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The Role of Emotions in Managerial Decision Making Processes under Uncertainty

A Systematic Review

by

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ABSTRACT

Purpose – With an increasing attention given to emotions in decision making processes, this paper investigates how and to what extent they can influence managerial strategic decisions under uncertainty. Therefore, this study explores the existing knowledge and reveals underlying mechanisms. The final aim is to provide valuable insights for the top managerial level (i.e. strategy makers) while at the same time supporting the academic research field by emphasising current gaps and proposing further research areas.

Methodology – This qualitative review follows a systematic approach to provide objective findings. 1,200 academic journal articles were screened, out of which 80 were included.

Findings – The literature’s current stand remains scarce and inconsistent. It is widely acknowledged that emotions affect decisions directly or moderate other factors that in turn impact decision making processes. Thus, it is undeniable that emotions interfere with more analytical processes in the managerial context. However, no unanimous conclusion could be found regarding their extent, since exogenous intermediate variables come into play and nuance the role of emotions. These factors and their influences are explained in detail in this paper.

Contribution – This study contributes to the status quo of this research topic by combining the findings of different research fields and displaying the underlying mechanisms between multiple factors investigated separately until now. On the basis of the analysis, a self-developed framework is created, practical implications are presented and insightful inputs regarding future research are provided, thereby shedding light on a long neglected topic in management.

Key Words – Emotions; affect; decision making; decisions; management; strategy; uncertainty; ambiguity; risk

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1 INTRODUCTION

“Hence, in order to have anything like a complete theory of human rationality, we have to understand what role emotion plays in it.”

Herbert Simon (1983)

1.1 Background

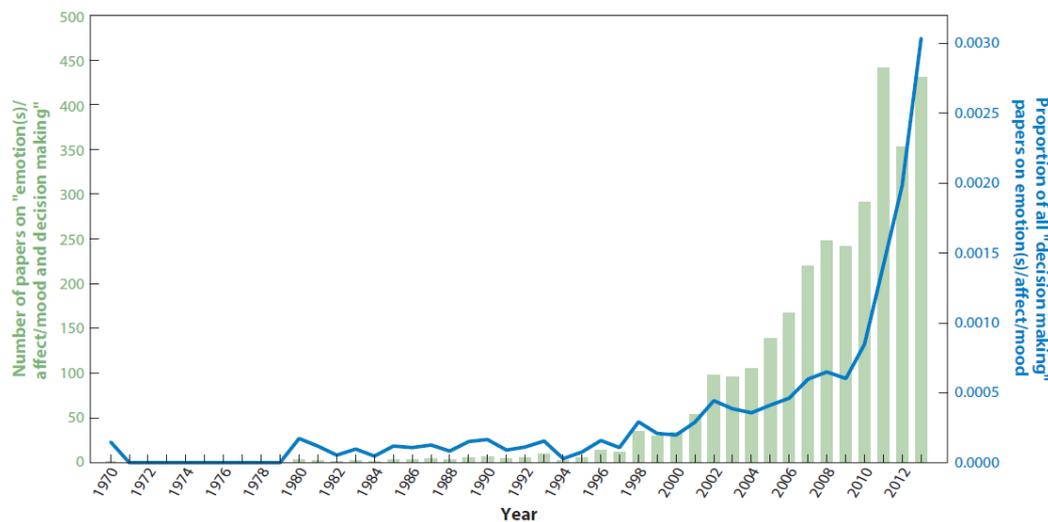
Decision making is regarded as a key aspect of managerial activity. Therefore, it has constituted a vital area of research on organisations and continues to gain high scholarly attention (Loewenstein & Lerner, 2003). However, as can be inferred from Simon’s quote (1983), decisions are only limitedly rational and other factors such as emotions come into play. Therefore, this paper aims to inquire *how and to what extent emotions influence managerial decision making under uncertainty*.

1.1.1 Historical background

For a considerable time, decision making was predominantly viewed as a cognitive procedure: decision makers were assumed to estimate which of diverse alternative decision options result in the most beneficial consequences and to choose the “utility”-maximizing alternative (Loewenstein & Lerner, 2003). Nonetheless, already in the year 1890, the author James analysed the usefulness of emotions and their interaction with cognition and herewith acted as a precursor of more recent research papers in this field (Lacasse, 2015). The term *uncertainty* is a crucial factor influencing the topic of this review and therefore, uncertainty shall be understood as “a continuum from complete ignorance (not even the possible outcomes are known), through ambiguity (the possible outcomes, or at least their dimensions, but not their probabilities are known), through risk (the outcome probabilities are known), and finally to certainty (only a single outcome is known to result)” (Starcke & Brand, 2016, p.909). Thus, uncertainty can be perceived as the overarching category for the aforementioned terms (FeldmanHall, Glimcher, Baker & Phelps, 2016), with ambiguity (interchangeable with the term uncertainty in some papers) and risk being the main focuses of this paper. For a long time, decisions were characterised by an analytical thinking perceiving reason as the main driver in the decision making process (Slovic, Peters, Finucane & MacGregor, 2005) before emotions received more attention as from the early 1980s (Böhm & Brun, 2008). Indeed, an ‘emotions revolution’ has emerged, which has the potential to induce a paradigm shift in decision theories (Lerner, Li, Valdesolo & Kassam, 2015). As depicted in Figure 1, the number of scholarly publications relating to “emotion(s)/affect/mood and decision making”

show a strong development starting from 1980 until 2013. Particularly in the last decade, a tremendous growth has taken place: from 2004 to 2007 a doubling of yearly publications was reported and from 2007 to 2011 the numbers doubled once more. Furthermore, papers on emotion and decision making did not only increase in absolute terms, but also in relative terms as proportion of all scholarly publications on “decision making” (Lerner et al., 2015). Thus, the data reveal the inherent dynamics and increasing importance of the study field on emotion and decision making.

