Creation Theory and theory on dynamic capabilities are based on the assumptions of the resource-based theory, that resources of a firm should be valuable, rare, inimitable, and non-substitutable in order to create and sustain competitive advantage for the firm. (Ambrosini & Bowman, 2009)

Numerous sources on Blockchain and its application in supply chain management have been read and reviewed, of which a few have been selected for further review for this thesis.

Literature on supply chain management has been reviewed to provide terminology, concepts and context.

2.2 The Entrepreneurial Value Creation Theory

The Entrepreneurial Value Creation Theory is presented by Chandra S. Mishra, professor of Entrepreneurship in the Department of Management Programs, College of Business at Florida Atlantic University, and Ramona K. Zachary, professor of Management in Narendra Paul Loomba Department of Management, Baruch College, City University of New York, in their book *The Theory of Entrepreneurship: Creating and Sustaining Entrepreneurial Value* from 2014. All references to the Entrepreneurial Value Creation Theory and its constituents in this thesis are derived from that book and other work by Mishra and Zachary.

2.2.1 Context and Application

The Theory of Entrepreneurship or, as it is also called and will be referred to as hereinafter, *The Entrepreneurial Value Creation Theory* (hereinafter “EVC”), aims at presenting a comprehensive explanation of the entrepreneurial experience, a process where the entrepreneur sets out to capture value by applying *entrepreneurial intention* to the discovery of an *entrepreneurial opportunity*, and the development of *entrepreneurial competence*, to finally appropriate *entrepreneurial reward*.

The EVC presents certain terms, which are defined or exemplified below in the order that they appear in the *Entrepreneurial Value Creation Process*, as described in the following.

The EVC consists of and presents the following sub-theories: *The Theory of Entrepreneurial Intentionality*, *The Theory of Entrepreneurial Competence* and *The Business Model Theory*.

The EVC aims at presenting and examining the detailed interiors of the Entrepreneurial Value Creation Process (“EVCP”) by defining and describing a two-stage value creation and appropriation framework. See Figure 2.2.1

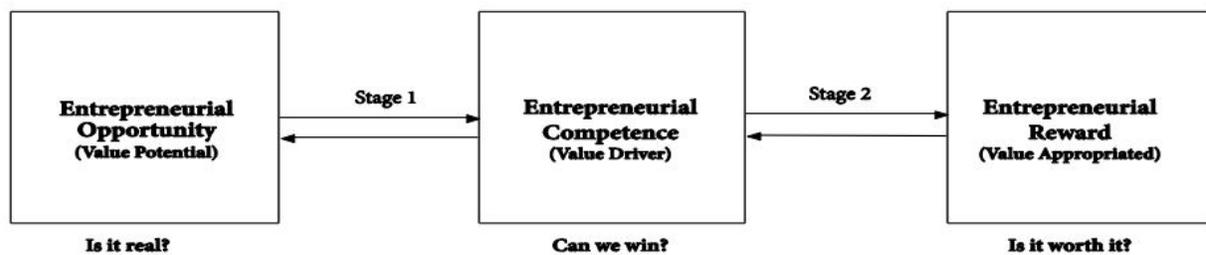


Figure 2.2.1 – Entrepreneurial Value Creation Process (Source: Mishra & Zachary, 2014)

The first stage of the EVCP concerns *Venture Formulation* and the second stage concerns *Venture Monetization* as further described in the following.

2.2.2 The Two Stages of the Entrepreneurial Value Creation Framework

2.2.2.1 Stage One – Venture Formulation

The EVCP begins with the entrepreneur’s discovery of an *entrepreneurial opportunity*, either based on or triggering *entrepreneurial intention*. **Entrepreneurial Intention** is described as a desire for reward and may lead to the discovery of an entrepreneurial opportunity or may be an effect of the discovery of an entrepreneurial opportunity. The **Entrepreneurial Opportunity** is an external stimulus and the base for the formulation of a venture. For example, the Entrepreneurial Opportunity can be an innovation or invention found, but not invented, by the entrepreneur.

The Entrepreneurial Value Creation Theory clearly makes a difference between an inventor inventing something and an entrepreneur discovering, e.g. someone else’s invention or innovation, and formulating a venture to commercialize and monetize the invention.

In the **Venture Formulation** process the entrepreneur may reconfigure the entrepreneurial opportunity to accomplish enough *entrepreneurial competence* to move to stage two of the EVCP.

There may be iterations between stage one and stage two of the EVCP, to, e.g. improve the entrepreneurial competence and be able to take the venture to stage two.

Entrepreneurial Competence is described as the entrepreneur internalizing available resources to form entrepreneurial competence. This means analyzing what resources are available and making them available for the venture. The display of entrepreneurial competence is an important factor when negotiating with potential investors to invest in the venture. Insufficient entrepreneurial competence may signal to the investor that the entrepreneurial ability is insufficient, or the venture quality is low.

The **Theory of Entrepreneurial Competence** states *intention* and *opportunity* as two distinct inputs for the internal dynamics of the processes of the venture in Stage One. Embedding *dynamic capabilities* in the business model design of a venture may reshape the entrepreneurial competence. Dynamic capabilities may also be used to configure, reconfigure and enhance entrepreneurial competence. The concept of dynamic capabilities is further described in Section 2.3 below.

Most ventures fail in stage one (Mishra & Zachary, 2014) and others may take a long time before they manifest sufficient entrepreneurial competence to move to stage two and into venture monetization. The process of venture formulation in stage one may be repeated and iterated as many times as necessary to enable the venture to move into venture monetization in stage two.

2.2.2.2 Stage Two – Venture Monetization

Stage Two of the EVCP describes the process from establishing and reconfiguring entrepreneurial competence to appropriation of *entrepreneurial reward*. **Entrepreneurial Reward** is described as the value created by the venture, i.e., the value appropriated by the entrepreneur from an entrepreneurial venture. (Mishra & Zachary, 2014)

Stage Two may include venture financing and the phenomena of adverse selection, risk and return, moral hazard, entrepreneurial incentives and risk mitigation. These concepts have been reviewed but not accounted for in this thesis due to time constraints and lack of relevance for the focus of this thesis.

Stage Two is concerned with dynamic capabilities as a method for an entrepreneurial venture to achieve and sustain competitive advantage. In Stage Two dynamic capabilities may be employed to modify and reconfigure the entrepreneurial competence and to strengthen the venture's business model and thereby facilitating value appropriation and entrepreneurial reward.

The **Business Model Theory** states four elements of business model design, i.e., customer lock-in, resource novelty, resource efficiency and product-market complementarities.

