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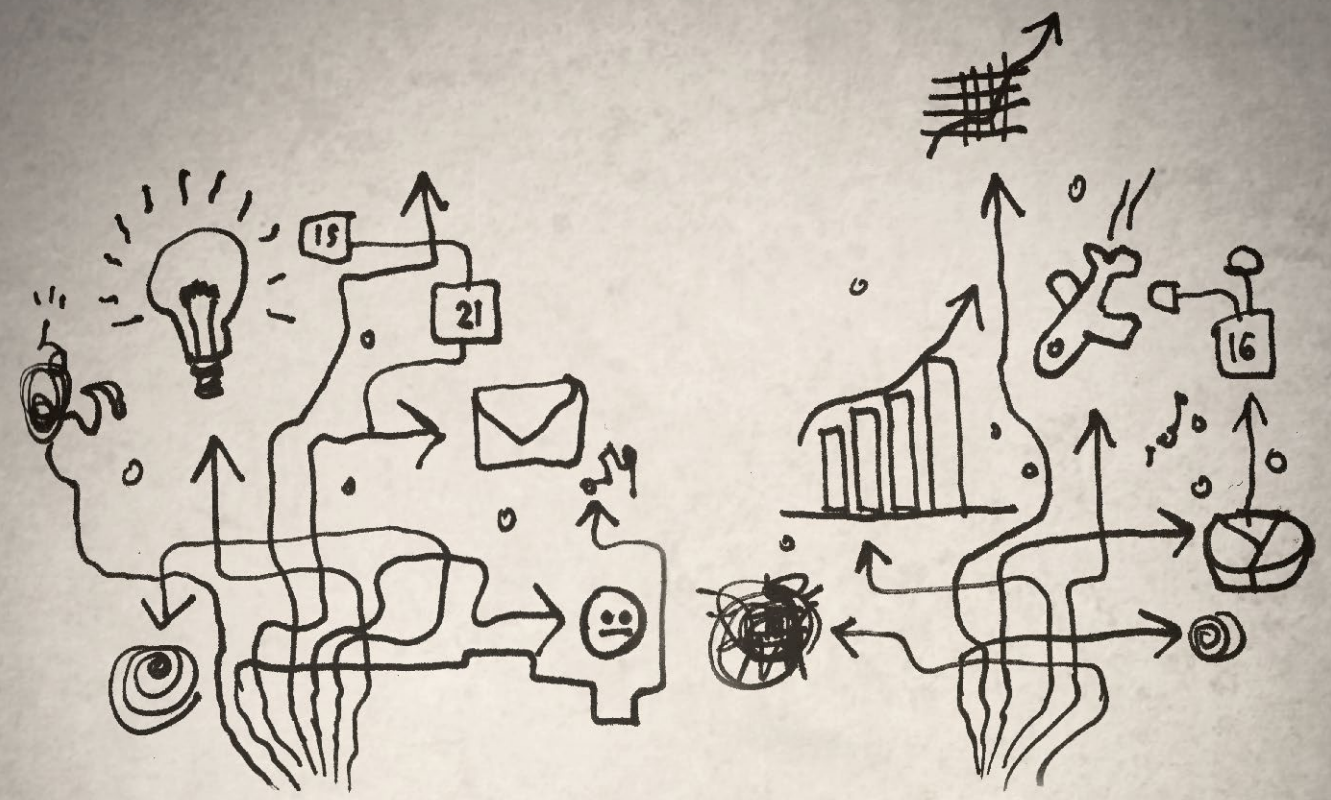

FEELINGS OF EMOTION IN STRATEGIC INVESTMENT DECISIONS

Mika Jakovaara

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I pledge allegiance to the Flag of Finland, and to the Republic for which it stands,
one Nation under God, inidivisible, with liberty and justice for all.

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ABSTRACT

Contemporary studies on emotions in decision-making provide strong evidence for the claim that emotions play a significant role in decision-making. Thus, they almost inevitably have an indisputable role also in strategic investment decision-making. This study was set to examine the role of business decision makers' feelings of emotion in strategic investment decision-making processes. The aim of this thesis is to problematize the current capital budgeting literature by utilizing the current theoretical understanding of emotions in strategic decision-making. In contrast to common belief, emotions do not only hinder our decision-making ability, but they also considerably help decision makers to make better decisions.

Therefore, an explorative and interpretive research methodology was adopted, more specifically through carrying out a case study on the *practice of strategic investment decision-making*. It is a qualitative study method that allows exploring and describing the essence of a phenomenon in its natural context using a variety of data sources. As the purpose of this study was to develop a better understanding through the development of a new theoretical framework, this study explores, clarifies, and explains the dynamics of feelings of emotion in the strategic investment decision-making process. Empirically, all material collection was purposefully made during ongoing strategic investment decision-making processes in Finnish-based industrial companies, as well as in the leading metal 3D printing technology seller in Finland and in one of the biggest metal 3D printing technology providers in the world. While the empirical analysis is mainly based on interviews, supplementary observations and questionnaires were helpful for validating the accounts of decision makers.

The key findings suggest that the feelings of emotion play at least twelve important roles—such as inner compass, decision enabler, call-to-action, learning device, social foundation, and idea broker—at different phases of the strategic investment decision-making process. As a result, these different roles of feelings of emotion can be conceptualized as an *integral "smart device" that has various vital functions in decision-making.* In addition, as the feeling of uncertainty in terms of the cause and effect in a decision-making situation and regarding decision makers' objectives gets stronger during strategic investment decision-making processes, the role of other feelings of emotion also seems to grow. Finally, as the feelings of emotion are tightly connected to learning mechanisms, they appear to influence the way in how business decision makers' use accounting information during the strategic investment decision-making processes.

KEYWORDS: feelings of emotion, strategic investments, decision-making, capital budgeting, 3D printing, emotions, rationality, uncertainty, learning

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TIIVISTELMÄ

Viimeaikaiset tutkimukset tunteista päätöksenteossa antavat vahvaa tukea väitteelle, että tunteilla on merkittävä rooli päätöksenteossa. Näin ollen tunteilla on lähes väistämättä kiistaton rooli myös strategisissa investointipäätöksissä. Tämän tutkimuksen tarkoituksena oli selvittää yritysjohdon päätöksentekijöiden tunnekokemusten merkitystä strategisissa investointipäätösprosesseissa. Sen myötä väitöskirjan tavoitteena on problematisoida olemassa oleva investointipäätöksentekoon liittyvä tutkimuskirjallisuus hyödyntämällä tieteellistä nykykäsitystä tunteiden roolista strategisessa päätöksenteossa. Vastoin yleistä uskomusta tunteet eivät ole ainoastaan haitaksi päätöksentekokyvyllemme, vaan sen sijaan tunteet myös olennaisesti auttavat päätöksentekijöitä tekemään parempia päätöksiä.

Tutkimuksessa käytetään eksploratiivista ja tulkitsevaa tutkimusmenetelmää, tarkemmin ottaen tapaustutkimusta, jonka avulla tarkastellaan *strategisen investointipäätöksenteon käytänteitä*. Se on laadullinen tutkimusmenetelmä, joka mahdollistaa tutkittavan ilmiön tarkastelemisen ja kuvailemisen sen luonnollisessa ympäristössä käyttäen erilaisia tietolähteitä. Koska tämän tutkimuksen tarkoituksena oli laajentaa nykykäsitystä kehittämällä uusi teoreettinen viitekehys, tässä tutkimuksessa selvitetään, selvennetään ja selitetään tunnekokemusten dynamiikkaa strategisessa investointipäätösprosessissa. Empiirisen materiaalin kokoaminen toteutettiin tarkoituksellisesti käynnissä olleiden strategisten investointipäätösprosessien aikana suomalaisissa teollisuusyrityksissä. Lisäksi aineistoa täydennettiin Suomen johtavan metallialan 3D-tulostusteknologian myyjän ja yhden maailman suurimman metallin 3D-tulostimien valmistajan haastatteluilla. Vaikka empiirinen analyysi perustuu pääosin haastatteluihin, tehdyt havainnot ja kyselytutkimus auttoivat päätöksentekijöiden kertomien asioiden todentamisessa.

Tutkimuksen tärkeimmät tulokset viittaavat siihen, että tunnekokemuksilla on ainakin kaksitoista tärkeätä roolia – kuten sisäinen kompassi, päätöksenteon mahdollistaja, kehotus toimintaan, oppimiskeino, sosiaalinen perusta ja ideanvälittäjä – strategisen investointipäätösprosessin eri vaiheissa. Seurauksena on, että nämä tunnekokemusten useat eri roolit voidaan mieltää *välttämättömäksi ”älylaitteeksi”, jolla on erilaisia elintärkeitä toimintoja päätöksenteossa*. Lisäksi kun syy-seuraussuhteisiin sekä päätöksentekijöiden tavoitteisiin liittyvät epävarmuuden tunteet kasvavat strategisen investointipäätösprosessin aikana, myös muut tunnekokemukset voimistuvat. Tunnekokemuksilla on myös tiivis yhteys oppimismekanismeihin, ja siksi ne näyttävät vaikuttavan yritysjohdon päätöksentekijöiden tapaan käyttää laskentatietoa strategisen investointipäätösprosessin aikana.

ASIASANAT: tunnekokemukset, strategiset investoinnit, päätöksenteko, investointilaskenta, 3D-tulostus, tunteet, rationaalisuus, epävarmuus, oppiminen

Foreword

This journey on the ocean of emotions in academia lasted for five insightful years, and to be honest, it has been an incredible time to be *alive* – and perhaps the best years of my life so far. During this time, I have grown a lot as a scholar, as a man, and above all as a father. Therefore, I dedicate this work to my son Leo and to my family who all, along the way, have been an abundant source of motivation and happy feelings of emotion to me. I hope this inspires you to express and feel your emotions—regardless the path you will choose to take in the future.

It has been my sincerest pleasure to serve in Turku School of Economics, and especially work with everyone in the department of accounting and finance. I greatly appreciate that I have had a chance to be a part of the intriguing academic world, as well as all the invaluable help I have received, particularly from my supervisors—Professor Kari Lukka and Dr. Jan Pfister—who have done an outstanding job. Moreover, I also like to give Professor Jukka Pellinen and Dr. Hannele Mäkelä the finest credit for their strong expertise and time that they invested in the profound and precious preliminary examination. This really helped me through the last mile.

This work would have not been possible without the collaborative companies (3DStep Oy, Delva Oy, HT Laser Oy, SLM Solutions Group AG, Vossi Group Oy, Wärtsilä Oyj) that are the spearhead paving the way for the next industrial revolution by adopting new and innovative metal 3D printing technologies. I like to warmly thank the interviewees—the amazingly open-minded and professional people—who shared their knowledge and experiences, and with great interest, participated in this study. A noticeable contribution to this thesis was also made by two seasoned decision makers—CEO Harri Tuomi and Professor Markus Granlund—who offered their valuable help while testing the interview questions for the actual interviews of this study, as well as Docent Johanna Kaakinen who gave her indispensable insights regarding emotion theories and concepts.

And last but not least, there have been so many inspiring and energizing discussions with interesting and pleasant people. They all have been helping to sort out my thought process and giving me the crucial drive to push forward in spite of some hardships and obstacles. I am very grateful to my dear parents Satu and Juha,

and my long-time friends Jouni and Jukka, as well as my more recent friends Stefania, Muddassar and Ingolf, just to mention a few, who all have being supporting me with their own particularly delightful and admirable personalities.

On a sunny morning in September 2020, in Pori
Mika Jakovaara

Table of Contents

Tables

Figures

1 Introduction

1.1 Motivation for the study

The accounting literature studying strategic investment decision-making is called *capital budgeting*, and it can be divided into two major streams, namely *normative* and *process* literature. Since the 1950s (Honko, 1955; Dean, 1954) until the present, most of the research efforts have been dedicated to exploring and refining the theory and calculations behind financial techniques for investment appraisal (Clancy and Collins, 2014; Haka, 2006). As the focus of classical normative research has been mainly on the use of different hurdle rates and payback periods, on the use of different capital budgeting methods, and on the economic value added methods (Clancy and Collins, 2014), it is most certainly understandable that emotions have not been considered as a meaningful or interesting phenomenon in this domain. Empirically, however, emotions have been somewhat visible in some capital budgeting process studies (e.g., Lumijärvi, 1991). While the process literature (e.g., Brunsson, 1990; Burchell et al., 1980; King, 1975; Bower, 1970) has been paying a lot of attention to organizational practices and processes that actually exist in firms, somewhat surprisingly, not even this stream of research has addressed and theoretically conceptualized the emotions in real-life strategic investment decision-making processes. With the exception of a couple of experimental laboratory-type studies (Moreno et al., 2002; Kida et al., 2001), the capital budgeting literature has kept a distance from emotions. Nevertheless, emotions have not been totally left unnoticed in the accounting domain, as a handful of accounting studies have recently considered emotions (e.g., Baxter et al., 2019; Taffler et al., 2017; Guénin-Paracini, 2014). In addition, the interest in emotions as well as calls for more attention to them have been increasing (e.g., Hall, 2016; Mouritsen and Kreiner, 2016; Boedker and Chua, 2013).

In light of recent influential studies on emotions in decision-making (e.g., Ekman, 2016; Lerner et al. 2015; Kahneman, 2011; Pfister and Böhm, 2008; Ekman, 2007; Bechara et al., 1997; Damasio, 2006/1994), emotions seem to be a critical component of human decision-making. In contrast to common belief, emotions do not only hinder our decision-making ability (e.g., Kahneman, 2011; Shiv et al., 2005), they can also considerably help us in making decisions (e.g., Nummenmaa,

2019; Damasio, 2018; Neumann, 2017; Damasio, 2010; Bechara et al., 1997; Damasio, 2006/1994). In fact, while making decisions, emotions appear to be the main driver of cognitive reasoning (e.g., Nofsinger, 2017; Lerner et al. 2015; Virlics, 2014; Zadra and Clore, 2011; Damasio, 2010; 2006/1994; Naqvi et al., 2006) and one of the most important underlying mechanisms for expert judgment (Harris, 2014), tacit knowledge (Puusa and Eerikäinen, 2010), and intuition (Dane and Pratt, 2007)—phenomena familiar to many experienced decision makers. In the complex context of strategic decision-making, emotions are proposed to occur more often and to be more intense, since the presence of high risks and uncertainty, as well as the potential for many kinds of change, evoke emotions among decision makers (Neumann, 2017; Li et al., 2014). Therefore, while theorizing investment decision-making practice in organizations, it would be imprudent to reject or ignore the role of emotions and their influence on the use of accounting information during strategic investment decision-making processes, and consequently on a company's long-term success.

1.2 Key concepts

The nexus of the organizational decision-making process and strategic investments provides an interesting arena—a case study on real-life strategic investment decision-making practice in which an attempt is made to explore the feelings of emotion in strategic investment decisions. Therefore, the key concepts of this study are *feelings of emotion*, *strategic decision-making*, and *strategic investment decision* (Figure 1). Based on these intertwined key concepts, a critical literature review is compiled and the theoretical framework of this thesis is developed in Chapter 2. These will provide the theoretical contextualization and the analytical lens for the study, as well as the epistemological tools to investigate and depict a more holistic understanding of the strategic investment decision-making process.

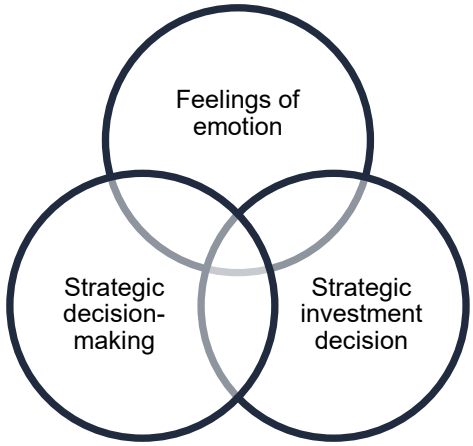

Figure 1. Key concepts of the study.

1.2.1 Distinction between emotion and feelings of emotion

In this study, the focus is on *feelings of emotion* that are aggregate perceptions of what happens in the mind and body as one is having an emotion (Damasio, 2010). According to Damasio (2018), *affect* is the set of processes that includes motivations, drives, emotions, and feelings. Because the fundamental premise of biological value is survival and the governance of life, affect is a dutiful servant and executor of this biological value principle. In this regard, Damasio (2018; 2010) makes a distinction between *emotions* and *feelings* (Figure 2), and he argues that even though they are tightly interconnected, the essence of these two processes are different. Feelings of emotion are a specific type of feelings. All of these notions are discussed more in depth in the following literature review, and more specifically in Section 2.1.2 *Emotion processes and feelings of emotion*.

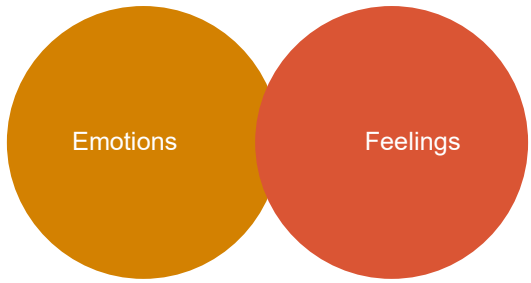

Figure 2. A distinction between emotions and feelings.

1.2.2 Strategic decision-making

Strategic decisions have been aptly described by Mintzberg et al. (1976: 246) "*as a specific commitment to action (usually a commitment of resources) and a decision process as a set of actions and dynamic factors that begins with the identification of a stimulus for action and ends with the specific commitment to action ... and strategic simply means important, in terms of the actions taken, the resources committed, or the precedents set.*" This definition has defied the test of time, and still today stands its ground (e.g., Neumann, 2017). During the last decades, several descriptive models of the strategic decision-making process have been published (e.g., Roberto, 2004; Dean and Sharfman, 1996; Hickson, 1986; Mintzberg et al., 1976). Schwenk (1984) came up with a simplified and widely used model with three stages: (1) problem identification, (2) alternative creation, and (3) evaluation and selection. This model has been adopted as the basis and for the purpose of this study (Figure 3) while studying the practice of strategic investment decision-making (or SID) processes.

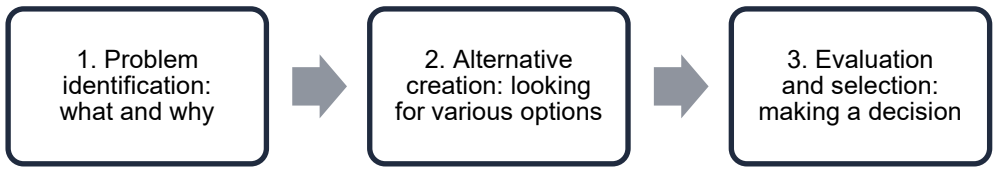

Figure 3. Strategic investment decision-making process.

1.2.3 Strategic investment decision

Strategic investment decisions are one of the most important (Harris et al., 2016; Clancy and Collins, 2014) and complex (Carr et al., 2010; Alkaraan and Northcott, 2006) processes that decision makers in organizations engage in. Strategic investment decisions are defined as major investments that involve a high degree of uncertainty, have a substantial long-term effect on corporate performance, and yield intangible or hard-to-quantify outcomes (Alkaraan and Northcott, 2013; Verbeeten, 2006). Some of the most common examples of strategic investment decisions include company mergers and acquisitions and the introduction of major new product lines or advanced manufacturing technologies (Emmanuel et al., 2010; Slagmulder, 1997; Butler et al., 1991).

1.3 Aim and research question

While the effects of emotions on decision-making are well-documented by academics (e.g., Neumann, 2017; Lerner et al., 2015; Harris, 2014; Virlics, 2014), the current capital budgeting literature implies that financial techniques dominate the appraisal and choice of capital investments (Alkaraan and Northcott, 2013). This perspective can be seen as a continuation of classical decision theory, which rests on the expected utility model, and it idealizes intellectual processes, supposing that a decision maker with a specific goal in mind "rationally" (i.e., intending to maximize his or her expected utility) chooses between different courses of action among a given set of alternatives (Gutnik et al., 2006). The assumption is that conscious knowledge of facts and logical analysis are not only sufficient to make a good decision, they also preclude the negative effect of emotions (Damasio, 2010).

Furthermore, in his influential book, *Thinking, Fast and Slow*, Kahneman (2011) addresses ideas about rationalist decision-making. According to him, in the 1970s social scientists widely accepted two ideas about human nature. First, people are usually rational, and their thinking is generally sound. Second, emotions explain most of the instances in which people depart from rationality. As a consequence, emotions (i.e., System 1) are often considered as the antithesis of rationality (i.e., System 2) in decision-making (e.g., Nummenmaa, 2019; Kahneman, 2011; see also Jung, 2016/1921), as depicted in Figure 4.

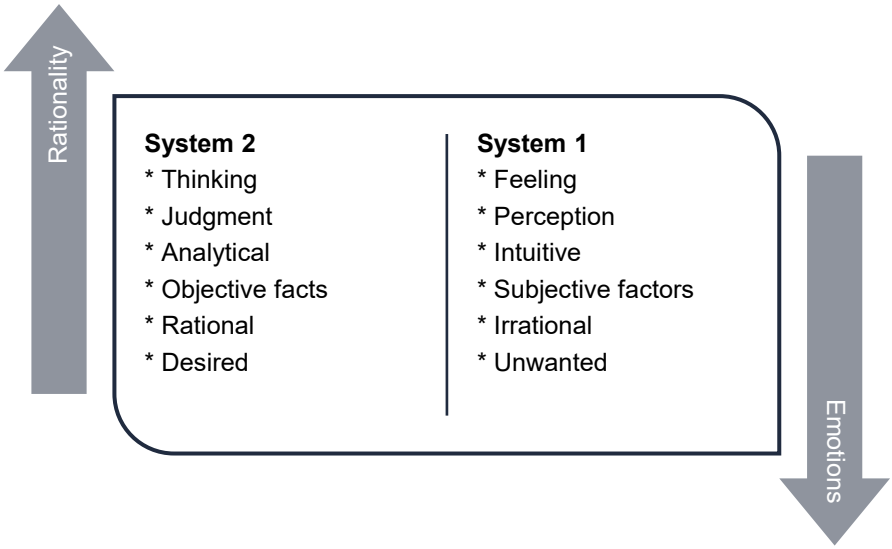

Figure 4. Emotions as the antithesis of rationality in decision-making.

However, the rationalist perspective can be challenged. In order to optimize decisions, a decision maker would require increasingly detailed knowledge or objective facts as well as improved deployment of logical instruments, such as thinking and judgment (Damasio, 2010). Moreover, findings from several fields—such as behavioral decision theory (e.g., Kahneman, 2011; Tversky and Kahneman, 1979), which is one of the main areas under behavioral economics (e.g., Hirshleifer, 2015); behavioral organization theory (e.g., Simon, 1991; 1979); experimental economics (e.g., Smith, 1991); and experimental psychology (e.g., Kahneman and Tversky, 1973)—have considerably widened the rather narrow understanding of rationalist decision-making. For instance, the rationalist perspective tends to overlook the fact that rational thinking is rife with hidden biases and prone to all kinds of illusions (Tversky and Kahneman, 1979).

In addition, one of the most prominent critiques of this classical view of *perfect rationality* came from Simon (1991; 1972; 1957), who coined the idea of *bounded rationality* (Table 1). This widely cited theory has been an inspiration for countless academics and practitioners. It states that when individuals engage in decision-making, their rationality is limited given the cognitive limitations of the mind, the intractability of naturally occurring decision problems, and the finite amount of time available for decision-making. In fact, behavioral decision-making research has traced people's systematic errors in decision-making to the mechanisms of cognition rather than the disruptions of emotion (Kahneman, 2011). Thus, empirically, the expected-utility model of analytically choosing and perfectly rational economic man seems to be an unsustainable description of real human behavior.

Finally, the contemporary accounting research drawing on psychology (e.g., Taffler et al., 2017; Hall, 2016; Boedker and Chua, 2013; see also Mouritsen and Kreiner, 2016) has made important contributions in order to get a better idea of *empirical rationality*, in which emotions are seen as an integral and important part of decision-making (see Table 1). Further, rather than deeming emotions as irrational or non-rational, emotions are considered to enable rationality in terms of substantive rationality (i.e., the decision has desired effects in the future) and procedural rationality (i.e., the procedure of how the decision is reached) by intuitively addressing various bodily signals striving to balance the current body state (see Damasio, 2010). Thus, emotion processes provide situational information to a decision maker by marking these signals as good, bad, or something in between, while associating them with the perceived stimuli. Even though these emotion processes are mostly unconscious and automated, the decision maker is trying to make sense of his or her feelings of emotion, which are aggregate perceptions of what happens in the mind and body as one is having an emotion. The different types of rationalities discussed above are summarized in Table 1.

Table 1. Perfect rationality, bounded rationality, and empirical rationality.

Type of rationality	*Relation to emotion*	*Characteristics of choice*
Perfect rationality	Emotions are irrational, and thus precluded	Maximizing expected utility, objective, optimal
Bounded rationality	Emotions are non-rational limiting factor	Satisficing expected utility, subjective, good-enough
Empirical rationality	Emotions are integral, and enabling rationality	Sensemaking of bodily signals, intuitive, situational

The classical rationalist perception of reality still seems to prevail and is amplified by the commonplace rhetoric in company boardrooms: *"Let's not get emotional about this."* However, as there is strong evidence for the claim that emotions play such a significant role in decision-making, it is almost inevitable that emotions have an indisputable role in the strategic investment decision-making process. More specifically, this thesis sets to examine the role of top decision makers' feelings of emotion in the strategic investment decision-making process, and how they may influence the use of accounting information while making strategic investment decisions. Therefore, the aim of this thesis is to problematize the current capital budgeting literature by utilizing the current theoretical understanding of emotion processes and feelings of emotion in strategic decision-making while empirically probing strategic investment decision-making processes with a carefully selected combination of empirical and analytical methods. The attempt is made to answer the call of exploring the role of feelings of emotion in a case study on real-life strategic investment decision-making practice. Consequently, this study sets out to ask the following research question:

> What is the role of immediate feelings of emotion in strategic investment decision-making processes?

1.4 Interpretive research approach

In the setting of strategic investments, human actions inside organizational decision-making processes comprise a multifaceted reality that is subjectively felt and socially constructed by its nature. Thus, this study has adopted the *interpretive research approach* (Scapens, 2004), and particularly the *humanistic accounting perspective* (Pihlanto, 1994) as its ontological and epistemological starting point. The interpretive paradigm (Burrell and Morgan, 1979) draws on a subjectivist approach. It aspires to understand social reality by focusing on subjective experience. This approach sees individuals "socially constructing" reality. Hence, everyone can

perceive social reality in a different way, depending on experiences, understandings, and meanings that are subjectively shared.

The foundation of the interpretive paradigm is particularly based on the thinking of Immanuel Kant, whose ideas started the German idealist tradition. His followers—such as Wilhelm Dilthey, Max Weber, and Edmund Husserl—have made significant contributions to laying the ground for the interpretive research approach. The key conceptualization of the German idealist tradition revolves around the idea that in order to make sense of social reality, one needs to *understand* (*verstehen*) the everyday life of humans (Burrell and Morgan, 1979). However, while this study is informed by interpretive understandings of social sciences, it does not stand on a single epistemic position but rather can span both constructivist and realist approaches (see also Kakkuri-Knuuttila et al., 2008). Thus, this view may constitute a discreet synthesis of realism and social constructivism, acknowledging both aspects rather than just one of them in order to gain a more holistic understanding of the studied phenomenon.

The humanistic accounting perspective (Pihlanto, 1994) assumes the existence of a person in three basic dimensions: (1) consciousness, (2) situationality, and (3) corpo-reality, which are intertwined and constitute a holistic human being. *Consciousness* is a state of mind and meanings related to previous experiences through which a person is currently experiencing and understanding the factors and phenomena in a situation. *Situationality* is a set of particular physical elements (e.g., other people, accounting reports, information systems) and idealistic components (e.g., values, norms, ideas, beliefs, ideologies, mental atmosphere, organizational culture). *Corpo-reality* is the visible behavior of a person affected by the situation, and at the same time reflected in the consciousness of this person, thus creating new related meanings.

As this study strives to understand *human behavior* and *decision-making* in a situation under the condition of assumed autonomy and free will of people, it builds on a subjective ontology (i.e., the nature of reality) and epistemology (i.e., the nature of knowledge and truth), as well as related qualitative methods. While this thesis examines the use of accounting information, Pihlanto (1994) proposes that *accounting information is not relevant as such*, but rather it is always contextual and related to a situation, in which a person perceives and interprets the situation and the particular accounting information. In other words, it is suggested here that:

> The actual world we live in is too big to be fitted inside the small notion of reality, and the truth about it is too tangled to be reduced to a logical statement.

Management accounting research can be depicted with the help of two analytical dimensions (Lukka, 2005): (1) the theory linkage of the study and (2) the nature of

the researcher's empirical intervention. There are some ethnographic characteristics in this case study, which by definition means that the researcher is in direct contact with the empirical subjects of the study, while the empirical material is collected through interviews, questionnaires, and observations. However, the *researcher's empirical intervention* has not been the aspiration of this study. Regarding the theory linkage, this case study can be defined as a *theory refinement* in the domain of capital budgeting, since its theoretical starting point is the existing emotion theory, which has traditionally, and until very recently, remained outside of the accounting domain. Moreover, this study also provides a *theory illustration*, as a conceptual framework (i.e., emotion processes and feelings of emotion) is developed by employing theoretical ideas and contemporary research on emotions; and this framework is used as a *method theory* (Lukka and Vinnari, 2014). This enables *new interpretations of decision-making* and allows the researcher to employ the *contemporary understanding of emotions* and related concepts as an avenue for the empirical exploration in the context of management accounting research. Finally, while empirical findings are mainly interpreted based on the theoretical framework, some notions emerged from the empirics.

While both *deductive* and *inductive* reasoning are generally acknowledged in management accounting studies, the interpretive research is increasingly accepting *abductive* reasoning as an integral part of case study research. Abductive reasoning differs from the two former modes of reasoning in that it is a way of developing theoretically informed explanations into new empirical observations that involve an interesting and surprising element. In contrast to the deductive mode, abductive reasoning starts from the empirical findings, not from theory. While inductive and abductive reasoning both have empirical observations as a starting point, the abductive mode of reasoning is based on the skillful process of developing theoretical explanations, not only with the help of empirical materials, but with the theoretical knowledge on the examined issue (Lukka and Modell, 2010).

This study can be seen as mainly utilizing the abductive mode of reasoning, as it started as a theory illustration in which the emotion research was used as a theoretical lens to better understand the tension between the contemporary literature on capital budgeting theory and psychology-based decision-making theory. Contrary to preliminary expectations, however, the empirical surprise of how top decision makers were rather openly describing the role of feelings of emotion in strategic investment decision-making processes, and how feelings of emotion may influence the use of accounting information, allowed re-examining the existing theoretical framework, and then going back to investigating the empirical materials (mainly qualitative interviews) in a case study setting. As a result, this process of alternately moving between two viewpoints—the accounts of decision makers from within a social group (emic) and the researcher from outside (etic)—changed the research

question to cover not only a theory illustration but also to attempt to make a contribution in terms of theory refinement in the domain of capital budgeting.

1.5 Structure of the thesis

The dissertation is composed of six chapters. In Chapter 1, the motivation and the key concepts of the thesis were introduced—feelings of emotion, strategic decision-making, and strategic investment decision. Moreover, the focus, aim, and research question of the study were stated. The end of the first chapter provided a brief description of the methodological assumptions of the interpretive research approach, and concludes by presenting the structure of this thesis. After this introductory chapter, Chapter 2 reviews the relevant literature on emotions in decision-making, strategic decision-making, and management accounting in strategic investments, and develops the theoretical contextualization and theoretical framework of this study in the following manner.

Section 2.1 reviews the background and basis of the emotion literature. In Section 2.1.1, the main definitions of emotion in the contemporary emotion literature are established. Section 2.1.2 discusses in more detail the feelings of emotion and emotion processes as well as their mechanisms affecting decision-making. A theoretical lens (i.e., a method theory) is developed for understanding what is meant by feelings of emotion and emotion processes, and why they are important. Section 2.1.3 reviews the relevant literature on the roles and effects of emotions in strategic decision-making. Next, while examining the role of feelings of emotion, a holistic understanding of strategic investment decision-making is needed. Thus, in Section 2.2, a broader perspective on strategic investment decision-making is developed. In Section 2.2.1, relevant strategic decision-making models are reviewed. Thereafter, two key components *inside* the strategic investment decision-making process are considered to be *incremental learning* and *rational planning*—which are inherently present in human decision-making—are defined and contrasted, as well as placed into the context of strategic decision-making. After that, the Levers of Control framework brings these two views together in Section 2.2.2. The relevant literature on management control systems (MCS) is reviewed in Section 2.2.3. It lays out how MCSs are used in strategic decision-making to provide useful accounting information for decision makers. In Section 2.3, the use of accounting information in strategic investments is discussed. Section 2.3.1 reviews the background and basis of the capital budgeting literature (i.e., methods and process). In Section 2.3.2, the feeling of uncertainty in terms of cause and effect and objectives, as well as how they may influence the use of accounting information, is discussed and tied to the role of feelings of emotion.