Figure 1. Development of scholarly papers on emotion and decision making.



(Lerner et al., 2015, p.801)

Although the field is comparatively young, the increasing interest and accompanying research in affective and emotional influences on decision making have led to a growing perception that emotional processes should be put on an equal footing with cognitive ones (Volz & Hertwig, 2016). Some psychological scientists go even further claiming that emotions are the dominant driver of most significant decisions in life (e.g. Ekman, 2007, Frijda, 1988, Gilbert, 2006, Keltner et al., 2014, Keltner & Lerner, 2010, Lazarus, 1991, Loewenstein et al., 2001, Scherer & Ekman, 1984, cit. in Lerner et al., 2015). Certainly, this specific view might represent a controversial issue among researchers. Nevertheless, it is undeniable that emotions do play a role in decision making processes according to the current state of research (Lerner et al., 2015). Herbert Simon – Nobel laureate and founder of the concept of *bounded rationality* – was already aware of the decisive role of emotions in decisions. His revolutionary concept of bounded rationality stated that cognitive and situational constraints lead to deviations from rationality in decision making. But as the quote cited above suggests,

Simon knew that his theory would be incomplete until emotions and their respective functions were appropriately incorporated in future theories. Consequently, Herbert Simon already predicted in the early 1980s the substantial attention that further decision research would dedicate to the role of emotions (Lerner et al., 2015). Having a second look at the development in Figure 1, one is almost inclined to believe Simon's observation itself gave the starting signal for the increasing scholarly focus on emotions and decision making and the emerging "emotions revolution".

Since then, some authors such as Zajonc (1980) and Damasio (1994) (cit. in Slovic et al., 2005) have postulated that emotional reactions play a primary role in guiding the analytical process and in enabling a more rapid and efficient process. The affect heuristic¹ and rationality will therefore co-operate and for instance, risk can be processed in two parallel manners: in a more irrational way basing on instinct and feelings as well as in a more rational manner relying on reason and an analytical deliberation (Slovic et al., 2005). Thus, it is assumed that both processes are not as distinguishable as it was assumed in the past (Slovic et al., 2005). Indeed, some researches go a step further than the mentioned "emotions revolution" and even advance an "affective rationality" (Slovic et al., 2002, cit. in Peters, Västfjäll, Gärling, & Slovic, 2006, p.79).

1.1.2 Theoretical background

As Mosier and Fischer (2010) discuss in their review, it seems that emotions have received a great attention in the 'Judgement and Decision Making' research but not in the domain of naturalistic decision making, since the latter assumes that experts solely found their decisions on an objective and rational appraisal. By questioning this deeply anchored belief and opposing it to the concept of affective processing, they summarise the current literature out of which they derive three hypotheses regarding the extent and the way affect may impact experts' decision making processes. The first would be that just as laypeople, experts are affected by their emotions at the time of a decision. Another consideration would be the ability of experts to totally suppress their emotions and thus remain unbiased. The last explanation, the one they argue for, would be that experts categorise their emotions and thereby, will only be affected by the task-related ones.

¹ Affect heuristic can be defined as the dependence on fast and automatic emotional reactions (Slovic et al., 2005)

Furthermore, by addressing the more specific area of strategic decision making, the authors Steptoe-Warren, Howat, Hume (2011) and Kim, Payne, Tan (2006) highlight the importance of contextual and internal factors influencing the top management level during a strategic decision. The emphasis is indeed put on the role of decision makers, as they are the ones responsible for processing these external as well as internal factors in order to adapt a firm's trajectory (Morgan, 1997, cit. Steptoe-Warren, Howat & Hume, 2011). Yet, complexity and uncertainty being prevalent factors of strategic decisions, decision-makers often use biased simplification mechanisms and assess internal and/or external uncertainty relying on both cognitive and affective processes (Steptoe-Warren, Howat & Hume, 2011; Kim, Payne & Tan, 2006). Indeed, Mikels, Maglio, Reed and Kaplowitz (2011) provided first evidence that particularly for complex decisions, a greater reliance on affective impressions may even result in a superior decision quality.

Therefore, basing on the fact that the majority of scholars across different fields of expertise (e.g. psychology, neuroscience, economics) agree that emotions interplay with rational cognitive processes, it could be assumed that emotions and more generally affect influence decision making processes also in the managerial context. Nevertheless, no unitary conclusion has been drawn on the underlying mechanisms, their extent or their consequences. Thus, a review of the current stand shall help identifying the most important findings (which will be presented in the form of clusters) and putting light on further research areas.

1.2 Aim and Objectives

With the recent increase of interest attributed to emotions within decision making processes combined with the fact that decision making is a crucial aspect of managerial activity, it is of interest to analyse the related causal links and managerial consequences. Specifically, this paper aims to emphasise the role of emotions in decision making processes under uncertainty, as this prevails in strategic decisions (Parayitam & Dooley, 2007). Indeed, as mentioned by Steptoe-Warren, Howat, Hume (2011) and Kim, Payne, Tan (2006), the constantly changing and complex environment forces managers and more generally strategic thinkers to make decisions without having access to complete information, while the intensifying competition drives firms to constantly appraise their risk behaviour in order to remain competitive. As scholar findings showed, the influence of emotions on decision making processes is hardly refutable, even more so in ambiguous and risky situations. Since these are also crucial elements of strategic decisions, this paper aims to provide a clearer view on how emotions can

affect managerial strategic decision making processes under uncertainty and thereby highlight practical implications. It is noteworthy to state that this paper will adopt Mintzberg et al.'s (1976, cit. in Mitchell, Shepherd & Sharfman, 2011) definition of strategic decisions, which is to allocate resources, set important criteria and orchestrate significant actions. More precisely, strategic decisions can be classified in four major categories: restructuring issues, collaboration with other firms, budgeting, and portfolio choices (Hickson et al., 1986, cit. in Dooley & Fryxell, 1999).