A business model is a description of how a venture generates revenues and cash flow and the value of a venture is determined by the generation, timing and risks of that cash flow. (Mishra & Zachary, 2014) According to the EVC, the business model is designed in Stage One and in Stage Two the business model can be reconfigured to, e.g., embed dynamic capabilities as a value creator and to appropriate entrepreneurial reward.

The EVC suggests that embedding dynamic capabilities in the design of the business model of a venture may reshape the entrepreneurial competence to create sustained value and facilitate the entrepreneurial reward. (Mishra & Zachary, 2014)

2.2.3 Critique

The Entrepreneurial Value Creation Theory is a rather new theory and as with most new theories it can be claimed that it has not been sufficiently tried and tested. As is common with research, a theory is first developed and then hypotheses and propositions can be developed before being empirically tested. This does not seem to have been done yet in the case of the Entrepreneurial Value Creation Theory. It was even difficult to find critique on the theory and hence the critique presented herein is the opinion of the author.

Sometimes it can be complicated to determine what stage in the Entrepreneurial Value Creation process a venture has reached. Ventures, such as the Case Company, tend to be rather hard to analyze using a fixed set of variables or parameters.

The Entrepreneurial Value Creation Theory is not very specific or detailed and may be too general to be used to make sense of complex and detailed entrepreneurial venture processes. It claims to be all encompassing but seems too general to claim that. It can be described as broad and general rather than narrow and focused. Some of the examples used when describing the different parts of the Entrepreneurial Value Creation Theory are not specific for entrepreneurial ventures. For example, its contradictory to describe processes of a company as an entrepreneurial venture looking to appropriate entrepreneurial reward when the company has clearly already generated entrepreneurial reward.

2.3 Theory of Dynamic Capabilities

2.3.1 Context, Definition and Application

The theory of dynamic capabilities is a concept within the field of strategic management and based on the assumption of the resource-based theory, i.e., that resources of a firm should be valuable, rare, inimitable, and non-substitutable in order to create and sustain competitive advantage for the firm. (Eisenhardt & Martin, 2000) The theory of dynamic capabilities suggests that firms can create resources that are rare, difficult to imitate and imperfectly substitutable by adapting resources within and outside the firm as a means to create competitive advantage to capture, create and sustain value. (Ambrosini & Bowman, 2009)

The dynamic capabilities concept is concerned with the ability of firms in rapidly evolving environments to be able to create and sustain new resources or adapt its incumbent resources. (Teece et al., 1997)

Dynamic capabilities can be defined as processes encompassing a firm's organizational ability to alter, build and integrate internal and external processes and competences in response to rapidly changing conditions and are concerned with intentional change of the resource base of a firm. (Ambrosini & Bowman, 2009) Processes such as product development, strategic decision making and alliancing are mentioned as dynamic capabilities (Eisenhardt & Martin, 2000)

Dynamic capabilities are a firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments. (Teece et al., 1997)

The purpose of dynamic capabilities is to affect the firm's current resources and alter them to create further resources in order to sustain or enhance competitive advantage with a focus on its outputs in the form of new valuable resources. In the expression dynamic capabilities, the word capabilities means processes. (Ambrosini & Bowman, 2009; Eisenhardt & Martin, 2000; Teece et al., 1997)

There are various kinds of dynamic capabilities of which some can be used to integrate external resources, alter internal or external resources, create new resources or even to exclude resources. There are four main processes for dynamic capabilities: reconfiguration, leveraging, learning and creative integration. (Ambrosini & Bowman, 2009)

Acquisitions, alliances and product innovation may be considered as *real* dynamic capabilities, since they facilitate the renewal and reconfiguration of a firm's resources. (Ambrosini & Bowman, 2009) Research & Development (R&D), acquisition processes, absorptive capacity, organizational structure reconfiguration and resource divestment can also be mentioned as examples of dynamic capabilities. (Ambrosini & Bowman, 2009)

As demonstrated, quite many of a firm's processes can be considered to be dynamic capabilities and it is of essence that the outputs of the dynamic capabilities are valuable, otherwise they may not be considered to be dynamic capabilities. (Ambrosini & Bowman, 2009) One study has shown how product innovation and new product development were connected to the development and renewal of firm-level competences over time and not only the expansion of a firm's portfolio of products and could as such be considered as a dynamic capability. (Ambrosini & Bowman, 2009)

2.3.2 Dynamic Capabilities and Value Creation

Dynamic capabilities are focused on creating value by creating and sustaining competitive advantage as a direct or indirect effect of the dynamic capabilities. There are, however, several other potential outcomes that can prove to be neutral or even negative as the graphic in Figure 2.3.2 below illustrates.

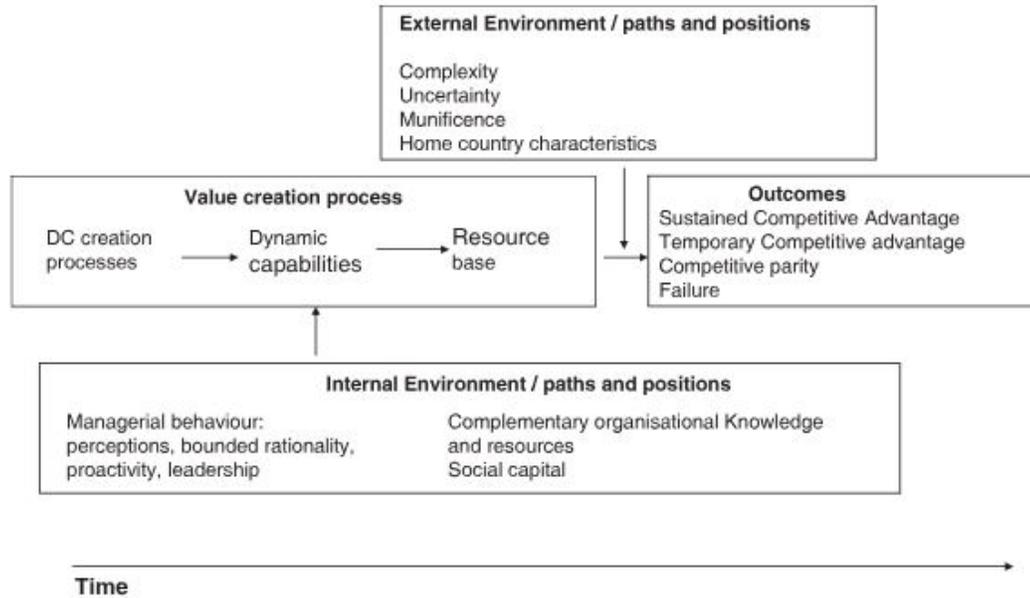


Figure 2.3.2 – Dynamic capabilities and value creation (Source: Ambrosini & Bowman, 2009, p. 43)