In Chapter 3, the empirical research methods of the study are introduced. The chapter begins with an overview of the empirical material collection process and the empirical materials that have been applied. The chapter concludes with a description of the methods of analysis that have been employed in the study and a discussion on the limitations of the empirical study. In Chapter 4, brief descriptions of the interviewed companies participating in this thesis are presented, and the results of the empirical findings are reported. Chapter 5 provides a discussion in which the empirical findings are reflected back onto the theoretical framework. Finally, Chapter 6 offers a summary and conclusions of the thesis with some interesting avenues for future research.

2 Literature Review

2.1 Emotions in decision-making

William James' ideas about emotions have had a far-reaching impact within psychology and philosophy over the last 130 years. He was a leading American psychologist who, along with Charles S. Peirce, established the philosophical school of pragmatism. James was a prominent philosopher of the late nineteenth century who has been cited as the father of American psychology. He is one of the founders of *functional psychology*, the purpose of which was to examine the function of mental activities and how they assist an individual to adapt to its environment. With its experimental roots in the 19th century, psychology is a relatively new area of science compared to other fields. Together with William Wundt, who considered psychology as a scientific examination of conscious experience and the components of consciousness (i.e., *structuralism*), James is credited with being the founder of psychology as an academic discipline separate from philosophy (Thorne and Henley, 1997).

As we locate James in the broader field of psychology, the most influential paradigms on the historical timeline of psychology after structuralism and functionalism have been *Freudian psychoanalysis*, *Gestalt psychology*, and *behaviorism*. In contrast to other earlier paradigms, which were all concerned with understanding and describing inner experiences, behaviorism had concerns that inner experience could be scientifically studied, and thus chose to focus on human behavior that is an objectively observable outcome of a mental process. In the early 20th century, psychoanalysis and behaviorism dominated the scientific field of psychology (Thorne and Henley, 1997).

However, these views were criticized as being limited perspectives since the pessimism and determinism of Freud (i.e., the human unconscious being the driver of all actions) and the simplifying nature (i.e., reductionism) of behaviorism, which also views human behavior as solely determined by a combination of environment and genetics. This spurred a new perspective called *humanism*, which is perhaps best known for Maslow's hierarchy of human needs, and which draws attention to human intentionality, personal control, and the propensity for the "innate good" that exists within all people as important for our behavior and our self-concept. While

humanistic psychologists revived interest in the mind and in the individual human as a whole, Ulric Neisser (among others) led another influential perspective known as the revolution of *cognitive psychology* (Thorne and Henley, 1997).

Ellsworth (1994) has done an interesting review of James's writings on emotions, and she maintains that James has been interpreted in many ways, to such an extent that his original ideas almost vanished in the process. A typical interpretation of James' ideas reduced *emotions to nothing but the sensations of bodily changes*. Even though this oversimplification initially sparked off a stream of research, it nonetheless gravely hindered (consequently nearly abolished) scientific research on emotion. According to Ellsworth (1994), however, the actual claim of James suggests that sensation of bodily changes is a *necessary condition* of emotion. James argued that there could be no *feelings of emotion* without the bodily sensations. In other words, the sense of bodily changes produces emotionality to what would otherwise be a neutral interpretation or perception of the particular situation. Yet these sensations are not the whole experience, but rather they are the component that makes the whole experience emotional. For James, emotion was multifaceted and caused by more than one factor. Moreover, in his mind, emotion had a role in nearly every aspect of mental life, comprising also thought. In general, he argued that every subtle change in bodily sensation produces a change in the quality of the emotional experience, thus denying the existence of *discrete emotions* as separate entities. James believed that emotions, like consciousness, are a *continuous stream* rather than a set of discrete states of mind (Ellsworth, 1994).

Since the early 1990s, scholarly interest in emotions studies has emerged again (Ellsworth, 1994). However, so far it has remained mostly in the domain of psychology and neurology. Yet there have been studies in the decision-making literature that show the various effects that emotions have on decision-making. As if to stir the pot even more, there are still ongoing debates among academics about what emotions actually are, how they function, and why they even have an effect on decision-making. However, these studies on emotions have not yet made a big impact on the accounting domain in general, and on the capital budgeting literature in particular. Even though some accounting researchers (Baxter et al., 2019; Taffler et al., 2017; Hall, 2016; Mouritsen and Kreiner, 2016; Guénin-Paracini, 2014; Boedker and Chua, 2013) have already pointed out that we need to pay more attention to emotions, we are still in the explorative phase. Thus, more understanding is needed about the role of emotions in the domain of accounting literature and how they influence decision-making. Hence, in this thesis, the understanding of emotion processes and feelings of emotion are used as a *method theory* that provides a theoretical lens for exploring the role of feelings of emotion in strategic investment decision-making, and how feelings of emotion may influence the use of accounting information. Furthermore, the method theory serves as an avenue for better

understanding the mechanisms underlying the actions of top decision makers in general, and their use of accounting information in particular, during strategic investment decision-making processes.

There are a *variety of conceptualizations* of emotions in the decision-making literature. Moreover, decision-making research is an interdisciplinary domain where researchers from several fields of psychology, sociology, economics, philosophy, neuroscience, and others are involved. Thus, there are both common and distinctive concepts about emotions in decision-making. Regardless of the wide divergence of emotions in studies, and various ways of measuring it, categorizing emotions as negative and positive is the most common conceptualization (Neumann, 2017). What has fragmented the research on emotions is the way in which several concepts related to emotions, such as affect and mood, are employed sometimes quite loosely and variably in the academic literature. Therefore, in the next two sections, we have a further look at how emotions are actually discussed in the contemporary emotions literature.

2.1.1 Basic universal emotions vs. Constructed emotions

Basic universal emotions and constructed emotions are perhaps the two most relevant streams of research, which are here categorized under *emotions-as-reactions*. These have paved the way for our understanding of emotions. The classical scientific landscape and public understanding of emotion was shaped by the widely used *basic emotion method* (e.g., Nummenmaa and Saarimäki, 2017; Ekman, 2016), which proposes that there are discrete basic emotions (such as happiness, sadness, disgust, surprise, anger, and fear) that have universal emotional signatures or "fingerprints", which every human being can identify from birth, since they have anatomically defined neural mechanisms, such as a certain brain area (e.g., the amygdala) or network of brain areas. However, today we can no longer totally ignore the cumulative opposite evidence with a shrug (e.g., Barrett, 2017; Cunningham et al., 2013; Lindquist and Gendron, 2013; Russell, 2003). Indeed, other scientists have *not found* the above-mentioned unambiguous facial, physiological, or neural patterns—the so-called fingerprints—that identify discrete emotions on a face, a body, or a brain.

For centuries, philosophers from René Descartes to William James have suggested that the mind is making sense of the body in the world. Today, recent neuroscience argues that it can uncover how this process of making sense happens in the brain to *construct emotions on the spot*. This explanation, based on the experience and perception of emotion, is called the *theory of constructed emotion* (TCE), which proposes (Barrett, 2017: 31): *"In every waking moment, your brain uses past experience, organized as concepts, to guide your actions and give your sensations meaning. When concepts involved are emotion concepts, your brain*

constructs instances of emotion." The TCE is derived from the broader scientific tradition of constructionism (e.g., Russell, 2003), which holds that one's perception and experience of emotion are created in the situation by biological processes within the body and brain. The TCE argues that emotions are a form of cognition (i.e., the mental action or process of acquiring knowledge and understanding through experience, thought, and the senses). Emotions are constructed in the same way as any other cognition—from past experiences, perceptions of sensory inputs, and recalled information—by making sense of and giving meanings to these experiences and information (Barrett, 2017). However, this view is in stark contrast to the basic universal emotions view (e.g., Nummenmaa and Saarimäki, 2017; Ekman, 2016), and it might be too early to declare a full paradigm shift.

2.1.2 Emotion processes and feelings of emotion

In the previous section, the two main perspectives on emotions were laid out. As we take a closer look at why emotions are so essential for human decision-making, we need to consider and define *what emotions are*. Since we already learned above that the debate among scientists on the concept of emotion is unsettled, a well-established notion of emotion by Damasio (2010) is adopted for the purpose of this research. This notion falls somewhere between those two main perspectives of the emotion research. Damasio's conceptualization of emotion is based on his groundbreaking study, in which Damasio (2006/1994) developed the *somatic marker hypothesis*. This theory suggests that when people are engaged selecting alternatives, especially under threat (e.g., risk in the environment) or opportunity (e.g., food to eat or making money), and when stakes are relatively high, emotion processes play a key role by providing emotional signals that are deeply rooted to survival and the governance of life (i.e., the fundamental premise of biological value) within the body (i.e., the soma), and are thus guiding and disrupting human behavior in decision-making situations.

Next, these *emotion processes* and related *feelings of emotion* are discussed in more detail. The core ideas of how these two intertwined but different processes play the key role in decision-making (Phases 1–12) are depicted in Figure 5 for the purpose of this study. Since the notion of emotion has been debated, *it is crucial to understand the emotion mechanisms affecting human decision-making*. Thus, a theoretical lens is developed for understanding what is meant by feelings of emotion and emotion processes, and why they are integral and important in decision-making. This framework is based on the work of Damasio (2010; 2006/1994). However, the depiction itself is novel and was made to clarify how these two key concepts—emotion processes and feelings of emotion—are related to the neurological, physiological, and biological mechanisms that (mostly automatically and partly unconsciously) fundamentally affect human decision-making.

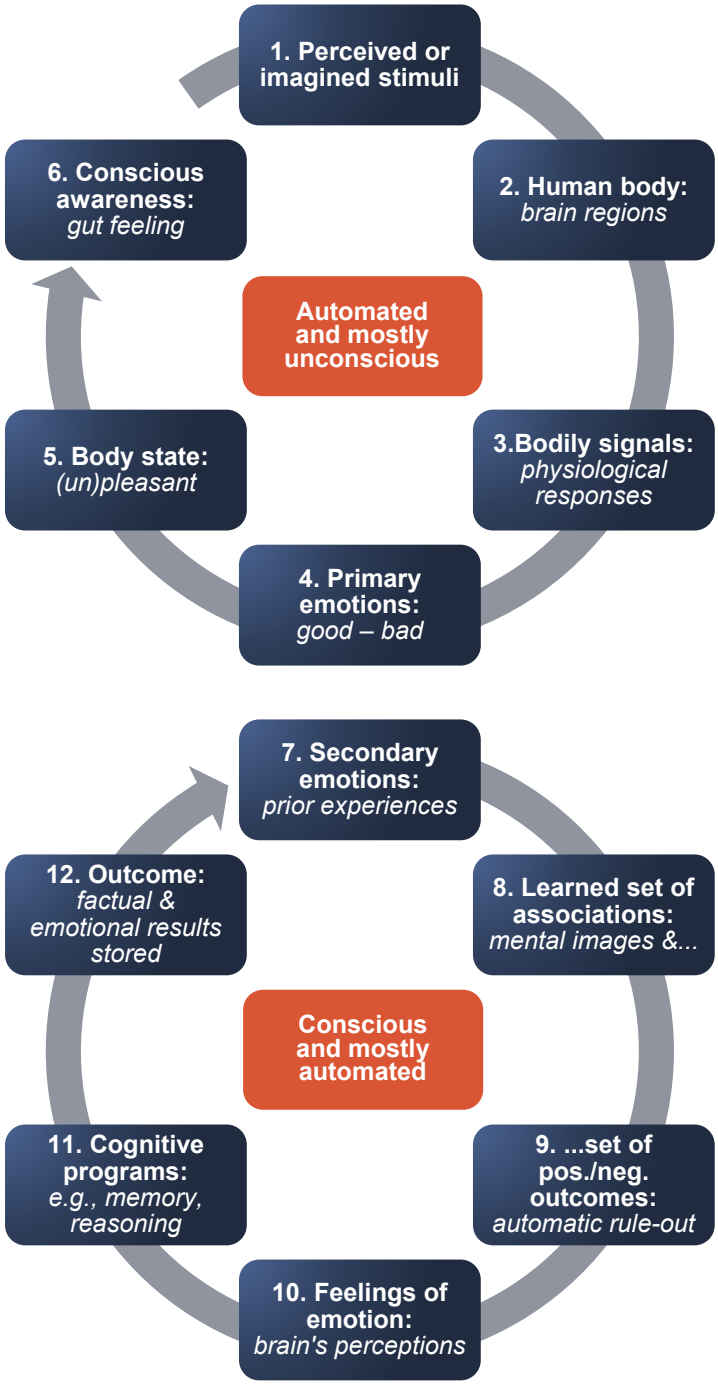

Figure 5. Emotion processes and feelings of emotion in decision-making.

While decision makers are continuously acting in and thinking of the world, their emotion processes in the brain assess signals coming from inside and outside of the body (Phases 1-2). There are three levels of brain regions that are involved in unconscious emotion processes: (a) "high-level" (i.e., some of the prefrontal cortices), (b) "low-level" (i.e., the limbic system), and (c) sectors that map and integrate bodily signals (Phases 2–3). When emotions (e.g., joy, anger, disgust, or fear) are properly discussed, it is crucial to mention constitutive components of each emotion, i.e., *primary emotions* (Phase 4).

Indeed, there are punishment and reward devices (i.e., release of chemical molecules in the brain and body, such as cortisol and dopamine) as well as motivations (e.g., care, attachment, exploration, play) and drives (e.g., appetites), which are a pivotal part of homeostatic mechanisms. Therefore, *autonomous decisions* are constantly made by emotion processes, as they are marking these emotional signals and related situation as good, bad, or something in-between (Phase 4). Essentially, the set of these mechanisms regulates the balance of bodily functions and of its internal environment, i.e., the body state (Phase 5). As a decision maker becomes consciously aware of his or her body state, aka *gut feeling*, sets of mental images are associated with the collective body state (Phase 6)

Emotions (Phases 1–6) are largely automated and complex programs of movements or actions (in the broad sense of the term) in organisms such as humans; and they have been composed by evolution in the course of millions of years. Among humans, these programmed actions are accompanied by a cognitive program, including certain ideas and modes of thinking (see Phase 11). Yet the realm of emotions is mostly unconscious and one of the actions carried out in a body: from changes in the internal milieu and viscera to postures and facial expressions.

Given a certain programmed nature of the essence of the emotion process, these programs are modified over time by one's experience, i.e., *secondary emotions* (Phase 7), and thus there are individual variations in the patterns. Secondary emotions involve a learned set of associations between mental images (Phases 8–9) evoked by certain stimuli and a corresponding set of positive or negative outcomes. In this manner, secondary emotions automatically rule out alternatives with likely negative outcomes (Phase 9). Emotions may be expressed physically somewhat differently, and naturally depending on the conditions, but *essentially the process of a particular emotion is the same*.

On the other hand, *feelings of emotion* (Phase 10) are aggregate perceptions of what happens in the mind and body as one is having an emotion (Damasio, 2006/1994, pp. xviii–xix): *"I conceptualize the essence of feelings as something you and I can see through a window that opens directly onto a continuously updated image of the structure and state of our body... By and large, a feeling is the momentary 'view' of a part of that body landscape."* Hence, in relation to the body,

feelings are a portrayal of actions rather than actions themselves, and they happen right after emotion processes have kicked in. Nevertheless, one may have just an emotion without consciously feeling it (see Phases 1–5). Thus, a person can be unconscious about his or her emotional state, which also presents a noteworthy methodological limitation for the study.

In order to feel an emotion, one needs to portray an image in the brain structures (Phase 10), which are different from the brain structures that invoke the emotion processes (see Phase 2). Thus, the realm of feelings is one of the perceptions carried out in the brain. However, the perceptions qualified as feelings of emotion comprise an important component of corresponding *primordial feelings* (Phases 3–5), which are based on the special connection, called interoception (i.e., a depiction of the body state, and processing the internal bodily signals (see Phases 2–5) between the brain and body (Damasio, 2010). This is simple, primitive feeling with two features: (1) *valence* (i.e., how unpleasant or pleasant one feels) and (2) *arousal* (i.e., how agitated/energized or calm/enervated one feels), which is called the *core affect* (Russell, 2003). It is a constant current, even while sleeping, throughout the life and a core feature of consciousness.

The core affect is also a part of *mood*, which is seen as a prolonged and usually relatively mild or even neutral experience combined with some thoughts, motivation, and behavior. Unlike an emotion, the core affect is not necessarily directed at a certain object, but rather it is the overall feeling that a person experiences all the time, and it is just a part of an emotion (Russell, 2003). Therefore, the core affect is always present in the feelings of emotion, which can stay in the memory (i.e., emotional result; see Phase 12) in terms of elaborations (e.g., by using language). This makes a huge difference, since people are then able to use feelings of emotion for future planning (Phase 11). In fact, previous experiences and feelings of emotion have a way of modeling what one is going to do next (Damasio, 2010). Hence, the brain is constructing a view of the world and making sure that the view is taken into consideration.

For example, when a decision maker faces an intimidating situation, such as shareholders' loss of confidence, sensory data from the eyes and ears triggers unconscious and complex processes in the brain. Furthermore, these processes call into action several emotion-triggering brain regions that consequently invoke processes of emotion. For example, chemical molecules as well as neural signals are produced and delivered to both the brain and the body. Particular actions are taken (e.g., contraction of the gut, adjusting the heart beat rate), and some expressions are assumed (e.g., posture and face of panic). Moreover, the communication between the body and the brain goes both ways asymmetrically. After these autonomous actions of the brain and body, the person becomes conscious of those somatic markers, connects them to sensory data from the environment, and perceives a

feeling of fear. This is followed by certain plans and ideas (e.g., freezing or fleeing) that come into mind flow. Finally, the emotional result, as well as the factual outcome, is stored in the memory (Damasio, 2010).

Another important point is that while having an emotional state, the plan of action depicted in the person's mind and the ideas about negative and positive facts recalled from memory are consistent with the overall signal of the emotion. Thus, Damasio (2010) suggests that emotions are incredible "smart devices", which evolved by evolution. Emotions are like an autopilot that tends to deliver a solution and makes sure that a person (or any organism) acts right without needing to think about the problem. Essentially, they are ensuring that at some level, a person knows that a threat or an opportunity is there and he or she has a tendency to act on it. Even at this level, it is quite easy to realize that the influence of emotion on one's behavior is rather remarkable and generally useful, albeit it has some drawbacks (Damasio, 2010).

On the other hand, emotion processes function much like our immunity system. They are fundamentally and automatically trying to keep us out of harm's way, and to guide us in the preferable direction, by firing positive and negative signals throughout the body and to the brain that spark various bodily changes and body states. As our brain's conscious perceptions and cognitive programs interact with emotion processes and current feelings of emotion, it molds our brain's adaptive emotion-cognition structures, the so-called *emotion schemas*, which prompt specific thinking patterns and behavioral tendencies. They are like wearing a pair of glasses that dictates our attention and colors how we see events. Starting in early childhood, new information and experiences become subjectively organized into emotion schemas including thoughts and beliefs, feelings of emotion, and action tendencies. Thus, in the face of a triggering event, our thinking and behaviour is affected by our prevailing emotion schemas (Izard, 2009).

However, if our emotion schemas get "infected" by psychologically traumatic experiences, such as uninvolved parenting in the childhood or a painful divorce, that induce strong negative feelings of emotion (e.g., fear or shame), it may develop to a sort of "autoimmune disease" by turning the emotion schemas against us. While the emotion schemas are dysfunctional, they provide us strong expectations that are an opportunistic ground for maladaptive thinking about (i.e., cognition), as well as responding to (i.e., behavior), the events in our external or mental environment (Izard, 2009). We could think an emotion schema as an electronic button on the visible top of an iceberg that is wired with the hidden parts under the water—the underlying *emotional results*. Since we are not usually well aware of our emotional results, they might go unnoticed. Yet, when someone or something pushes that button, it activates also the emotional results that vary depending on our earlier experiences and related feelings of emotion. Thus, our thinking patterns and action

tendencies may be very different, even if the trigger event is similar or exactly the same. As a result, while our emotion schemas invoke the emotional results connected to prior experiences, our mind and behavior in a situation may be driven more by the emotion schemas than the actual trigger event.

2.1.3 Roles and effects of emotions in strategic decision-making

In the previous section, the notions of emotion processes and feelings of emotion were introduced to the conceptual framework and as the theoretical lens for the thesis. Damasio's groundbreaking study (2006/1994) developed the *somatic marker hypothesis*. His theory suggests that as people are engaged in selection of alternatives, especially under an opportunity or threat, and when stakes are relatively high, emotion processes and feelings of emotion play a key role by guiding, but also disrupting, human behavior and decision-making. In this section, however, we have a look at some of the main earlier theoretical arguments in the literature on roles and effects of emotions in strategic decision-making.

Traditionally, in the *classical economic literature*, the mental process of decision-making has been seen as a rational and formal process based on expected utility maximization (Rick and Loewenstein, 2008). The classical theory focuses on why and how decision makers depart from the specific standard of rationality that rest on the assumption of optimality (Gutnik et al., 2006). Hence, in the prevalent paradigm, economic models of decision-making and choice behavior have been typically approached by simplifying and mathematizing the subjects. The assumption is that as decision makers choose between known alternatives, they assess the likelihood and desirability of their consequences and evaluate this information with some kind of calculus based on expectations. This is known as the *consequentialist model of decision-making* (e.g., the prospect theory by Tversky and Kahneman, 1979).

Actually, this line of thinking is not inconsistent with the concept of *expected emotions*—i.e., the anticipated future impact of emotions, such as disappointment or admiration evoked by bad or good decision outcomes. While not explicitly ruling out the idea that utilities may depend on expected emotions, most researchers in economics until recently considered comprehensive accounts of such emotions as outside of their discipline (Rick and Loewenstein, 2008). As a consequence, for a long time emotions did not get much attention in traditional studies on decision-making. In fact, emotions are still now often seen as irrational, and thus they distort reasoning, or they are considered only as outcomes of the decision-making process affecting expected utility (e.g., Peterson, 2007; Shefrin, 2002).

As these normative (i.e., prescriptive) theories are based on research conducted typically in controlled laboratory settings (Gutnik et al., 2006) and they have largely failed to explain decision-making and behavior in real-world practical situations—and where almost no decision makers have been found to make decisions in this way (Beach and Lipshitz, 2017)—many economists would nowadays consider the consequentialist framework to be outdated (e.g., Gutnik et al., 2006; Jones, 1999). Nonetheless, *behavioral economics*, a sub-discipline of economics, has made a great contribution to decision theory by proposing more psychologically realistic assumptions. By doing so, it has been able to increase the predictive and explanatory power of economic theory. For instance, some economists proved how *counterfactual emotions* (e.g., regret), which arise from thinking about possible consequences of different choices, can affect decision-making (Rick and Loewenstein, 2008).

More recently, both economists and psychologists have been more interested in studying *immediate emotions*, which can be divided into two types: *integral emotions* (i.e., emotions arising from considering the outcomes of one's decision, which in that sense are similar to expected emotions) and *incidental emotions* (i.e., emotions arising from situational or dispositional sources objectively unconnected to the choice at hand). More specifically, there are two kinds of incidental emotions that are stemming either from (1) situational sources, which are external influences from the environment, or from (2) dispositional sources, which are internal characteristics of a person. Both integral and incidental emotions seem to play a crucial role in decision-making. Whereas integral emotions can be incorporated into a consequentialist perspective, incidental emotions often drive decisions contrary to the predictions of a consequentialist framework. Thereby, contemporary findings imply that the consequentialist model of decision-making is too simple to be a descriptively accurate account of actual decision-making behavior (Rick and Loewenstein, 2008). Mainly out of this incompatibility with multifaceted and complex settings, the *naturalistic* (i.e., *descriptive*) *decision-making theory* has emerged. In this model of decision-making, traditional research methods are combined with more innovative methods that are designed to explore behavior and cognition in realistic settings. More precisely, the naturalistic models emphasize descriptive adequacy, which consequently require in-depth qualitative methodologies complementing quantitative ones (Gutnik et al., 2006).

To sum up the previous classical economic and behavioral economics literatures, whereas some researchers have examined the impacts of emotions that one expects to be experiencing *after* the decision-making process (i.e., *expected emotions*), only minor attention has been given to the effect of emotions experienced *during* the process of decision-making (i.e., *immediate emotions*), like for instance fear or anxiety. The former approach refers to the *cognitive* and *consequentialist theories* of

choice under risk or uncertainty. The latter approach provides an alternative perspective based on the *risk-as-feelings hypothesis* (Loewenstein et al., 2001), which makes an explicit distinction between expected future emotions and immediately experienced emotions. This so-called *Loewenstein-Lerner classification* positions emotions as an *immediate factor* in the decision-making process. Recently, some research has combined these two streams into one integrated model of decision-making, synthesizing scientific findings to-date (e.g., Lerner et al. 2015).

Finally, in decision theory, the traditional two-system model of choice (e.g., Kahneman, 2011; Camerer et al., 2005; Kahneman and Frederick, 2002; Sloman, 1996)—in which there is an ongoing battle between rational (i.e., a long-sighted cognitive system) and irrational (i.e., a short-sighted emotional system)—is starting to seem inadequate, as the contemporary neurobiological and psychological data favors multiple decision systems. This is mostly attributable to the advent of the *neurological basis of decision-making,* which involves a number of inputs such as past experience, diverse sensory inputs, the anticipation of future goals, and sensory and emotional responses. In this field, researchers exploit new technological methods, such as positron emission topography (PET) and functional magnetic resonance imaging (fMRI), in order to identify and measure emotions in decision-making situations. As we know more about the cognitive mechanisms in our brains, the past three decades have transformed the thinking in several fields away from the classical perspectives towards a more holistic understanding in which psychological factors and subjectivity in human behavior are given a more central role. Recently, developments in neuroscientific research have also increasingly contributed to decision theory (Gutnik et al., 2006).

In line with the Loewenstein-Lerner classification and the neurological basis of decision-making, the role of emotions in decision-making processes has been conceptualized in a theoretical framework by Pfister and Böhm (2008). The authors argue that rather than simply affecting decision-making, emotions are considered to have an *integral role* in decision-making. They formulated the framework proposing four roles that emotions play in decision-making: (1) emotions evoked directly from alternative options *provide information* about pain or pleasure for building a preference, (2) emotions *speed up* the decision-making process, as this is often critical to achieve a conclusion, (3) emotions *assess the relevance* of certain elements, and thus focus attention on a particular situation, and (4) emotions *enhance commitment* in a group and encourage interaction and reciprocity beyond pure self-interest.

While considering the biasing or facilitating effects of emotions, the research literature regarding the role of affective experience in decision-making can be divided into two main perspectives (Seo and Barrett, 2007) that focus on two

different processes: (1) how people experience their feelings during decision-making is called the *feeling-as-decision facilitator* perspective, and (2) what people do about their experienced feelings is labeled as the *feeling-as-bias-inducer* perspective. The former view suggests that feelings as such inherently foster decision-making without regard to what people do about those feelings. Surprisingly, one does not need to even realize that emotions play a role and they can still have a significant effect. The latter view implies that the way in which emotions affect decision-making depends on how people handle their emotions during decision-making. So far, while some theorists propose emotions as a source of bias (e.g., Shiv et al., 2005), it is widely understood that emotions facilitate rational thought and judgment (e.g., Neumann, 2017; Damasio, 2010; Bechara et al., 1997).

Neumann (2017) offers a fresh and comprehensive literature review on antecedents and effects of emotions in strategic decision-making that is characterized by high risk and uncertainty. In the review, 32 peer-reviewed and quality-sourced papers and two book chapters were analyzed, and the results indicate that emotions play at least some role in this field of research. The examination of these studies has shown that research has concentrated on negative and positive emotions in decision-making. For instance, while participating in *planning* and *problem-solving*, positive emotions of a decision maker are often increased as a result of perceived change. In contrast, a decision maker's *time pressure* amplifies negative emotions following the perception of change. In addition, the current literature on emotion in decision-making proposes that positive emotions in the decision-making situation promote *innovative* and *creative thinking* and negative emotions have the opposite effect.

Further, decision makers' emotions have an effect on their *information processing* (Neumann, 2017). With positive emotions, decision makers are typically acting in a more *intuitive* and *flexible way* (i.e., heuristic processing), while with negative emotions, decision makers are categorizing stimuli and events in a more *systematic* and *effortful manner* (i.e., substantive processing). However, Livet (2010) argues that emotions are not that basic and pure, and the emotional state can be mixed (i.e., positive and negative).

Motivated by the literature on emotions in decision-making, this study will focus on *immediate feelings of emotion* that seem to have an integral and central role throughout the whole strategic investment decision-making (or SID) process. Thus, it relates the research question—*What is the role of immediate feelings of emotion in strategic investment decision-making processes?*—to the strategic investment decision-making process. This is illustrated in Figure 6. As the research in this area is in an explorative phase and the scope of this study is limited, the theoretical ideas provided above about the roles and effects of emotions in strategic decision-making are still considered as tentative and not necessarily a conclusive set of roles and effects. However, these theoretical ideas are used as a basis in the theoretical

framework. In the next section, the relevant theoretical models of strategic decision-making are presented, and the theoretical framework is supplemented by two key components of strategic investment decision-making, namely incremental learning and rational planning.

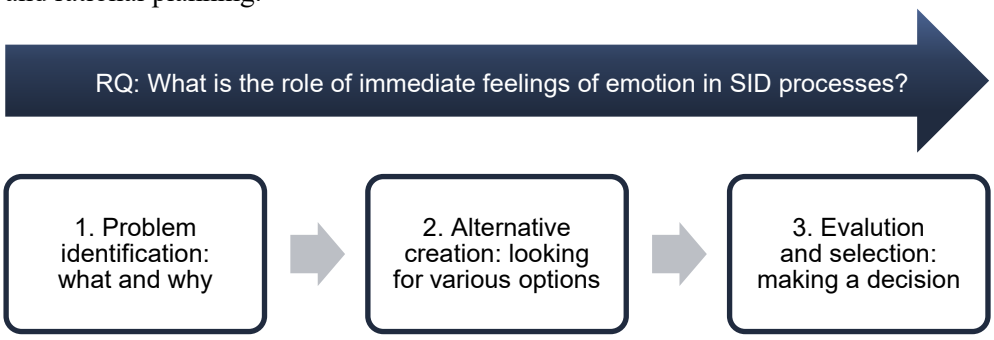

Figure 6. Immediate feelings of emotion in strategic investment decisions.

2.2 Strategic decision-making

Strategy seems to be a slippery notion, so *what* is a strategy? Writings about strategy in ancient military terminology go back thousands of years. *Strategos* literally means ”army leader”. Later, the concept of a strategy was related to business and the art of managerial skills (e.g., Mintzberg et al., 1998; Ansoff, 1965; Chandler, 1962). One of the most cited definitions for strategy, coined by Mintzberg (1987), is *Five Ps for Strategy*: (1) plan, (2) ploy, (3) pattern, (4) position, and (5) perspective. Even though these Five Ps are competing definitions, they above all complement each other. All of them enlarge our understanding of strategy. One especially interesting statement by Mintzberg (1987) is that *”strategies can emerge as well as be deliberately imposed.”* Ever since then, strategy has had a number of definitions in the business and academic literatures. However, according to Robert Anthony and Vijay Govindarajan (2007), two well-known and influential professors in management accounting research, there is widespread consensus that *”strategy describes the general direction in which an organization plans to move to attain its goals.”*

Strategic decision-making is perhaps the most important action that top decision makers engage in. As strategic investments have an extensive and long-time effect on the success of a company, the strategic investment decision-making (or SID) process has an integral and central role in strategic decision-making. In this study, two key components *inside* the SID process are considered to be *incremental learning* and *rational planning,* which are inherently present in human decision-making. They are discussed in more detail in the next sections. The SID process involving these two key components is depicted in Figure 7. It can be seen as a

continuous, simultaneous and interacting process in which rational planning is accompanied by incremental learning which in turn informs and supports rational planning (Mintzberg, 1991). This *broadens the perspective* on aspects of strategic investment decision-making that are also interconnected with the emotion processes. For instance, as shown in Figure 5, secondary emotions involve a learned set of associations between mental images evoked by certain stimuli and a corresponding set of positive or negative outcomes from previous experiences stored in memory. As these two key components—incremental learning and rational planning—provide a more holistic understanding of the strategic investment decision-making process, they help to examine the research question—*"What is the role of immediate feelings of emotion in strategic investment decision-making processes?"* Hence, the notion of strategic investment decision-making process is supplemented by these two components and added to the theoretical framework.