This systematic literature review aims to identify the major scholarly findings on the influence of emotions in the managerial context. The literature from several research fields (e.g. psychology, management, organisational behaviour) is reviewed and research gaps are identified in order to contribute to future research. These will eventually be summarised in the form of a self-developed framework highlighting the principal findings (clusters and respective relations). The latter could represent a useful tool to detect further research areas.

1.3 Research Purpose

This paper aims to scrutinise the role of emotions in decision making processes under uncertainty by focusing on theoretical and empirical findings within the existing literature. Thus, by taking a purely qualitative approach, the purpose of this literature review is to describe, analyse and synthesise the main trends and outcomes of the current state of research on the topic and to present implications for the managerial context. In doing so, this work shall enable a better understanding of the multifaceted and complex decision making processes under uncertainty and the inherent significance of emotional factors. Ultimately, the study's contribution is to provide an in-depth analysis of the interplay of emotional and cognitive processes for managerial decision making and to elucidate the underlying links and practical implications. Compiling the existing knowledge, revealing interrelations, uncovering contradictions and identifying gaps in the research literature will enable further knowledge development. The objective of this study is to answer the following research question:

How and to what extent do emotions influence managerial decision making under uncertainty?

1.4 Research Limitations

Using a single database and screening the 1,200 first articles out of the 25,000, the most significant results are presented. However, this implies that this paper does not pretend to

include the entire existing literature and it cannot be excluded that relevant studies have been missed. This is also due to the fact that in regards to the time limitation, additional key words combinations could not be added. Further, as the key words search ended in April 2017, some new and relevant papers could have been published since. Finally, by adopting a purely qualitative and objective approach, this paper does not collect data in order to present a new theory or apply existing ones.

1.5 Outline of the Thesis

This paper begins with presenting the methodology applied. Subsequently, the context and general findings regarding emotions, decision making and strategy are briefly explained. The major findings are divided into different clusters and analysed more in depth. Lastly, the interaction and links between the main factors (i.e. clusters) are explained and presented in the form of a self-developed framework in the analysis and discussion part, which will eventually be followed by further research proposals and practical implications in the conclusion.

2 METHODOLOGY

2.1 Research Approach

This paper uses a systematic literature review approach and draws on the method and guidelines proposed by Denyer and Tranfield (2009). It is argued that systematic reviews provide high-quality evidence by applying a replicable, rigorous and transparent data collection process (Tranfield, Denyer, & Smart, 2003). Therefore, systematic reviews differ substantially from traditional narrative reviews since the latter often exhibit a lack of rigor, are susceptible to researchers' bias and are often unsatisfactory in elucidating what the selection of reviewed papers is saying (Cook et al., 1997, cit. in Urinboyev, Wickenberg & Leo, 2016). In systematic literature reviews it is required that the researcher unequivocally specifies how the review was conducted, which type of literature was reviewed and to record exactly how and where the literature was identified. Consequently, the systematic review represents a research methodology which stands out due to its pragmatic, transparent and reproducible approach of synthesising scientific knowledge (Cook et al., 1997, Cooper, 1998, Lettieri et al., 2009, cit. in Urinboyev, Wickenberg & Leo, 2016). In order to ensure such a systematic and transparent proceeding, this literature review was carried out through four stages, following the approach of Denyer and Tranfield (2009):

- (1) Question formulation
- (2) Locating studies
- (3) Selection and evaluation
- (4) Analysis and synthesis

2.2 Research Design

In this section, the aforementioned process stages will be presented to inform the reader how this literature review was conducted in detail.

(1) Question formulation

As with any research, it is paramount to establish the focus of the review first (Light & Pillemar, 1998, cit. in Denyer & Tranfield, 2009). The focus is defined most effectively by posing explicit and clearly framed questions (Cooper & Hedges, 1994, cit. in Denyer & Tranfield, 2009). Rousseau, Manning and Denyer (2008) underline the importance of this first process stage by stating that systematic reviews represent a “comprehensive accumulation, transparent analysis and reflective interpretation of all empirical studies pertinent to a specific question” (p.9). Appreciating the relevance of the review preparation, considerable time was

devoted to formulating the explicit research question (stated in 1.3), which laid the foundation for the systematic literature review.

(2) Locating studies

Given that systematic reviews aim to locate, select and evaluate the greatest possible amount of research articles of relevance to the specific review question (Denyer & Tranfield, 2009), high importance was attached to the second process in conducting the literature review. EBSCOhost database was chosen as the main source identifying the relevant studies. The rationale for this choice is that EBSCOhost provides a multi-database search and offers access to tens of thousands full text-journals, magazines, reports, newspapers and various other publication types for diverse disciplines across the multiple following databases (EBSCOhost, 2017): Scopus®, Science Citation Index, ScienceDirect, JSTOR Journals, MEDLINE, Social Sciences Citation Index, CINAHL Complete, Business Source Complete, Directory of Open Access Journals, PsycINFO, IEEE Xplore Digital Library, MathSciNet, SocINDEX, Arts & Humanities Citation Index, arXiv, Political Science Complete, ATLA Religion Database with ATLASerials, ERIC, GreenFILE, MLA International Bibliography, Art & Architecture Source, British Library EThOS, Communication Source, Criminal Justice, SwePub, Teacher Reference Center, Library Information Science & Technology, PsycARTICLES, Project MUSE, BioOne Online Journals, Persée, Urban Studies Abstracts, LGBT Life, Emerald Insight, RILM Abstracts of Music Literature (1967 to Present only), AGIS Plus Text, Idunn.no, Short Story Index (H.W. Wilson), CogPrints, OAPEN Library, Minority Health Archive, University Publishing Online, MLA Directory of Periodicals, Archive of European Integration, PhilSci Archive and Gale Virtual Reference Library. Being cited as “the most-used paid electronic resource in libraries around the world” (‘EBSCOhost® Research Databases’, n.d.), the authors rely on the worldwide recognition and high quality of this database.