Figure 2.3.2 above displays how the creation of dynamic capabilities is influenced by internal managerial behavior and complementary organizational knowledge and resources, and how external factors can create outcomes in the form of sustained or temporary competitive advantage or that are neutral or even negative. (Ambrosini & Bowman, 2009)

Part of the discourse revolving around dynamic capabilities posits that dynamic capabilities should be evaluated based on their evolutionary fitness, referring to its effects on revenue and/or profits, and technical fitness, focusing on its quality of capability performance. (Ambrosini & Bowman, 2009)

2.3.3 Critique

Dynamic capabilities do not always lead to improved performance of the firm and may not have the intended effect or a positive outcome. Reasons for this may be uncertainty in prediction of effects of dynamic capabilities and unknown circumstances of external factors. It is difficult to forecast if changes to a firm’s resources will result in a valuable new resource, which is a requirement in order to be considered a dynamic capability.

Dynamic capabilities revolve around the creation of future resources and their potential benefit can only be known in arrears, which may be sensitive to small and young companies. There may be other actions for companies to focus on to enhance even greater value and there will always be an alternative cost to consider.

The concept of dynamic capabilities seems to involve circular reasoning since potential processes that are valuable may be valuable without being dynamic capabilities.

Dynamic capabilities also present some challenges when it comes to definitions since terms like processes and resources can mean a lot of different things and the concepts are quite broad and inexact. Theories of dynamic capabilities have been subject to a lot of debate regarding its focus on definitions rather than how well it informs and impacts practice. (Pisano, 2015)

The field of dynamic capabilities seems to be mostly based on conceptual elaboration and less on empirical research which may be due to the capabilities being less well specified and its observers may hence have difficulties setting a focal point. Previous research within the field of dynamic capabilities seems to have been mostly quantitative and quantitative research may prove less suitable for detailed analysis of complex processes and answering questions starting with “how”. (Ambrosini & Bowman, 2009)

Organizations may operate in environments they cannot fully grasp or analyze, and thus organizational action patterns inevitably involve simplification, selectivity and uncertainty, which may lead to blind spots in strategic actions. (Burisch & Wohlgemuth, 2016)

The research regarding dynamic capabilities needs to be reset around the fundamental strategic problem facing firms and how to identify and select capabilities that lead to competitive advantage. (Pisano, 2015)

2.4 Blockchain and Supply Chain Management

2.4.1 The Emergence of Blockchain Technology

In this era of rapid development, novel concepts spring out of collaborative and open systems of innovation. One of those concepts is the innovative and collaborative use of cryptography for a secured chain of information blocks called Blockchain. Cryptography is the study of mathematical techniques related to aspects of information security such as confidentiality, data integrity, entity authentication, and data origin authentication. (Menezes et al., 2001)

In 2008 a pseudonym person or persons, called Satoshi Nakamoto, released a protocol for a peer-to-peer digital money system called Bitcoin, which was to become the world’s first widely spread cryptocurrency. A cryptocurrency is a digital currency that differs from traditional fiat currencies because it is not created or controlled by a country or state. (Tapscott & Tapscott, 2016) The Bitcoin type of cryptocurrency is “mined” by people and businesses, using computers in a peer-to-peer network with software that solves mathematical problems and thereby uses computer power and hardware, electricity and internet connection as underlying assets for mining. (Gupta, 2017) Blockchain serves as the public, decentralized and shared ledger for Bitcoin where Bitcoin transactions are recorded and verified by the participants in the Blockchain network of interconnected computers.

Since the creation of Bitcoin, Blockchain has been predicted to revolutionize several areas within business and industry but no actual revolution has yet taken place. (Tapscott & Tapscott, 2016) Blockchain has even been called the most important invention since the internet itself. (Vorabutra, 2016)

While Blockchain is the foundation of Bitcoin and emerged in the creation of Bitcoin, Blockchain should not be confused with Bitcoin because its potential uses are much greater than that. (Gupta, 2017)

2.4.2 Explanation of Blockchain Technology

A “block” in Blockchain is a record containing a timestamp and transaction data. The “chain” in Blockchain is a list of such records that are linked and secured using cryptography in a peer-to-peer network of participating computers to create a distributed ledger that is immutable and resistant to modification by any one member in the network. Changes require verification from peers in the network. The ledger is “distributed” since it is run on participating computers in the peer-to-peer network and needs to be verified by a majority of the participants in order to be valid. Once the data in any given block has been validated by the network and recorded it cannot be altered retroactively without the following blocks also being altered after validation of the network majority. (Drescher, 2017)

The combination of being decentralized and immutable to change by one party, makes Blockchain a very secure way to record transactions, which doesn’t require clearing from a third party. (Norton, 2016)

When describing Blockchain as immutable in this thesis, it means that a block or a Blockchain cannot be changed by one party and it needs consensus by a majority of a group to be able to be changed.

The below image illustrates the difference between a system with a centralized ledger handled by a third party clearing house and a decentralized ledger handled by its constituent parties without need for a middleman.

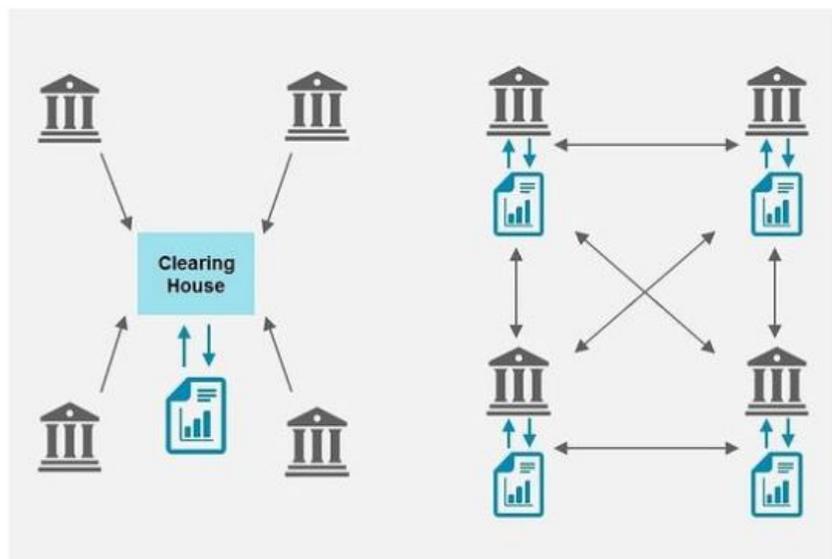


Figure 2.4.2 – Central party clearing compared to distributed ledger (Source: Norton, 2016)

Users may access or inspect a Blockchain, but they can't change or delete it. A Blockchain may only be updated through consensus of a majority of participants in the system. (Vorabutra, 2016)

Blockchains can be public, allowing anyone with computing capacity to add to the network, maintain the ledger and participate on issues requiring consensus, public permissioned, or private. Public permissioned and private Blockchains may be run by one or more businesses that control all aspects of the platform including who can participate and what participants are allowed to do. (Ganeriwalla et al., 2018)

Based on the above, Blockchain can simply be summarized as a secure, traceable, transparent, efficient, scalable and immutable system for records of events such as, e.g., transactions without the need for an intermediary.