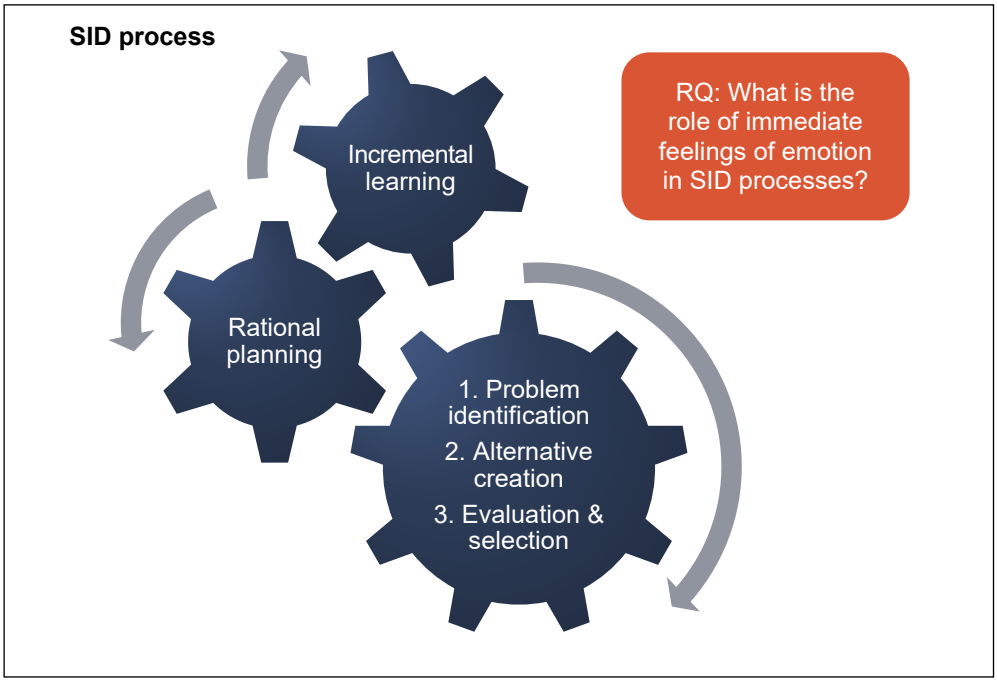

Figure 7. Broader perspective on strategic investment decision-making.

As the outlines of strategic decision-making are sketched, we cannot ignore the fact that there are also several other well-known theoretical conceptualizations for purposes of strategic decision-making. For instance, the Ansoff Matrix, the Boston Consulting Group (BCG) Matrix, and Porters' framework are widely used by top

decision makers in practice. Despite the differences in the theoretical models and real-life situations in practice, in all strategic decisions (and therefore also strategic investments), there are common nominators, such as *complexity* and *uncertainty*, which these models try to mitigate. However, these models represent the rational planning view that mostly ignores the incremental learning view and has been the prevalent paradigm of strategic thinking, both in the lecture halls of academic institutions and in the boardrooms of big corporations. Next, we will have a look at these strategic decision-making models.

2.2.1 Strategic decision-making models

In strategy research, much attention in the 1970s, 1980s, and 1990s focused on developing more accurate frameworks to perform environmental analyses and internal analyses (Anthony and Govindarajan, 2007). In order to examine opportunities and threats (e.g., SWOT analysis), a careful environmental analysis is made by top executives (Porter, 1980). An internal analysis is conducted while identifying core competencies of the firm (Hamel and Prahalad, 1990). Combining these two key dimensions, a company builds its strategies by matching industry opportunities with its core competencies (Anthony and Govindarajan, 2007).

Typically, a firm may have one or more strategies on two levels—corporate strategy and business unit strategy. The former is about *where* to compete (i.e., the right mix of businesses), and the latter is concerned with *how* to compete (i.e., how to create and maintain competitive advantage) in a specific industry. Drawing on the above-mentioned two levels of strategy, Anthony and Govindarajan (2007) have described several generic strategies in their book, *Management Control Systems*. At the corporate level, there are basically three generic corporate strategies: single industry firm, related diversified firm, and unrelated diversified firm. A central notion in the corporate level strategy to take into account is the concept of core competency (Hamel and Prahalad, 1990). On the other hand, at the business unit level, two of the most widely used planning models for business unit level strategies are the Boston Consulting Group (or BCG) Matrix and the General Electric (GE)/McKinsey Matrix. Both of them distinguish four generic business unit strategies (i.e., build, hold, harvest, and divest).

Several frameworks describe how companies adapt to a changing and competitive environment (see Peljhan, 2007). Classifications of strategic choices by Miles et al. (1978) and Porter (1985; 1980) seem to be referred most to in the literature. While Porter's (1985) generic strategies for obtaining a competitive advantage are cost leadership, differentiation, or focus, Miles et al. (1978) developed their typology based on how organizations responded and aligned to changes in the environment. In the typology, they identified four generic strategies: defender,

prospector, analyzer, and reactor. The defender and prospector are placed at opposite ends of the continuum. Miles et al. (1978) argue that *prospectors* utilize extensive planning and subjective performance measurement. Moreover, they have a learning orientation with a decentralized and flexible structure. In contrast, rather than keeping eyes open for new opportunities in the environment, *defenders* emphasize centralized and tight cost control, efficiency orientation, and monitoring of trends. *Analyzers* try to balance these two extremes and combine learning with efficiency by adopting flexible structures and relatively tight cost control. *Reactors* seem to have no clear organizational approach, and characteristics of the organization structure may shift suddenly, depending on the needs at the moment.

Next, the rational planning model is contrasted with the incremental learning view. While the latter view is often regarded as opposing the former, in this study incremental learning is considered as another side of the same coin.

2.2.2 Rational planning vs. Incremental learning (Ansoff vs. Mintzberg)

In the academic literature, the father of the strategic management notion was Igor Ansoff, a Russian American scholar and business manager. He has been credited for establishing a strategic planning paradigm as an independent area of management activity. His seminal book, *Corporate Strategy* (1965), was the first writing dedicated to strategy, and it is still considered one of the classics of management literature. Ansoff (1965) built up a framework of theories, techniques, and models in order to develop a systematic approach to strategic decision-making and strategy formulation. This is considered to be the core of the rational planning paradigm. Although other theorists in the field of strategy frequently cite his work, Ansoff has remained relatively unrecognized compared to other prominent business strategists such as Henry Mintzberg and Michael Porter. Perhaps the complexity of his texts and their reliance on the disciplines of planning and analysis are among the reasons why Ansoff has not reached the top echelon of strategic thinkers. However, along with Porter and Mintzberg, Ansoff has been one of those theorists who have had a great impact on strategy work in practice by laying out the necessary theoretical substance, as well as on academia by building firm foundations for the emerging of different schools of strategic thinking (Mintzberg and Lampel, 1999).

The nature of the strategy process and substance has been debated among different strategy schools, which can be divided into two main branches, namely prescriptive (i.e., “ought”) and descriptive (i.e., “is”). Especially the discussion between the *rational planning school* (e.g., Ansoff and McDonnell, 1988) and the *incremental learning school* (e.g., Mintzberg, 1987) is well-documented in print (see Mintzberg, 1991; Ansoff, 1991) and particularly in the Harvard Business Review

over several years as Igor Ansoff and Henry Mintzberg argued over their differing views on strategy. Since Mintzberg did not believe in the premises of formal strategic planning supported by analytical techniques, he has often criticized Ansoff's writings. Mintzberg based his main critique on the view that strategic planning had three fallacies: (1) that predicting events is possible, (2) that operational management is separable from strategic planning, and (3) that by using techniques and analysis with hard data, novel strategies can be produced (Mintzberg, 1991). The incremental learning school is likely the most significant descriptive school; its name signals the incremental nature of the strategy process. According to the learning school, strategies emerge in organizations through intertwined formulation and implementation processes that are actually happening at the same time (Mintzberg and Lampel, 1999).

Over the past 25 years, the *resource-based view (RBV)* has become one of the standards in the strategy literature. The RBV-thinking is close to Mintzberg's process view –based ideas. Nowadays, the RBV is a substantial framework; it examines the firm as to the origins of competitive advantage. The theory is based on the principle that competitiveness is a function of valuable and distinctive capabilities and resources controlled by a company (Henri, 2006).

Other notable schools of thought in this context are the *design school* (e.g., Andrews, 1971; Chandler, 1962) and the *positioning school* (e.g., Porter, 1980). The former school of thought is perhaps best known for its SWOT-analysis tool. The design school is mainly based on the same core premises as the rational planning school. However, it emphasizes that clear and unique strategies are formulated by top decision makers in a deliberate process of conscious thought. Thus, the design school does not rely so much on the formal process and procedures of the rational planning school that are supported by techniques (such as objectives, budgets and operating plans) and decomposable into various actionable and repeatable phases. Consequently, in contrast to the design school, the planning school moves the realm of strategic planning away from top decision makers to staff planners in middle management (Mintzberg and Lampel, 1999).

The latter perspective, on the other hand, was given impetus particularly by Michael Porter in the 1980s. The positioning school is based on a formal and analytical process of the situation in the industry that reduces strategy to generic positions. Thus, this school replaced the planners with analysts who could now promote their "scientific truths" backed up by hard data; and in this way, it focused more on the substance of strategies. Probably the most recognizable models of the positioning school are the BCG Matrix and the Profit Impact of Market Strategies (PIMS) project. Besides the above-mentioned strategy schools, there are also other descriptive schools of thought, such as the power, cognitive, environmental, entrepreneurial, and cultural schools (Mintzberg and Lampel, 1999).

Since the seminal contributions of Michael Porter, strategy research has mostly been following the microeconomics tradition. As a result, research has typically remained on the macro-level of markets and firms while simplifying strategy to a handful of causally related variables, and almost ignoring human agency. However, in order to understand *human action* in the process of strategy, researchers need to look more closely at the actions and interactions of practitioners (Jarzabkowski et al., 2007). Thus, *strategy-as-practice* is a part of a broader turn to humanize organization and management research (Pettigrew et al., 2002). According to this view, strategy is explicitly based on human activity. It is not an attribute of an organization. Instead, strategy is something that members of the organization do.

Mintzberg (1991) argues that the problem in academia and practice has always been the imbalance in the assumptions of the planning school and the learning school that one of them could do it all. He goes further and states that before the emergence of the planning school, top decision makers were probably rather weak on rational analysis. However, nowadays they might conduct too many analyses. Thus, the era of the rational planning school may have had a blinding effect, like the blinders on horses. Mintzberg (1991: 465) concludes: *"I like to say that strategy and structure proceed like two feet walking: strategy always precedes structure, and always follows it too. And so it is with planning and learning. BCG's mistake was not in what it did describe so much as in what it left out; the critical period of emergent learning that had to inform the deliberate planning process."*

This above-mentioned distinction can also be seen as two important perspectives on strategy, namely *structural strategies* and *emergent strategies* (see also Chenhall, 2005). For structural strategies, the underlying logic is that a corporation's strategic options are bounded by the environment (e.g., Simons, 1987; Porter, 1985; 1980; Miles et al., 1978), and accordingly, strategic decisions need to be rationally planned. During the last 35 years, the *structuralist paradigm* has dominated the practice of strategy (Kim and Mauborgne, 2009). Instead, the emergent strategies view has been the challenger. It has focused on the process of strategy formation and the human agency in strategic decision-making. Emergent strategy itself supposes incremental learning and taking one step at a time in search of that consistency or viable pattern (Mintzberg and Waters, 1985).

One of the most renowned academics who has subtly combined the rational planning and incremental learning perspectives is Robert Simons, a professor at the Harvard Business School, which published (in 1995) his book, *Levers of control: How Managers Use Innovative Control Systems to Drive Strategic Renewal*. In his influential work, Simons argues that traditionally used hierarchical diagnostic control systems, based on measuring progress against plans to guarantee the predictable achievements of goals, are inadequate to steer a company successfully in the era of highly competitive markets with complex inherent dynamics. In addition,

he states that the key to business success is the execution of winning strategies. Thus, in today's business environment, Simons argues that four levers of control are needed: diagnostic control systems, belief systems, boundary systems, and interactive control systems.

Simons describes these systems precisely with a thoughtful and deep approach. In short, these four levels of control are involved in monitoring the implementation of intended strategy and in creating fruitful ground for new emergent strategies. These different levers also represent different aspects for controlling strategy. In his book, Simons matches the levers of control with Mintzberg's (1987) views on strategy. Strategy as a *plan/ploy*, an intended course of action, is controlled with *diagnostic control systems* through monitoring key performance indicators. The definition of strategy as a *pattern* is the consistent behavior of a company, even though it might appear without preconception. Managers try to control these emerging strategies with *interactive control systems*. Companies take different approaches to compete in the markets. Strategy as a *position* follows Michael Porter's (1980) widely accepted distinction between differentiation and low cost. By using *boundary systems*, top management seeks to control a strategic position and focus attention on risks to be avoided. Finally, in many firms with a rich history and strong culture, the members have a shared *perspective*, which is characterized by common behavior and/or thinking. As managers employ *belief systems*, they attempt to control the values and purpose of the firm.

2.2.3 Management control systems in strategic decision-making

As we learned at the end of the previous section, decision makers appear to rely on different types of management control systems in order to deal with various aspects of strategic decision-making. When managers influence other members of the company to implement the strategies of the firm, it is called *management control process*. This process is primarily behavioral. A distinction between *strategy formulation* and *strategic planning* can be made. Strategic planning is the process of deciding *how* to implement strategies, whereas strategy formulation is the process of deciding on *new* strategies (Anthony and Govindarajan, 2007).

Management control systems can form one part of strategic planning. A company's strategy process affects—and is affected by—management control systems (Langfield-Smith, 1997; Simons, 1995). A substantial body of literature has examined the effects of strategy on management control systems. However, the effects of management control systems, and hence the *effects of accounting information* provided by these systems, on strategic decision-making have been studied to a lesser extent (Shields, 1997; Langfield-Smith, 1997; Dent, 1990).

The stated purpose of a management control system is to aid management in moving a company in the direction of its strategic objectives. For instance, Johnson and Kaplan (1987) argued that management accounting must serve a *firm's strategic objectives*. These objectives are specific statements of planned performance in a given time period. In contrast, the goals of an organization are relatively timeless, such as earning a satisfactory return on investment. These goals are only changed in rare situations. According to Anthony and Govindarajan (2007), the management control system is one of four strategy implementation mechanisms, which are the management control system, the organizational structure, the culture, and HR management. The key functions of the management control system are to *provide useful information* for sound decision-making by managers and to *enable performance measurement*, both financial and nonfinancial, of the company and its business units.

A number of studies before the mid-1990s in the field of management accounting and strategy adopted a *contingency perspective*. An organizational theory that argues that there is no best way to organize a company, to lead a firm, or to make decisions is a contingency theory. Thus, the optimal mode of operation is dependent upon the external and internal situation (e.g., Mintzberg, 1987; 1983; Pugh et al., 1969; Woodward, 1966; Burns and Stalker, 1961). In management accounting, contingency theorists (e.g., Chenhall, 2003; Otley, 1980; Gordon and Miller, 1976) tend to examine the circumstances in which management control systems work better or worse.

These studies focused on the fit between some aspects of management control systems and four main contextual variables: strategy, structure, technology, and environment. While investigating the relationship between management control systems and business strategies, these strategies have been often characterized with several typologies, such as build/harvest and differentiation/cost leadership, which were described earlier. In fact, all of these typologies fall under the research made from the perspective of contingency theory.

Earlier, empirical research in the area of management accounting and strategy was relatively scarce. The research was dominated by survey studies that described the status of different aspects of management control systems and a business strategy at a given time. This has been criticized as a methodological deficiency (e.g., Chenhall, 2003). Much of this earlier research used a content (i.e., fundamental principles) approach, while just a handful adopted case study approaches and focused more on process (Langfield-Smith, 2005). Therefore, the strategy-based management accounting research can be seen as falling under two main approaches, namely *content approach* and *process approach*.

A first group of research emphasizes the *effects of strategy on management control systems*. For instance, Langfield-Smith (1997) suggests that a management

control system should be explicitly customized to support the business strategy, thus leading to superior performance and a competitive advantage. Further, Govindarajan (1988) provides evidence that high-performing companies align the business strategy, internal systems, and structures with their environment. Also, Miles et al. (1978) propose that the strategic choice made by the company has an effect on the management control system. As a result, different kinds of business plans and strategies tend to lead to various management control system configurations. However, the notion of strategy is generally explored at a level of strategic choice between Porter's (1985) generic strategies, differentiation and cost leadership (e.g., Govindarajan, 1988), and between the Miles et al. (1978) typology defender strategy and the prospector strategy (e.g., Hoque, 2004; Simons, 1987). In this group of studies, strategy is typically seen as a given, as well as management control systems are perceived mainly as systems of strategy implementation and the final phase in the management's strategy process (Henri, 2006). This group is called the *structural approach with the static perspective*. The approach focuses on such issues as the absence or presence of particular systems, system design, and their technical aspects (Chapman, 1998).

A second group of research emphasizes the *effects of management control systems on strategy*. Predominantly, also in this group, the notion of strategy is examined at the level of strategic choice (e.g., Chenhall, 2005; Chenhall and Langfield-Smith, 2003; Marginson, 2002; Abernethy and Brownell, 1999). In contrast to the first group, the second group of studies conceives management control systems implicating the strategy. In this way of thinking, management control systems have a role in strategy formulation. In addition, management control systems' *continuous influence* is recognized during the management's strategy process. This group is labeled *processual approach with the dynamic perspective*. The approach focuses on questions, such as interaction and dialogue regarding the application of management control systems (Chapman, 1998; 1997).

To sum up, researchers (e.g., Whittington, 2001; Hope and Hope, 1995) emphasize the important linkage, essential to optimal performance, between the management control system and the business strategy. Indeed, in most accounting research, the *underlying assumption* is, that *management control systems contribute to performance and profitability of organizations*; and therefore this view maintains the traditional idea of rational decision-making, in which rational decisions are made with the help of useful (accounting) information provided by management control systems. As a consequence and quite obviously, *accounting information provided by these management control systems is typically also assumed to play a key role in strategic decision-making*. However, the size and impact of accounting information's role has been debated (e.g., Pihlanto, 1994; Wikman, 1994; Lumijärvi, 1991) and relatively scarcely studied. Even though the theoretical understanding of

the role of management control systems within strategic decision-making is developing, the majority of studies have so far explored the impacts of strategy on management control systems; not vice versa.

While the literature on management control systems seems to suggest that these systems provide important accounting and other information for decision makers—and they actually use it as a basis for their strategic decision-making—there are no studies on the role of feelings of emotion in strategic investment decision-making processes and how they may influence the use of accounting information, which is the focus of this study. The next part of the theoretical framework is built on the management accounting literature regarding the nature and use of accounting information in strategic investment decisions. The branch of management accounting literature studying strategic investments is called *capital budgeting*. In the next chapter, the role of accounting information in capital budgeting is examined more closely.

2.3 Management accounting in strategic investments

2.3.1 Earlier research on capital budgeting

Capital budgeting has attracted a lot of interest in the management accounting literature. Nevertheless, as the 70-year history (1950s–2010s) of academic research on capital budgeting is fairly short, it is useful to begin with a brief look at the history of capital budgeting, which has been reviewed in a great detail by Haka (2006).

Even though the time-value of money has been considered in valuing future cash flows and applied to actuarial analyses and loans as early as the fourteenth century (Littleton and Yamey, 1956), it took over 300 years to reach the point where the right conditions emerged to motivate the use of discounted valuations of cash flows for investments in non-financial assets (Haka, 2006). During the industrial revolution in particular, both the number of non-owner managed firms and the size of non-financial investments increased. These major, coincident changes laid the foundation for the use of advanced investment appraisal techniques and for the capital budgeting processes that are still in use today.

According to Haka (2006), the diffusion of advanced capital budgeting techniques was very slow at first. After a solid foundation was made, larger oil and railroads companies pioneered valuation approaches for investments and capital budgeting processes in the 1920s and 1930s. From the beginning of the 1900s, it took over fifty years to create a fertile ground for sophisticated capital budgeting methods in large companies; thus until the 1950s, advanced valuation methods that recognized the time-value of money were not widely used by businesses. The

knowledge of these fine investment appraisal techniques were mainly withheld in a few hands, as they were the exclusive property of industry giants.

Like fifty years before, Haka (2006) describes the 1950s again as a decade of major changes in business conditions. For instance, practitioners began to network with each other, with consultants, and with academics (e.g., Klammer, 1972; Dean, 1954; 1951). The networking opportunities significantly impacted the opportunity for forerunners from different firms to access discounted cash flow knowledge and capital budgeting practices. Moreover, the construction of the present value table by Charles Christenson (1955), completed using one of the earliest available computers, was published as part of Anthony's (1956) landmark textbook, *Management Accounting: Text and Cases*. Thus, the technological innovation of the tables supplemented with a crisp and brief explanation for their use in Anthony's text remarkably lowered the cost of accessing the knowledge and using more sophisticated financial analysis tools.

In the 1960s and early 1970s, Haka (2006) continues, the pioneers in academic research began using field studies to examine the practices firms used to build and appraise capital budgets (e.g., Bower, 1970; Istvan, 1961). Later, as discounted cash flow concepts began to spread, academics turned toward documenting that diffusion process through survey research (cf. Graham and Harvey, 2001; Klammer et al., 1991; Pike 1983; Fremgen, 1973).

As only a few academics in the 1970s set their research focus on how people and their characteristics affected investment decisions (Haka, 2006), Bower's (1970) and King's (1975) insights are the bedrock of much of the agency theory research. Thereafter, the landmark paper by Harris et al. (1982) set the foundation for several research models that analyze agency problems caused by intra-firm resource allocations. Agency theory research assumes agents have the capacity and ability for rational economic decision-making. In addition, agency theory characterizes individual utility functions as having a desire for more economic wealth, risk aversion, and less effort. According to Harris et al.'s model (1982), a manager's concern about his own compensation and effort drive the results. Unfortunately, these agency theory-based models pose significant tractability problems (Lambert, 2001).

Sine the 1990s and early 2000s, academics have focused more on the organizational and institutional research point of view. The main argument is that in order for firms to be more successful, a competitive advantage as well as value-chain and cost driver analyses should be weighted more heavily in capital budgeting processes (e.g., Mouck, 2000; Carr and Tomkins, 1996; Shank and Govindarajan, 1992). The topic of value chain analysis has received much of its impetus due to the influence of Porter's books on competitive strategy, which draw attention to strategies for cost leadership and differentiation leadership.

More recently, according to Birnberg et al. (2006), the decision-maker-related and psychology-based research stream has focused on the assumption that decision makers have systematic cognitive representations and biases that influence decision outcomes during the investment appraisal. This type of research has its primary focus on psychology-based explanations for observed escalation of commitment to failing investments and the underweighting of opportunity costs.

Other areas with less interest from researchers include group and cultural impacts on investment decisions, as well as post-auditing of investment projects (Haka, 2006). Regarding the post-auditing of capital projects, Istvan (1961, pp. 38) commented: *"...in view of the important benefits of the post-audit claimed by both theorists and practitioners, it is surprising that all firms do not make such a study part of their capital-expenditure decision-making process."* Despite its suggested usefulness early on, post-completion auditing has nowadays received only minor attention in the empirical capital budgeting research (Huikku, 2009).

2.3.2 Capital budgeting: methods and process

In the literature of capital budgeting, one needs to realize that there are two main branches in the contemporary literature. The dominant branch has focused on investment calculations (or *methods*) and giving normative suggestions how decision makers should do capital budgeting. The challenger of the normative view emphasized the capital budgeting *process* as a more multidimensional phenomenon than decision-making based on investment appraisal. Since the capital budgeting literature first emerged in the 1950s and is continuing today, most of the studies explored and refined the theory as well as the calculations underlying the financial techniques (i.e., methods) of investment appraisal (Clancy and Collins, 2014; Haka, 2006).

However, focusing only on the net present value calculations places no role for organizational policies and processes that exist in firms. Moreover, they appear to be critical to the outcomes of company's investments. These policies and processes are inherent to firms because human agency has an essential effect on the capital investment appraisal. For instance, Bower (1970) was one of the early academic researchers focusing on capital budgeting processes. His work is a thorough documentation of the importance of the human element in organizational capital budgeting processes. Furthermore, King (1975) questioned: *"Is the emphasis of capital budgeting theory misplaced?"* His field research studies emphasized the importance of organizational and political processes rather than investment evaluation methods.

In the historical perspective, accounting has been following the scientific ideals of the natural and social sciences. It seems to be a logical choice because accounting

has made an effort in gaining status as a proper science in the academic field (Kasanen et al., 1993). However, this adoption has led to the notion of mainstream accounting research with traditional research methods, and as a consequence may be one more reason for emphasizing research on normative technically orientated capital budgeting. The literature on capital budgeting techniques has progressed over the past decade, but steps have been limited, as the focus has been mainly on the use of different payback periods and hurdle rates, as well as the use of various economic value-added methods and capital budgeting methods (Clancy and Collins, 2014).

Most of the Finnish studies and textbooks on capital investment decisions have concentrated on the techniques used for project selection, such as net present value and internal rate of return. Luukka and Collan (2015), Brunzell et al. (2015; 2013), Collan (2011), Liljeblom and Vaihekoski (2009; 2004), Collan and Liu (2003), and Collan and Långström (2002) have conducted the most recent research on capital budgeting. Brunzell et al. (2015) have summarized most of the prior Finnish capital budgeting literature as follows: *"...Honko and Virtanen (1975), Virtanen (1984) and most recently Keloharju and Puttonen (1995) have surveyed the investment evaluation criteria and planning horizon of Finnish publicly listed and non-public companies."* There are some exceptions that have addressed more generally the role of management accounting in strategic decision-making as a part of management control systems (e.g., Malmi and Brown, 2008; Tuomela, 2005). However, none of them examined the capital budgeting process. In fact, only a few Finnish researchers have made contributions directly to capital budgeting process research (e.g., Wikman, 1994; Lumijärvi, 1991).

During the last two decades, however, the inadequacies of the capital budgeting models have been increasingly brought to light, and theorists have increasingly been moving toward the view that capital investing decisions are more properly considered as an inherent part of an adaptive, contextually informed strategy than as the outcome of contextually isolated algorithmic present value calculations. This trend started to emerge already by the early 1980s. Logue (1981), for instance, argued that *traditional capital budgeting theory is inadequate for strategic investments*. Moreover, even though accounting information, such as investment calculations, is used during a capital investment decision-making process, it is not the most influential factor (Lumijärvi, 1991). On the contrary, accounting information is only third or fourth among decision-making criteria when the final investment decisions are made (Wikman, 1994).

Nevertheless, the traditional view of capital budgeting—in which rational strategic investment decision-making is (or at least should be) based mainly on investment calculations—has been predominant. Thus, based on the evident absence of emotions in the current capital budgeting literature, this thesis draws on a more holistic understanding of the strategic investment decision-making process, which

acknowledges the integral and holistic role of emotion processes and feelings of emotion. Next, we look at the various roles given to accounting information in decision-making. As we now know from the emotion research that the role of emotions in decision-making is bigger when decision makers' feeling of uncertainty is higher, the role of accounting information and how the feelings of emotion influence the use of accounting information can be better understood.

2.3.3 The roles of accounting information in decision-making

A rich stream of literature on the role of accounting information in decision-making was initiated by Burchell et al. (1980) almost 40 years ago. Their article took a wider look at the contingencies analyzed, and it has been an inspiring piece of thought for many scholars ever since, and is highly relevant even today. In their landmark paper, Burchell et al. (1980) analyzed organizational and environmental uncertainty, and more precisely *uncertainty of objectives* and *uncertainty of cause and effect*, and their implications on decision-making. The notion of uncertainty that underlies most contingency research was coined in the work of Galbraith (1973). His argument was that for an organization to perform well, it needed to address increasing uncertainty with more information. Essentially, uncertainty is a state of an organism that lacks information about whether, when, where, why, or how an event has occurred or will occur (Knight, 1921), and it indicates a gap between what is known and what needs to be known (Galbraith, 1973). However, uncertainty has also a subjective component, namely a *feeling of not knowing* (Bar-Anan et al., 2009; Smith and Washburn, 2005). Moreover, this subjective feeling of uncertainty has been suggested to intensify people's negative and positive affective reactions to ongoing events, such as a choice situation (Bar-Anan et al., 2009).

From their analyses, Burchell et al. (1980) distinguished the four different roles of accounting practice that are dependent on a number of different types of uncertainties. They conceptualized them as "machines" for *answers*, *learning*, *ammunition*, and *rationalization* (Figure 8). Thus, the authors argued that the accounting information used in decision-making is *neither neutral nor objective* as such (see also Pihlanto, 1994; Lukka, 1990), and the *way accounting information is used* does not depend solely on the uncertainty of the cause and effect in a decision-making situation, but also on the extent of agreement on objectives among the decision makers.

		Uncertainty of objectives	
		Low	*High*
Uncertainty of cause and effect	*Low*	Decision by computation: Answer machine	Decision by compromise: Ammunition machines
	High	Decision by judgment: Answer and learning machines	Decision by inspiration: Rationalization machines

Figure 8. The roles of accounting information in decision-making.

In the framework (Figure 8), there are four modes of decision-making: (1) computational, (2) judgmental, (3) compromise, and (4) inspiration. These modes were originally proposed by Thompson and Tuden (1959). First, a decision by *computation* is essentially made with different kinds of calculations. In much of capital budgeting theory, a common assumption is that this is the practice how long-term capital investment decisions are made, or at least should be made. Typical appraisal techniques used are payback time, return on investment, discounted cash flow, and the like. Second, a decision by *judgment* might involve figures and facts, but ultimately the decision comes about by considering factors that are intangible and not easily quantifiable. A third mode of decision-making is decision by *compromise*, in which the various parties negotiate their views, and they try to find a compromise. The fourth type of decision occurs in case of an impasse—decision makers do not know what to do—and the decision-making situation is finally solved by somebody utilizing an incidental event and making the decision based on *inspiration*. This conceptualization has also been used before in strategic investment studies (e.g., Butler et al., 1991).

While the subjective feeling of uncertainty plays a central role in Burchell et al.'s (1980) framework, emotions did not get much attention in management accounting (Hall, 2016; Boedker and Chua, 2013) or economics (Virlics, 2014) research, until very recently. Even though these two fields of research have otherwise contributed to the strategic decision-making literature, in these disciplines, however, there is a common belief that emotions are difficult or almost impossible to capture. At first glance, this belief might seem to be in line with common sense: How do you observe and measure emotions? As it was discussed in the earlier section, perhaps this line of thinking has more to do with the fact that the most commonly used approaches—for example in capital budgeting studies—have focused more on theoretical tenets than on empirical exploration (Alkaraan and Northcott, 2013). Although this research deserves credit on its merits, something seems to be missing from the big picture.

This thesis has theorized that the emotion processes and feelings of emotion play integral and important roles during strategic investment decision-making processes. In order to connect the accounting literature to this idea and to the research question—*What is the role of immediate feelings of emotion in strategic investment decision-making processes?*—the typology by Burchell et al. (1980) serves as the starting point in the domain of management accounting in general, and of capital budgeting in particular. While this typology described *how* decision makers tend to use accounting information in different types of decision-making situations, the emotion processes and feelings of emotion offer a *plausible way* of explaining *why* the decision makers behave as they do. Indeed, emotion theory (Bar-Anan et al., 2009) suggests that the *feeling of uncertainty* functions as an amplifier and evokes decision makers' emotion processes and *other feelings of emotion*. As a result, the decision makers' emotion processes try to make sense of bodily signals and produce intuitive feelings of emotion related to that situation. Therefore, the perception of, and thus also the use of, accounting information is affected by the *subjective* feeling of uncertainty and other feelings of emotion that a decision maker has in a particular decision-making situation.

As accounting information renders some issues visible, the association of accounting with rational choice has been pervasive (Mouritsen, 1994). However, it is suggested here that while looking back on the capital budgeting literature so far, the "pink elephant in the room" (i.e., something very obvious, one cannot miss it, yet no one wants to be the person to point it out or talk about it) has been the emotion processes and feelings of emotion. Finally, these will be added to the theoretical framework of capital budgeting. Hence, *this thesis problematizes the prevalent assumption* (see Alvesson and Sandberg, 2013) in the capital budgeting literature, one of rational decision-making, in which emotions are often seen as the antithesis of rationality.

Drawing on the literature reviews of emotions in decision-making, strategic decision-making, and capital budgeting, this thesis argues that emotion processes and feelings of emotion play a key role in the complex context of strategic investment decision-making. As decision makers engage in the selection of alternatives and address uncertainties proposed in the framework of Burchell et al. (1980), emotion processes and feelings of emotion occur more often and more intensely in the presence of high uncertainty (see Figure 9), big changes, and when the stakes are relatively high (Damasio, 2006/1994). As a consequence, rather than being the antithesis of rationality, emotions are proposed to be the *enablers, or perhaps even antecedents, of rational decision-makin*g when there is a lack of (accounting) information or when the available, oftentimes scattered and sparse, information needs to be closely evaluated, and strategic decisions needs to be made without certain investment calculations.