After having chosen the database, significant time was spent on constructing the search strings as the search vocabulary is fundamental for the final results and the articles being included in the literature review. Denyer and Tranfield (2009) even argue that a thorough preliminary consideration enhances the efficiency of the search. By reviewing the research questions as well as the objectives of this review, six keyword combinations were derived. It was decided to use the Boolean operator “AND” to specify the selected articles and thus to increase their relevance for the study. Furthermore, proxies were used such as the term “affect” instead of “emotion”. These terms are closely interlinked since both belong to the

category of *feeling* (Synonym Finder, 2017). More precisely, affect can be described as unspecified feelings and thus represents a “superordinate umbrella of constructs involving emotion, mood, and emotion-related traits” (Lerner et al., 2015, p.801). Consequently, by using proxies, the aim was to include all significant research papers within the context of the research topic. Ultimately, simple operators were included (“affect”) to ensure that only results with the exact phrase were selected and to limit the numbers of results in which the word “affect” is used as a verb. Moreover, truncation characters were added to the word *strateg** to ensure that results containing both “strategy” and “strategic” are included. The following combinations were applied for the database search:

- Emotion AND decision making AND uncertainty (*1126 results*)
- Emotion AND decision making AND risk (*2909 results*)
- Emotion AND decision making AND *strateg** (*2124 results*)
- “Affect” AND decision making AND uncertainty (*3039 results*)
- “Affect” AND decision making AND risk (*8263 results*)
- “Affect” AND decision making AND *strateg** (*7855 results*)

Furthermore, in order to receive the most accurate results, some filters have been implemented on EBSCOhost:

- Only peer-reviewed and academic journals
- Only results in English
- Results classified according to their relevance
- Results between 1980 and 2017, April²
- All available databases on EBSCOhost (see 2.2 (2))

Combining the results found with the six key words combinations, more than 25,000 results were found. However, due this large number, the authors decided to screen the first 200 results for each combination, which resulted in the selection of 1,200 articles. Given that the articles are sorted by their relevance, the authors agreed that this approach is reasonable and does not represent a bias in this study.

²This timeframe was chosen as attention attributed to this topic started in the early 1980s (see part 1.1.1).

(3) Study selection and evaluation

To ensure the requirement for transparency in the systematic literature review process, it is necessary to define a set of explicit selection criteria to appraise the relevance of each article. Hence, it can be assessed if the respective article appropriately addresses the research question and if this study is suitable to be included in the literature review (Denyer & Tranfield, 2009). For this reason, a list was developed containing detailed inclusion and exclusion criteria, which was agreed on by both authors (see Table 1 below).

Table 1. Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Only peer-reviewed journal articles published between 1980 and 2017	Books, edited volumes, book chapters, unpublished papers, theses, reports, magazine articles, peer-reviewed studies published in conference proceedings, etc.
Research published in English	Research published in other languages
Research on emotions and decision making explicitly focusing on <ul style="list-style-type: none">• Managerial or organisational decision making• The context of uncertainty, risk or ambiguity• Long-term and strategic decisions	Research on emotions and decision making related to <ul style="list-style-type: none">• Every-day decision making• Consumer decision making• Ethical decision making
Research in the field of management, decision making, behavioural decision making, behavioural finance or psychology	Research in the field of neuropsychology or neuroscience
Relative generalizability and representativeness	Small representativeness: specific case studies of a small number of firms, under aged participants, experiments done on animals, too narrow focus etc.

To provide a justification for the selection of criteria – particularly the rationale for the exclusion criteria – the table will be discussed more thoroughly. In order to identify and select relevant articles, it was decided to focus exclusively on articles stemming from peer-reviewed journals. Given that peer-reviewed articles are characterised by going through an extensive editorial process, the quality of the manuscript is increased (Denyer & Tranfield, 2009) and its validity is confirmed (American Journal Experts, 2017). On this account, any other type of

research works such as books, magazines etc. is excluded, ensuring that only articles of high quality are incorporated in the review. Additionally, solely research published in English is included since English is the dominant language for scholarly publication.

Regarding the thematic focus of the literature review, the inclusion criteria were derived from the research question as well as from the aim and objectives of this study. Due to the fact that the investigation focus is on the role of emotions within managerial and organisational decision making, decision processes from a consumer perspective are deliberately not taken into account. Moreover, this research intends to scrutinise decision making processes in a strategic context which is often characterised by ambiguity and risk. Consequently, articles relating to every-day decision making are excluded since those decisions fundamentally differ in their nature from managerial decisions under uncertainty. The last thematic exclusion criterion is related to ethical decision making. Although it is admitted that organisations or managers should consider ethical standards in their decisions, ethical decision making has established as an own research field and often focuses particularly on ethical dilemmas (Beu, Buckley & Harvey, 2003; Trevino, 1986). Therefore, the authors agreed on excluding this rather specific aspect of decision making research.