Blockchain has many applications and can be used for any exchange, agreements and contracts, tracking or transactions. (Marr, 2018) Experiments have been conducted with use of Blockchain to, e.g., track responsible sourcing of tuna in Indonesia, secure the usage and sharing rights of digital media and sharing revenue across the media creators and certify diamonds. (Laaper et al., 2017)

2.4.3 Supply Chain Management

A supply chain is the collection of processes and resources required to make and deliver a product to the final customer. (Rajgopal, 2016) Supply chain management (SCM) is the active management of supply chain activities to maximize customer value and achieve a sustainable competitive advantage. (SCRC, 2017) Supply chains exist to take material from suppliers, move it through manufacturing and then distribute it to customers or end users. (Sarkar, 2017) A large part of the Case Company's business is SCM and to secure the supply chain on behalf of its customers in order to, e.g., verify that it is environmentally sustainable.

The companies that constitute the supply chain are interconnected through physical flows, involving the transformation, displacement and storage of materials and goods, and the less visible information flows, which may allow the constituents of the supply chain to coordinate and control long-term strategies and the ongoing movement of materials and goods along the supply chain. (SCRC, 2017)

Proper management of supply chains can help companies increase revenue, manage risks and reduce costs as well as create competitive advantage. (Sarkar, 2017)

2.4.4 Blockchain and Supply Chains

Blockchain is predicted to transform the supply chain and logistics industry. (Marr, 2018) Supply chains can contain hundreds of constituent suppliers, in many different countries and locations

and hence be a very complex and complicated process to overview and manage. Due to the complexity and lack of transparency of current supply chains, an interest for how Blockchain can be used to create transparency and traceability has emerged in recent times. (Marr, 2018)

One of the problems with the large and complex supply chains of today is the difficulty for involved parties to know the true value of products due to lack of transparency in the current system as it may be difficult to verify that supply chains do not contain illegal or unethical practices. (Marr, 2018)

Each time a product is transferred from one party to another in a supply chain, the transaction could be immutably documented by use of Blockchain, thereby creating a permanent document of the history of the product. (Vorabutra, 2016)

Blockchain is predicted to become a universal supply chain operating system. (Vorabutra, 2016)

The following actions associated with, e.g., a supply chain process, can be immutably secured and recorded by the use of Blockchain, thereby creating a permanent, transparent and traceable record of the actions in the supply chain process:

Recording the quantity and transfer of assets - like pallets, trailers, containers, etc. - as they move between supply chain nodes;

Tracking purchase orders, change orders, receipts, shipment notifications, or other trade-related documents;

Assigning or verifying certifications or certain properties of physical products; for example, determining if a food product is organic or fair trade;

Linking physical goods to serial numbers, bar codes, digital tags like RFID, etc.;

Sharing information about manufacturing process, assembly, delivery, and maintenance of products with suppliers and vendors. (Vorabutra, 2016)

Blockchain also has a secondary potential benefit as it can be used to, e.g., strengthen corporate reputation by providing transparency regarding what materials are used in products. (Laaper et al., 2017)

2.4.5 Critique

Most theories regarding the application of Blockchain in supply chains lack empirical evidence. So far, the field mostly consists of predictions and hypotheses and there seems to be very little objective research on Blockchain actually applied to supply chains.

Many of the sources encountered that are positive about the potential of Blockchain are written by consultants that stand to gain from projects of analyzing and implementing Blockchain in businesses. As such these sources can be questioned since they are more of “pitch material” and

may not be sufficiently neutral or critical. They are, however, a source of information and inspiration.

It may prove difficult to form or join a consortium and to set up and coordinate a Blockchain platform for firms other than large global corporations, with incentive and resources to set up a Blockchain platform independently, like, e.g., Maersk has for shipping, with help from IBM. (Ganeriwalla et al., 2018)

3 Methodology

3.1 Research Paradigm

The research paradigm, or philosophical framework, that has guided how this thesis has been conducted is interpretivist realism, which is a mix of interpretivism and realism derived from the portal of research methods. (Håkansson, 2013) It is focused on exploring the complexity of a phenomenon with the purpose to gain interpretive understanding and to seek to describe, translate and otherwise come to terms with the meaning of a certain phenomenon in the social world. (Collis & Hussey, 2014)

Interpretivism is characterized by the ontological assumption that reality is a social construct and a projection of human imagination. It can be used as an epistemological stance to understand how social reality is created and to obtain phenomenological insight.

Interpretivism borders on realism on the continuum of paradigms, and data collection in the form of a case study and observations is characteristic of realism.

Any findings will be derived from qualitative methods of analysis and be based on the interpretation of qualitative research data derived from interviews, literature and case study. (Collis & Hussey, 2014)

3.2 Purpose of the Research

The purpose of this research is explorative, using case study and observation to provide qualitative data and to assess which existing theories and concepts can be applied to the problem. (Collis & Hussey, 2014)

Parts of this thesis are descriptive and explanatory, but its main purpose is not to be descriptive or explanatory. Its purpose is explorative since it aims to explore and analyze certain phenomena based on hypothesized, general relationships and scenarios. (Collis & Hussey, 2014)

The case study will be explorative in order to be able to understand “how” and, potentially, “why” with focus on contemporary concepts. (Yin, 2009)

The research will be inductive and analytical rather than deductive, which is also characteristic of interpretivism and realism. (Collis & Hussey, 2014)

3.3 Data Collection

I have chosen a qualitative approach and designed the study to collect qualitative data based on interviews and studying a specific case company and its processes.

The data has been collected by in-depth semi structured interviews (Yin, 2009) with a designated key person at the Case Company and from written sources as described in the literature review.