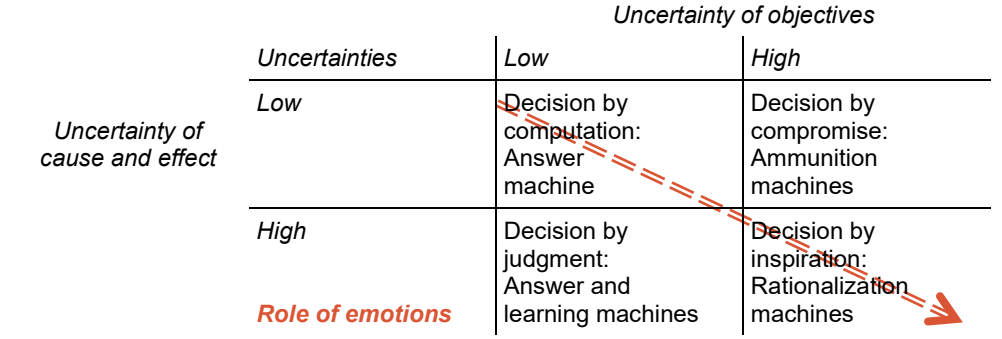

Figure 9. Use of accounting information in relation to the role of emotions (adapted from Burchell et al., 1980).

2.4 Theoretical framework for empirical analysis

This case study starts with ideas based on theory. Drawing on the analysis of the case study, these theoretical ideas may be improved and refined. This approach has been the guiding principle of this case study on strategic investment decision-making practice, as the relevant literature was reviewed. The key conceptual tools—feelings of emotion and emotion processes, the strategic investment decision-making process with its two key components of rational planning and incremental learning, and the four types of accounting information use—were identified and defined, and the theoretical framework around these concepts for empirical analysis can be now depicted. Despite emotions having been defined in various ways in different studies, their theoretical ideas about the role of emotions (e.g., Pfister and Böhm, 2008) and how they affect strategic decision-making (e.g., Neumann, 2017) can be used as a basis for the empirical analysis.

In the popular paradigm, economic models of decision-making and choice behavior have been often studied by mathematizing and simplifying the subjects. The underlying assumption is that as people choose between known alternatives, they assess the desirability and likelihood of their consequences, and appraise this information with some type of calculus based on expectations. However, this approach has been challenged, as various studies have proposed a number of roles and effects of emotions during strategic decision-making. These theoretical ideas from the literature review in Chapter 2 are recapped in Table 2.

Table 2. Summary of the main theoretical ideas from the literature review.

no	*Theoretical ideas*	*Authors*
1	**Section 1.1:** Emotions have an *integral* and *holistic* role in every decision made. While making decisions, emotions are proposed as the *main driver* of cognitive reasoning. They affect decision-making, partly unconsciously, whether we want it to or not.	e.g., Nofsinger, 2017 Lerner et al., 2015 Virlics, 2014 Zadra and Clore, 2011 Naqvi et al., 2006
2	**Section 1.1:** Emotions have been proposed to be one of the most important underlying mechanisms for *expert judgment*, *tacit knowledge* and *intuition*.	Harris, 2014 Puusa and Eerikäinen, 2010 Dane and Pratt, 2007
3	**Section 1.1:** During the strategic decision-making, emotions are proposed to occur more often and to be more intense, since the presence of *high risks* and *uncertainty*, as well as potential for *various changes*, evoke emotions among decision makers.	Neumann, 2017 Li et al., 2014
4	**Section 2.1:** According to Ellsworth (1994), the actual claim of William James suggests that sensation of bodily changes is a *necessary condition* of emotion. The sense of bodily changes produce emotionality to what would otherwise be a neutral interpretation or perception of the particular situation. Thus, emotion processes and feelings of emotion also affect the decision makers' interpretation and perception of a strategic decision-making situation.	Ellsworth, 1994
5	**Section 2.1.2:** Emotion processes and feelings of emotion are among the *key neurological, physiological, and biological mechanisms* through which emotions automatically affect decision-making. They are crucial for learning, and thus for rational decision-making. Prior experiences and emotional results stored in memory affect rational planning.	Damasio, 2010 Bechara et al., 1997 Damasio, 2006/1994
6	**Section 2.1.3:** Regardless of the contemporary understanding of emotions, they are still often seen by many as *irrational* and *distorting* reasoning, or they are considered only as outcomes of the decision-making process and affecting only expected utility.	e.g., Peterson, 2007 Shefrin, 2002
7	**Section 2.1.3:** The *risk-as-feelings hypothesis* makes an explicit distinction between expected future emotions and immediately experienced emotions. This, the so-called Loewenstein-Lerner classification, proposes emotions as an *immediate factor* in decision-making processes.	Loewenstein et al., 2001

Table 2. Summary of the main theoretical ideas from the literature review [continued].

no	*Theoretical ideas*	*Authors*
8	**Section 2.1.3:** The contemporary neurobiological and psychological data favors multiple decision systems. This is mostly attributable to the advent of the neurological basis of decision-making, which involves a number of inputs such as *past experience*, *diverse sensory inputs*, the *anticipation of future goals*, and *sensory* and *emotional responses*.	Puusa and Eerikäinen, 2010 Gutnik et al., 2006
9	**Section 2.1.3:** Theoretical arguments in several research fields have moved away from the classical perspectives of decision-making towards a more *holistic understanding*, in which *psychological factors* and *subjectivity* in human behavior are given a more central role.	Gutnik et al., 2006
10	**Section 2.1.3:** It has been proposed that rather than simply affecting decision-making, emotions are considered to have an *integral role* in decision-making. The widely applied framework proposes four roles that emotions play in decision-making: (1) *provide information*, (2) *improve speed*, (3) *assess relevance*, and (4) *enhance commitment*.	Pfister and Böhm, 2008
12	**Section 2.1.3:** The research on the effects of emotions on strategic decision-making proposes that while participating in *planning* and *problem solving*, positive emotions of a decision maker are often increased as a result of perceived change. In contrast, for instance, *time pressure* amplifies the negative emotions following the perception of change.	Neumann (2017)
13	**Section 2.1.3:** Positive emotions in the decision-making situation are proposed to promote *innovative* and *creative thinking*, and negative emotions have the opposite effect. Furthermore, decision makers' emotions have an effect on their *information processing*. With positive emotions, decision makers are typically acting in a more *intuitive* and *flexible way* (i.e., heuristic processing); while with negative emotions decision makers are categorizing stimuli and events in a more *systematic* and *effortful manner* (i.e., substantive processing). Thus, emotions affect the use of accounting information.	Neumann (2017)
11	**Section 2.1.3:** Some researchers propose that a decision maker *does not need to even realize* that emotions play a role, and yet they have a significant effect. It has been proposed that feelings as such inherently foster decision-making (i.e., *feeling-as-decision facilitator*), without regard what people do about those feelings (i.e., *feeling-as-bias-inducer*). The mostly automated and partly unconscious nature of emotion processes makes this view more understandable and rather plausible.	e.g., Damasio, 2010 Seo and Barrett, 2007

The main theoretical ideas regarding the roles and effects of emotions during strategic decision-making were explicated in Table 2. As a result, the theoretical framework for analyzing the empirical materials draws on the above-mentioned theoretical ideas and key emotion concepts (i.e., emotion processes and feelings of emotion), as well as on the broader perspective on the strategic investment decision-making process (see Figure 7) with its key components (i.e., rational planning and incremental learning) that were discussed in detail and depicted in Chapter 2. Therefore, the empirical analysis focuses on the role of feelings of emotion in strategic investment decision-making (or SID) processes, as well as their influence on the use of accounting information, while making strategic investment decisions. Everything included in the theoretical framework of this thesis is based on the literature review of relevant doctrines compiled in Chapter 2. The main concepts and the focus of empirical analysis are summarized in Table 3.

Table 3. The focus of empirical analysis.

Strategic investment decision-making (SID) process		
Phase 1	Phase 2	Phase 3
Problem identification: what and why	Alternative creation: looking for various options	Valuation and selection: making a decision
Feelings of emotion (FoE) are examined throughout the different phases of SID as an integral part of a holistic view of the SID process that involves *rational planning* and *incremental learning*.		
The analysis focuses on the roles of FoE in SID processes and their influence on decision makers' *use of accounting information*. The ideas in the prior literature are used as the basis of analysis.		

The summary of the theoretical framework (Figure 10) depicts how the theoretical ideas (Table 2) *broaden our understanding* of what we are actually looking at, while we are observing emotions in strategic investment decision-making practice, and how these new theoretical lenses *enable new interpretations* of what we are "seeing". For instance, as we now understand that emotions are an integral part of every decision made and decision makers can describe their feelings of emotion with words, we can "see" emotions in people's speech and actions.

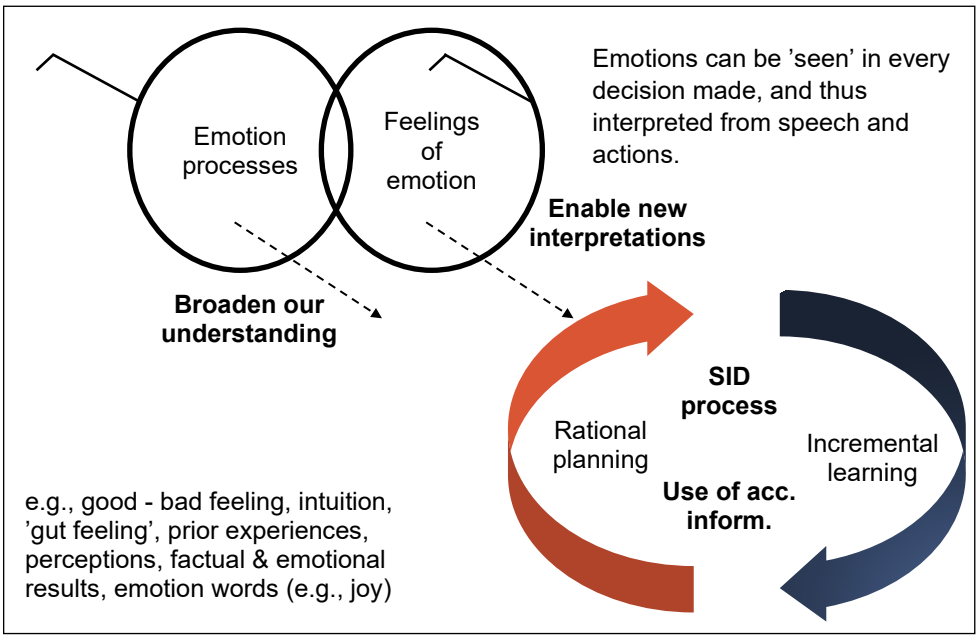

Figure 10. Summary of the theoretical framework.

3 Collection of Empirical Materials and Their Analysis

Regardless of the contemporary, more comprehensive understanding of emotions in strategic decision-making, current beliefs and the predominant view in the capital budgeting literature is based on the principle that emotions should have no role in or effect on investment decision-making. In order to better understand this mismatch, it is proposed here that we researchers need to go among practitioners to explore the roots of this vivid phenomenon called feelings of emotion and interact with decision makers who possess their own feelings of emotion and experience them within their unique circumstances and contexts. By utilizing emotion theory, this study makes an attempt to explore and understand strategic investment decision-making practice emerging in companies.

Therefore, an *explorative* and *interpretive* research methodology (see Lukka, 2005; Scapens, 2004; 1990) was adopted, more specifically through carrying out a case study on the *practice of strategic investment decision-making*. It is a qualitative study method that allows exploring and describing the essence of the phenomenon in its natural context using a variety of data sources. The idea behind this approach is to *focus on a specific phenomenon* that is studied by using several *individuals as instruments* for the investigation. As the purpose of this study was to develop a better understanding through the development of a new theoretical framework, this study explores, clarifies, and explains to the dynamics of feelings of emotion in the strategic investment decision-making process.

Access to the field was established through a technology seller (Vossi Group Oy), which provides a wide selection of advanced manufacturing machinery, such as a potentially disruptive technology of industrial-scale metal 3D printing. As advanced manufacturing technologies are regarded as one typical form of strategic investment, and because the technology seller was able to provide an interesting access into the strategic investment decision-making processes of their B2B customer companies, as well as access to its technology provider (SLM Solutions Group AG), the empirical choice was well-grounded.

3.1 Empirical materials

In the context of four strategic investment decision-making (or SID) processes, this study explores how actions of top decision makers are guided, or respectively disrupted, by their feelings of emotion (i.e., role), and how they influence the use of investment appraisal techniques and other relevant accounting information. In addition, before interviewing these top decision makers, one top manager from the technology seller and the technology provider was interviewed in order to gain better understanding of the industry and a wider angle for triangulation. This study follows Alvesson and Sandberg (2013, pp. 145), who proposed the use of the term "empirical material" instead of the term "data". All material collection was purposefully made during ongoing strategic investment decision-making processes in *Finnish-based B2B companies* (Wärtsilä Oyj, HT Laser Oy, 3DStep Oy, and Novela Oy/Delva Oy), as well as in the leading metal 3D printing technology seller in Finland (Vossi Group Oy), and in one of the biggest metal 3D printing technology providers worldwide (SLM Solutions Group AG).

The most common sampling strategy, *purposeful sampling*, was used to satisfy the saturation criterion (Creswell, 1998). In the context of the industrial metal 3D printing industry, complex strategic investments with a *lot of uncertainty* are likely to be found. Furthermore, the industry is still rather small (Larsen, 2019), and the current sample includes most of the key players in Finland. Thus, it is assumed that even though the sample is relatively small, it is likely to be as good as any other sample, given the emerging state of the 3D printing industry. In addition, a *triangulation of methods approach* was adopted, and the empirical material was collected using three methods: (1) cross-sectional qualitative interviews, (2) research questionnaires, and (3) field observations. While the empirical analysis is mainly based on in-depth interviews, supplementary observations and questionnaires were helpful for validating the accounts of top decision makers. As a consequence, various empirical materials gathered by multiple methods offers a solid starting-point for interpretation. Next, each method is described in more detail.

3.1.1 Field observations

In the first phase, the researcher got an invitation to a two-day business meeting, in which the researcher was attending a real-life business negotiation considering a strategic investment project between the seller and a buyer of advanced manufacturing technology. The idea of this empirical material collection phase was to gain a first-hand understanding and insights into decision makers' actions by applying an ethnographic method of *observation*. While the first day was an informal pre-meeting in a more relaxed setting (i.e., dinner in a restaurant between the technology seller and a B2B customer), the second day included a factory visit to the

headquarters of the technology provider and formal negotiations between the seller, the provider, and the B2B customer.

During the business negotiation, it was possible to observe, without further intervention, decision makers who were engaged in cognitive reasoning and at least in the pre-selection of alternatives, particularly under a perceived opportunity or threat. Thus, the researcher was able to talk with the people involved in the SID process as well as to follow an interesting phase of this SID process rather closely without explicitly exposing the aim of the study.

Observations were documented by making field notes during the business meeting between the B2B customer, the technology seller, and the technology provider, as well as during the questionnaires and interviews. In general, the above-mentioned observations and other complementary observations (see Appendix 3) remained in a slightly smaller role than it was initially thought, since other B2B customers were hesitant to grant access to sensitive strategic negotiations. Nevertheless, as the method was applied with an understanding of current emotion theory while interacting with the decision makers, it validated their positive general feelings of emotion also found in the questionnaires and interviews.

3.1.2 Research questionnaires

As the advanced manufacturing technologies are considered to be strategic investments, the stakes of decision makers in the B2B customer companies were likely to be high. Moreover, in the context of strategic decision-making, feelings of emotion are assumed to occur more often and to be more intense, since high risks and uncertainty, as well as organizational change, invoke feelings of emotion among decision makers. In the second phase, the decision makers (n = 6) in all B2B customer companies were probed with a short *research questionnaire* that was conducted within the research interviews scheduled to be held during ongoing real-life investment projects between the B2B customers and the technology seller (i.e., the buyers and seller of advanced manufacturing technology). A short research questionnaire was made in *oral form* and *recorded*, as decision makers preferred that instead of in written form.

As the questionnaires were provided while the decision makers were engaged in the ongoing SID processes, and the duration of the questionnaire was relatively short (approx. 10 to 15 minutes), decision makers were automatically giving their current "right now" perception of their *general feelings of emotion* (i.e., positive, negative, or neutral) about the strategic investment project. This setting inherently overcomes two typical problems: (1) the resulting feelings are likely to be mild due to the conventional laboratory setting, and (2) the emotional state is prone to change during

lengthy questionnaires. The questionnaire includes *four questions*, structured as follows:

1. Give your general appraisal of the investment project by using a scale from 1 to 5, in which 1 is strongly negative, 2 is mildly negative, 3 is neutral, 4 is mildly positive, and 5 is strongly positive.
2. Briefly describe the aspects underlying your general appraisal of this investment project.
3. Give your general appraisal of the most important, similar, or corresponding previous investment project by using the same scale as before (1–5).
4. Briefly describe the aspects underlying your general appraisal of the previous investment project.

On that account, the questionnaire uses a *two-points-in-time method* to amplify and validate the current emotional state. This is why the questionnaire also included the general appraisal and descriptive tasks for the most important, similar, or corresponding previous investment project. As a consequence, the construct of this questionnaire uses both the "remembered moments" and "current moment" methods to assess the core affect and is derived from the *circumplex model of emotion* (Yik et al., 2011), including two dimensions: (1) *positive* and *negative* (i.e., valence), and (2) *strong* and *mild* (i.e., arousal).

Since emotions are a touchy topic for many, as oftentimes emotions are considered unprofessional or irrational, particularly in practice, the circumplex model (see Yik et al., 2011) was not used as such. Rather a more neutral and simple, two-dimensional model was developed for probing the valence and arousal aspects. The research questionnaire probes decision makers with two appraisal tasks, in which they are asked to give their general appraisal of the current and the most important, similar, or corresponding previous investment project by using the same scale from 1 to 5. However, even if it is not a direct measure of "emotion" or "mood", it is relevant, since the core affect is a key ingredient in both. According to Yik et al. (2011), the core affect is considered to be always present, even though its salience in consciousness varies. It is assumed to be always accessible as people can tell, whenever asked, how they feel.

In order to better comprehend the structure of the questionnaire and the logic behind how it was built, it is necessary to understand how memory works. According to Damasio (2010), memory stores many kinds of things, from *past experiences* to *imaginations about the future*, by combining various aspects in a given situation (see incidental emotions). Instead of recording everything around and inside a person like an autobiographical movie, the memory is far more sophisticated and economical,

as it stores only the conjunctions of combined aspects, and then it links them to previous memories that are similar or corresponding. Every time that something is recalled from memory, it is reconstructed out of these conjunctions. However, this type of circuitry in the memory is obviously prone to error and deviations.

Regarding the types of information recorded in the memory, Damasio (2010) suggests that it is relatively easy to comprehend what kind of memories build up past experiences. On the other hand, a more counterintuitive type of information stored in memory is imaginations of the future, which are narratives about us to ourselves concerning the future (i.e., what it may be, what we would like to have, and what we should avoid). Moreover, often the things that are driving decisions are pains and pleasures that have never occurred (see integral emotions), but could occur. These are also part of a decision maker's constant planning process. Most importantly, memory is not only recording the *factual outcomes* of our past decisions, but also the *emotional result* of that decision (i.e., what we felt at the time of the decision). From this perspective, Damasio (2010) concludes, wisdom cultivates knowledge of how emotions behaved and what was learned from them in the process. In the process of recalling memories, this *tandem of factual and emotional results is critical*, and thus it is employed to better capture current feelings of emotion.

As we learned in Chapter 2 (pp. 28), the core affect is a key part of emotion, and it is reasonable to think that for the purpose of this study it gives a close-enough approximation of how people are feeling their emotions. Furthermore, decision makers were asked to briefly describe aspects underlying their general appraisal of these two investment projects. In this manner, decision makers were reporting how they were feeling and making sense of their feelings during SID processes.

3.1.3 Cross-sectional qualitative interviews

In the third and last phase, the *cross-sectional qualitative interviews* were conducted with the B2B customers. Based on the literature review, a semi-structured interview guide was developed; and it was first tested and validated in *two pilot interviews.* (See Appendix 1 for the semi-structured interview guide.) The empirical materials were collected with qualitative in-depth interviews that were conducted regarding the schedules of the decision makers during the SID processes. All interviews were conducted in-person at the premises of the B2B customers, and they were recorded by digital audio recorder. These interviews examined what kind of feelings of emotion or related emotional states (e.g., intuition) decision makers reported during the SID processes, how they experienced feelings of emotion influencing their own behavior and the behavior of the other decision makers, and what kind of investment appraisal techniques and other information were being used in the SID processes.

First, decision makers were asked to describe their understanding of strategic investments and the SID process in general. As they described their view of the SID process, they were asked to elaborate on interesting and relevant avenues with follow-up questions, such as "Why did this happen?" and "How did you feel at this point?" Then they were prompted to describe the use of investment appraisal techniques as well as the use of accounting information and other relevant information. Finally, they were probed directly and indirectly about their experiences of emotional states during the SID processes.

Combining these three methods provided rich and extensive empirical material for further analysis and interpretation. Moreover, empirical findings can then be contrasted to the theoretical framework put together earlier in this thesis, thus also answering the increasing call to examine the strategic investment decisions by case or fieldwork (Emmanuel et al., 2010). In the next section, the methods of analysis of this study are discussed.

3.2 Methods of analysis

The empirical materials can be analyzed in several ways. However, the main idea of analyzing is to put the empirical materials into a meaningful order in view of the research question by summarizing it, clarifying it, and putting it into categories through the process of sorting, sifting, and writing (Fisher and Buglear, 2010). In this study, the main methods of analysis were: (1) *interpretive analysis* and (2) *thematic analysis*, which are somewhat intertwined. While analyzing the empirical materials, the underlying themes, meanings, and perceptions of the decision makers have been explored and unveiled by looking at the empirical materials and asking the questions *what?* and *how?* (Bryman, 2004). As several materials are used and combined, the level of analysis can vary. Thus, the variety of the level can range from meticulous scrutiny to conceptualizations of large entities. However, in this thesis, the level of analysis is focused on individual top managers.

During the research process, the researcher has had frequent guidance discussions with his supervisors about the different phases of the study, such as the research plan, the collection of empirical materials, and their analysis. While some differing views existed, the discussions with senior researchers have been a good way to reflect and refine the research process in such a manner that the different phases are coherent, and to ensure the conformity to proper analytical methods as well as trustworthiness of the analysis. Another important way of doing this self-reflection has been a research diary (i.e., memos of the guidance meetings) during the research work. In the research diary, thoughts, considerations, ideas, and helpful comments from the supervisors have been written down, particularly when working with the research plan and design, material collection, structure of the thesis, and

modes of analysis. In addition, the researcher has consulted a senior researcher in the field of emotions studies, who has been able to give insightful advice regarding the various streams of emotions research and how to construct and analyze a valid quantitative measure for feelings of emotion.

3.2.1 Combining various empirical materials and methods of analysis

Regardless of the source of the empirical materials, careful analysis is the most important part of the qualitative research (Silverman, 2013; Eriksson and Kovalainen, 2008). The empirical part of the thesis is drawn on a combination of methods for material collection, as well as interpretative and thematic analysis. In studies focusing on written text, Peräkylä and Ruusuvuori (2011) point out that even though an informal and creatively emerging approach may in many cases be the best method of analysis, it can be beneficial to utilize one or several somewhat predefined analytical procedures.

It is possible to gain several advantages by combining various methods and materials together. First, with distinct empirical materials and methods of analysis, different kinds of information are produced as different points of view are revealed. Second, not only the scope, but also the depth and diversity of the studied phenomena can be achieved by combining various materials. This may provide new insights into the discussion. Third, linking several materials and methods also yields the means for triangulation.

Therefore, distinct empirical materials were used in this study, and each of them played somewhat different role in the findings part of the thesis. As a result, the observations served primarily a validation purpose as the researcher employed direct involvement inside a strategic investment decision-making (SID) process. This equipped the researcher with first-hand knowledge about the top managers' strategic decision-making practice. On the other hand, the questionnaires were mainly used to measure the top managers' current emotional states during the ongoing strategic investment decision-making processes. Finally, the interviews of top managers provided in-depth accounts, which play a material role in the findings of the study as they depict the various feelings of emotion and their roles in strategic investment decision-making processes. In addition, the in-depth accounts also illustrate how emotion processes and feelings of emotion influence the use of accounting information. Thus, in this thesis, several empirical materials and methods of analysis were utilized to better capture complex phenomena of feelings of emotion in strategic investment decisions, and to ensure distinct aspects of the study. This is shown in Table 4.

Table 4. Combination of empirical materials and methods of analysis.

No	*Empirical material type*	*Collection period*	*Analysis method(s)*	*Role of empirical materials*
I	Observations	9/2018	Interpretive analysis	Researcher's own first-hand validation
II	Questionnaires	9-12/2018	Quantitative and interpretive analysis	Self-assesment of manager's emotional state
III	Interviews	6/2016, 9-12/2018	Interpretive and thematic analysis	Depictions of FoE in SID processes

As discussed in the previous section, the empirical materials comprise observations, questionnaires and interviews. Table 4 shows how these empirical materials are combined with the different analytical methods. The observations and interviews were interpretively analyzed by using the theoretical framework developed in Chapter 2, which also provided the main topics for the thematic analysis. On the other hand, some minor topics arose from the interviews. Overall, the focus was on the immediate feelings of emotion that were experienced during the strategic investment decision-making process (see Damasio, 2010; Loewenstein et al., 2001). Thus, the issues and themes that were examined were to some extent predefined, and they are based on a pre-given theoretical interest, as well as they are partially deductions of prior studies. For this reason, the thematic analyses based mainly on cross-sectional interviews may appear to be rather "thinly" described, and sometimes abstract in nature, compared to intensive case studies.

The analysis of questionnaires examines decision makers' answers about their feelings of emotion in terms of a general appraisal of particular ongoing and previous investment projects, and aspects underlying the reported positive, negative, or neutral feelings. It is a typical and fairly simple, quantitative Likert-scale (e.g., Fisher and Buglear, 2010) type of measure that gives a simple numerical value for describing the emotional state (i.e., 1 = strongly negative, 2 = mildly negative, 3 = neutral, 4 = mildly positive, 5 = strongly positive) of the decision maker regarding the strategic investment project. As discussed earlier in this chapter, this gives a close-enough approximation of how the top decision makers are feeling their emotions during the SID processes. Thus, it is considered that this quantitative method of analysis needs no further introduction. As the questionnaires were conducted orally during the research interviews, and the decision makers described the underlying aspects of their general appraisals, it is possible to supplement the quantitative analysis with further interpretive analysis. In the next section, the interpretive analysis and the thematic analysis methods are presented.

3.2.2 Interpretive analysis

After the collection of empirical material, the aim is to offer insights into how a person, in a particular context, makes sense of his/her experiences of emotional states and experiences. In order to understand the decision makers' aggregate perceptions of emotional states, the analysis of empirical materials follows the *interpretive research approach* chosen for this study. It is a qualitative method with an idiographic focus on subjective perceptions of given persons. Flexibility, critical self-reflection, and challenging skepticism are needed during the *interpretative analysis* phase. To address the research question, the theoretical framework of this thesis and the key emotion concepts (i.e., emotion processes and feelings of emotion) were utilized as conceptual tools to explore and describe the experienced emotional states of decision makers during the SID processes.

In this study, feelings of emotion were interpreted and identified from the transcripts and field notes with the help of the new theoretical framework developed in Chapter 2. It provided the necessary method theory—broader understanding and conceptual lenses (e.g., good – bad feelings, intuition, "gut feeling", prior experiences, subjective perceptions, factual and emotional results, and emotion words such as feelings of joy, fear, excitement, frustration, trust, uncertainty, comfort, and anxiety), which enabled new interpretations from the empirical materials regarding strategic investment decision-making practice. With this broader understanding of how emotion processes are an integral part of every decision made, and how decision makers can describe their feelings of emotion, we can "see" emotions in the speech and actions of decision makers. Thus, with this new theoretical framework that comprises the key emotion concepts and their relations to the emotion processes in decision-making, it was possible to interpret emotions from the empirical materials during the Nvivo analysis process. This approach provided the framework of words and actions that were systematically tracked by identifying emotion-related situations (e.g., incremental learning, feelings of emotion during SID processes, uncertainties that evoke emotion processes), and it allowed the capture of feelings of emotion (e.g., talks about positive and negative feelings, previous experiences as a part of emotional states, intuition, emotional results stored in the memory that are guiding immediate feelings of emotion, and particular feelings such as excitement, joy, fear, etc., that were explicitly reported by the decision makers).

In addition, while probing the decision makers' subjective experiences, 27 emotion categories (Appendix 2) from the framework by Cowen and Keltner (2017) have been applied as a *supplementary tool for analyzing the emotion-related language* used by decision makers. While examining one of the richest arrays of self-reported emotional experiences studied to date, Cowen and Keltner (2017) were able to capture categories of emotion by using statistical methods, and to develop a

conceptual framework to analyze self-reported emotional states. Contrary to discrete emotion theories, however, many of these emotion categories were linked by smooth gradients, such as from anxiety to fear to horror to disgust. Hence, this stance could be seen as a subtle hybrid of the categorical and the dimensional views on emotions, which is not ruling out either of them but rather using both. Consistent with recent findings, suggesting that *"emotions are centered in subjective experiences that people represent, in part, with hundreds, if not thousands, of semantic terms"* (Cowen and Keltner, 2017; pp. 1), emotion words in talks were also identified with the help of these 27 emotion categories, such as anxiety and excitement. Next, the adopted *interpretive analysis process* (see Elliot and Timulak, 2005) is described in more detail.

The first phase was the *preparation of empirical material*. The materials from the interview recordings of the B2B customers were transcribed verbatim, and materials from the observational notes were summarized in memos. During the initial reading of empirical materials, some initial editing of the materials took place. For instance, obvious repetitions, redundancies, and unimportant things were omitted. Naturally, it has been ensured that the deleted data is backed up and that it does not constitute any relevant and important aspects of the phenomenon. After the transcripts were finalized, *they were sent to the interviewees for proofreading*, and all them acknowledged that they had read and checked the transcripts for errors in substance.

The second phase comprised the *processing of meaning units*. The empirical materials were divided into distinctive meaning units that typically would communicate enough information to convey a bit of meaning to the reader. After the meaning units had been recognized, they were delineated or shortened by removing redundancies that did not change the meaning. The meaning units are the basic component of information with which the analysis is done.

The third phase was about *structuring the data*. Various sets of meaning units that represent different aspects of the phenomenon were organized under broader domains (or themes). The basic structure for analyzing derives from the interview guide, which is based on the previous theoretical understanding, and from interesting patterns emerging from the empirical data. In this phase, the framework was still kept rather flexible; and it was critically tested during the analyzing phase in order to organize the data meaningfully until it fit the overall theoretical framework of the study.

The fourth phase involved *generating categories*. Previously organized meaning units were categorized (or coded) within the domains (themes) they belong to. The idea in this phase was to find recognizable similarities or regularities in the empirical materials. This was an interpretive process, in which the researcher was trying to identify category labels used in the original language of interviewees and used in

previous studies. This could be described as a dialogue with the empirical materials. It is typical that the categories are refined as similar meaning units converge during the analysis. As a consequence, the meaning units are compared. An important aspect of this phase is to sketch the relationships between the categories.

The fifth phase was one of *abstracting the key findings*. The whole phenomenon was described and interpreted as it was comprised in the empirical materials. The aim of the analysis was to depict the essence of the phenomenon in the simplest possible way following the rule of essential sufficiency, so that it is clearly communicated to the reader. In this part of the analysis, it is typical to employ tables, figures, graphs, and diagrams.

The sixth phase contained the *validation of the analysis*. It was important to assess the validity of the analysis throughout the research process. This process is based on the critical independence of a constructively skeptical researcher and a careful internal reviewing throughout the study. The following validation strategies were used: (a) triangulation of data from multiple sources and different methods, (b) validation by interviewees as they had a chance to read and make comments on their interview transcripts, and (c) resonance with the reader as the findings are illustrated with examples, so readers are able to make their own conclusions.

3.2.3 Thematic analysis

The other approach used was a thematic analysis that intertwined with the interpretive analysis phase. However, there are several ways of doing thematic analysis depending on the approach they are based on, such as grounded theory, phenomenology, or applied thematic analysis (Fisher and Buglear, 2010). First, *grounded theory* emphasizes identifying the themes purely in an inductive manner from qualitative empirics that represents, for instance, *cultural actions*, such as behavior and beliefs, of a particular group of people in real-life situations (i.e., building a theory from the ground up). Second, *phenomenology* aspires to understand the *cognitive meanings* that individuals give to their social reality and lived experiences; and for that reason, theming typically involves at least some type of deductive and psychological undertone. Third and finally, *applied thematic analysis* seeks to take advantage of both the above-mentioned interpretive approaches; but it also combines some elements from the positivistic methodology by focusing more on measurement than on meanings, and by presenting more numbers instead of narratives.

Therefore, in this section, the specific features of the thematic analysis process of this study are highlighted. Thematic analysis does not need to stand on a single epistemic position, but rather it can span both constructivist and realist approaches (see also Kakkuri-Knuuttila et al., 2008). In this study, feelings of emotion are

considered to be *observable in the language* used by decision makers as well as they exist in the realm of socially constructed personal experience. Thus, feelings of emotion have both individual and social meaning, and they can be observed in real-life situations and expressed afterwards with words, for example by referring to the categories of emotional states.