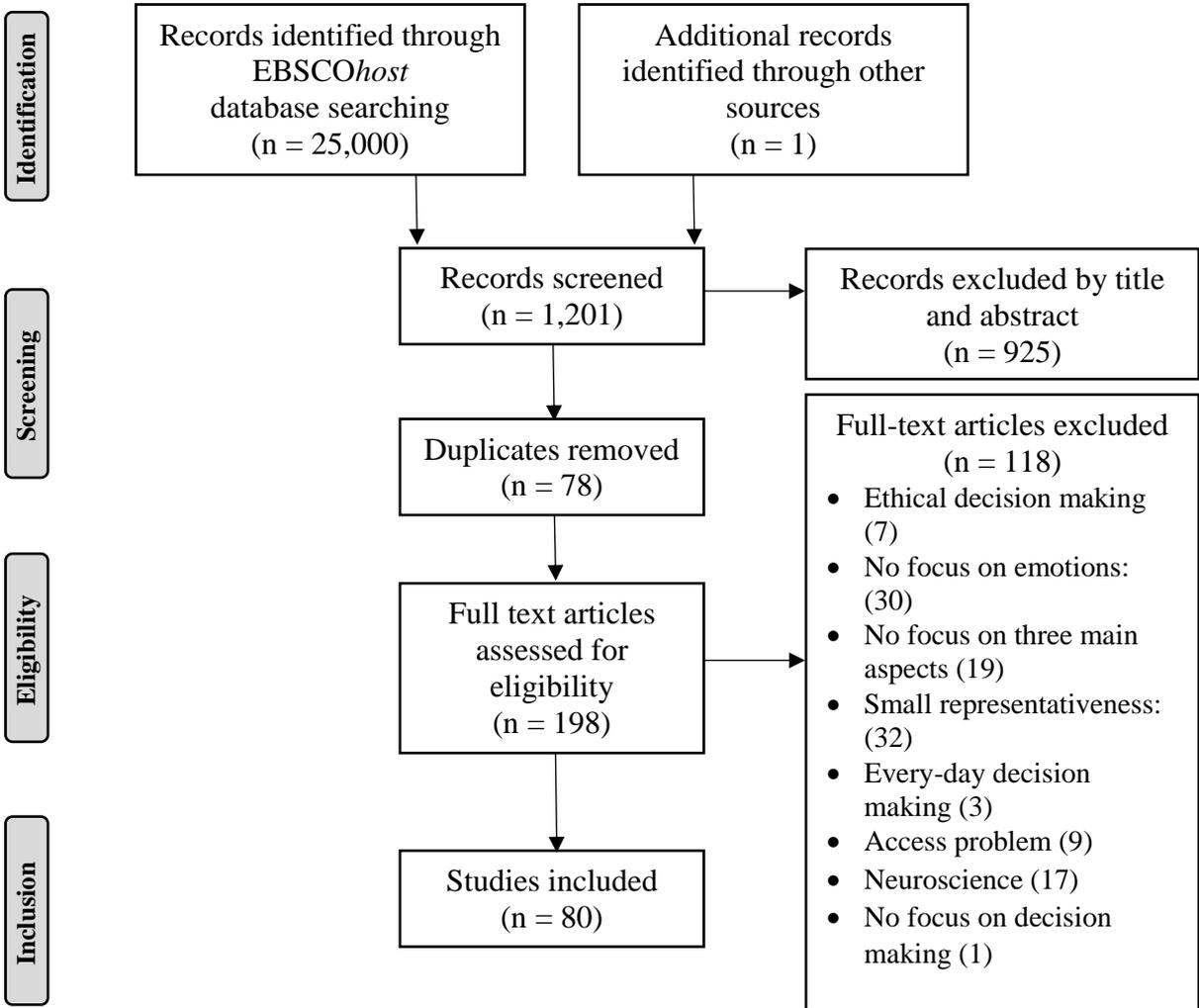
Apart from defining the thematic focus of the literature review, it had to be determined which fields of research are of relevance for this study. As Easterby-Smith, Thorpe and Jackson, (2015) argue, a substantial advantage of systematic reviews lies in their promotion of interdisciplinarity through emphasising cross-disciplinary themes. To enable such interdisciplinarity and to provide an appropriate fundament for an extensive appraisal and synthesis of existing research, research areas going beyond the usual scope of management and business research were taken into account. For instance, research in behavioural decision making, behavioural finance or even psychology was considered in the selection process. However, it was decided to explicitly exclude research from neuroscience and neuropsychology. Given that those research fields mainly concentrate on the functions, system and structures of the nervous system and brain (Oxford University Press, 2017), findings in this area go into too much scientific detail for the purpose of this management study.

Ultimately, articles are assessed for their relative generalizability and representativeness. In cases where papers were very specific or narrow in their thematic focus in the sense that the findings are not applicable for the research purpose, they are excluded from further

examination. Besides, generalizability and representativeness are not given when the sample is too small (e.g. a case study with a low number of firms), when the participants are not of adult age (since managerial decisions require a certain maturity) or not even human (animal experiments). Consequently, such articles are not included in the systematic literature review.

After all inclusion and exclusion criteria had been defined, the actual selection process could be conducted. For this purpose, the authors analysed all titles and abstracts of the identified articles according to the predefined criteria. As a result, 275 out of 1,200 articles were retained for further examination. One additional article identified in our preliminary research was also saved. In order to identify and remove all duplicates, the reference management programme Zotero was used, by which 78 duplicates were eliminated. In the last step, the authors appraised the remaining 198 articles for their eligibility by reading the full-text of the papers – inclusion and exclusion criteria remained the same. After this in-depth screening procedure, 80 articles have been estimated as eligible. To provide a detailed overview, Figure 2 visualises the different process steps in a flow diagram.