The interview started with a fixed set of questions that were completed with follow-up questions based on the answers and findings during the research. The process has been linear, but iterative (Yin, 2009) where the Entrepreneur (as defined in Section 4.1 below) was first asked to describe the case company, its processes, its supply chain and the case project. Based on answers received further questions have been formulated and presented. Unfortunately, some of the follow-up questions were left unanswered, due to intermittent time constraints on behalf of the Entrepreneur during the thesis project. The results of the data collected through interviews are presented and analyzed in Section 4 below.

For the data collection a literature review was also conducted where topics of Blockchain, supply chain management, value creation, entrepreneurship and innovation management have been reviewed, analyzed and applied. The sources for the literature review consisted of books, commercial publications, academic journals, Internet sources and scholarly articles. The literature review informed some of the follow-up questions presented to the Case Company.

3.4 Data Analysis

The study is designed to apply its findings to solving a specific, existing problem presented by the Case Company and is as such to be considered as applied research (Collis & Hussey, 2014) and its findings will be presented to the Case Company.

Qualitative secondary data in the form of reports and articles will be analyzed and primary data in the form of interview transcripts will also be analyzed. Case study research requires a logical design, pre-described data collection techniques and pre-determined data-analysis methods. (Yin, 2009) The data-analysis used in this thesis has been analytic and interpretive content analysis based on the answers and information provided by the Entrepreneur and the Case Company. (Collis & Hussey, 2014)

The difficulty with analyzing qualitative data is that there is no convention for this analysis as is the case with quantitative data. (Collis & Hussey, 2014)

The analysis will hopefully allow for findings from the research to be generalized from one setting to another similar setting, which is also characteristic of interpretivism. (Collis & Hussey, 2014)

The analysis of the data collected is presented in Section 4 and Section 5 below.

3.5 Ethics and Sustainability Issues

3.5.1 Research Ethics

During the thesis research, ethics have been upheld and no participants have been harmed and their dignity, informed consent, privacy, confidentiality and anonymity have been upheld.

The Case Company and, consequently, the person at the Case Company that I have had access to for interviews have asked to be anonymous for two reasons. One reason is that certain of the material, findings and potential results of this thesis may prove to be company secrets and detrimental to the Case Company if disclosed. The other reason is that the Case Company is currently negotiating financing with various venture capital providers and does not want this work to affect the negotiation process adversely. Due to this they have asked to be given the chance to review the work and suggest changes and anonymization of certain parts if deemed necessary. The anonymity and confidentiality have been thoroughly discussed and agreed with the Case Company and their participation is voluntary. All personal and confidential data about the Case Company will be stored securely.

It should be mentioned that the author has previous ties to the Case Company from previously working with them. However, it is not believed that the ties to the Case Company will affect the work with this thesis since there is no personal gain or interest in the practical outcome of the research, and the contribution from the Case Company is not of a nature that it might steer the work in one way or another to the benefit or detriment of any party. The matter has been discussed and will be kept under consideration during the process of writing this thesis.

Other research ethics such as, e.g., honesty, transparency and referencing have been observed and applied and generally accepted scientific principles and research practices have been conformed to. (Collis & Hussey, 2014)

3.5.2 Sustainability

The work with this thesis has been conducted with consideration to sustainability and with aim to leave as little environmental footprint as possible. Only a limited few documents have been printed and all the literature has been acquired and reviewed in a digital format.

The interviews for this thesis have been conducted through phone calls, email and other electronic communication formats. No travelling has been undertaken to facilitate interviews.

Meetings and communication with the thesis supervisor have been mainly in electronic format and the author has walked to the few meetings and seminars that have been a part of the thesis project. The thesis will be published in electronic format only.

4 Case Study

4.1 The Case Company

The Case Company is a Swedish start-up company within the textile industry founded by a group of Swedish entrepreneurs and a Taiwanese textile engineer (the “**Inventor**”) with a vision to reduce the environmental footprint of textile production by applying a novel method of dyeing textiles that requires significantly less chemicals, energy and has lower carbon dioxide emissions than comparable traditional methods of dyeing textiles do.

The person (the “**Entrepreneur**”), whom I have had access to for interviews, information and material regarding the Case Company, its business and processes, is one of the founders of the Case Company and works mainly as a creative and commercial director. As is the case in many start-up companies, the Entrepreneur also handles other work assignments within the Case Company and has been assigned a special Case Project (as defined below) that this thesis revolves around. The purpose of the Case Project and its context in this thesis is further described below.

4.2 The Innovation

The Case Company has commercialized a novel method, developed by the Inventor, for dyeing textiles in production of man-made microfibers (the “**Innovation**”). The Innovation requires significantly less chemicals, energy and has lower carbon dioxide emissions than traditional methods of dyeing textiles. The Innovation can be applied to production of man-made fabrics such as nylon, polyamide and polyester but it is not suited for production of natural fabrics such as cotton or wool. According to the Entrepreneur, man-made fabrics account for roughly 70% of all textile production globally.

Please see figure 4.2a below, which is a simplified illustration showing the traditional method and supply chain where uncolored material is extruded and spun to uncolored thread in step 1. The uncolored thread is then sent to a weaver and woven to uncolored fabric in step 2. The uncolored fabric is then sent to third facility for coloring and finishing. The last step in this production process is the one that does most harm to the environment since a lot of chemicals, colorants and other resources are used to prepare and color the fabric.

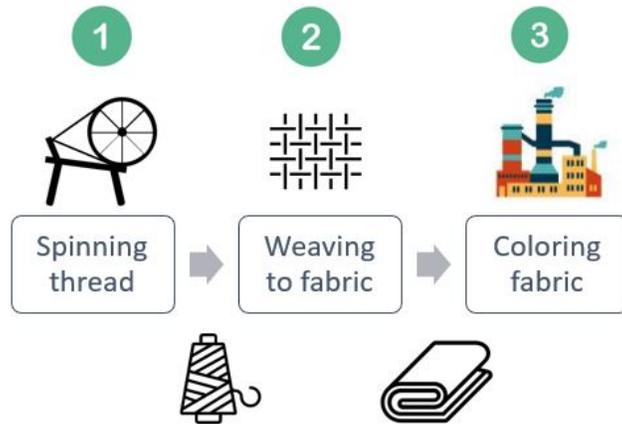


Figure 4.2a - Traditional method of producing textiles (Source: the Case Company)

With the Innovation the traditional way of making man-made fabric is altered and instead of producing un-colored fabrics that are then colored, the basic material used for extrusion of thread filaments is colored and the coloring is hence made already in the thread stage of the fabric production.