In this kind of setting, the *phenomenological theme analysis* is a logical choice. This research tradition was started by the father of phenomenology, Edmund Husserl, and was followed by several other philosophers, including Martin Heidegger and Jean-Paul Sartre. Unlike the positivist or Cartesian tradition of research, the interpretivist or constructivist tradition do not see just one reality that is something "out there", but rather there are multiple realities that are socially constructed in their social, historical, and cultural contexts (Laverty, 2003). This simply indicates that different people can perceive and interpret, or construct, their own realities in various ways (i.e., your world may look different than mine). Paramount and the object of the study in phenomenological theme analysis are individuals' lived experiences, perceptions, and feelings, as its roots lie in humanistic psychology (e.g., Giorgi, 2009; Wertz, 2005).

The practical process of thematic analysis was the following. The empirical materials from the cross-sectional interviews of the B2B customer companies were transcribed by hand using typical word processing software side-by-side with a digital audio player with audio controls (for pausing, and skipping back and forth), and open-coded using NVivo software. The transcription process can be seen as an essential phase for developing an in-depth understanding of empirical materials. It requires a research discipline to transcribe an interview. As the interviews are properly listened to, a 60-minute interview took around 8-10 hours to transcribe. This intensive comprehension of the empirical materials means that the researcher needs to engage in elements of well-founded and valid research while applying a level of rigor to his/her work.

NVivo enables the coding of a large amount of empirical material into various codes called nodes, and it is particularly designed for qualitative analysis. The first step is to form the theoretically derived nodes for categorizing the empirical materials. In the next step, in order to analyze materials further, the theoretical framework that framed the study was connected to the nodes formed in the first step. While analyzing and thematically classifying the empirical materials, new topics also emerged. During the thematic analysis process, the interview transcripts were read several times and different codes were applied to the text, highlighting the topics that arose from the empirical materials.

Thus, the codes and themes were mostly theoretically driven. For instance, coding categories—such as positive and negative feelings of emotion, immediate emotions, 27 emotion categories, and intuition—were drawn from the constructs

identified in the literature. However, some interesting minor topics (e.g., co-creation, collaborative strategic investments, building an ecosystem, and changing the mindset on the company level) emerged empirically from the observations, questionnaires, and interviews. As a result, the characterizing field notes from the observations, as well as the results of questionnaires and common statements from the interviews, were identified and used as the basis for a set of coding categories. Thereafter, the categories were refined and consolidated. As the empirical materials were analyzed and as tentative conclusions started to emerge, disconfirming evidence was explicitly sought to critically test the validity of the findings.

Finally, the last step concentrated on the relationships between the themes and how they are connected with the theoretical framework of this study, which lead to combining the themes into more coherent categories following the theoretical framework. In the following main chapter, *4 Empirical results*, the key findings and evidence from the empirical materials are illustrated with descriptions and direct quotes from the interviews, questionnaires, and field observation notes. It presents a qualitative conclusion arrived at through analyzing and categorizing the findings and drawing on the importance, consistency, and clarity of supporting materials and the possible existence of any disconfirming materials. Next, concluding this chapter, the practical process of thematic analysis is summarized in Table 5, and the possible limitations of the empirical study are discussed.

Table 5. The practical process of thematic analysis.

No	***Analytical steps***	***Description of the main tasks***
I	Iterative review	Interview audio files and transcripts were repeatedly listened to and re-read.
II	Design analysis	Key empirical materials were extracted from the interview transcripts.
III	Design synthesis	Empirical evidence were moved, grouped and sorted into several themes.

3.3 Limitations of the empirical study

The limitations of the study due to possible issues of the interviewees' ex-post rationalization in general—and of studying emotions through an interpretive methodology in particular (i.e., not measuring and studying emotions per se but rather perceptions of them)—are acknowledged. Another methodological risk is that some important part of emotions might not be captured accurately. For instance, decision makers may try to hide their feelings of emotion or to avoid admitting them.

In addition, it is recognized that there is a large field in psychology research in which emotions are studied employing predominantly rather "positivistic" approaches and methods. Therefore, the methodology of this thesis should be seen as a complement rather than substitute for traditional approaches. Thus, it is positioned to be more subjective and interpretive in relation to mainstream approaches.

4 Empirical Results

4.1 Description of companies participating in the study

For the purpose of giving some background on the participating companies and the interviewees' accounts on strategic investments, the companies and their situations at the time interviews were conducted are briefly described. This research was mainly based on cross-sectional interviews with the following companies: Novela Oy (the name changed to Delva Oy), 3DStep Oy, HT Laser Oy, Wärtsilä Oyj, Vossi Group Oy, and SLM Solutions Group AG. The first four above-mentioned companies are the B2B customer companies of Vossi Group Oy. These firms represent various types of organizations at different stages of their business life cycle—from an established big public company to an emerging small startup company. Moreover, these B2B customer companies are among the first Finnish businesses to adopt the new advanced manufacturing technology of industrial metal 3D printing, and they cover a prominent portion of the current empirical field in Finland.

The latter two companies also had an important role, as Vossi Group Oy is one of the main advanced manufacturing technology sellers in Finland, and SLM Solution Group AG is globally one of the key industrial metal 3D printing technology providers. Both of them broadened the perspective and understanding of the empirical field by offering their accounts of the different parts of the value chain, as well as by providing crucial access to their B2B customer companies. Even though the focus is on the feelings of emotion in strategic investment decisions, illustrated through the B2B customer companies, this kind of empirical setting enabled this study to triangulate the empirical materials. Hence, with the empirical materials at hand, it is believed to better capture the main characteristics of an emerging and multifaceted industrial metal 3D printing industry, in which strategic investments are complex and the uncertainty and stakes are typically relatively high.

Table 6 presents a brief overview of four B2B customer companies and the technology seller and technology provider. With one exception, the interviewees in the participating companies were among the top decision makers, such as CEOs and the owners of the company. However, this one exception also had a central position and played a crucial role in a particular strategic investment process that was of

interest in this study. *To preserve the anonymity of the interviewees*, some identifying details have been omitted. For example, the interviewees are referred as H1, H2, H3, etc., without revealing the company they work for. In addition, the empirical materials are presented as evidence within the theoretical framework rather than connected to a specific company. Furthermore, the interest of this thesis is not in specific companies as such, but rather in the phenomenon—the feelings of emotion in strategic investment decisions, of which the B2B customer companies serve as illustrative empirical evidence.

Table 6. Overview of the participating companies of this study.

No	***Name***	***Description of the participating company***
I	Novela Oy (the name changed to Delva Oy)	A micro-size company focusing solely on metal 3D printing. The firm was in the startup phase, and in the middle of a strategic investment decision-making process, but had not yet decided.
II	3DStep Oy	A small company with an innovation and platform building focus. The firm had already invested in a metal 3D printing machine in 2016 and was now considering another machine.
III	HT Laser Oy	A mid-size company that is a subcontractor in the metal industry. The firm had just made the investment decision, and was starting to implement the metal 3D printing technology.
IV	Wärtsilä Oyj	A big and internationally well-known company that was examining the possibilities of metal 3D printing technology. The firm was in the middle of the strategic investment process.
V	Vossi Group Oy	A leading Finnish technology seller that provides a wide selection of advanced manufacturing machinery, such as the potentially disruptive technology of industrial metal 3D printing.
VI	SLM Solutions Group AG	A German-based manufacturing technology supplier for the technology seller. The company is one of the biggest industrial metal 3D printing technology manufacturers worldwide.

The SID processes of four B2B customer companies that are direct customers of the technology seller were investigated. Moreover, two other insightful perspectives on strategic investment decision-making in this context was given by the top directors of the technology seller and the technology provider. Both of them have a broad view on their customer base, and thus they were able to shed light on more general aspects of SID processes with their customers. Table 7 provides an overview of the eight (8) research interviews conducted in the participating companies, which totaled 113 pages of textual material for the study.

Table 7. Overview of the research interviews.

Name	*Date*	*Duration*	*Pages (A4)*
Vossi Group Oy	22.06.2016	55 min	5 (no audio)
SLM Solutions	04.09.2018	35 min	3 (no audio)
HT Laser Oy	01.11.2018	1 hr 4 min	14
Novela Oy	08.11.2018	1 hr 19 min	19
Novela Oy	08.11.2018	46 min	15
3DStep Oy	19.11.2018	1 hr 25 min	21
Wärtsilä Oyj	26.11.2018	1 hr 32 min	23
Wärtsilä Oyj	26.11.2018	48 min	13

4.2 Findings from the empirical materials

In this section, the empirical materials from the participating companies are presented according to the theoretical framework developed in Chapter 2 (pp. 50–54), which also lays out the main themes and key concepts for the analysis. Hence, the empirical materials are organized under the five main themes derived from the previous literature. The idea here is to first follow up the theoretical ideas found in the literature, and then, to analyze what kind of evidence emerges from the empirical materials gathered from the real-life strategic investment decision-making processes. As it was described in detail in the earlier sections, the empirical materials were interpretively analyzed (see pp. 63–65) and coded with help of the theoretical framework that allowed new interpretations and identification of feelings of emotion as well as the distilling of the remaining five themes of the study (i.e., the thematic analysis, see pp. 65–68). After that, the empirical evidence is compared with the ideas derived from the theory (see Chapter 5 Discussion). This analytical process shall reveal if and to what extent the patterns of relationships that are found in the thematic analyses match the theoretical ideas.

However, as the domain of capital budgeting has kept a distance from the emotion research, the theoretical ideas based on the literature review are only considered as tentative, and they serve as an analytical lens for a rather unexplored territory. Hence, it is reasonable to expect that the ideas based on the current theory of capital budgeting shall be refined and improved in the process. While the organizational life regarding the role of feelings of emotion during strategic investment decision-making processes in general, and in the use of accounting information in particular, still remains a relatively unknown phenomenon, the open and reflexive mind is a tool of great worth and importance during the empirical

analysis. It is hoped that the new findings contribute to capital budgeting theory, and to some extent to strategic decision-making research as well as emotion research.

Overall, the findings from the empirical materials *illustrate the emotion theory* in practice and *refine our understanding* of how the feelings of emotion play a significant and integral role in the strategic investment decision-making (or SID) process, and hence appear to influence the way in which top decision makers use the accounting information, as they are in front of strategic investment decisions. This finding can be already deemed as a rather significant contribution to the management accounting literature in general, and to the capital budgeting literature in particular which has kept a distance from emotion research. Presumably, this could also have many kinds of implications for practice.

Next, the empirical materials are examined according to the five main themes in the theoretical framework summarized in Figure 10. In order to provide background and put the collected empirical materials into proper perspective, the *first theme* starts by describing the complex and uncertain context of the participating companies, in which the interviewees are engaging in strategic investment decision-making processes. The theme then moves on to the role of intuition in this context. After that, the *second theme* sheds light onto the integral and holistic role of emotions in strategic decision-making. The *third theme* provides evidence for the link between feelings of emotion and incremental learning. After that, the *fourth theme* looks into how feelings of emotion support rational planning. Finally, the *fifth theme* analyzes what kind of role the feelings of emotion play in the use of accounting information while top decision makers engage in SID processes. The following empirical sections are mainly based on the cross-sectional interviews, but also on the supplementary questionnaires and observations in the field that validate the accounts of interviewees in the participating companies.

Drawing on the current emotion theory, as well as on the empirical analysis of the five themes, the following *twelve roles*, which represent relevant and recurring patterns in the empirical materials, were abductively identified and labeled during several readings of the empirical materials: (1) integral part, (2) inner compass, (3) SWOT sensors, (4) decision enabler, (5) learning device, (6) call-to-action, (7) social foundation, (8) idea broker, (9) drive booster, (10) last gatekeeper, (11) culture creator, and (12) creativity switch. These roles are marked in the empirical analysis and presented with a label and a definition in Table 8.

Table 8. The roles of feelings of emotion in SID processes.

No	*Label*	*The role of feelings of emotion (FoE) in SID processes*
1	Integral part	As people make decisions, FoE are inherently involved in them.
2	Inner compass	FoE give informative emotional signals for the intuitive guidance.
3	SWOT sensors	FoE are very sensitive to the information in the environment.
4	Decision enabler	Under high uncertainties, FoE enable and drive brave decisions.
5	Learning device	Un/consciously recalled earlier experiences underpin learning.
6	Call-to-action	FoE give decision makers a particular push for taking action.
7	Social foundation	FoE are fundamental for social relationships and interaction.
8	Idea broker	In specific situations, FoE are a part of selling ideas to others.
9	Drive booster	In the face of problems and difficulties, FoE give the “drive”.
10	Last gatekeeper	FoE may keep decision makers postponing the final decisions.
11	Culture creator	Shared FoE in a group sway the spirit and modes of operation.
12	Creativity switch	As decision makers struggle, FoE increase their creativity.

4.2.1 Theme 1: Intuition in the complex context of strategic investments

Industrial metal 3D printing is considered a strategic investment and something totally new that is able to change the way the manufacturing industry operates, what kind of component and end-product designs are possible, and what types of materials can be used. This requires a big change in thinking, since the offering is designed fundamentally in a new way and often in co-creation with other stakeholders, such as customers and universities (H1–H8). As a consequence, companies are able to produce a whole new set of components and end-products that provide novel and unique features and highly customizable properties (H2; H8). Hence, it is not enough to acquire new technology. One needs to build new competence and expertise (H1).

With 3D printing technology, previously separately produced and assembled components can now be combined and manufactured at once as a whole. Furthermore, in contrast to traditional subtracting manufacturing methods, the new additive and particularly precise nature of processing—ultra-thin layers of material on top of each other—allows the manufacturing of complex and high-quality structures never seen before (e.g., hollow components that are extremely durable but light-weight). Consequently, for example, the cooling time during the processing and the usage of material can be significantly reduced, and hence the throughput time of the manufacturing process can be remarkably shortened, as several work phases are squeezed or eliminated. Finally, as 3D printing technology takes advantage of

automatization and the proportional amount of salary costs is relatively low, it means that the industry actors across the globe are basically on the same line, regardless the regional level of earnings. Thus, the possibilities regarding the location of manufacturing facilities are broader (H2; H5; H8).

The notion of "co-creation" (H1; H2; H4; H5; H6) was widely used among the interviewees. The basic idea of co-creation is to bring different stakeholders closer to each other and to develop together an ecosystem based on 3D printing. The close collaboration with suppliers, customers, partners, and schools is a way to combine the *visions* (i.e., what is seen as good) of different stakeholders [**Culture creator**]. This idea was illustrated in one of the interviewee accounts (H5):

> "However, we have talked with the schools that they can do some case studies or research at our premises and use our 3D printer already now. Even though our new [advanced manufacturing] site is not yet ready, we can start testing what kind of collaboration model we should have. Everything cannot be suddenly ready in two years; rather it needs to be built gradually."

After a while, he/she continued the collaboration theme (H5):

> "We have had this collaboration project going on for approximately one year now. The aim is to buy a [metal 3D printing] machine here and to build a teaching environment around it, so that we as a company can acquire skilled personnel, and schools are able to provide them."

As 3D printing technology is heavily based on the ecosystem, a 3D printer is just one part of it. For instance, according to industry expert estimates, as much as 50 percent of the added value could come from the software platforms (e.g., Materialise) that are required in 3D printing (e.g., designing 3D printable models, running 3D printing machines and controlling the process, optimizing 3D models and material usage). Moreover, the material laboratories (e.g., VTT in Finland) are using their material topology optimization expertise for developing new and better materials that increase the material quality all the way down to the particle level. Thus, for example, it can improve mechanical stress and heat resistance, as well as the cooling properties of a metal component. Furthermore, there is a wide spectrum of raw material suppliers involved. In contrast to traditional technologies, 3D printing technology can better take advantage of the simultaneous use of new material combinations (e.g., composite materials comprising both metal and plastic). Finally, the customer base of a company can expand or change remarkably, since the process of additive manufacturing allows the production of totally new types of components and products that have dynamic structures (e.g., a stiff metal component with flexible

composite structures in it, such as prostheses). It is noteworthy that there are several specialized actors who operate on the different parts of the ecosystem (H2; H5; H8).

Investments in new emerging technologies require relatively large amounts of capital financing (H1–H6), and the overarching questions are about the timing of investment, and how it can be implemented in useful and profitable ways (H6). Moreover, even if the benefits of implementation are not so clear, sometimes companies just need to follow the overall trend that is developing in a certain direction, and to start adopting the new technologies [**Call-to-action**]. These are some of the central complexities regarding the strategic investments in industrial metal 3D printing technology (H2). As one of the interviewees put it (H3):

> "Financial institutions are probably the trickiest to convince, since they too are not familiar with 3D printing technology. The industry is so new, and quite a few 3D printing machines [in Finland] have been sold so far. For them, it is hard to know what will happen, or what if the technology does not 'fly', and the 3D printing machines have been accepted as collateral for the financing."

In the bigger picture, this kind of advanced manufacturing technology has potential to affect the entire value chain. For example, on the one hand, a company does not necessarily need so many suppliers for the components; but on the other hand, the company may need to outsource the expertise on 3D printing design and manufacturing software. Furthermore, it may likely change the business models, as the 3D printing technology enables manufacturers to increase the degree of processing, and hence the value proposition to their customers. Therefore, the changes inside companies (e.g., organizational culture) and within industries are already now rather remarkable (H2; H4; H6; H8).

As industrial metal 3D printing is seen as a new emerging technology (H1–H8), it involves *more* and *higher risks* related to, for instance, finding the right strategic partners and skillful people with the right kind of expertise, as well as having too big expectations as the technology peaks in the Gartner hype cycle. Moreover, unexpected surprises are more likely to occur, as the technology is new and fast developing, and no one actually has much previous knowledge or practical experience (H1; H7). Thus, the *feelings of risk, uncertainty,* and *confidence* are common among decision makers, as one interviewee described it [**Drive booster**] (H3):

> "They [the feelings of risk and uncertainty] encourage you to prove that there is this much business for us, too. Like we have discussed, it [the proof] is required as much as possible when we apply for financing [of the investment]. As we get these cases and give training, and consider what kind of parts our customers have

> and how much they have, it is a way to prove to ourselves that here is some business for us. Then it always gives you more confidence."

Even though top decision makers consider the *risks* and *uncertainty* (e.g., market growth, competition, lack of 3D printing education) relatively high (H4), the *general feeling* and *outlook* among top decision makers remains very positive, and they expect strong market growth in terms of new projects and customers [**Decision enabler**] (H2):

> "We consider it [the strategic investment] as a mid-high risk, as our view is that it [the 3D printing market] will grow strongly."

As strategic investment decisions in this context engage top decision makers in very complex and uncertain processes in organizations, they provide a specific setting that rather easily evokes emotion processes. Thus, especially in these kinds of situations, emotion processes and feelings of emotion are considered as an integral part of the decision-making process [**Integral part**].

Companies cannot really know if this or that particular 3D printing technology will be exactly the right investment in the near future. However, they find the underlying idea of 3D printing appealing, that is, how it enables a new kind of product design with the goal of the "perfect product". In order to achieve this goal, companies need to possess a great deal of understanding about what the perfect product looks like. If they can master the design process, they can then choose the most suitable 3D printing technology for their manufacturing purposes (H5). Thus, even though there is some uncertainty of objectives regarding the views of decision makers about which type of 3D printing technology they should pursue, the decision makers in the B2B customer companies *feel confident* that 3D printing as an ecosystem (e.g., the additive manufacturing process, new possibilities in product designs, software platforms for designing and production, new kinds of material combinations) is something in which they should be investing in and learning more about [**Inner compass**].

Generally, however, all of the interviewed B2B customers considered that their main objectives are rather clear and certain (H1–H6). There were only a little ambiguity and some strong different views on the objectives, as one interviewee made an analogy between 3D printers and computers [**Culture creator**] (H1):

> "Now, everyone had a shared view that this is the future, and perhaps we should now be among those who buy 'the first computer'."

As the interviewees were asked if the objective of company has been certain, albeit many factors causing the *feeling of uncertainty*, one of the interviewees replied [**SWOT sensors**] (H3):

> "In Finland, we should get on our feet faster [with the technology]. This has been relatively slow. Otherwise, we will fall behind. Development [of 3D printing] in Finland is uncertain. However, regarding the technology, I have no doubts, no uncertainty—only about how it will progress in Finland, and how well and fast we manage to move on with the machine investment. These are the uncertainty factors. The technology as such is solid, even though it is still in its infancy; and it is already used to such an extent that it does not feel in any way as a risk to get into this type of industry."

In another B2B customer company, one interviewee had a similar *sentiment* about the certainty of objectives [**Inner compass**] (H2):

> "We have had it [the objective] bright in our minds that this is where we are going. These are the things that it requires. Thereupon, we consider what we can do by ourselves and what we can buy as a service, and this is how we go forward."

Other interviewees also argued for the *feeling of certainty* regarding objectives of the company, as one interviewee stated (H4):

> "Yes, our vision has remained the same, that is to say this [industrial metal 3D printing] will become a normal [manufacturing] business. … We aim to develop the most important regional concentration of 3D printing [competence] in the Nordic countries. Here we have the capacity and other things. These are the main objectives towards which we are going, step by step. As we go, we find different ways to achieve our aims. For instance, we [recently] got a new neighbor, a robot company that has its own business. However, we know already now that there is a lot we can do together in the future."

Nevertheless, the interviewee acknowledges that the situation in smaller and bigger companies can be different (H4):

> "In contrast to a startup company that tries to find a way forward [and survive], a big company with resources is able to go and see how it turns out."

One of the most typical instances of evidence on *feelings of emotion* in the empirical materials was the fact that the top decision makers needed to rely on *intuition* in many occasions during the strategic investment decision-making process. As one interviewee explained, the beginning phase of a strategic investment decision-making process can be rather intuitive [**SWOT sensors**] (H4):

> "As we invested in our first metal 3D printer, we had already followed the market development around the world for a while, and what we saw was quite positive. So, observing the market development was our starting point. At the same time, we noticed how the markets in Finland and Nordic countries were roughly zero. It was the basis for our thinking that here is probably an opportunity in which an investment makes sense."

The only thing they really knew in the company was that some Finnish industrial companies had ordered and experimented with 3D printed metal parts manufactured in Europe. Therefore, even though there were no markets in Finland at the moment, and the decision makers recognized and accepted that the *felt risk level* was very high, they had the *feeling of curiosity* in this opportunity, which positively affected their shared probability assessment regarding the success of their strategic investment project [**Culture creator**] (H4).

Similarly, the investment idea can emerge from *one's own interest* in the new technology or through discussions with other actors in the field. As a consequence, rather than making an investment appraisal based on facts, one sees how the technology starts to develop and what kind of potential the industry has (H3):

> "I do believe that everyone can see the potential in this industry. It [commitment] is purely about that. We can observe what happens in the world."

Later, he/she continued on how the *feeling of commitment* and *interest* developed [**Call-to-action**] (H3):

> "Of course, there has been all kinds of talk in Finnish newspapers and in different media. However, in terms of what are really the actual things that people are doing there [in the 3D printing industry], especially on the industrial side, public information is really scarce. So when one sees that and other things, it makes one really committed, I think. This is [something] new and marvelous, I would say. It is interesting to do this stuff."

While the information available is scarce and fractured, the role of *intuition increases* [**Learning device**] (H3):

> "It [intuition] comes from the experiences of what one has heard and knows about the industry. Needles to say, when it comes to choosing between different technology providers, there are not many more facts than what fits on one sheet of A4 paper. Everything else is 'sales talk'. One tries to find out, somewhere between the lines, what is true and to listen a bit to what is happening."

Another example of intuition taking a role in the problem identification phase came across in the account of an interviewee, as the decision maker (H1) stated that the idea of their company is to be a technological forerunner, and in fact, they have previously been quite successful in that [**Idea broker**]. The idea of investing in metal 3D printing technology emerged as they were following the trends (e.g., digitalization of manufacturing) [**SWOT sensors**], and they noted that 3D printing technology was clearly on a growth path. The company spotted a market gap in the Nordic countries, which seemed to lag behind the overall market growth, for instance, compared to Germany. Thereby, the decision makers in the company attached great importance to previous positive experiences [**Learning device**] and felt this core idea as a strong argument for seizing the opportunity that in turn evoked the *feelings of curiosity* and *excitement* [**Idea broker**] (H1):

> "Then we saw that here is an opportunity to spearhead the frontier [in Finland]."

In addition, the decision makers had a shared positive vision that this technology will have an increasing demand and volume in the future (H1) [**Culture creator**].

When explicitly probed if intuition has a strong role in strategic investments, one of the interviewees replied [**Inner compass**] (H1):

> "Yes, it [intuition] has [a strong role] in this kind of situation."

Soon, he/she added [**Call-to-action**] (H1):

> "Even if we make very long reviews and calculations, at some point we face the situation where we conclude that now we have enough information, and now we just need to make a decision or we will never get to a conclusion. One can always examine more, but at some point a decision needs to be made. Of course, the decision is made with the best available information at that moment."

When asked about the role of intuition in the situation where there is the *feeling of uncertainty* regarding investment calculations, an interviewee concluded [**Decision enabler**] (H5):

> "One needs to be more intuitive than so far in a simple world."

Furthermore, one interviewee maintained [**Learning device**] (H3):

> "It [intuition] is here. … Of course, those feelings and intuition are based on something, and I think it is based on some kind of industry experience from which it is coming. However, mostly it is like [a feeling] that this is probably the best. … Yes, I think it [intuition] is a rather big thing."

Another interviewee stated [**Inner compass**] (H6):

> "Intuition has a role as we are screening different technologies or what is something that makes sense to be involved in doing [business] in the future."

However, there is probably some variation between bigger and smaller companies, as one of the interviewees described how the strategic investment decision-making process in a big company typically goes through certain formal "gates", whereas in a small company, the decision-making is based more on intuition and a "gut feeling" (H2).

In general, strategic decision-making is seen as a complex and uncertain process, in which the "big decisions" do not happen overnight (H4). People need to think about the decision for a longer period of time rather than sitting in a meeting and simply making a choice. Strategic investment decisions need to go through a "maturing process" [**Last gatekeeper**] (H4). Thereupon, decision makers process the upsides and downsides of the investment idea, at least unconsciously, for an extended period of time during the strategic investment decision-making process, and thus simultaneously build up their *intuitive feeling* [**Learning device**] (H1):

> "While we have worked on this case [investment project] for a longer time, people have had a possibility to develop their intuition."

For instance, as the strategic investment decision-making process takes time, people collect ideas and information from trainings, seminars (H1), and fairs (e.g., FormNext), as well as by doing preliminary product development with potential customers (H2) and in-house experimental projects, such as producing some process tooling for their own use (H5). As there are a lot of information pieces in complex circumstances, *intuitive feeling* seems to give a decision maker the sense of the most relevant information that is finally used in decision-making [**Inner compass**] (H5):

> "As we have a huge amount of data and grains of information all over the globe, with intuition, I think, one is able to screen what is relevant and which way we choose to go. However, one needs a strong fact basis for going forward [with strategic decision-making]. I think that both, fifty-fifty, are needed all the time."

In an uncertain and complex environment, decision makers seem to need *more intuitive* decision-making. As the number of different possibilities increases, it is impossible to know everything. Moreover, no one is able to do these kinds of big changes alone [**Social foundation**] (H6):

> "This technology enables so much, but just one or two persons cannot have all the information that it requires. If we want to go forward quickly, we must share the information. On the other hand, we get information from others, such as technology providers."

Thus, one needs to *trust in openness* and working together with others. Of course, the easily available facts are collected and different views are heard. However, the potential alternative is chosen *rather intuitively* [**Inner compass**] (H5). One interviewee put this explicitly into words [**Integral part**] (H6):

> "Emotions come along as we make a decision concerning a particular investment alternative that we think has potential. Typically, we have two or three other options. We usually think that this is the one, but there needs to be comparable alternatives. At that stage, emotions are strongly involved. At a time when the final [or formal] decision is being made, it is based on a simple thing, which is numbers."

Therefore, while decision makers are in front of various alternatives, the *feelings of emotion* help to choose the direction to go; and only after that, the decision makers consider how this option looks like in light of the numbers (H6). The feelings of emotion appear to serve the role of an "inner compass" for a decision maker, as *emotion processes* and the *feelings of emotion* focus the decision makers' attention on something and provide the direction where to go next [**Inner compass**].

Finally, building up a new future capability—such as expertise in metal 3D printing—for a company is seen as an *exciting* and *empowering* [**Drive booster**] yet *demanding* task. *Positive emotions* occur as people feel being not only a part of—but also a driver for—positive change [**Idea broker**] (H6):

> "Everyone has an opportunity to be at least slightly involved. It is a really important thing. We engineers are a little weird in that sense. No matter how

> good the idea is, if we are not able to do some 'tinkering', we think we can do better ourselves."

This *feeling of being part of something meaningful* makes a decision maker's *belief in the future* stronger, as well as invoking more *positive feelings* [**Culture creator**]; and hence, it enables *intuitive* decision-making right now [**Decision enabler**] (H2):

> "Indeed, very often it [feeling] is influential in the situation when the final decision is made. Are we going to do it now or later? Should we postpone the decision or not?"

However, the success of strategic investment is not a "black and white" equation that gives a good or bad result. While a strategic investment can end up being a failure, the next strategic investment can be successful because of the failed investment and lessons learned from that experience [**Learning device**] (H1; H4; H5). Therefore, the earlier experiences of a decision maker build up the *intuitive feeling of emotion* and *feeling of commitment*, which in turn give the needed impetus for making the final decision [**Decision enabler**].

As a conclusion, in uncertain and complex contexts, feelings of emotion appear to be an integral part of the strategic investment decision-making process. The *feeling of uncertainty* has an especially prominent role; and it seems that the emotion processes of top decision makers try to facilitate this feeling by sensitizing themselves to the scattered inputs of information in the environment [**Integral part**], by sharing the burden and creating an *optimistic culture* among the various stakeholders [**Culture creator**], and by increasing the *felt confidence* in the ecosystem of new emerging technologies [**Drive booster**]. In this kind of setting, top decision makers were receiving plenty of positive signals, for example, in terms of the growing trend of industrial metal 3D printing technology elsewhere and the investments of other stakeholders in the ecosystem [**SWOT sensors**]. Thus, feelings of emotion seem to give informative signals for intuition and guide the attention of decision makers to potential strategic investments, to give a call-to-action [**Call-to-action**], for instance, by evoking a feeling of curiosity or necessity, thus building up top decision makers' intuitive feeling [**Inner compass**] and enabling them to make the decision to go forward [**Decision enabler**]. As feelings of emotion evoked by emotion processes are very sensitive to information in the environment, they appear to help top decision makers to cope with the complex contexts involving the feelings of high risk and uncertainty.

4.2.2 Theme 2: Integral and holistic role of emotions in strategic decisions

One of the biggest empirical surprises was the observation that the importance of feelings of emotion in contrast to calculations was explicitly acknowledged by the top decision makers. Before entering the empirical material collection phase of this study, it was assumed that the feelings of emotion may be a somewhat "touchy topic" for top decision makers, who could feel that in order to save their credibility as businessmen, they would prefer not to talk about emotions in the context of strategic investment decision-making. However, all of the interviewees talked about the feelings of emotion related to strategic investment decision-making. For instance, one interviewee expressed this bluntly [**Integral part**] (H1):

> "Scientific studies say that every decision made is based on emotions. This is a scientific fact. At the end of the day, everyone is making decisions based on emotion. Obviously, people try to convince themselves with these calculations."

The accounts regarding *various feelings of emotion* are reviewed in the following section. This will illustrate the integral and holistic role of emotions that is naturally intertwined with the other roles that feelings of emotion play in strategic investment decision-making [**Integral part**].

In the beginning phase of a strategic investment decision-making process, companies may want to stay "under the radar" and develop a competitive advantage. As there are more and more companies interested in adopting the new technology, they start to talk to each other. Eventually, the *feeling of curiosity* inspires decision makers to invest in experimenting and moving forward on the learning curve towards the industrial manufacturing of their own products [**Learning device**] (H4). However, sometimes also the *feeling of necessity* was involved, as one of the participating companies started to get familiar with the 3D printing technology and its previous business cases [**Call-to-action**] (H1):

> "If we want to be involved in a rising technology, we need to invest in this [technology]."

Thereafter, they began to organize in-house training, and *much interest* has been given to learning how 3D printing has evolved from prototyping and small-size production into industrial-scale manufacturing [**Learning device**], as the company noticed that most actors in Finland are still focusing on prototyping and small-size production (such as tooling fasteners) and that there are next to no industrial applications in the Finnish metal industry (H1).

Another interviewee also remarked about the *necessity* of some strategic investments, and how it *enables* decision makers to take action [**Decision enabler**] (H2):

> "Even if the investments are big, like tens of millions, and the risks are high, the risk level does not affect us [so much], as the investments are seen as necessary investments that must be made."