Figure 2. Summary of the systematic selection steps



(4) Analysis and synthesis

Basing our research on the selected articles, the final goal is to provide the reader with an in depth understanding of the most significant aspects of emotions with the process of strategic decision making. Thus, articles are analysed and evaluated focusing on their content. The findings are then categorised in different sub-categories. The links between these clusters will subsequently be analysed and result in a final overview depicting the different interactions and influence forces.

2.3 Validity and Reliability

By selecting the articles in a systematic way and basing the appraisal on the presented explicit criteria, this review satisfies the criteria of objectivity. Furthermore, due to the use of the EBSCOhost database providing access to different specialised databases combined with the selection of peer-reviewed academic journals only, it is assumed that the content of this paper is limitedly influenced by a unique field of research and that only verified information and theories are considered. It is to conclude that the findings presented at the end of this paper can be qualified as reliable and valid.

2.4 Chapter Summary

Circumventing possible biases and unreliable articles, this systematic review solely relies on peer-reviewed journals within the 1980-2017 timeframe and encompasses several inclusion/exclusion criteria (e.g. method, generalizability). Characterised by a purely qualitative and theoretical approach, the authors aim to summarise the most important findings until this day regarding the role of emotions in managerial decision making under uncertainty and to depict the significant correlations between the different identified clusters (illustrated by a summarising framework) in an objective manner.

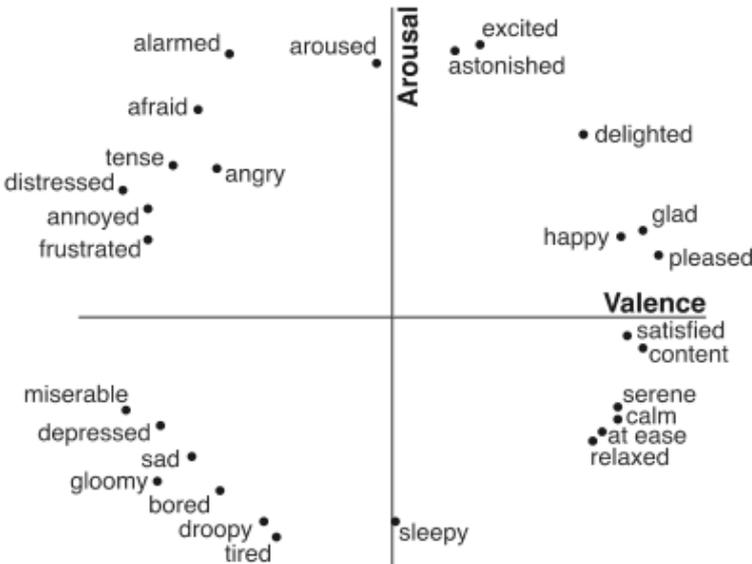
3 THEORETICAL REVIEW

Before elucidating the more detailed results, an overall presentation of the main concepts and general understandings shall be provided. Therewith, the reader shall be able to follow more easily the findings presented in chapter 4.

3.1 Functions of Emotions

More than a mere concept reduced to its valence and deteriorating rational thinking, Pfister and Böhm (2008) postulate that emotions are a component of the rational process having multiple functional facets. Combining their view (also see Böhm & Brun, (2008)) with Peters et al.'s (2006), the functions of emotions can be divided into the following four major pillars: (1) a purely informative role basing on the valence of an emotion (positive or negative), (2) a common factor over time to base on and make conclusion more rapidly, which is also supported by Kahneman (2011, cit. in Lacasse, 2015), referring to emotions requiring less effort and time than reviewing all factors every single time, (3) a guiding tool in the process of information collection and assimilation (i.e. a motivator) and finally, (4) a tool to influence the morality of a judgement. The authors agree that affect and emotions play an important role in decision making processes as well as judgement. Indeed, emotions interact with one's information and decision making processing on which so-called analytical cognition should rely later on. However, these functions certainly are nuanced by additional factors, which shall be analysed in the following chapter. In the figure below, some of these emotions are displayed and classified according to their valence as well as their occurrence. Some of them will be discussed in depth later on. Note that these will not be the only two dimensions examined.

Figure 3. Russell's affect model



(Russell, 1980, p.1168, cit. in Døjbak Håkonsson, Eskildsen, Argote, Mønster, Burton & Obel, 2016, p.990)

3.2 Important Theories and Models

Many of the research papers strive to confirm or infirm existing theories. For this reason, it was perceived as important to present some of the most often utilised ones, as they will be referenced to in the findings.

First, the *Appraisal Tendency Framework* (ATF) represents a pillar in this field by going beyond an emotion’s valence. This framework claims that emotions have to be analysed individually along further criteria, as each emotion will have emotion-specific consequences on outcomes. The ATF below depicts how emotions are characterised by different appraisal dimensions (e.g. certainty, individual control and others) which ultimately influence a decision. As can be observed (see Table 2 below), these several characteristics are impacted differently by emotions, and will in turn alter one’s perception and decision making process (Lerner et al., 2015). Yet, since then, some critics questioning this model have appeared regarding its applicability (e.g. see in Kugler, Connolly, & Ordóñez, 2012).