This production process has essentially been the same for many thousands of years, i.e., that fabric is first produced and then colored, and stems from when natural fiber was the only base source for textile manufacturing and it was more convenient to color the readymade fabric as opposed to coloring threads. Coloring the readymade fabric gives more flexibility regarding when to choose color for the fabric and the process has not undergone change in this aspect, even though nowadays most of the fabric produced globally is made from man-made fibers, e.g., nylon and polyester etc.

With the Innovation, however, the production process has been rearranged as regards production of fabric made from man-made fibers and the process starts with coloring the base material, the “master batch”, which is then extruded to filaments and spun to colored thread as illustrated in step 1 in figure 4.2b below. That colored thread is then sent to a separate facility for weaving of a colored fabric in step 2. In this reconfigured process the dirty and environmentally hazardous coloring step is eliminated.

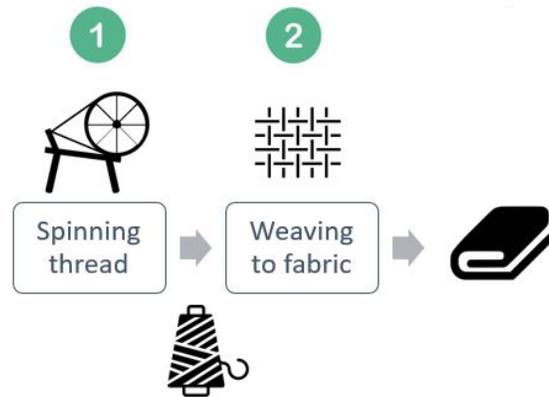


Figure 4.2b - New method of producing textiles (Source: the Case Company)

Since the Innovation entails a rearranged production process with different requirements of when to choose color, the Innovation has initially met some challenges in convincing customers to try a new approach to a traditional and widely established process. One of the differences with the Innovation is, e.g., that customers need to decide color at an earlier stage than what they are accustomed to with the traditional method. With the traditional method fabric can be produced and then the color can be applied to the un-colored fabric at a later stage.

For fashion and apparel companies, the coloring is a very important factor and deciding colors earlier poses a challenge to the way of working they are accustomed to, according to the Entrepreneur. Many of the customers that the Case Company targets have difficulty changing their established way of working and need clear incentives to do so in order to start using the Innovation. According to the Entrepreneur, the environmental benefit of the Innovation is luckily a strong incentive since for a majority of the world's fashion and apparel companies, the impact on the environment that textile production has is a serious issue that they are struggling with. In recent years the environmental impact of textile production has been more and more acute for the global textile industry to address and improve. Pressure from environmental organizations, the media, consumers and governmental organizations has created a debate and a movement for change in the textile industry.

Not only do incumbents in the textile industry want to improve their environmental impact but they also want to communicate their work to the public. Many of the multinational fashion and apparel companies, such as H&M and Adidas, have adopted policies on sustainability and corporate social responsibility (CSR) and have dedicated teams working with following up on these policies and communication regarding the sustainability and CSR work they do.

In order for the Case Company to be able to convince customers to try the Innovation it has been essential for them to be able to demonstrate and display transparency and traceability in the supply chain(s) used by the Case Company in order to demonstrate the environmental benefits of the Innovation. Until now the Case Company has been depending on one particular supply chain, which has been manually inspected and certified by Swerea. Swerea is a Swedish research group for industrial renewal and sustainable development and their services include independent testing, analyses and certification of manufacturing processes. (Swerea, 2018)

The certification process has so far been manual and has created bottlenecks in the Case Company's production capability. Being dependent on only one supply chain is a potential risk factor and prospective customers have expressed concern about this. To avoid bottlenecks in the production and to display transparency and traceability to their customers the Case Company wants to investigate ways to create a transparent, immutable and traceable digital system for participants of their supply chain. It's not enough to be environmentally sustainable; they also need to show and communicate it to their customers and create a unique value proposition to convince customers to change their accustomed way of working and try the Innovation.

The Case Company is a start-up with a limited budget and any projects they take on need first to be analyzed to establish if they are viable and worth investing in. The Case Company has previously conducted a few projects that were not successful, where a more thorough analysis could perhaps have resulted in them never being conducted and thereby saving time and money. Due to this, the board of directors of the Case Company asked for more thorough investigations and a better basis for making decisions regarding any new projects. If possible, the board asked for any new projects to be supported by theories as well as being realistic in practice as a basis for their decision.

The Case Company is currently discussing financing with various investors who have also expressed concern regarding the risks of only having one supply chain and the importance of being able to demonstrate and communicate the benefits of the Innovation. Investors have also expressed the need for the Case Company to create some feature in their business that is difficult or impossible for competitors to imitate or copy.

4.3 Analysis and Orientation of the Case Company

4.3.1 Analysis and Orientation of the Case Company Using the Entrepreneurial Value Creation Theory

At this stage, it may be logical and helpful to orient the Case Company in the Entrepreneurial Value Creation Process and to label certain of the Case Company's actions using the concepts described in the Entrepreneurial Value Creation Theory.

The Inventor and the Innovation may be regarded as the Case Company's and the Entrepreneur's *discovery of entrepreneurial opportunity* and seems to be the source of the Entrepreneur's *entrepreneurial intention*. The Entrepreneur cannot verify whether the entrepreneurial intention emerged before or after the discovery of the entrepreneurial opportunity.

The Case Company has passed the stage of *venture formulation* and is currently configuring the *entrepreneurial competence*.

The Case Company's current entrepreneurial competence and resources consist of, e.g., previous experience and know-how of the Entrepreneur, the Inventor and other employees of the Case Company. The Case Company's current supply chain, its SCM and its certification from Swerea are also entrepreneurial competences and resources of the Case Company.

The Case Company can be considered to have achieved *stage one* of the Entrepreneurial Value Creation Process and has embarked on *stage two* of *venture monetization* where the entrepreneurial competence may be reconfigured by, e.g., dynamic capabilities to achieve entrepreneurial reward and sustainable value.

According to theory, the reconfiguration of the supply chain and the Case Company's SCM practices may constitute dynamic capabilities if they create valuable new resources and may thereby create competitive advantage as well as enhanced entrepreneurial competences.

The development and reconfiguration of the supply chain and the Case Company's SCM practices may also constitute an improvement of entrepreneurial competence and, in that sense, it may improve the Case Company's negotiation possibilities in relation to investors or even constitute an alternative to external financing if it leads to increased revenues due to customer lock-in and increased resource efficiency as parts of its business model.