Moreover, the *feeling of necessity* can be linked to the *feeling of fear*, as the decision makers may feel that if they do not invest, the company will fall behind the competition [**Call-to-action**] (H3):

> "As I have discussed with senior Finnish experts [in the 3D printing industry], there is a fear of getting overtaken by the others, which urges us to push things forward."

Positive signals from current and potential customers also influence the *outlook* as to how the decision makers view the future [**SWOT sensors**] (H2):

> "The feeling is dependent on how our customers are receiving the message, and that feeling, for sure, has an effect on our prospects."

A bit later, he/she continues [**Call-to-action**] (H2):

> "They [positive signals] embolden us to believe that now it is reasonable to take the leap."

Moreover, the *positive feelings* are nourished by *strong confidence* [**Culture creator**] (H6):

> "We are heading towards technologies that do even fully exist yet [operationally]. Yet, we strongly believe that it will succeed."

The companies that viewed themselves as innovative actors seem to have an *optimistic undertone* in strategic investment decision-making [**Learning device**] (H4):

> "Feelings and actions related to that [innovativeness] are just like that: trust, optimism, and experimenting. When something goes wrong, one learns from it and remembers the lessons learned."

Moreover, the *mindset* of decision makers engaging in the strategic investment decision-making process is often *excited* [**Culture creator**] (H4):

> "As you always have people around you who are excited, I would say that 90 or 95 percent of feelings are positive. Other feelings are more about the realization that this is something we need to learn from and not hit our heads against the same wall again."

Positive feelings during strategic investment decision-making processes arise, for example, from the *feeling of success* and when people deem their own actions as helping to do something good for other people, for example, helping the schools. People are social creatures, and social interaction *feels good* for many [**Social foundation**]. Furthermore, social interaction—such as sharing and helping others and building new relationships—also rewards decision makers with valuable information [**Learning device**] (H5). The thrust accruing from *positive feelings* comes across also when a question is raised about how decision makers face situations that did not go as planned and how they deal with it, as one of the decision makers replied [**Drive booster**] (H4):

> "I do not know if it is anything I am conscious of. All the time, however, I am going forward; and if one door is closed, then I look at the next door to open."

Moreover, *positive feelings* are associated with being a part of meaningful change [**Idea broker**] (H6):

> "As one is able to convince the 'toughest brakes', they will bring the others with them."

Soon, he/she continued [**Culture creator**] (H6):

> "It is important [for changing the mindset] that people by themselves can get involved. I think it is the most important thing."

Sometimes, the desired information for decision-making is not available in a specific time frame, but a decision needs to be made, regardless of the *feeling of uncertainty* [**Decision enabler**] (H3). Even though the limited resources and time during the long adoption process of a new technology accumulate *feelings of distress* and *frustration*, at the same time they may stimulate *positive creative thinking* [**Creativity switch**] (H4):

> "It [limited resources] forces one to think creatively and focus on how we are going to manage this. It is a kind of 'economic scarcity' that, in the end, is an extremely good thing."

Furthermore, even if the *feeling of stress* can be evoked by time pressure, this can evolve into the *feeling of determination* [**Call-to-action**] (H5):

> "Although there were several stakeholders [in different places during the project], we completed it fully in one month. I think no one in the company had ever tried the same concept before. And we did it and succeeded. Stress levels were pretty high, so then we needed to have [the attitude] that now we are going to make it."

Hence, the collaboration with other people may also alleviate the *feeling of stress* [**Social foundation**] (H5).

Negative feelings, such as *feelings of hesitation, impatience, frustration*, as well as *giving up* and even *desperation*, arise when one can see the potential, but it takes so much time to prove to and talk with other people about this new technology [**Idea broker**] (H1–H6). One interviewee depicted his/her negative feelings like this (H6):

> "The most desperate feeling is that this [proving to others] takes so much time and requires a huge effort. However, positive feelings arise when the 'worst' [disbelieving] people, whose mindsets do not seem to change at all, are among the first to change. Probably that is a sign of good workmanship, when one is able to change the mindset."

On the other hand, feelings of emotion also prevent making quick big mistakes [**Last gatekeeper**]. The idea is that people may be slower in decision-making, but at least they are doing the right thing. Both types of people are needed, the "crazies" and the "brakes". The former puts things forward. The latter are those who are in *doubt*, as they wonder if there is any sense to what the others are doing, and thus they are applying the brakes (H5).

The role of emotions in strategic investment decision-making practice appears to be integral and holistic, as the process itself is rather *passionate action* after all [**Integral part**] (H5). It seems to require *strong motivation* in decision makers that is based on *positive emotions* and the *feeling of doing the right thing* [**Inner compass**] (H5):

> "One cannot do it [a strategic investment decision] without a strong emotional tie to it, and also because it is more like art than engineering."

Moreover, strategic investments are considered to be more personal (H5):

> "It is a lot about doing your 'own thing' and leaving your 'own handprint' on the wall."

This *passion* gives the "drive" to carry on, so that the decision maker does not *give up* [**Drive booster**]. In this kind of situation, one might first face two or three failures before one finally succeeds. Sometimes, decision makers may have the *feeling of giving up*, but then "the inner fire" makes them *believe* again in what they are doing and eventually noticing that they are succeeding (H5).

Perhaps one of the most interesting findings came from the research questionnaires that probed decision makers with two appraisal tasks, in which they were asked to give their *general appraisal* of the current strategic investment and the most important, similar, or corresponding previous strategic investment by using the same scale from 1 to 5. The average appraisal of the current strategic investment was 4.5; and on the previous, most similar investment it was 4.8. The results of the research questionnaire are summarized in Table 9.

Table 9. The results of questionnaires: Feelings of emotion are very positive.

Top decision makers in SID processes	*H1*	*H2*	*H3*	*H4*	*H5*	*H6*	*Avg*
Current strategic investment (SI)	5	4 / 5	4 / 5	4 / 5	3 / 4	5	4.5
Most similar prior experience of SI	4(+)	5	N/A	5(+)	N/A	5	4.8

Scale 1–5: 1 strongly negative, 2 mildly negative, 3 neutral, 4 mildly positive, 5 strongly positive

While the interviewees were asked to give their general appraisals by using the scale from 1 to 5 (1=strongly negative; 2=mildly negative; 3=neutral; 4=mildly positive; 5=strongly positive), they were also asked to briefly describe the aspects underlying their *general feelings* of these investment projects. The results show that all of the interviewees gave a *strongly positive* or *mildly positive* appraisal in both categories. In some cases, decision makers were pondering between 4 and 5, or 3 and 4. Those instances are valued in the total average as 4.5 and 3.5. The plus sign (+) means that an interviewee emphasized the appraisal to be strongly 4 or 5. Finally, there were two decision makers (marked "N/A") who did not identify any similar previous strategic investments due to their relatively early career phases and scarcity of previous experiences. Surprisingly, the general feelings about ongoing strategic investments were without exception *very positive* on average (i.e., 4.5), even though

it was still impossible for decision makers to produce virtually any calculative facts on how the investment will be realized in the future, and what kind of effects it eventually will have for the success of a company [**Decision enabler**]. However, some decision makers acknowledged that the hardest times are still ahead to the end that they are able to keep a firm grip on the positive development, as one interviewee formulated his/her own take [**Social foundation**] (H1):

> "The team we have gathered for this [investment project] needs to maintain the confidence and take things forward, even with small steps, building on success. The commitment of the team is a pivotal factor."

While the interviewees described briefly the underlying aspects of their general appraisals, the current strategic investments were described in terms of *current emotional feelings* (i.e., feeling of good or bad about something), such as a good and potential opportunity (e.g., a relatively fast developing market, desire to be a frontrunner) and something that it is considered very important to be involved in (e.g., learning by co-creation, being part of an ecosystem, building up new competence). On the other hand, regarding the most similar, previous strategic investments, the focus was more on the *factual positive outcomes* (e.g., a short payback time, a big success in terms of a peak position in the market, a concrete competitive advantage), which were now possible to witness afterwards.

As concluding remarks, contemporary theoretical understanding supports the idea that emotion processes and feelings of emotion comprise an integral and holistic part of every decision made [**Integral part**]. Moreover, the feelings of emotion appears to be guiding the intuitive behavior of decision makers [**Inner compass**] and enabling them to make brave decisions in front of complex and uncertain strategic investments [**Decision enabler**]**.** As predicted by the earlier literature, emotions seem to be quite strongly involved among the top decision makers, who are deeply engaged in the complex and uncertain context of the strategic investment decision-making (or SID) process. The overall feeling during the strategic investment decision-making process was very positive, without exception in this setting. This finding comes through not only from the cross-sectional interviews, but also from the supplementary observations and questionnaires, which all suggest that top decision makers (H1-H6) are having very positive feelings of emotion during the current SID process, and the feelings of emotion align with their most similar prior experiences in SID processes. This suggests the link between incremental learning and feelings of emotion [**Learning device**].

4.2.3 Theme 3: Link between feelings of emotion and incremental learning

As discussed in the theoretical framework, emotion processes and the feelings of emotion appear to be tightly linked to learning mechanisms, since our memory not only stores the factual outcome of our earlier decisions, but also the emotional result of those particular experiences. Why does this matter in a strategic investment decision-making process? While decision makers engage in new situations, the most similar or corresponding prior experiences are recalled from memory, and thus the prior experiences provide factual and emotional information to the emotion processes, which in turn transforms these signals into a component of feelings of emotion occurring during a strategic investment decision-making process. This link between incremental learning and feelings of emotion is now illustrated empirically in this section.

The current feelings of emotion appear to have a tight connection to the earlier experiences of decision makers (i.e., secondary emotions). As the top decision makers answered the research questionnaire (see Table 9) and described their prior experiences of strategic investment projects that were most important and similar or corresponding to the current project, it became somewhat clear that those investment projects evoked similar, *strongly positive feelings of emotion* as with the current strategic investments [**Learning device**]. Therefore, as proposed by the emotion literature, the emotion processes and feelings of emotion were giving *positive signals* to the decision makers due to the similarity between the prior situation and the current situation, and accordingly marking the current situation as positive as well. In this manner, learning by doing, such as experimenting and co-creating with other stakeholders, is embedded in the emotion processes, which are supplied with positive or negative signals from the earlier experiences and lessons learned. For example, when decision makers are learning more and getting a clearer big picture of the strategic investment, it is inducing *positive emotions* such as the *feeling of ease* and *comfort* [**Learning device**] (H6):

> "When one is able to clear up the big picture to oneself, then it [strategic decision-making] becomes somewhat easy."

The complexity of calculating a strategic investment is enormous and somewhat obvious. However, even if an investment is a failure, the lessons learned, and hence the *positive* and *negative emotional results* from that experience, could be later applied in other investment projects to make them more successful [**Learning device**]. If an investment is a success, the lessons can also be adopted in other parts of the company, not just on the site where the investment was originally implemented. The bottom line is that the effects of a strategic investment on the

bigger picture are difficult to estimate, and thus difficult to take into consideration in investment calculations without the prior emotional results (H5):

> "This [3D printing technology] is complex, since one cannot change only one part of the manufacturing process and manage only that part separately. Instead, one needs to understand the characteristics of every part [in the whole manufacturing process] and their meanings. Moreover, those who are operating different parts [of the process] need to be informed how this [change] is linked to other parts, and that they [the operators] need to learn something totally new."

In general, incremental learning seems to be a comfortable area for decision makers to describe their feelings of emotion. For example, a strategic investment decision-making process was described as involving *elements of creativity* (H1; H4; H5; H6), such as brainstorming and experimenting, which invoke the *feeling of freedom* [**Creativity switch**]. This type of incremental learning builds up decision makers' *positive drive* to develop an idea into an investment project [**Drive booster**] and to show its potential to others [**Idea broker**]. Moreover, the process of incremental learning yields the *feeling of success* (H5):

> "On an emotional level, I got the best 'kicks' when we succeed in producing a 10,000-euro tool with 1,000 euros, and we prove to the others that there really is potential."

As there is a lot of uncertainty and a huge amount of new things to learn, finding out that an idea actually works and that something concrete has been achieved is found to be meaningful and something that makes decision makers experience *feelings of joy and excitement* [**Culture creator**] (H5).

Gathering more information through experimenting and learning is part of the strategic investment decision-making process, especially during the alternative creation phase (H5). Moreover, learning through experimenting is an essential part of the required *positive mindset change* that builds *trust* and enables brave decisions [**Decision enabler**] (H5):

> "This brave decision was possible specifically because of our experimenting, in other words, with the [experimental] operating model of our team. We are doing rather cheap and wild experiments."

The interviewee went further (H5):

> "For example, we carry out three try-outs, and we notice that these two options did not work, and this one was workable. Then we develop that one, and we discover the direction where we should go. With these kinds of small steps, we always prove first, so that we can see if it really works."

Regarding the importance of a *positive mindset* change during a strategic investment decision-making process, one of the interviewees gave an interesting example from his/her previous experiences [**Learning device**] (H6):

> "As the company invested in the first robot in 2005, it was an exceedingly difficult job, albeit the cost [of the robot] was only around 200,000–300,000 euros. Everyone 'knew' that they [robots] were not feasible, even though robots had already been commonly used a little bit everywhere since the year 2000. We really needed to sell that [idea] [**Idea broker**]. When we finally somehow got the first robot—I do not know what kind of gimmicks was required, after all—the payback time for that robot was counted in months. After that, everyone 'knew' that this is how things should have always been done. They [decision makers] considered that we absolutely needed this kind of robot. Thereupon, automation started to grow pretty fast. Well, then it went a bit to the other end, so that one did not need to have many grounds for an [robot] investment. As long as there is a robot, everything goes [**Culture creator**]. However, at that point it is a moral thing. It is very important that if you propose an investment, you need to be able to look in the mirror the next morning and say: 'Yes, we can really do that'."

Different actors in the ecosystem of a company or within the same technology have a *variety of feelings of emotion* related to incremental learning in different phases of the strategic investment decision-making process. For instance, having the *feeling of positive change* in the company or the *feeling of belonging* to a movement were among the desired feelings [**Culture creator**]. As one of the interviewees pointed out, one of the B2B customers wanted to change the *mindset of the people* in the company [**Learning device**] (H5):

> "Half of it [the strategic investment] is about tooling production, which is a clear business case. However, the other half is a kind of mindset change, and this new [advanced manufacturing] site is proving that—and also internally to us. My job is to take this knowledge to the others."

Later, he/she again emphasized how important the positive mindset change actually is (H5):

> "It [changing the mindset of the people] has a crucial role, since if I would be the only one doing this stuff and would do all the cases [by myself], it would lead nowhere."

The process of changing the mindset regarding *how people feel* about a new technology in the company might involve "timeline thinking" in terms of several strategic investments that are used for experimenting and "slicing" the investment into smaller pieces (H5). In the first stage, a simpler and smaller metal 3D printer for gaining new experiences and changing the mindset is acquired, along with learning about the technology and producing in-house tooling parts [**Learning device**]. One of the interviewees described the importance of having one's own machine (H5):

> "[It is important] that one has a clear opinion or maybe some kind of guess [**Inner compass**], which has then been proven to be wrong or right. Thus, it is a clear and concrete thing, [such as] a component that is able to push the technology further. This is exactly the same thing as to why it is necessary to acquire one's own machine; or at least the main reason is that [with one's own machine] people are able to experiment and prove, mostly to themselves, that one can really trust and believe in this [technology] [**Culture creator**]."

Thereupon, the second step is a strategic investment in a bigger and more effective machine for collaboration, for example, with other stakeholders in a shared knowledge center [**Decision enabler**] (H5).

While learning about new emerging technologies, especially certain types of feelings of emotion, such as the *feelings of confidence* and *trust*, were acknowledged as important enablers for strategic investment decision-making [**Decision enabler**] (H7):

> "The feeling of confidence is very important, since 3D printing is still an emerging market, and there is not yet so much existing 3D-printing-produced serial parts in the key industries (i.e., aerospace, automotive, healthcare, energy). Thus, there is not yet 100% guarantee for success by existing and similar well-established applications. … [Yet], everybody is believing in 3D printing technology."

When asked about the role of building *trust* and reinforcing *confidence* during the strategic investment decision-making process, one interviewee emphasized their importance inside a company while learning about new technology [**Social foundation**] (H6):

> "It is really big. In fact, it is actually very, very big."

However, industrial B2B customers still have the *mindset* of: "I do not want to be the first to fail with this new technology." Since no one has much prior experience, the *fear of failure* is typical, and the *feeling of hesitation* tends to influence decision makers, which becomes visible in terms of stretching the schedule and delaying the decision until the last minute [**Last gatekeeper**] (H1):

> "Generally speaking, so not only in this case, but rather typical is that any given time limit is reached, and every decision is made as late as possible. Even if the intention is to avoid that point, in practice, this is the case where we always tend to end up delaying the decision until the final moments."

A little later, he/she concluded [**Integral part**] (H1):

> "This is a common human trait."

In contrast, according to the account of one interviewee, in the aerospace industry—as the industry has a track record of tens or hundreds of finished products that have passed strict regulations—the *feeling of certainty*, which is linked to the perception of concreteness, is already greater due to the pure probability of succeeding is higher [**Learning device**] (H7).

In the sphere of the 3D printing industry, the interviewees *feel that they belong* to the 3D printing community [**Culture creator**], and being part of it keeps one informed. Since everything is still new, there is much marketing promotion and "half-imaginary cases" floating around. Thus, in order to learn about new technology, the importance of talks with other people (for instance at industry events, where users gather and exchange experiences and knowledge) was mentioned regularly [**Social foundation**] (H5):

> "Last winter, I was in the United States and participated in a five-day long 'Additive Manufacturing Users Group' conference, which is particularly [for sharing knowledge] among users. There, I learned practically more than during my whole career so far. They provide valuable information."

Typically, the best ideas are based on combinations of solutions developed by others (H5). Another interviewee also had a similar view on this topic [**SWOT sensors**] (H4):

> "One can find and read dissertations and articles about the properties of materials, which are published a lot, for instance, in Germany. However, one cannot find any business-related information in them. The fairs are the 'number one' [source of information]. Obviously, another important source of information is the technology providers."

As a consequence, the *feelings of relief* and *comfort* arise when one realizes that others also have the same problems [**Social foundation**], and one can share ideas and solutions with others. This builds the *feeling of confidence* in that the problems can be overcome [**Creativity switch**]. The *feeling of "we are on the right track"* emerges [**SWOT sensors**] as hundreds of other people are talking about and doing the same things. As there are a wide range of companies and other stakeholders in the community, relatively open cooperation within the 3D printing community increases the *positive "we are doing this together" spirit* [**Culture creator**]. Moreover, it equips decision makers with the *feeling of courage* and *stamina* to push forward [**Drive booster**] (H5).

In fact, the most important source of information the top decision makers stressed was the other people operating in the same field (i.e., the industrial metal 3D printing and other companies applying 3D printing technology). While top decision makers in a particular situation perceive, through their eyes and ears the sensory inputs of *positive feelings* expressed by other people [**SWOT sensors**], the emotion processes and following feelings of emotion mark the current situation as good, thus *focusing the attention* of decision makers on this matter [**Inner compass**]. For example, when probing explicitly the question about how feelings of emotion affect decision-making during the strategic decision-making process, one of the interviewees gave an illustrative account [**Culture creator**] (H1):

> "It has built confidence in the future. If something is presented positively in the limelight and everybody is talking favorably about it, you start to think that it probably holds water and is a good thing. As concrete things start to add up and one can see some real examples, it amplifies that [feeling]. After that, the [positive] feeling reinforces itself."

Moreover, the link is so intertwined [**Integral part**] that sometimes it is hard for decision makers to distinguish whether something is coming from prior experience or immediate feelings of emotion [**Learning device**] (H1):

> "It is hard to say how much it is about prior experience and assumptions, and how much it is about feelings. I cannot distinguish it in that way. As I understand

> it, feelings are in a sense one's expertise and background, and how one concerns particular things in general."

In this manner, emotion processes guide the decision maker towards the alternative choice that evokes *positive feelings of emotion* [**Inner compass**]. Thereby, the empirical evidence gives support to the important connection between emotion processes and incremental learning, as well as their enabling role in a strategic decision-making process.

Indeed, while a lot of information needs to be gathered and different types of experiments are carried out during the strategic investment decision-making process—and the most important source of knowledge is other people and discussions with them—it suggests that the feelings of emotion, good or bad, are affected a lot by the people surrounding the decision maker [**Social foundation**]**.** Therefore, if the others are thinking that this technology is an important platform or ecosystem, decision makers take that as a *positive sign*, which increases the *positive feeling* about the investment [**Learning device**] (H3):

> "We have been discussing [about alternatives] and how we feel about them. At some point, I have stopped and asked if this is only my feeling or does somebody else feel like this too, or is it occurring [only] to me because of something I have learned [before]."

This all relates back to the *feeling of uncertainty*, about which the notion of uncertainty was defined earlier in Chapter 2 as "a lack of information". It is crucial to keep in mind that as decision makers are incrementally learning about the new technology, the *felt uncertainty* is always a *subjective feeling*. For example, according to the technology provider, while enthusiasm raises the interest in 3D printing technology, and analysts push up the hype with the expectation of rising markets, the actual growth in the market is not necessarily happening so fast, since the adoption of a new technology involves a lot of uncertainty and thus takes a longer period of time. Therefore, as the 3D printing industry is still facing a push market, a lot of effort is needed to *convince* the buyers [**Idea broker**].

As a consequence, rather than the actual amount of new information, the *feeling of certainty (or security)* mitigates the feeling of uncertainty, and its role is seen as an important part of the strategic investment decision-making process by top decision makers [**Decision enabler**]. For instance, at that point, when a B2B customer company starts to think that metal 3D printing could be a solution, then the technology provider tries to increase the customer's feeling of certainty by helping to build a production plan for the years ahead, according to the production demand. Furthermore, the technology provider offers a map of how to implement 3D printing

technology with a particular production capacity and with certain costs. Finally, the technology provider gives a guarantee of continuity for spare parts delivery.

While doing investment calculations in the 3D printing industry, a lot of money is typically required, several things need to be taken into account, and the *feeling of risk* is high. As a strategic investment in the 3D printing ecosystem and the development of a new type of co-creation process can be worth millions (up to hundreds of millions of euros) and uncertainties are high, it affects the decision makers' *mode of thinking* and *operation* [**Culture creator**], and thus also their incremental learning [**Learning device**]. For example, while choosing among many different alternative 3D printing machines, a possibility to immediately use the existing ecosystem by renting similar machine capacity from others if needed, alleviated the *feeling of uncertainty* [**Decision enabler**] (H4):

> "Most of the industrial actors in Europe are using the same [3D printers]. It is a sort of standard machine. It also supports us that this platform is already existing, if we need more capacity."

Moreover, the situations and the competition are in constant change. Hence, as decision makers seem to be addressing their mostly unpleasant *feeling of high uncertainty*, derived essentially from the complex context of strategic investment decision-making [**Integral part**], they try to mitigate their feeling of uncertainty with investment calculations and various other sources of information, especially other people [**Social foundation**]. This becomes visible as decision makers describe the way a company navigates towards its objectives, and how a strategic investment in a new technology is eventually an exceedingly unorganized process (H4):

> "You cannot put it [a strategic investment decision] inside a formula, but rather it is kind of a shared (as well as individual) thinking process of several people."

Another interviewee stated that [**Idea broker**] (H5):

> "It takes a long time to mediate the basic knowledge and to discuss [about the technology]. A kind of burden of proof exists of course all the time. The first year goes with that."

Finally, one of the interviewees maintained [**Learning device**] (H6):

> "These [strategic investments] are very complex stuff…and the needs of customers are really complex. What customers are ordering from us is not necessarily what they actually want. Instead, they want some added value."

A little bit later, he/she continued on the topic (H6):

> "The way we produce that [added value] can be totally different from what the customers initially order from us. Thus, it is important to deliver the added value."

As a conclusion, incremental learning seems to be tightly connected with various feelings of emotion, particularly the feeling of uncertainty [**Learning device**]. Depending on the complexity of the situation, a number of uncertain factors may decrease or increase. Even though top decision makers also learn by using different types of decision-making tools (such as the BCG Matrix and the GE Matrix) and that model can simplify the uncertain context "on paper", most real-life events are somewhat uncertain with several factors that cause the feeling of uncertainty, thus making it an integral part of this kind of situations [**Integral part**]. It appears that emotion processes and feelings of emotion are also tuned into the *social frequency* of other people. This highlights the social foundation and nature of incremental learning [**Social foundation**]. In addition, as human decision-making is subject to limited mental, temporal, and factual resources, it does not even require so many uncertain factors to arouse the feeling of uncertainty. While feeling uncertain, people tend to have the feelings of hesitation or even fear [**Last gatekeeper**]. Therefore, emotion processes try to bring the unpleasant body state back into balance and alleviate the mostly unpleasant feeling of uncertainty in complex situations [**Drive booster**]. This is why investment appraisals might be a way to increase positive feelings that enable brave decision-making [**Decision enabler**], and thus more like a tool for "proving" to oneself and others the intuitively felt positive signals than the actual basis of a strategic investment decision.

4.2.4 Theme 4: Feelings of emotion supporting rational planning

Along with incremental learning, rational planning plays a role in the holistic view of the strategic investment decision-making process. The accounts providing the evidence for the supporting role of feelings of emotion are analyzed in this section. First, however, some of the most typical types of rational planning in the participating companies are described. For instance, one of the B2B customers had established a specific team for creative experimenting and organizational learning (H5). While this organizational unit is a consequence of rational planning, at the same time, it explicitly illustrates the important connection between learning and planning in practice. Also some other examples of rational planning (H1–H8) were observed, such as using a "roadmap" for adopting 3D printing technology—for

example, strategy and vision, in-house trainings for key people, planned screenings of alternative technologies, implementation timetables, and an investment budget. In addition, interviewees (H1–H8) reported on rational planning in terms of drafting the desired strategic direction (e.g., doing business in the industrial metal 3D printing industry, scouting potential strategic partners), outlining the organizational changes (e.g., swapping people in different positions), and recruiting new people with a particular expertise (e.g., industrial sales, 3D printing engineering).

Different kinds of calculations reported by interviewees can also be viewed as rational planning that comprised, for example, sketching an investment financing plan (e.g., equity vs. long-term debt), making investment appraisals (e.g., ROI, payback time, net present value, cash flow estimates, sensitivity and scenario analysis), and conducting cost-benefit (or business-case) analysis and market-size calculations, as well as balance sheet management. One of the interviewees gave an example of their investment calculations (H4):

> "It is a great deal about what something costs. If we go to the operative level in the company, it is very ordinary practice: where we should put the money and what is coming out of it. It is basic accounting. There is no way to get around it. One needs to pay the salaries and other things so that it works. One needs to purchase materials. There is nothing peculiar in that."

A bit later, he/she exemplified their balance sheet management (H4):

> "It does not make sense from our point of view to greatly increase our balance sheet, but rather [to think] how we can, through partnerships and other arrangements, keep the balance sheet steady and still make full-fledged business."

Nevertheless, it appears (as expected) that the smaller the company is, the simpler the calculations are, and the focus is more on cash flows.

Additionally, another interesting aspect of rational planning, which is related to strategic investments in new emerging technologies but are not always included in calculations, is the source(s) of development funding outside of the company (e.g., Business Finland) (H6):

> "The matter that perhaps cannot be taken into consideration, while computing payback times for this type of investment and bringing in new technology in the company, is the outside development and other funding that a company may receive. It is obviously one element that possibly can bring in a stream of cash flow."

After a while, the decision maker concluded (H6):

> "Instead of direct payback times, the added value [in this strategic investment] is obtained in terms of the [lower] operating costs of a product."

In general, the initial investment and running costs of the 3D printing machines were well-known. However, one of the most complicated calculations is to *estimate* the incoming cash flows that were mostly based on the discussions with the potential industrial customers [**Social foundation**] (H3):

> "Of course we can make various estimates. However, it would be good if those could be based on something more concrete. That is what we are trying to figure out, but customers are careful to make their own estimates."

Another interviewee also had a similar view [**Inner compass**] (H4):

> "Yet, what is interesting is how to anticipate, that is to say, to make an anticipatory estimate of how things are developing, and timing when we need to and are able to invest. I guess there could be all kinds of tools for that. However, while we are talking about an emerging business that is developing, at least I have not found a way to change that into cash flows. It is the view about it [timing] that now is the time when it is lucrative to invest. And there are some basis for that [**Decision enabler**]. We can see by looking at our customers that they will need something like this, and the volume could be something like this. It is a pretty tough area, this 'anticipatory accounting' that is made before the investment, let us say for example, a half year before the investment. One needs to be innovative [**Creativity switch**] in that—who is investing and in what. Then we are talking about partnerships and this stuff."

As we now know from the contemporary emotion research, rational planning also constitutes a form of incremental learning that is embedded with feelings of emotion. For example, as a company is considering investing in its own machine, the level of utilization needs to be considered in relation to *subjective assumptions* from the earlier experiences of decision makers [**Learning device**] (H5):

> "We calculated that the utilization ratio needs to be around 60–65 percent, and over 50 percent in any case, depending on the calculation model."

However, *estimates* about the market development are not so straightforward to make [**Decision enabler**] (H3):

> "Actually, we do not have other facts than what we get from the technology manufacturers and our own estimate of the demand extracted from our customer cases."

The interviewee soon added the kind of indicators they can look at to estimate the market [**SWOT sensors**] (H3):

> "How does the technology growth trend look like, and how it will develop in Finland, and how has the industry and related companies developed in recent years? There is data about that. Moreover, we see how the industry is developing around the world. That is quite easy to follow. Clearly this is convincing us, when both the 3D printing actors in Finland and elsewhere are facing pretty much similar, very strong growth, and even on a fast schedule."

On the other hand, if a company chooses not to invest in their own 3D printer and is buying the needed parts outside the company, it might lose some of the learning aspects (e.g., own first-hand experiences) [**Learning device**]. However, using an in-house service provider could combine the best sides of first-hand learning and cost-sharing. Especially, for *changing the mindset*, it is *psychologically* surprisingly important that the machine is physically near the people [**Culture creator**] (H5):

> "People can design, go, and see for themselves as a component is being 3D printed. It is very important psychologically and regarding how people are thinking. Moreover, it also proves that the technology works, since a person believes only when one sees the part and is twiddling with it in one's own hands."

During the strategic investment decision-making processes, *positive feelings of emotion* were acknowledged by the decision makers as supporting rational planning. For example, one of the interviewees described the *role of optimism* [**Culture creator**] (H4):

> "This is based on a 'crazy optimism', all this kind of action. There would be no entrepreneurs anywhere if there would not be optimism."

The decision maker explains how the *interest in* 3D printing started, as they saw that the maturity phase of the technology was starting to be in a good position, and the technology was on a strong growth trend as well. 3D printing enjoyed a lot of good press, and it was even hyped. Moreover, as the interviewee discovered that there was

already a variety of 3D printing applications in almost every business sector, it increased the *feeling of optimism* [**Drive booster**] (H4).

Therefore, it appears that rational planning during strategic investment decision-making is supported by various feelings of emotion [**Integral part**]. First, on many occasions, during the problem identification phase, there are just a few active people who have a *belief* in their cause [**Inner compass**] and involved at the beginning of the strategic investment project (H1). Moreover, they typically need to have *feelings of excitement* and *passion* in order to collect more information about the possible benefits and costs [**Call-to-action**], and thereafter to *convince* and to teach (or "to give the wisdom" to) the others [**Idea broker**] (H1-H6). Sometimes, however, an investment in a specific technology is *felt as an imperative* if decision makers think that it is necessary for a company to stay in the business based on a particular ecosystem [**Decision enabler**] (H6):

> "Besides, in some situations, as we are talking about new technologies, even if there are no benefits at all, it might be compulsory to implement it [a new technology] so you can stay in business. How do you compute the payback time then? It can be a bit tricky."

From the very beginning and throughout the whole strategic investment decision-making process, the *feeling of being supported* by other people [**Social foundation**] is viewed as a crucial enabler for decision-making, as one of the interviewees argued [**Decision enabler**] (H3):

> "I could not do this [strategic investment decision] alone. It would be impossible to compile this package for the financing institutions [by myself]."

Later, the decision maker elaborated his/her own take [**Integral part**] (H3):

> "The support from others is important. The same applies to everything in this industry."

Finally, the interviewee concluded [**Drive booster**] (H3)*:*

> "It [support] has given me more enthusiasm. In general, this kind of interaction and sharing thoughts facilitates [my] working a lot."

To *feel supported* is deeply interrelated with another *essential feeling*, namely, the *trust* towards each other among the interacting people [**Social foundation**] (H4):

> "There needs to be a fundamental trust, for instance among the members of the board. If trust disappears, I do not believe you anymore."

After a while, the interviewee highlighted the main point [**Social foundation**] (H4):

> "The most important feeling is trust within the team."

As a result, the *feelings of trust* and *of being supported* make the decision makers *feel more optimistic*, regardless of setbacks that naturally occur every now and then [**Drive booster**].