Table 2. The Appraisal Tendency Framework

Cognitive appraisal dimensions	Illustrations: negative emotions		Illustrations: positive emotions	
	Anger	Fear	Pride	Surprise
Certainty	High	Low	High	Low
Pleasantness	Low	Low	High	High
Attentional activity	Medium	Medium	High	Medium
Anticipated effort	High	High	Low	Low
Individual control	High	Low	High	Medium
Others' responsibility	High	Medium	Low	High
Appraisal tendency	Perceive negative events as predictable, under human control and brought about by others	Perceive negative events as unpredictable, under human control and under situational control	Perceive positive events as brought about by self	Perceive positive events as unpredictable and brought about by others
Influence on relevant outcome	Influence on risk perception		Influence on attribution	
	Perceive low risk	Perceive high risk	Perceive self as responsible	Perceive others as responsible

(Lerner et al., 2015, p.806)

Another important theory in this field is for example Forgas' *affect-infusion model* (1995, 2002, cit. in Cahir & Thomas, 2010). Specifically, in unknown and complex situations, the model states that individuals will tend to appeal more intensively to their feelings. Individuals with a positive affect would more likely follow an affect-based heuristic process than ones experiencing a negative affect, who would proceed more analytically.

According to Broman-Fulks et al. (2014), papers have been describing the consequences of negative and positive affect as general concepts, while sometimes overseeing to distinguish between different emotions. The criticised view is for example illustrated by the *mood maintenance* and *mood repair hypotheses*: respectively, individuals with a positive affect want to maintain their situation and are less willing to take risks while negative affect leads to riskier choices, as individuals aim to attain a positive valence (Cahir & Thomas, 2010; Bruyneel, Dewitte, Franses & Dekimpe, 2009).

This contrasts with the *affect generalisation theory*. The latter asserts that individuals experiencing a positive affect (triggered by either task-related circumstances or incidental ones) will evaluate risk more optimistically and thus become more risk-seeking. The patterns are supposedly reversed in the case of negative affect (Johnson and Tversky, 1983, cit. in Nguyen & Noussair, 2014).

Finally, an often-cited theory is the *prospect theory*. Kahneman and Tversky developed the latter in 1979 (cit. in Rivers & Arvai, 2007). According to their theory, under risk, individuals tend to evaluate an outcome's possible impact on their welfare in comparison to a self-defined reference point. It is assumed that individuals are more affected by losses than gains, thereby explaining why people would take greater risks after losses: they aim to recover from their losses and attain the original welfare state again (i.e. the reference point).

However, these theories are only shortly mentioned and represent only a small fraction of all existing theories. Yet, these should provide the reader with a better understanding of the broader idea: not all theories do agree.

3.3 A Limited Generalizability across Domains and Individuals

Moreover, it is noteworthy to acknowledge - prior to a more in depth analysis - that the importance and thus the functions attributed to feelings differ between individuals and risk perceptions may vary accordingly, as each individual will perceive emotions more or less intensively (Lacasse, 2015; Slovic et al., 2005). Moreover, as was already addressed with the

ATF, the valence (i.e. the feeling of pleasure or displeasure (Baumann & DeSteno, 2012)) of emotions is not sufficient to predict a possible outcome and each emotion can have different consequences, even though they are characterised by a same valence (Zeelenberg et al., cit. in Böhm & Brun, 2008; Lerner & Tiedens, cit. in Peters et al., 2006).

Pachur & Spaar (2015) demonstrate that individuals' decision style could also vary across domains and thus, a unique decision behaviour is not generalizable for one individual across tasks. Specifically, this is due to a different level of expertise within particular domains. The more expertise one has in a specific domain, the more likely it will be that this person uses an affect-based decision mode. This expertise partially relies on associated previous experiences, in line with James's theory (1890, cit. in Lacasse, 2015). Nevertheless, this point of view is not unanimous and strongly contrasts with the naturalistic belief presented by Mosier and Fischer (2010) (see part 1.1.2).

Simply put, it is important to keep in mind that emotions can play different roles, varying across domains and between individuals. Thus, it is safe to say that no universal conclusion can be drawn when it comes to either their impact or their consequences and that the latter may be dependent on further criteria than valence. Therefore, this paper will focus on a more detailed analysis of these criteria in the following chapter, after briefly explaining the relation to strategic thinking, decision making and uncertainty.

3.4 Strategic Thinking and Decision Making

In their review, the authors Steptoe-Warren, Howat and Hume (2011) support Kim, Payne and Tan (2006) and define decision making as the prevalent task of a strategist. According to the authors, the process of defining a firm's strategy should be understood as analysing the past and present results and defining the path to follow with the goal to remain resilient in a complex and rapidly changing environment. Indeed, in today's highly uncertain and complex context, strategic decision-makers often have to rely on both structured analytical processes as well as affect-based systems to assess uncertainty (Steptoe-Warren, Howat & Hume, 2011; Kim, Payne & Tan, 2006). Thus, even though strategy bases on analytical and rational processes, the role of emotions cannot be ignored any longer, especially under uncertainty.

3.5 Decision Making under Uncertainty

A further important element in decision making processes is the risk assessment, which results in weighting the possible negative and positive outcomes and choosing between them