Development of the supply chain and the Case Company's SCM practices may further lead to reconfiguration of the Case Company's business model design, e.g., if it creates customer lock-in and increased resource efficiency, which leads to increased revenues and cash flow.

4.3.2 Analysis of the Case Company and the Case Project Using Dynamic Capabilities

At this stage, it may also be helpful to analyze the potential dynamic capabilities of the Case Company and the Case Project.

I have identified the Case Project, as further described below, as falling under the categories of *reconfiguration*, since it refers to the transformation and recombination of assets and resources, and *creative integration*, since it involves the Case Company's ability to integrate assets and resources to create a new resource combination.

The theory of Entrepreneurial Value Creation includes a firm's dynamic capabilities as a potential source of entrepreneurial value creation. If the Case Company's processes for SCM can be regarded as both an internal and external resource, then the Case Company's potential ability to improve its SCM may be regarded as a dynamic capability in the context of Entrepreneurial Value Creation. However, this would also require that the changes made to the SCM process would provide a valuable new resource in order for it to be considered a dynamic capability.

4.4 The Case Project

The Entrepreneur has been reading recent reports regarding Blockchain and its potential in supply chain management and has presented to the board of the Case Company that they investigate this further to potentially create a competitive advantage and to eliminate the bottleneck that the Case Company's only supply chain is currently presenting.

The project (the "**Case Project**") consists of constructing a hypothetical process in which Blockchain is applied to the Case Company's supply chain and to find support in theories that this hypothetical process will create value for the Case Company.

4.4.1 The Case Company's Supply Chain

For the purposes of the Case Project and for the sake of analyzing the application of Blockchain to the Company's supply chain, a part of the Case Company's supply chain has been broken out and described in the following (the "**Case Supply Chain**"). The Case Supply Chain consists of the below described constituents (also illustrated in Figure 4.2b) in accordance with the following:

Supplier A - supplier involved in extrusion/spinning of thread;

Supplier B - the supplier involved in transporting the thread from Supplier A to Supplier C;

Supplier C - the supplier that weaves the thread to fabric; and

Supplier D - the supplier involved in transporting the fabric from Supplier C to the next supplier in the supply chain.

4.4.2 Why Blockchain?

The Case Company has identified Blockchain as a potential value enhancer for several reasons. One is the potential to enhance the Case Company's business model by adding elements of digitalization to the supply chain. Digitalization (also called digitization) is currently a hot topic in all areas of business and industry and Blockchain is a buzz phenomenon in business and industry and might be attractive to customers, participants in the supply chain and investors. Besides being hot topics that may spark interest, digitalization and Blockchain can potentially be applied to make processes more efficient, transparent and traceable, which is the primary reason for the Case Company's interest.

Transparency and traceability are important factors for the Case Company since a large part of their value proposition is environmental sustainability and if this cannot be presented to their customers and customers' customers they may not win them over and create lock-in.

Blockchain is, however, a new technology and the assumptions that the Case Company makes regarding Blockchain's suitability as method for digitalizing and reconfiguring their supply chain are only assumptions without proof. The Case Company therefore needs to further analyze Blockchain to assess its suitability.

4.4.3 Blockchain Applied to the Case Company's Supply Chain

Based on the Case Company's description of their supply chain in Section 4.4.1 and the application of certain features of Blockchain described in Section 2.4.4, a hypothetical Blockchain system has been created and described below (the "**Case Blockchain**") to demonstrate and analyze the features of Blockchain in relation to each step of the Case Supply Chain.

Since the Case Supply Chain is physical, the physical actions and items in the Case Supply Chain could be linked to the digital Case Blockchain by using, e.g., radio frequency identification (RFID), serial numbers or bar codes. For the purposes of the Case Blockchain, a system using bar codes has been chosen and a specific bar code has been designated (the "**Bar Code**"). The Bar Code is printed on labels fixed to each container used to transport items between each supplier in the Case Supply Chain. The Bar Code is scanned using scanning devices connected to computers or an application in, e.g., a smart phone or other smart device, to log each step and action taken in the Case Supply Chain in the Case Blockchain. The Case Company can scan the Bar Code and receive information regarding the Case Blockchain and may be the keeper of the Case Blockchain. As described in Section 2.4.4, blocks in the Case Blockchain can be configured to, e.g.:

Record the quantity and transfer of assets - like pallets, trailers, containers, etc. - as they move between supply chain nodes;

Track purchase orders, change orders, receipts, shipment notifications, or other trade-related documents;

Assign or verify certifications; and

Share information about manufacturing process, assembly, delivery, and maintenance of products with suppliers in the Case Supply Chain.

The Case Company can then show a record of the Case Blockchain to, e.g., the relevant customer whose products have been produced using the Case Company's supply chain and thereby show all the relevant suppliers and the actions in the supply chain.

5 Findings, Discussion and Analysis

5.1 Findings and Discussion

The Case Company's two main intentions with the Case Project are to find out if the risk in its internal projects can be decreased or eliminated by basing them on academic theories, and to investigate if the application of Blockchain in its supply chain can create value and competitive advantage in the form of, e.g., a new resource.

The research question for this thesis is: *How can the application of Blockchain to a supply chain in the textile industry create entrepreneurial value?*

The application of Blockchain to a supply chain in the textile industry may create entrepreneurial value in the form of improving the supply chain when it comes to traceability, transparency, cost reduction and risk mitigation. There are, however, uncertainties associated with, e.g., the potential costs, implementation and use of a Blockchain system that cannot be established from the findings in this thesis.

Part of the Case Company's interest in Blockchain is the element of digitalization it provides, but the analysis shows that perhaps there are less costly and more accessible ways of digitalizing its business and processes.

The application of Blockchain to a supply chain in the textile industry may also create entrepreneurial value in the form of a dynamic capability. This may, however, result in a situation where the cost is higher than the benefits of the results actually achieved. It may prove too expensive, time consuming and difficult to build a Blockchain system without a strategic alliance or consortium.

The theory of dynamic capabilities and Entrepreneurial Value Creation Theory are perhaps too general and retrospective to be applied as tools for predicting results of a specific project. As with most theories, they are methods of analyzing phenomena and as with most predictive work it is difficult to predict outcomes based on limited information and input since you can never take every potential factor into account. The Entrepreneurial Value Creation Theory presents an opportunity for companies like the Case Company to orient itself in the value creation process but even as a tool for orientation it is difficult to apply since every company is different from the other. Small or young companies like the Case Company tend to be rather chaotic and difficult to analyze since their circumstances change rapidly and with point of perspective. One person's version of its processes may differ from other person's version of the same processes and it's hard to objectively determine inputs for analysis.