Indeed, the *felt optimism* seems to be an important driver for rational planning during the strategic investment decision-making process, as put into words by one decision maker [**Decision enabler**] (H4):

> "I found out that even though one does not succeed every single time, if one starts something while feeling pessimistic, nothing gets done. Optimism and spreading it to the actors around you is important. For instance, no one in this industry is certain about the outlook for incoming orders. The outlook for what is ahead in the next four to five weeks is very foggy."

As the concluding notes of this section draw upon the empirical evidence from the participating companies, one could argue that any kind of rational planning is necessarily preceded by incremental learning. Indeed, how could someone do rational planning without any prior knowledge? On the other hand, one can first make rational plans, which in turn facilitates incremental learning in an organization. However, only by doing concrete things during a strategic investment decision-making process—such as gathering and analyzing information and experimenting with new technologies—the process of incremental learning is put in motion. This process appears to be intertwined with emotion processes and subsequent feelings of emotion that support rational planning [**Integral part**]. This support comes about as emotion processes automatically and mostly unconsciously evoke the tandem of factual outcomes and emotional results from prior experiences, and hence provide various emotional signals and intuitive information for decision-making [**Inner compass**]. Nevertheless, both incremental learning and rational planning seem to be needed in a holistic view of strategic investment decision-making, and indeed they tend to go "hand in hand". These two fundamental elements—incremental learning and rational planning—of a more holistic view of strategic investment decision-making process come across as an important gateway for feelings of emotion, in which decision makers learn by doing. And thereafter the decision makers apply—partly due to the emotion processes—the lessons learned in their future planning

[**Learning device**]. Finally, incremental learning appears to be a somewhat dominating counterpart compared to rational planning. As decision makers engage in building up something new (e.g., a future capability for a company), it seems to be a combination of *curiosity* (and sometimes a necessity) for new things [**Call-to-action**], *excitement* and *passion* to learn more, *fundamental feelings of trust* and *being supported by the others* [**Social foundation**], and the *attraction* to the discourse about a *positive future* that keeps people striving for success, albeit the road can be rocky, muddy, and full of big holes [**Drive booster**].

4.2.5 Theme 5: The use of accounting information in SID processes

The overarching theme of the top decision makers' accounts was their need to rely and base their decisions mostly on something other than investment calculations as they engage in strategic investment decision-making (or SID) processes. This is an important clue, as we next look into the role of feelings of emotion regarding the use of accounting information in SID processes, of which this section provides illustrations. For example, strategic investments can be hard to assess with investment calculations, since a company is not investing in a new technology in isolation, but rather in relation to other actors in an ecosystem [**SWOT sensors**]. A company making a strategic investment can base their decision on the global impact inside the company, as one of interviewees maintained [**Learning device**] (H5):

> "Some of the complexity occurs as we do here some basic things [experimenting and learning], and then this knowledge can be utilized with big results somewhere else [in our network]. Nonetheless, we are only looking at the calculations regarding our site and finding out that the machine cost us, let's say, 15,000 euros. Is it then a good or bad thing? At the same time, with this knowledge inside the company, we may save, for instance, 50,000 euros."

Moreover, a strategic investment may also be based on the cooperation with other parts of the value chain [**Social foundation**]. Indeed, while investing in an ecosystem, investment calculations become even more complicated, as a lot of information is shared and a company does not need to pay for that information. However, it is supposed that information goes both ways, and the "win-win" principle is followed [**SWOT sensors**] (H6):

> "We are pursuing a kind of 'manufacturing Linux' model. As we develop something for the ecosystem and it is useful, we try to give it for free to the

> ecosystem. With the same principle, another company in the ecosystem is doing reciprocal development and shares that information with us for free."

Interestingly, strategic investment decisions can be assessed, at least partially, even in collaboration with potential competitors, if they are relatively openly sharing their experiences with a new technology. One interviewee had an interesting account on this topic [**Social foundation**] (H2):

> "We are able to discuss [with other actors in the ecosystem] the technology and to decide what kind of equipment is worthwhile to acquire and where to invest. It is not reasonable to purchase overlapping and competing technology. I think this is 'smart industry' thinking, in which there are no solitary and stupid actors, but rather a network that able to coordinate. This is how everyone [in the ecosystem] can do their own best and we are not killing each others with the competition, as the markets are still small and in the emerging phase."

Generally speaking, the interviewees regarded the *spirit* in the industry as very positive and open. As a consequence, this spirit yields *optimism*, *trust* and *cooperation* among the actors within the ecosystem [**Culture creator**]. When interviewees were asked to describe their strategic investment that was made in collaboration with another company, one decision maker argued [**Social foundation**] (H4):

> "This framework is based on trust and collaboration. Of course, money must come from somewhere. Normally, when an investment is made, one calculates that it should be immediately profitable. With this kind of partnerships, it is possible that in effect everything else that the investment yields is part of the same calculation. Typical calculations find out if the utilization of a machine is enough and if it is profitable. However, in this [framework], that kind of mathematics is not the most important one. Instead, we consider the broader effect and the bigger business that is achieved [with this investment]. Machines are means to help reaching that goal."

While the calculations regarding traditional investments are made rather straightforwardly (for example, with net present value and payback time, as well as with some criteria for what is good or acceptable), the interviewee's accounts from the empirical materials draw another kind of picture that puts more weight on emotions in strategic investments, as one interviewee described it [**Decision enabler**] (H6):

> "I do believe that emotions or those kinds of associations have a bigger significance in this [strategic investment] than in traditional investments related to new production systems or manufacturing lines. The traditional investment decisions are made mostly with numbers. However, in this [strategic investment], it is so strongly about changing the mindset and changing the image of a company, that is damn difficult to calculate. And it is not counted in this, by any means. Nevertheless, it [the change in mindset] is an important thing that comes along, and everybody needs to take care that it is implemented as we go."

Since there are so many assumptions about the future state of affairs, the *feeling of uncertainty* renders many factors unquantifiable. As a consequence, typical investment calculations (such as return on investment or payback time) are difficult to make (H1–H6). And therefore it appears more likely to have feelings of emotion rather than investment appraisals in the driver's seat while making a decision. One of the interviewees put it this way [**Decision enabler**] (H6):

> "Yes, we have taken them into consideration. I mean the payback [time] is one and the net present value is another KPI [key performance indicator], as we are doing the general investment appraisal. The internal rate is counted in the payback [time]. As we speak of this [strategic investment], we move on to a different mode of thinking. I am not sure if that [the general investment appraisal] applies [to this strategic investment]. The business case or the way of thinking is different, that is to say, we are trying to build an ecosystem. In this context, the calculations are interesting, since we should compute some benefits for building the ecosystem as well."

Regarding the *subjective view* on investment appraisal in light of the bigger picture, the reply of one interviewee was illustrative [**Learning device**] (H5):

> "One significant milestone of this [strategic investment] is that we build our understanding and knowledge about this [3D printing technology], but also about other things, such as automatization and how we should use robots. The calculations are not impossible, but it is more difficult than to assess one investment in one site, and determine if this is profitable or not. Actually, it is a matter of interpretation."

In these situations, in which investment calculations are made, only the "known" facts, whether relevant or not, can be assessed. And thus the *feeling of confidence* is crucial for decision makers [**Inner compass**] (H5):

> "I have noticed that, especially in Finland, one needs to know the facts pretty broadly, albeit they would not be so relevant anymore. However, here we go pretty much with facts up front, even if it were not necessary. Rather easily, if one cannot provide facts for one aspect, then there is no confidence at all."

All the interviewed decision makers in the B2B customers acknowledged the *feeling of high uncertainty* in terms of cause and effect. For example, they cannot just copy the benefits of advanced manufacturing (i.e., 3D printing technology) from another industry, such as the aerospace industry, and figure that this is a profitable business [**SWOT sensors**]. Instead, they need to understand what this new technology means in the context of their own industry, and find the added value there (e.g., lighter structures, more rapid cooling, better heat and mechanical resistance properties, flexible customization, totally new properties, or upgrades to existing products). As one interviewee illustrated this point (H5):

> "We cannot just look at Airbus and do the same and start to make money. It does not work like that."

As the B2B customers are dealing with a new emerging technology, there are several risk factors that invoke the *feeling of uncertainty* in terms of cause and effect, and this influences the *feeling of risk* during the strategic investment appraisal [**Last gatekeeper**]. One interviewee gave an example of how they try to assess risks (H6):

> "They [risks] just need to be calculated in. Okay, there are actually many different ways [to do that]. In practice, we are not calculating [unknown] risks, but only what we do know for sure. Of course we consider some 'contingencies' in the calculus regarding the benefits, and secondly, the costs. And then we produce a sensitivity analysis. So, as we have the factors we are sure of, then we compute the sensitivity analysis on top of that, typically plus or minus 10 percent."

Nevertheless, the interviewee emphasized that the known risks are managed mostly in the project implementation phase. Furthermore, it is not uncommon that the *risk outlook* may change [**Call-to-action**] (H2):

> "For instance, if we have ongoing projects, and if we discover that these particular projects are not going to be realized, then the risk increases—especially if we have already invested in a new machine and some of the projects are not going to happen."

While the *feeling of uncertainty* is high, one interviewee considered the calculations only as a reference point [**Inner compass**] (H1):

> "As we go into a new technology, these investment calculations are, after all, referential values. If we think that in 5 to 10 years this [technology] could start to have a significant role, it is quite hard to say what its payback time would be."

Sometimes this can be problematic, since this kind of calculation can be seen as requirements that need to be met in order to carry out an investment. Nevertheless, the interviewee explained their situation [**Call-to-action**] (H1):

> "This investment has been considered from the point of view that this technology will be compulsory in the future. If we are not investing in it, then a part of our business is out. Thus, if we had made an investment appraisal in terms of a particular payback time, we would probably invest in something other than the 3D printing technology. This is one critical element that distinguishes strategic investments from conventional investments that are typically evaluated in the short term. However, strategic investments are more like a decision to take action, for example to build a factory in Sweden and invest in it. Even if one can make various calculations, in the end the decision is based on the choice that now the focus of the operations will be on the factory in Sweden."

As a result, traditional investment appraisal techniques (e.g., payback time, net present value, other cash flow estimates, internal rate, and ROI) do not seem to apply very well in strategic investments under the *feeling of high uncertainty*, especially in terms of objectives [**Decision enabler**] (H1):

> "Even though we would do several scenarios, no one is able to tell if one is better or more in the right direction than the other. As we go over the 'visible horizon', no one can really know what will happen next year. It is like we try to anticipate what will happen in 3 to 4 years, it is a pretty tough call to say what will be going on in the world then. If we take investment in a paper factory as an example, we cannot say what the situation there will be after 15 years. However, those decisions are still made, and they are based on something."

Finally, the decision maker delivered the main point [**Inner compass**] (H1):

> "While the management of a company sets the question of whether the company wants to be in this 3D printing business, it is then much more difficult to think how one could compute the payback time. It is more like writing down the

> assumptions on a piece of paper, rather than the calculations giving some kind of answers."

When the uncertainties are high and calculations do not easily apply, the feeling of emotion, such as *confidence* in a new technology [**Culture creator**], *trust* in surrounding people [**Social foundation**], or sometimes the *felt necessity* of an investment [**Call-to-action**] give a decision maker the needed *stamina* to face the obstacles and the necessary *"drive"* to go forward with decision-making. For instance, one interviewee put his/her feelings of emotion in this way [**Drive booster**] (H3):

> "As one is constantly following what happens in technology or what is going on in the [3D printing] industry, so advancing this [trend] here in Finland gives a powerful drive."

As interviewees were asked about what kinds of feelings they have had during the strategic investment decision-making process, one of the decision makers summed up his/her *positive feelings* [**Culture creator**] (H2):

> "I have had, after all, a feeling of great enthusiasm and positive feelings in general. I have the desire to take these things forward."

Another interviewee also opened up and stated [**Drive booster**] (H1):

> "When one is pioneering something new, it is always an opportunity, and thus it increases the 'drive'. Our people who have been involved with the investment project have been very excited [**Social foundation**] and willing to get involved in the build-up of the venture. Excited feelings, indeed!"

In addition, the *positive feedback* from customers [**SWOT sensors**], as the company is sharing knowledge about the new opportunities of 3D printing technology, is giving the decision makers the positive "drive" (H1; H2). One interviewee gave an example of the feedback after a customer meeting [**Drive booster**] (H2):

> "Those examples, what we show to them [the customer] and what is possible to do with this [technology], hit right on the spot for their business. This customer told us that it [the meeting] was a positive surprise. Perhaps it gives you positive energy, so that you have the stamina to 'preach' about this [technology]."

As a consequence, the *positive drive* builds up intuitive feelings of emotion, thus also affecting the *assumptions* and the *outlook* [**Decision enabler**] that decision makers maintain (H2).

Therefore, the feelings of emotion affect the importance and proportional weight given to a particular *assumption* in the investment calculations [**Integral part**] (H2). As one of the interviewees was prompted with a question about what role emotions play during the strategic investment decision-making process, the decision maker replied openly [**Inner compass**] (H1):

> "Of course, we have the calculations and the reasoning. Thereafter, one's own intuition and emotion affect the judgment of what is felt to be the strongest or weakest points. Indeed, at this point, emotions have an influence. The calculations are just calculations, and they have been made with some assumptions. One needs to evaluate which of those assumptions are the strongest, and emotions affect that [evaluation]. I cannot say whether it is emotion or intuition, but rather I consider them as the same thing."

Since the 3D printing industry is still in its infancy and involves the *feeling of high uncertainty* in terms of cause and effect as well as objectives, all of the interviewees acknowledged that *intuition* has an important role to play. As one interviewee stated his/her view on intuition [**Decision enabler**] (H4):

> "It is about taking risks and guessing. Indeed, we are anticipating that this is what is going to happen."

When probed with a question about whether intuition gives the *feeling of something appearing to be the "right thing",* one of the interviewees answered [**Inner compass**] (H3):

> "Yes, exactly. This is still a new technology. Even though there are some prior experiences, those are still quite narrow. For example, with a machine tool, it is a quite fast calculation to compute how much it [the machine] produces 'some shafts'. Nonetheless, these 3D printing machines are disparate, and the technology is different. We are able to use rather good guesses, to some extent, all of which do not necessarily always hold in the real world."

As prompted with a question about the *role of intuition* when there are uncertainties in investment calculations, one decision maker replied [**Decision enabler**] (H5):

> "In a simple world, we have, let us say, three options; and we can easily compare them. As we then choose among them, we can have three follow-up questions, and then we calculate them all and decide that this is the best alternative. Now, however, we can have a thousand different alternatives at different levels, so it is impossible to know [them all]. One needs to trust in the openness and co-creation, since no one is able to do this alone [**Social foundation**]. There are a huge number of factors, information, and aspects that affect [the situation]. The facts basis is needed. However, I have compared this to be something like playing in a music band. Everyone needs to have their own post, and then one trusts that the bass player and drummer take care of their own posts, and it [the band] works as a team. Everyone listens to each others' opinions. Nevertheless, the best decisions are made intuitively [**Inner compass**]."

Another interviewee described the *role of intuition* like this [**Learning device**] (H3):

> "Yes, it is quite important. One needs to use it a lot. Whether they are estimates based on what has been done [by the company] before or what has happened to others in this industry, one can use those and make a guess. One needs to estimate how much one can do by oneself in order to get the business growing in a similar way as it has grown elsewhere, and how one is going to attract customers."

One of the interviewees pondered whether the role of intuition also depends on the size of a company [**Integral part**] (H2):

> "Maybe in family businesses and other smaller companies, everything is based on that [intuition]."

A little bit later, he/she told about it in more detail [**Call-to-action**] (H2):

> "Because it is about your own work, you have the urge and intuition to develop that [industry] and to take it further. When these kinds of [3D printing] machines are acquired, it is more about whether we believe that this industry will go forward, and whether there is an outlook for growth. For instance, these calculations, such as cash flow estimates and others, have been made under the assumption that this [industry] will go forward. Of course, I have looked up the financial statements of our competitors as well…and compared them. In that way, it is possible to estimate the growth trend."

Regardless of the big role of intuition in investment calculations, he/she concluded that investment calculations are typically made in the form of an annual income

statement, in which one has to *project* the cost structure and sales [**Inner compass**], and what it mean in terms of products sold (H2).

However, while some of the objectives of a company (e.g., "we need to invest in this or that technology") may be relatively certain, there tends to be several objectives that are not so easy or almost impossible to compute [**Decision enabler**]. One of the decision makers maintained (H6):

> "We surely have different kinds of calculations, but if we are talking about [investments in] manufacturing, we use pretty basic calculations. [In our strategic investment project] we have used calculations that show what does this investment enable. We did that on the basis of what we knew for sure."

Soon, he/she continued [**Decision enabler**] (H6):

> "We have not calculated any kind of payback time for this [strategic investment]. However, we have estimated various added values that we take into consideration. For instance, we want to change our business image more towards a technology company."

The interviewee continued, giving other examples (H6):

> "And another thing is that as we are dealing with the new generations [of people]…the working culture, and how the work is actually made, is changing completely. We also try to pay attention to this issue within that change. And then there is this development of a new ecosystem."

There appears to be no investment calculations, whatsoever, that could show even with relatively good probability if a strategic investment is a profitable or right decision. This is especially the case with investments in a new technology when the markets for new applications are just emerging [**Decision enabler**]. For example, one interviewee explained how with old manufacturing methods, the cost of a particular tool was 10,000 euros. Surprisingly, however, with the new 3D printing method, it costs only 1,000 euros. Moreover, with the new method, the tool was 90 percent lighter and was produced 90 percent faster (H5):

> "Regarding 3D printing technology, there is not a really good accounting methodology. For example, one may use the payback time. However, while we do not yet know what this [technology] is capable of, it is really difficult to make estimates. It might be too optimistic or even too pessimistic."

Indeed, there is no clear methodology for accounting, as this kind of new technology is changing so many aspects of manufacturing, as well as the business models in various industries. Therefore, one cannot really predict and calculate these kinds of *big changes* (that evoke feelings of emotion) [**Integral part**] (H5).

The concluding remarks in this section lay out multiple roles that feelings of emotion appear to play in strategic investment decision-making processes. Since the decision makers in the B2B customer companies are dealing with long-term strategic investments with *high uncertainties*, it is not the most surprising finding that the role of calculations seems to be marginal and sometimes even insignificant. Even though some calculations exist in the background, one of the most important aspects of strategic investment seems to be whether the feeling of emotion is *positive* or *negative* during the strategic investment decision-making process [**Integral part**]. For instance, as the main objective of a strategic investment might be the "soft but wide effect"—changing the *mindset of people* in a company [**Culture creator**]—the decision makers *feel strongly positive* [**Inner compass**] about those soft but wide effect objectives. Finally, even if the objectives of the top decision makers in the B2B customers are relatively clear, a lot of time is needed to gather, learn, and distribute the basic knowledge about the new technology due to the high uncertainty regarding that new emerging technology [**SWOT sensors**]. Hence, it is a rather long process to *prove the possibilities* of the technology and to *convince* people [**Idea broker**]. For a long time, it may *feel* that no one is interested [**Last gatekeeper**]. But when it starts to happen, it appears to happen very quickly, ending up in an *escalation of commitment* [**Call-to-action**], and thereby it continues to accelerate all the time. Sometimes, as *feelings of frustration* build up, focusing on the basic development of the idea in one's own daily work and *feeling supported* by other people (e.g., one's superiors) are considered to be very important and helpful [**Social foundation**]. In addition, the *feeling of freedom*, as well as the *creative process* among one's own team as people work on an idea and build that into something concrete [**Creativity switch**], gives the *"best kicks"* and *"drive"* during the strategic investment decision-making process [**Drive booster**]. The *feelings of achieving* and *succeeding*, albeit there is a *lot of uncertainty*, seem to be the overarching enablers for overcoming troubles with the necessary but insufficient investment calculations [**Decision enabler**]. As a result, regardless of positive calculations, the results of an investment can also be very poor. Therefore, the investment calculations that decision makers utilize either increase or decrease their *intuitive feeling of emotion*, and thus *rationalize* their final decision [**Learning device**].

This is the end of Chapter 4 summarizing the key findings of the empirical results. In the big picture, the key findings indicate that *feelings of emotion play several roles* in the different phases of the strategic investment decision-making process. These roles were illustrated through five thematic analyses. The first theme

was about the role of intuition in the complex and uncertain context of the participating companies, in which the interviewees were engaging in strategic investment decision-making processes. The second theme shed light on the integral and holistic role of emotions in strategic decision-making. The third theme offered evidence about the link between feelings of emotion and incremental learning. The fourth theme looked into how feelings of emotion support rational planning. Finally, the fifth theme analyzed the role of the feelings of emotion in the use of accounting information as top decision makers engage in strategic investment decision-making. Based on the contemporary emotion theory, as well as several readings of empirical materials, and the empirical analysis in the five thematic sections above, the following twelve (12) roles were abductively identified in the empirical materials: (1) integral part, (2) inner compass, (3) SWOT sensors, (4) decision enabler, (5) learning device, (6) call-to-action, (7) social foundation, (8) idea broker, (9) drive booster, (10) last gatekeeper, (11) culture creator, and (12) creativity switch.

By and large, the key findings suggest that the *feelings of emotion play a substantial and integral role* in strategic investment decision-making processes, and thus they *seem to influence the use of accounting information*, as decision makers are in front of strategic investment decisions. This finding alone can be considered to be a rather remarkable contribution to the current management accounting literature, and specifically to the capital budgeting literature, which has kept a distance from the emotion research. Arguably, the findings may also have implications on practice. In the next chapter, the theoretical ideas are contrasted with the empirical findings, and the meaning of the findings in the context of strategic investment decision-making is discussed.

5 Discussion

In the beginning of this thesis, the contemporary theory on strategic decision-making and capital budgeting as well as emotions in decision-making were reviewed, and the theoretical framework was constructed. Thereafter, the study described the applied research methodology and presented the empirical results. In the following section, the key empirical findings will be discussed and contrasted with the theoretical ideas laid out in the theoretical framework. An attempt is also made to illustrate their theoretical contributions to the thesis, and finally, to give an overview of the possible practical implications.

While Chapter 4 was a descriptive narrative of real-life strategic investment processes and made an attempt to answer the research question by identifying the roles of feelings of emotion in those processes, this chapter raises the examination on a more analytical level. The aim of the discussion is to answer the question, "What do the results mean?" and to present the main arguments of this study. Thus, the next section will elaborate and critically appraise the key findings on a more general level, extending them beyond the research question by bringing them into conversation with the relevant literature. The discussion will proceed from the main arguments to the more subtle insights.

The key findings imply that emotion processes and feelings of emotion are playing an *integral* and *holistic role* in the complex and uncertain context of strategic investment decision-making. The main functions of the emotions seem first of all to *enable rational decision-making*, and secondly, to *ensure incremental learning*. The emotion processes build up decision makers' intuitive feelings of emotion through his/her own prior experiences, as well as the factual outcomes and emotional results from previous decisions. Therefore, as emotion processes produce bodily signals in a particular situation and evoke good or bad feelings of emotion, they give essential *intuitive information* to decision makers, and thus support their *rational planning*. As a consequence, *the way decision makers use accounting information in strategic investment decisions is embedded with the roles that feelings of emotion play in decision-making*. In total, twelve somewhat intertwined roles were identified from the empirical materials: (1) integral part, (2) inner compass, (3) SWOT sensors, (4) decision enabler, (5) learning device, (6) call-to-action, (7) social foundation, (8)

idea broker, (9) drive booster, (10) last gatekeeper, (11) culture creator, and (12) creativity switch. These roles were presented and defined earlier in Table 8 and identified in the empirical materials.

As a result, these different, but not necessarily always so distinct, roles of feelings of emotion can be conceptualized as an *integral "smart device" that has various vital functions.* For example, the feelings of emotion provide an inner compass and SWOT sensors for decision makers, and as suggested by emotion research, serve decision makers in multiple ways, such as enabling rational decision-making (e.g., automating, speeding, signaling, intuiting, warning) and processing information (e.g., collecting, converging, connecting, ceasing, canceling). Moreover, as the *feeling of uncertainty* in terms of cause and effect and objectives increases during strategic investment decision-making processes, the role of other feelings of emotion also seems to grow. In addition, the feelings of emotion appear to be tightly connected to *learning mechanisms*, and thus this connection may have a significant role in how top decision makers use accounting information during strategic investment decision-making processes.

5.1 What do the findings mean for strategic investment decisions?

In the current capital budgeting literature, the understanding of how decision makers actually appraise and choose capital investments in practice has been dominated by the idea of widespread use of financial techniques in organizations (e.g., Clancy and Collins, 2014; Alkaraan and Northcott, 2013; Haka, 2006). Furthermore, until very recently, the management accounting literature in general, and the capital budgeting literature in particular, has kept a distance from emotions (e.g., Hall, 2016; Mouritsen and Kreiner, 2016; Boedker and Chua, 2013), which have been mostly viewed as irrational and unwanted phenomena (Peterson, 2007; Shefrin, 2002) in the realm of decision-making. However, the traditional view of emotions, considering them as the antithesis of rationality, seems to be outdated by the contemporary research on emotions in decision-making (e.g., Neumann, 2017; Lerner et al., 2015; Harris, 2014; Virlics, 2014). Moreover, the reviewed studies (e.g., Lerner et al. 2015; Kahneman, 2011; Pfister and Böhm, 2008; Ekman, 2007; Gutnik et al., 2006; Bechara et al., 1997; Damasio, 2006/1994) and the empirical evidence from this study suggest that mostly automated and partly unconscious (Damasio, 2010; Seo and Barrett, 2007) emotion processes and feelings of emotion are, indeed, *holistic* and an *integral part* of human decision-making. In line with contemporary emotion research, they seem to be one of the *main drivers of cognitive reasoning* (e.g., rational planning and incremental learning), as well as one of the most important underlying mechanisms for intuition and expert judgment, as they guide (but

sometimes also disrupt) decision makers' intuitive *inner compass*, which is constantly fine-tuned by prior experiences, the factual outcomes of earlier decisions, and the emotional results of those outcomes, whether we want it or not.

The empirical findings support the *risk-as-feelings hypothesis* (Loewenstein et al., 2001), which explicitly separates expected future emotions from immediately experienced emotions, albeit the underlying emotion processes are essentially the same. Therefore, this study is in line with the *Loewenstein-Lerner classification,* which has positioned emotions as an immediate factor in the decision-making process. In fact, while the effect of emotions experienced during the process of decision-making has only gotten scarce attention in decision-making studies (Rick and Loewenstein, 2008), interestingly, the emotion processes and feelings of emotion appear to be fundamental *decision enablers* for empirically emerging rationality in decision-making. (See also Table 1.) This study is not alone in this line of thinking, as the contemporary neurobiological and psychological data favors multiple decision systems instead of the traditional dualistic view (e.g., Nummenmaa, 2019; Kahneman, 2011; see also Jung, 2016/1921), in which rationality and emotions are in a constant duel. Especially the *neurological basis of decision-making* involves a number of inputs, such as diverse sensory inputs, past experiences, sensory and emotional responses, and anticipation of future goals (Puusa and Eerikäinen, 2010; Gutnik et al., 2006). This stream of literature supports the idea, originally proposed by William James, suggesting that *sensation of bodily changes is actually a necessary condition of emotion*, which produces emotionality in a situation that would otherwise be a neutral perception or interpretation (Ellsworth, 1994). Therefore, emotion processes and feelings of emotion fundamentally influence decision makers' perception and interpretation while making strategic investment decisions.

The findings at hand show that, especially in complex and uncertain circumstances and when stakes are high—such as during a strategic investment decision-making process—emotion processes and feelings of emotion occur more often and are more intense, as proposed by emotion studies (e.g., Neumann, 2017; Li et al., 2014). *While complexity increases and uncertainties are higher, the role of emotions becomes bigger* (see also Figure 11), as emotion processes and feelings of emotion try to automatically rule out the most likely negative alternatives and guide decision makers in the direction supported by positive experiences (Damasio, 2010). Hence, emotion processes and feelings of emotion are very sensitive to information in the decision makers' environment, connecting the information with bodily signals, and thus providing swift *SWOT sensors* in the current situation at hand.

Even if the literature on emotions in decision-making—such as the theory of constructed emotion (Barrett, 2017) or the somatic marker hypothesis (Damasio, 2006/1994)—implied that emotions have a connection to the way our memory

works, one of the biggest empirical surprises were that the feelings of emotion are so tightly linked to the *learning mechanisms*, and thus invaluable for decision makers. This gives new evidence on the importance of *incremental learning* in strategic decision-making and validates much of what Mintzberg (1991; 1987) pointed out more than 30 years ago. Mostly unconscious and automated emotion processes and feelings of emotion constitute a crucial *learning device*, as it has marked similar earlier experiences with an emotional tag, and evokes those experiences from the memory and elicits bodily signals aligned with the recalled emotional results while decision makers engage in new situations (Damasio, 2010), and thus greatly underpins decision makers' learning ability.

Although emotion processes are mostly unconscious and automated, the empirical results suggest that decision makers are trying to make sense of their feelings of emotion, which are aggregate perceptions of what happens in the body and mind while they are having emotions. As a matter of fact, Bechara et al. (1997) argued that people with damaged emotion processes were not able to properly receive emotional signals and thus not able to choose advantageously. This study shows how feelings of emotion are a critical *call-to-action*, as they seem to give decision makers a particular push for taking action. Moreover, with this realization, it is even more evident why earlier studies have suggested that emotions are the main driver of cognitive reasoning while making decisions (e.g., Nofsinger, 2017; Damasio, 2010; Lerner et al. 2015; Virlics, 2014; Zadra and Clore, 2011; Naqvi et al., 2006; Damasio, 2006/1994) and one of the key underlying mechanisms for intuition (Dane and Pratt, 2007), tacit knowledge (Puusa and Eerikäinen, 2010), and expert judgment (Harris, 2014). The empirical findings of this study also suggest that these phenomena are important for decision makers' *incremental learning*, and thus, the ways in which decision makers use that information.

There are solid theoretical grounds for the role of emotions in the decision-making process, which have been paving the way for deeper explorations into the ocean of emotions. In their theoretical framework, Pfister and Böhm (2008) argued that emotions should be seen as having an integral role in decision-making rather than just being a factor affecting decision-making. The authors conceptualized four roles that emotions play in decision-making: (1) providing information, (2) improving speed, (3) assessing relevance, and (4) enhancing commitment. This study validates emotions as an integral part of the strategic investment decision-making process. Moreover, the above-mentioned four roles align with the roles identified in the empirical evidence (see Table 8). However, the key findings of this study not only confirm what has been said before, but they also depict an even more rich and fascinating landscape, in which the emotion processes and feelings of emotion have at least *twelve roles* in strategic investment decision-making, and hence serve decision makers as a *delicate "smart device"* with multiple functions.

As discussed before, it should be clear by now that emotions evoked directly from alternative options provide decision makers with a lot of information (i.e., inner compass, SWOT sensors) about the pain and pleasure for building preferences. Furthermore, while emotions certainly give the necessary push, and help decision makers to make brave but empirically rational decisions in complex situations under high uncertainties (i.e., call-to-action, decision enabler), emotion processes and feelings of emotion sometimes also play the role of *last gatekeeper*, and therefore keep decision makers postponing final decisions. In addition, as suggested by Pfister and Böhm (2008), emotions seem to assess the relevance of different elements in a particular situation (i.e., inner compass, SWOT sensors), thus functioning as a *learning device* and a *call-to-action* by drawing the decision makers' attention to the aspects at hand that are *subjectively felt to be the most important*. Finally, the evidence from the empirical materials implies that emotions, indeed, enhance commitment among decision makers, as emotion processes and feelings of emotion are the *social foundation* of trust and reciprocity, which are fundamental for social relationships and interaction. In this manner, emotions enhance the commitment in a group of people who are then acting beyond pure self-interest. At the same time, however, decision makers are skillful *idea brokers*, and they use emotion processes and feelings of emotion, partly unconsciously, in specific situations as they are selling their ideas to others.

In a recent and comprehensive literature review, Neumann (2017) examined the antecedents and effects of emotions in strategic decision-making that involves high risks and uncertainties, and found that research has focused on positive and negative emotions in decision-making. The author suggests that decision makers have more positive feelings of emotion while engaging in problem solving and planning, such as strategic decision-making, as a result of perceived positive change. The results of this study show a similar and strong tendency for decision makers to have positive feelings of emotion during strategic investment decision-making processes (see Table 9). In the face of problems and difficulties, these positive feelings of emotion can be viewed through the analogy of a spacecraft's booster rockets, which are used to lift the space shuttle up through the Earth's atmosphere, against the force of gravity. Therefore, positive feelings of emotion give decision makers the needed "drive", and function as a *drive booster* that helps them to continue forward, find solutions to problems, and rise up against the difficulties.

On the other hand, while experiencing a negative change—such as time pressure, which is somewhat typical in strategic decision-making—negative emotions are amplified. The empirical findings suggest that the prevailing positive or negative feelings of emotion affect the decision makers' spirit and modes of operation, and thus can be conceptualized as a crucial *culture creator* in strategic decision-making. However, during strategic investment decision-making processes, the empirical

evidence implies that the felt emotions are mainly positive. Furthermore, the positive feelings of emotion also promote creative and innovative thinking, as also proposed by Neumann (2017). Surprisingly, and contrary to theoretical arguments, this study shows that the negative feelings of emotion (such as frustration and distress) may evolve to positive determination and trigger a *creativity switch*, as decision makers are struggling with limited resources and the related negative feelings. The most likely explanation is that these kinds of complex decision-making situations sometimes force decision makers to think more creatively in the face of scarcity.

The contemporary theoretical understanding is that *decision makers' emotion processes and feelings of emotion affect the way they process information* (Neumann, 2017). While having positive emotions, decision makers tend to use heuristic processing and to act in a more intuitive and flexible manner. With negative emotions, decision makers usually engage in substantive processing of information, and categorize stimuli and events in a more effortful and systematic way. Moreover, as argued by Livet (2010), the empirical evidence shows that decision makers' feelings of emotion are not so distinctly pure and basic, but rather they are a mix of positive and negative emotions. Therefore, the overall emotional state may be skewed either towards positive or negative, albeit the theoretical idea is that the emotional state normally is rather neutral most of the time—meaning that physiologically and psychologically, the body state is in a balance.

In general, the key findings indicate that both positive and negative emotions influence the way decision makers use accounting information. In the context of the strategic investment decision-making process, while positive feelings of emotion were overwhelmingly present (see Table 9), decision makers were indeed proceeding in the decision-making process in a *rather intuitive and flexible way*, as suggested in the studies on emotion in decision-making. In contrast to the theoretical idea, the general feeling of decision makers were, without exception, strongly positive, not neutral. The simplest explanation appears to come from the complex and uncertain nature of strategic investment decision-making, in which the emotion processes and feelings of emotion inherently occur more often and tend to be more intense (e.g., Neumann, 2017; Li et al., 2014).

Therefore, the influence of emotion processes and feelings of emotion on the use of accounting information is also likely stronger in complex and uncertain circumstances, especially when the stakes are high. In fact, the role of emotions seems to be in a relatively direct relation to the amount of two key dimensions of uncertainties in decision-making (see Figure 11), namely the uncertainty of cause and effect (i.e., uncertainties in the environment) and the uncertainty of objectives (i.e., uncertainties in the organization). The empirical results support the notion that emotion processes and feelings of emotion guide the way decision makers gather, analyze, and use information. Thus, in the context of strategic investment decision-

making, the empirical findings suggest that since there is a somewhat close connection between emotion processes and learning mechanisms, a rough estimate would be that *most of the time, accounting information is used for incremental learning*, for instance through experimenting. This is illustrated in Figure 11, which gives an idea of the proportional weights among the different roles. Moreover, Figure 11 depicts how the role of emotions grows bigger as the feeling of uncertainty among decision makers is higher. The four letters in Figure 11 stand for the four modes of decision-making (e.g., inspiration) and the related roles of accounting information (e.g., rationalization machine) conceptualized by Burchell et al. (1980):

A) computational & answer machine,

B) compromise & ammunition machine,

C) judgmental & answer / learning machine, and

D) inspiration & rationalization machine.

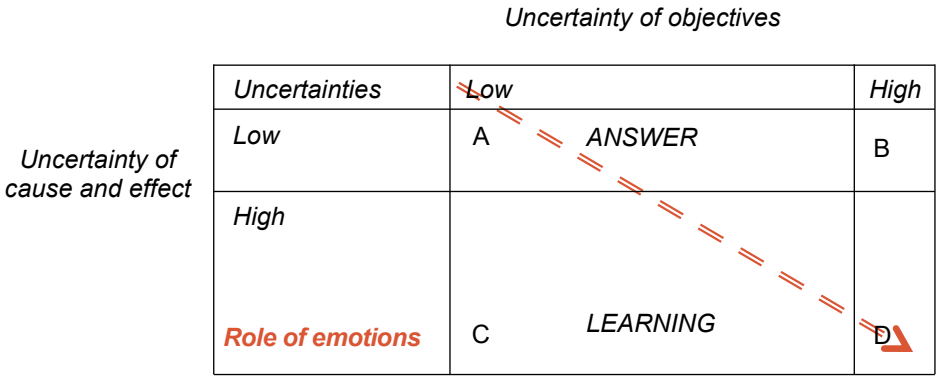

Figure 11. Use of accounting information in relation to the role of emotions (adapted from Burchell et al., 1980).

The typology depicted by Burchell et al. (1980) described *how* decision makers actually use accounting information in different types of decision-making situations. However, as the empirical findings indicate, the emotion processes and feelings of emotion offer a *plausible way* of explaining *why* the decision makers behave as proposed in the Burchell et al. (1980) framework. In Figure 11, the sizes of the four boxes (A, B, C, D) illustrate the relative proportions of each type of decision-making situation, and hence *how often* the decision makers use accounting information in a certain way. For example, the empirical findings suggest that during a strategic investment decision-making process, decision makers are most of the time in an

answer/learning mode, and thus use the accounting information for incremental learning purposes. On the other hand, while the uncertainties of cause and effect were typically perceived as high, the objectives among decision makers were rather similar (i.e., the uncertainty of objectives was low). Therefore, decision makers did not end up in situations where they would have to compromise and use the accounting information as ammunition. However, if there would be high uncertainty of objectives, it would likely involve even more intense emotion processes and feelings of emotion, as it is easily observable, for example, in politics. Finally, as the uncertainty of cause and effect increases, decision makers are not able to mitigate the feeling of uncertainty with more learning. Thus, they start the rationalization process, and the decisions are justified and made by inspiration.

What has been discussed above ties back to the debate in strategic decision-making, in which especially Ansoff (1991) and Mintzberg (1991) were arguing about the nature of strategic decision-making. Whereas Ansoff (1991) insisted that organizations need to implement *rational planning* in order to develop a successful strategy, Mintzberg (1991) pointed out three inherent fallacies in the assumptions of rational planning: (1) operational management is separable from strategic planning, (2) by using techniques and analysis with hard data, novel strategies can be produced, and (3) predicting events is possible. Instead, Mintzberg suggested that strategies emerge in organizations through intertwined formulation and implementation processes, and that they are actually happening at the same time (Mintzberg and Lampel, 1999). The empirical evidence from this study is in line with the critique made by Mintzberg. For instance, under the condition of a complex environment and the feeling of high uncertainty, it is impossible for top decision makers to predict future events. In addition, the empirical results show that there was not much relevant "hard data" in the first place. Hence, the strategies appear to emerge from incremental learning, rather than from the use of techniques and analysis backed up with data.

Since the 1980s, the positioning school was given impetus particularly by Michael Porter, whose seminal contributions ensured that most of the strategy research has followed the microeconomics tradition. As a result, the studies on strategy have usually remained on the macro-level of companies and markets, while *almost ignoring human agency* altogether and simplifying strategy to a few causally related factors. Therefore, the key findings of this study highlight the blind spots in mainstream strategy discussion and support calls made by some researchers (e.g., Jarzabkowski et al., 2007; Pettigrew et al., 2002) to focus more on understanding the *human action* and the *role of emotions* in the process of strategic decision-making; and thus, to take the next steps to explore *strategy-as-practice*, in which strategy is explicitly seen as human activity, something that members of an organization concretely do and feel.

Despite the fact that some recent accounting studies have been calling for more attention to the role of emotions in contingency-based management accounting research, especially in a field study setting (e.g., Hall, 2016), academic discussions on this topic have been sparse. Following the current *affective turn* as an emerging way to theorize the social (Boedker and Chua, 2013), as well as the *practice turn* to explore the management accounting practice (e.g., Ahrens and Chapman, 2007), this study address this urgent call. This thesis positions itself on the field of contingency-based accounting studies employing an interpretive approach and theories from psychology to explain issues in accounting (see Birnberg et al., 2006), and particularly on the scarce domain of real-life case studies on strategic investment decision-making processes. While the contemporary capital budgeting literature has been focusing mainly on theoretical tenets (Alkaraan and Northcott, 2013) and financial techniques, such as use of different hurdle rates and payback periods as well as the use of various economic value-added methods (Clancy and Collins, 2014), this study delivers notable theoretical and practical contributions to the interpretive accounting research and capital budgeting research. Namely, this thesis develops a new theoretical framework and a method for examining the role of feelings of emotion and their influence on the use of accounting and other information during strategic investment decision-making processes. Moreover, this study does not stop on refining the theoretical tenets, but rather goes into the practice of top decision makers, and illustrates the contemporary emotion theory in a real-life case study. In the next section, the practical implications of the key findings are discussed in more detail.

5.2 What are the practical implications of the key findings?

In spite of the fact that the contemporary understanding of emotions in strategic decision-making has developed a lot in recent years, the predominant view and beliefs in the capital budgeting literature appear to be based on the principle that emotions should have neither a role in nor an effect on strategic investment decision-making. As we start to better understand this mismatch, it is proposed here that practitioners as well as accounting researchers need to acknowledge and learn more about this vivid phenomenon called *feelings of emotion*.

By utilizing emotion theory, this study has made an attempt to explore and lay out the emotions emerging in strategic investment decision-making practice. In general, the key findings give us evidence that the role of the emotion processes and immediate feelings of emotion during strategic investment decision-making seems to be rather remarkable. However, this is not what has been traditionally assumed in the capital budgeting literature, as emotions have been mostly seen as the antithesis

of rationality, and the capital budgeting practice and use of accounting information have typically been associated with rational decision-making (Mouritsen, 1994). Moreover, the commonplace rhetoric in company boardrooms has been: *"Let's not get emotional about this."* Therefore, it is not surprising that there has not been much room for emotions in the everyday considerations of top decision makers.

As the emotion processes and feelings of emotion play several roles in strategic investment decision-making, and they appear to have significant influence on the use of accounting information during strategic investment decision-making processes, it is suggested that it is time for decision makers to start pay attention and take advantage of this valuable "smart device". While we are still learning to better understand the role of emotions, the beachhead in the capital budgeting literature has been established, and the "pink elephant in the room" (i.e., something very obvious, one cannot miss it, yet no one wants to be the person to point it out or talk about it), that is to say the emotion processes and feelings of emotion, has been pointed out. There is no further need to downplay the role of emotions.

In total, twelve somewhat intertwined roles were identified from the empirical materials: (1) integral part, (2) inner compass, (3) SWOT sensors, (4) decision enabler, (5) learning device, (6) call-to-action, (7) social foundation, (8) idea broker, (9) drive booster, (10) last gatekeeper, (11) culture creator, and (12) creativity switch. These different, but not necessarily always so distinct, roles of feelings of emotion are integral part of our decision making process and they constitute delicate machinery inside our body and brain—designed essentially to help us. They do not only guide us to navigate with the intuitive feelings of emotion, but they also monitor and provide us with pre-screened information about our current internal and external environments that our emotion processes consider important for us. Perhaps one of the most important function of emotions are that they enable us to make decisions in the first place, especially when there is a lack of "tangible and touchable" information, and when the feeling of uncertainty is higher.

Moreover, as well-working emotion processes enable us to go forward in complex and unpredictable situations, emotion processes also significantly help us to learn from our decisions and experiences following them (i.e., factual outcomes of our decisions). Sometimes, emotions push us to take action, even if we hesitate and are not really sure what will happen. However, at the same time, emotion processes make sure that we are very sensitive to the other people's feelings of emotion. This is crucial for sound decision-making, since all of us have always some bias in our, predominantly unconscious, *emotional memory* (i.e., emotional results of our past experiences). Especially, if we have emotional traumas that are like an ice berg under water—that is something big and heavy, but we typically cannot spot them before we hit them—and if we have not faced and dealt with them properly,

we may develop a kind of "autoimmune disease" in which our subtle emotion processes start partially to work against us.

This thesis has problematized the prevalent assumption in the capital budgeting literature (see Alvesson and Sandberg, 2013), one of rational decision-making, and argues that emotion processes and feelings of emotion play a key role in the complex context of strategic investment decision-making. While decision makers engage in the selection of alternatives and address uncertainties in an organization, as well as in the environment, emotion processes and feelings of emotion occur more often and are more intense when the stakes and the feeling of uncertainty are relatively high (Damasio, 2006/1994). Rather than being the antithesis of rationality, emotions are proposed to be the *enablers, or perhaps even antecedents, of rational decision-makin*g. Therefore, in order to make rational decisions, well-functioning emotion processes, as well as feelings of emotion, are actually needed. This can be seen as a kind of *emotional intelligence*, and we can start to look at emotions as a "smart device" with several useful functions that—if acknowledged, monitored and expressed—can be masterfully employed by decision makers while engaging in strategic investment decisions.

In practice, as the emotions seem to *enable rational decision-making*, it is important for decision makers to be aware of and understand how emotion processes are influencing every decision they make, whether they want it or not. To put it simply, our emotion processes are oftentimes doing the "heavy-lifting" in decision-making (e.g., automating, speeding, signaling, intuiting, warning). Indeed, before we become aware of the situation, our emotions have already done a variety of unconscious actions that have essentially focused our attention to a couple of alternatives that intuively are giving us the most positive feelings of emotion as well as ruled out the options that are related to negative feelings of emotion. Therefore, our superfast and fine-tuned emotion processes are making extensive automatic pre-selection for us, albeit we rarely are aware of the whole process.

In addition, automatic and mostly unconscious emotion processes are working hard for us to *ensure incremental learning*. This is actually happening through a mechanism, in which the emotion processes are building up decision makers' intuitive feelings of emotion through his/her own earlier experiences, the factual outcomes and emotional results from the decisions made in the past. Hence, in a specific choice situation, as emotion processes produce bodily signals and evoke good or bad feelings of emotion, they provide crucial intuitive information to decision makers, and support their incremental learning through the influence on information processing (e.g., collecting, converging, connecting, ceasing, canceling), and therefore emotions affect also decision makers' rational planning. Consequently, the practical use of accounting information in strategic investment decisions is always embedded with the roles that feelings of emotion play in

decision-making, and these feelings of emotion help decision makers to better evaluate the available accounting information against their intuitive feelings, and thus give impetus to their learning process.

The findings imply that the emotion processes and feelings of emotion appear to play a role in how top decision makers use accounting information in different choice situations. Hence, while decision makers in practice are in front of strategic investment decisions, it is argued that emotions also *influence on decision makers information processing* in several ways. Based on the empirical analysis, five tentative roles were found: (1) secondary use, (2) selective use, (3) downplayed use, (4) experimental use, and (5) increased use. *Secondary use* means that decision makers did not value the accounting information as the most important source of information, as they preferred, for instance, talks with other people in the industry. The same conclusion was made by Lumijärvi (1991), who pointed out that even if accounting information, such as investment calculations, is used during a capital investment decision-making process, it is not the most influential factor. Instead, as the case study by Wikman (1994) proposes, accounting information is only third or fourth among decision-making criteria as the final investment decisions are made. This fact also highlights the role that emotions play in a form of social foundation among decision makers as peer-to-peer information is actively preferred. *Selective use* refers to the mostly unconscious actions of emotion processes and feelings of emotion that intuitively guide decision makers' attention to the accounting information that is subjectively felt to be most important. When the feeling of emotion is strong (for example, strongly positive), even the seemingly obvious accounting information or lack of it (such as an unsatisfactory ROI or payback time) may go unnoticed, and hence decision makers commit themselves to the *downplayed use* of accounting information. While decision makers were driven by the general positive feelings of emotion, they often engaged in the *experimental use* of accounting information, and use it for learning purposes. Finally, feelings of emotion sometimes cause an *increased use* of accounting information. This was especially the case when decision makers felt great excitement, faced tough problems, or postponed the final decision. As the scope of this study is limited, however, these tentative practical implications on the ways that decision makers' information processing is affected by emotion processes and feelings of emotion needs to be considered with some caution. Thus, more focus on this aspect is needed in the further studies.

Nowadays, it appears that top decision makers are talking more openly about the feelings of emotion and their various roles in the strategic investment decision-making process. Indeed, there are clear indications of the usefulness of emotions in the context of management team practice, especially if the decision makers are willing to express and put their feelings of emotion into words and communicate

them to each other. This may increase the commitment, satisfaction, motivation, innovativeness, and enthusiasm of the top decision makers, which arguably give a stronger base for strategic investment decisions. Finally, while traditional investment appraisal methods may not be so helpful in complex and uncertain strategic investment decisions, positive feelings of emotion and the feeling of uncertainty seem to increase the role of intuition and to guide decision makers towards brave but mostly successful strategic investment decisions.

6 Conclusions

This chapter summarizes and concludes this thesis. Strategic investments are perhaps the most important decisions top management engages in, and the decisions are typically made in very complex and uncertain circumstances. Investments are related, for example, to company acquisitions, building advanced manufacturing lines, or acquiring new technologies. These investments involve high risks and tend to have profound and long-term effects on the success of a company. However, evaluation of these multidimensional effects is usually not easy, as their dynamic aspects are hard to quantify in terms of currency or probability. Moreover, the effects are not necessarily limited to one plant or company, but rather they radiate throughout the ecosystem of a company.

Since the beginning stages of the capital budgeting literature, and until very recently, most of the studies have been making many but limited refinements and explorations in the theory, as well as in the calculations underlying the financial techniques, of investment appraisal. However, the recent decades have highlighted the inadequacies of the capital budgeting models, and researchers have increasingly started to view capital investment decisions as an inherent part of a contextually informed and adaptive strategy rather than as the outcome of mathematical present value calculations. This perspective started to emerge as early as the 1980s, when for the first time traditional capital budgeting theory was considered to be inadequate for strategic investments.

The traditional Western way of thinking about investment decision-making has set rationality and emotions in stark contrast, as the emotions have been seen as disrupting rational reasoning. However, contemporary psychology and neurology research suggests that evolutionary developed emotion processes are among the key elements for any kind of human decision-making, and thus also for rational decisions. The inherently intelligent emotion processes work mostly automatically and partly unconsciously, together with several other brain and body processes, such as perceptions captured by bodily senses and memories of our prior experiences. The emotion processes are constantly giving various signals to our consciousness and therefore updating the mostly conscious feeling, an aggregate perception, of what is going on in our body. This is called *feelings of emotion*.

With this contemporary understanding of emotion research, this thesis make a contribution to the capital budgeting literature by bringing the robust notions of emotions, emotion processes, and feelings of emotion into the management accounting literature, which typically has kept a distance from emotions. This allows a theoretically broader understanding of the strategic investment decision-making process, as well as a new theoretical framework that provides a new way of analyzing feelings of emotion empirically in a case study of strategic investment decision-making practice. While new concepts function mainly as theoretical tools and help the management accounting researchers better capture emotions in capital budgeting, the new theoretical framework enables new interpretations of complex empirical settings, as we now can "see" emotions in talks and actions of decision makers in organizations.

The contextual setting of this thesis is based on the industry with relatively positive hype, and it may influence the generalizability of the results, since feelings of emotion might be more positive than in other industries, as top decision makers are considering strategic investments in new emergent technologies such as industrial metal 3D printing. It is also acknowledged that the feelings of emotion of top decision makers—who are accountable for strategic-level decisions and are typically more widely engaged with the context and are receiving more information inputs and thus also more emotional signals—might be more positive than decision makers on other levels have.

Even though the empirical setting in this thesis is limited to the Finnish metal industry, it is still possible to make a plausible theoretical generalization to some extent, as emotion processes are evolutionary developed, and essentially they function in the same way among people regardless of the contextual differences, such as political, economic, sociocultural, technological, environmental, and legal. However, as the feeling of high uncertainty appears to grow the role of emotions in decision-making, it can be argued that certain types of contexts evoke more feelings of uncertainty, and thus the role of feelings of emotion is probably smaller when the feeling of uncertainty is lower. As a result, the context of strategic investments in new emerging technologies may be skewed towards a more positive picture of the role of emotions in decision-making.

Thus, the big question seems to be: *"Are emotions helpful in strategic investment decisions?"* In the midst of complex circumstances, high uncertainty, and big risks, feelings of emotion seem to play several roles in different phases of the strategic investment decision-making process and appear to help decision makers to make up their minds—to consider whether something is good, bad, or something between—and then to take action. As it has been shown, people suffering damages in their emotion processes make irrational decisions or are not able to make decisions at all. In fact, as one needs to be able to make a decision in the first place, properly working

emotion processes and feelings of emotion could be seen as a *necessary pre-condition* for rational reasoning. This challenges the predominant view in capital budgeting, as well as in management accounting. In this manner, this thesis contributes to the accounting literature in terms of a more holistic understanding of what constitutes empirically rational decision-making.

Based on the key findings, this thesis argues for a more holistic understanding of strategic investment decision-making that acknowledges especially the role of emotion processes and feelings of emotion as *enablers of rational decisions* in the strategic investment decision-making process. Therefore, this thesis challenges the prevalent assumption of the irrational or non-rational role of emotions in management accounting in general, and in capital budgeting in particular. In addition, the key findings of this study suggest that feelings of emotion are important for decision makers' *incremental learning*, and thus feelings of emotion seem to influence, in rather remarkable ways, *how decision makers use information*. Indeed, as it comes to the accounting information that has had a dominant role in capital budgeting theory, it appears that *most of the time, accounting information is used for incremental learning*, for instance through experimenting. Hence, the use of accounting information increases or decreases the intuitive feelings of emotion and rationalizes the intuitively taken position in front of available alternatives.

These findings open up a new door for research in management accounting and capital budgeting, as the empirical results show that the feelings of emotion experienced during strategic investment decision-making are relevant, and they have a believably important influence on the use of accounting information. This view can be connected to the stream of earlier management accounting literature, which has sprouted from the humanistic accounting perspective (e.g., Pihlanto, 1994; Lukka, 1990), which proposes that *accounting information is not relevant as such*, but rather it is always situational and related to a context in which a decision maker perceives and interprets the particular accounting information at hand.

As we start to learn more about feelings of emotion and to develop empirically more accurate theorizing on the strategic investment decision-making process, this thesis argues that feelings of emotion can be conceptualized as a *"smart device" with various vital functions* that could be even more useful for decision makers in practice than they are now. This could be labeled as one type of *emotional intelligence*. However, the first step is to explicitly *acknowledge* that this smart device is available when top decision makers engage in strategic investment decision-making. The second phase is to start more conscious *monitoring* of this smart device, i.e., to be more consciously aware of the feelings of emotion and to be self-reflective about those feelings. The third and probably the most difficult step is to deliberately *express* those feelings of emotion, since only by expressing them explicitly and concretely, for instance by putting into words what one is feeling at the moment, is

it possible to understand what we are actually feeling, and it allows us to get important feedback from others and to learn how we can use the invaluable information provided by this smart device that is trying to help us with all its incredible functions.

As the feeling of emotion is mostly a conscious phenomenon that is strongly related to perceptions and memories, it is suggested that we can study the role of emotions in the strategic investment decision-making process by probing decision makers in companies with interviews, questionnaires, and observations. Since it has been presented that there are methods to explore the role of emotions in strategic decision-making practice, this study can also be viewed as a methodological contribution to the management accounting and capital budgeting literature. However, one of the methodological challenges might be that decision makers may try to hide their true feelings of emotion or they are not able to express them properly for some reason. For example, they might think that it is not "professional" to talk about or express feelings of emotion due to their top-level position, in which decision makers should not get "emotional". Moreover, the interpretations of feelings of emotion made by a researcher might be inaccurate.

For decades, the advocates of computational rationality have been trying to suppress human emotions and enhance the belief in the superb calculation powers of computers. Today, there is a lot of debate about artificial intelligence, which for many represents rational decision-making in its purest form, since the human emotions have been erased. For example, the most advanced chess programs are beating the human chess masters purely with their computational capacity in the game, which has been thought to require outstanding strategic decision-making skills. However, emotion processes seem to be the platform for human intelligence and reason that made civilizations prevail, care, and flourish. Neither man-made chess program nor any other algorithm has made, and most probably never will, such remarkable achievements that nature in terms of humans has done. If we just look around us, it is quite easy to observe that nature and all the organisms in it are amazingly intelligent in the ways that humble humans are yet to better understand. Hence, while we are thirsty for thriving in strategic decision-making, we should not downplay the power of the feelings of emotion.

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Appendices

Appendix 1. The qualitative, semi-structured interview guide.

Background of interviewee, a strategic investment decision (SID), and the SID process

1. Could you describe your educational and professional background, your current position and its nature?
2. How would you describe a strategic investment decision? Could you give examples?
3. What kind of phases, if any, you would identify in the SID process?

Investment appraisal techniques, relevant accounting and other (non-accounting) information

4. Could you describe the sources of information that are the most relevant as you are evaluating the SIDs?
5. How would describe the importance of these information sources, i.e., is one more important than others?
6. How do you assess strategic investments? Calculations (ROI/PBT/ DCF/IRR)? When? Why?

Social action during the SID process

7. Who (in terms of position) is typically involved in the SID process? When? Why?
8. Could you describe how the ideas of strategic investment projects typically emerge? What happens then?
9. How would you describe your experience of how others tend to enhance commitment during the SID process?
10. How would describe these SIDs in a general level, if they were though/difficult or easy/simple? Why?

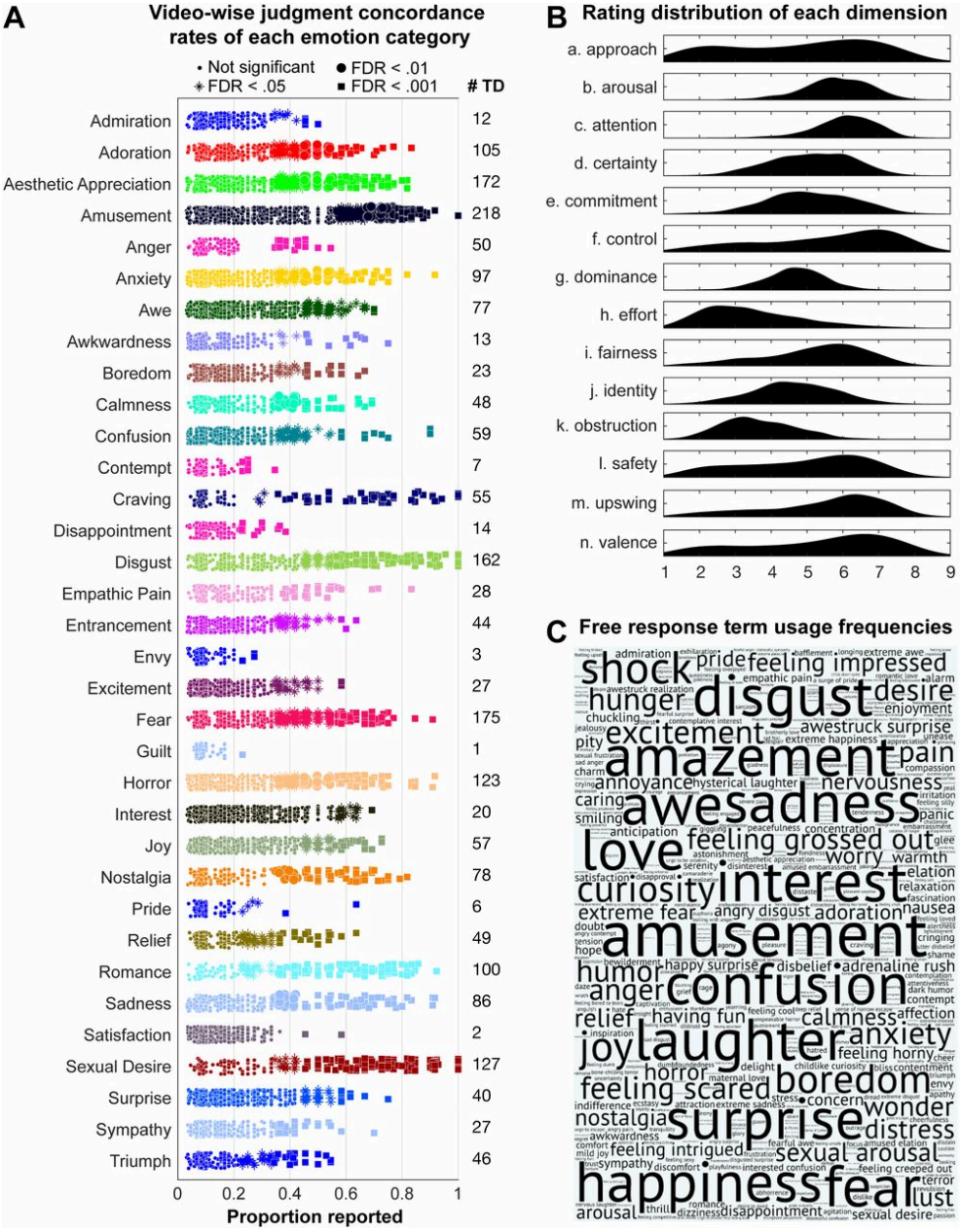
11. Was everything smooth or were there any stronger opposite views? What happened?

Foreshadowing and direct questions about the feelings of emotion

12. Could you describe the sense of risk during the SID process? High/low/personal? Uncertainty of cause and effect? Uncertainty of objectives? How does it affect?
13. How would you describe the situations, in which you cannot be totally sure about the calculations? Intuition?
14. How person's own subjective aspects are taken into account? Important? Why?
15. Could you describe people's participation in planning and problem solving? Active/passive? Discoursive?
16. How would you describe your experience of the SID process, does it give you more 'drive' or other feelings?
17. Could you describe the time-pressure situations, when you need to conclude the SID process faster?
18. How would you describe your experience of innovative and creative thinking in the SID process? Examples?
19. What kind of feelings you have felt during the SID meetings? Examples? Effects?
20. What kind of role do different emotions play during the SID process? Examples?

Appendix 2. The framework of 27 emotion categories.

The figure below depicts the framework of 27 emotion categories which was adapted from Cowen and Keltner (2017).



Appendix 3. List of field observations (in events, meetings, interviews, calls and e-mails).

7.9.2015 (Mon) I started a 3D printing & designing training at Äänekoski.

18.9.2015 (Fri) A phone meeting with Vossi Group Oy.

9.11.2015 (Mon) I started a co-operation project with Nopia Oy to test 3D prints.

31.12.2015 (Thu) I finished with the 3D printing & designing training.

11.1.2016 (Mon) I had a face-to-face interview with Vossi Group Oy (Tampere).

1.3.2016 (Tue) I participated in the metal 3D-printing webinar called *'Metal 3D printing will explode the customer value proposition'* held by Vossi Group Oy.

17.3.2016 (Thu) I visited Konepajamessut (Tampere) and participated in an engineering works (konepaja) seminar, as well as I had two face-to-face meetings with the 3DStep Oy and Vossi Group Oy (Tampere).

13.4.2016 (Wed) A face-to-face meeting with Nopia Oy CEO Teemu Erämaa.

15.4.2016 (Fri) An e-mail exhance with Vossi Group Oy.

9.5.2016 (Mon) I made a research co-operation contract with Vossi Group Oy.

14.5.2016 (Sat) A meeting with 3D printing engineer Markus Helmle (Pori).

21.6.2016 (Tue) An e-mail exhance with Vossi Group Oy.

22.8.2016 (Mon) A face-to-face meeting with Vossi Group Oy (Tampere).

27.9.2016 (Tue) I participated in Alihankinta 2016 exhibition (Tampere).

4.10.2016 (Mon) 3DSTEP-seminar and a face-to-face meeting with Peter Sander, the vice president of emerging technologies at Airbus, and with 3DStep Oy (Tre).

26.10.2016 (Wed) A face-to-face meeting with Teemu Erämaa, Nopia Oy (Pori).

15.11.2016 (Tue) I held a 3D printing keynote at the Sataedu seminar (Ulvila).

22.11.2016 (Tue) An e-mail exhance on Wohlers Report with Vossi Group Oy.

1.2.2018 (Thu) An emotion research webinar in University of Turku (remote).

7.2.2018 (Wed) A Skype-meeting with emotion researcher Johanna Kaakinen.

1.2.2018 (Thu) A whole-day emotion research seminar in University of Turku and a face-to-face meeting about emotion res. methods with Johanna Kaakinen.

29.8.2018 (Wed) A pilot interview with Satakunnan Osuuskauppa CEO Harri Tuomi.

3.-4.9.2018 (Mon-Tue) An onsite business meeting at SLM Solutions (Lybeck).

5.9.2018 (Wed) A pilot interview with the dean of TSE Markus Granlund.

25.9.2018 (Tue) A Skype-meeting on emotion research with Johanna Kaakinen.

29.10.2018 (Mon) A phone meeting with HT Laser Oy.

1.11.2018 (Thu) A research interview with HT Laser Oy (Kaarina).

8.11.2018 (Thu) Two res. interviews with Novela Oy / Delva Oy (Hämeenlinna).

19.11.2018 (Mon) A research interview with 3DSTEP Oy (Ylöjärvi).

26.11.2018 (Mon) Two research interviews with Wärtsilä Oyj (Vaasa).

12.3.2019 (Tue) Metal 3D printing seminar day for industrial companies (Tre).

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