The Entrepreneurial Value Creation Theory and the creation of dynamic capabilities when applied to create entrepreneurial value are difficult to assess since they are mostly about labelling processes of companies and their environment. It is difficult to determine what exactly in the inner workings of companies creates value and if that value creates success or failure for a

particular company. A company may be successful in creating dynamic capabilities and entrepreneurial value in the short term but may still fail in the long term.

Looking at the Case Company and its potential to attract, and negotiate better terms from, investors by displaying Entrepreneurial Competence in the form of Blockchain applied to their supply chain, there is a significant risk this approach will result in a negative effect if the Blockchain project is perceived by investors as too costly or complicated. The display of Entrepreneurial Competence by the Company's process of innovation leading up to the implementation of Blockchain, i.e. the Case Project, may be difficult to communicate and may be overshadowed by the perception of potential risk.

The research in this thesis has provided an overview of the situation of a Swedish start-up company within the textile industry, Blockchain and its potential as value creator in supply chains. It has also examined and tested theories of dynamic capabilities and entrepreneurial value creation and provided answers to the research question.

It is difficult to study start-ups since they are all different and therefore provide little basis for specific or general conclusions that may be used to analyze other companies or scenarios. The Case Project may prove to be a dynamic capability and lead to entrepreneurial value creation, but it is not possible to say at this point in time and therefore not suitable to recommend to the Case Company.

5.2 Analysis of the Case Blockchain

As demonstrated above, implementing Blockchain into a supply chain does not only require the creation of a technological system connected with and with support from ancillary technological applications and systems, such as in this case, the Bar Code and bar code scanners, it also requires that all the participants in the supply chain agree with and comply with the new system. The Case Company's intended purpose of applying Blockchain to its supply chain will not work as intended if not all the participants in the supply chain adapt to the new system.

The application of Blockchain also does not seem to solve the Case Company's problem with bottlenecks in the supply chain; on the contrary, it seems to create further potential bottlenecks.

Furthermore, it may not make sense for the Case Company to implement its own Blockchain system due to costs and the risk of not being able to convince its supply chain to also adapt to the new standard and actually use it once it is implemented. Perhaps it is better for the Case Company to wait and see if Blockchain does in fact become a new standard in supply chain management in the textile industry and, if so, adapt its own processes to that system.

6 Conclusions

6.1 Conclusions

The research question for this thesis is: *How can the application of Blockchain to a supply chain in the textile industry create entrepreneurial value?*

The application of Blockchain to a supply chain in the textile industry may create entrepreneurial value in the form of improving the supply chain when it comes to traceability, transparency, cost reduction and risk mitigation. There are, however, uncertainties associated with, e.g., the potential costs, implementation and use of a Blockchain system that cannot be established from the findings in this thesis.

The application of Blockchain to a supply chain in the textile industry may also create entrepreneurial value in the form of a dynamic capability. This may, however, result in a situation where the cost is higher than the benefits of the results actually achieved. It may prove too expensive, time consuming and difficult to build a Blockchain system without a strategic alliance or consortium.

A company's process of innovation may be regarded as a dynamic capability and as such be considered as a valuable resource. It may be difficult for a young or small company, e.g. a start-up, to implement processes of innovation due to lack of resources. It may also be too great of a risk for a start-up try certain processes of innovation due to costs and uncertainties of the results.

The application of Blockchain in supply chains in the textile industry may create entrepreneurial value for the Case Company by constituting a process of innovation and thereby be considered a dynamic capability if proven to be a valuable new resource. However, there is no way of knowing if Blockchain is the right way to go and the process of innovation may not be a sufficient value creator in itself.

6.2 Recommendations

The Case Company should perhaps wait and watch the developments in supply chains in the textile industry and see if Blockchain will emerge as a valuable new feature since it is difficult, time consuming and costly for the Case Company alone to set a new standard. It is perhaps better to not be the first mover and learn from previous attempts and latch on to a winning standard or work in concert with others, e.g., suppliers, to build a consortium for Blockchain in supply chains in the textile industry.

It is difficult to study start-ups since they are all different, dynamic and rapidly changing, and therefore provide little basis for specific or general conclusions that may be used to analyze other companies or scenarios. The Case Project may prove to be a dynamic capability and lead to

entrepreneurial value creation, but it is not possible to say at this point in time and therefore not suitable to recommend to the Case Company.

6.3 Implications and Contributions to Relevant Fields of Study

The use of case study to analyze a phenomenon may provide an insufficient base for any broader conclusions. The application of Blockchain in the particular case of the Case Company provides a very limited view on Blockchain and its application in supply chains. The application of dynamic capabilities and entrepreneurial value creation to the Case Company's process of innovation provides a limited number of conclusions.

This thesis addresses and contributes to the fields of industrial engineering, industrial economics and management as well as entrepreneurship and innovation management.

6.4 Limitations

Basing the research in this thesis on only one case company has presented a limitation, partly because the company in question is small and young start-up with limited resources but that provided good access to information and material initially but was hard to reach for follow-up questions and for material mentioned during initial contacts. Access to the case company in later stages of the research has been limited and it has been hard to reach relevant persons for follow-up questions and accessing further material.

Conducting research about Blockchain was hampered due to the limited and one-sided material available.

Conducting research on the Entrepreneurial Value Creation Theory provided a limitation due to the lack of research based on this theory.

The circumstance that the data collected for this thesis was collected by the author of the thesis provided a limitation in the form of self-reporting and the data may as such be affected by bias such as selective memory, telescoping, attribution or exaggeration, etc.

The information provided by the Case Company may have been affected by acquiescence bias, where a respondent demonstrates a tendency to agree with and be positive about what is presented, and/or social desirability bias, where a respondent answers questions in a way that they think will lead to being accepted and liked. (Groves et al., 2009)

The work conducted by the author of this thesis may have been affected by confirmation bias, where the researcher forms a hypothesis and uses received information to confirm that hypothesis (Rabin & Shrag, 1999), question-order bias, where one question can influence answers to following questions, and/or leading questions and wording bias, where the researcher elaborates on a respondent's answer and puts words in their mouth. (Lewis-Beck et al. 2004)

The time space provided has presented limitations in several ways, e.g., the possible size of the project at hand and the time for analysis and conclusions etc.

6.5 Future Research

Future research on the topics covered in this thesis can, e.g., be to look at more detailed implementation of Blockchain in supply chains by perhaps studying existing supply chains using Blockchain in other industries. Future research can also look into costs associated with implementing a Blockchain or look into the dynamics of creating and managing a Blockchain consortium.

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