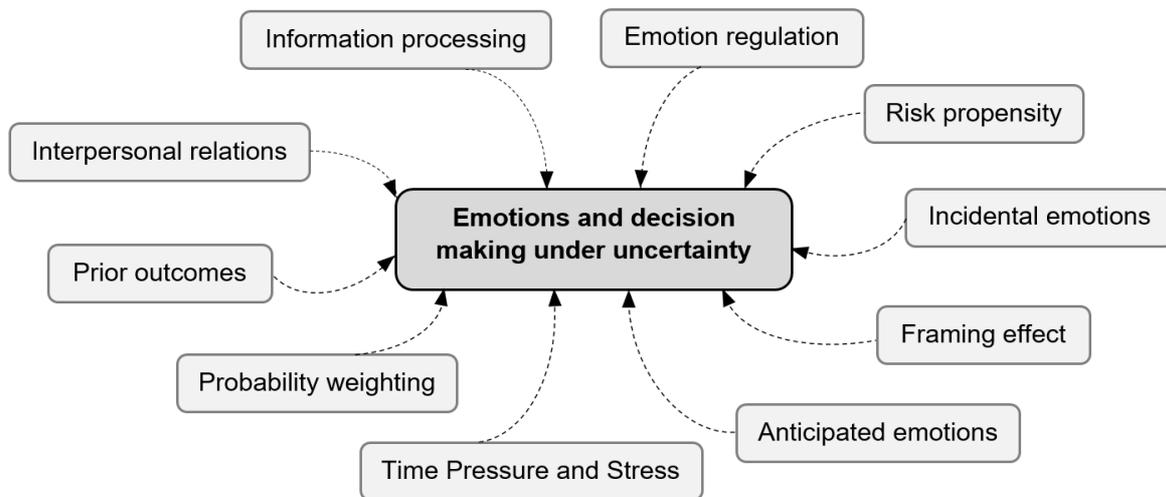
(Ortega, Ramírez, Colmenero, & García-Viedma, 2017), belonging to strategic decision makers' responsibility (Liedtka, 1998, cit. in Steptoe-Warren, Howat & Hume, 2011). A great deal of attention and research has focused heavily on the relation between emotions and risk behaviour (Broman-Fulks, Urbaniak, Bondy, & Toomey, 2014). In the current literature, it is recognised that affect-based heuristics influence decisions under risk (Loewenstein et al., 2001, cit. in Ortega et al., 2017). For instance, the authors Mittal and Ross (1998, cit. in Bruyneel et al., 2009) found that risky strategic decisions were higher under negative affect. Furthermore, a majority of the investigated papers emphasise the role of emotions under uncertainty. Nevertheless, it is not to rule out that emotions might also influence decisions although certain outcomes are at hand.

Even though it is too soon to draw a clear conclusion by relying on only a few studies, it seems that the use of affect-based processes is clearly correlated with risk, ambiguity and decision-making. As these represent determinants of managerial strategic decisions, it is to speculate that emotions also influence strategy makers. In the following chapter, emotions and the related mechanisms are scrutinised more extensively.

4 FINDINGS

Having investigated thoroughly the included articles and their results, this paper's authors identified recurrent findings, which were then categorised in so-called clusters. Each of them will be explained more in depth below. However, to provide a better overview of the topics that will be discussed, an illustration is displayed below. Each article used, its main findings and its attributed cluster are also findable in Appendix A.

Figure 4. Clusters of the systematic literature review.



(Authors' own illustration)

In the first part of this chapter, the effects of specific emotions on risk propensity shall be analysed more in depth, touching upon the main categories that will be explained subsequently.

4.1 Risk Propensity

As already stated several times, uncertainty is a prominent variable of managerial decisions. Thus, it is important to inquire how emotions impact risk behaviour.

4.1.1 Valence and specific emotions

Starting with the case of induced positive affect, Cahir and Thomas (2010) confirm the mood maintenance hypothesis basing on a horses race experiment, stating that positive affect triggered higher risk aversion. Yet, negative affect did not result in riskier choices in their study, on the contrary. This would for instance speak against the mood repair hypothesis. In contrast to this view Zhao, Gu, Tang, Yang, and Luo (2016) conducted a monetary gambling

task and found opposite results for the positive affect while the negative affect did not have an impact on risk behaviour. Indeed, according to the authors, positive incidental emotions provoke a more risk-seeking behaviour in comparison to the groups in negative or neutral states and thereby confirm the idea that individuals in a good mood make more optimistic estimations (Johnson & Tversky, 1983, Wright & Bower, 1992, cit. in Zhao et al., 2016). Fehr-Duda, Epper, Bruhin, and Schubert (2011) also support this view. By conducting risky lotteries, the authors demonstrate that incidental good mood generates a more optimistic valuation of gains and loss probabilities. That is, it is to note that their findings only apply to women: men's perception of probabilities was not influenced by mood. More specifically, their valuation was based on a very objective and more rational process, namely by basing their valuation on the outcome's expected value. However, this does not apply under higher ambiguity (Borghans et al., 2009, cit. in Fehr-Dudua et al., 2011) (more on that topic can be found in part 4.6). Interestingly, Visser-Keizer, Westerhof-Evers, Gerritsen, van der Naalt, and Spikman (2016) claimed that healthy women yield better results in emotion recognition than men. Though a relation should not be excluded, it contradicts with Eckel and Grossman's results that women are more risk-averse than men (2008, cit. in Nguyen & Noussair, 2014). Thus, no clear conclusion can be drawn after all.

Further, Nguyen and Noussair (2014) analysed the effects of positive valence in general as well as more specific emotions (happiness, anger, surprise and fear) by conducting risky lotteries. In contrast to the previously described research papers, they concentrated on so-called integral emotions, which are defined as context related, short and more powerful feelings (Capra, 2004, cit. in Nguyen & Noussair, 2014) compared to moods, which are longer lasting, incidental and softer. The authors mainly build their hypotheses on two principal theories: the mood maintenance hypothesis and the affective generalisation theory, (described in part 3.2). Surprisingly, the authors found partial confirmation for both theories: on the one hand, positive valence leads to less risk-averse decisions in following segments of the experiment while fear leads to higher risk-aversion. On the other hand though, higher anger, happiness and surprise are also correlated with a greater risk-aversion, which is only partially consistent with the affective generalisation theory (i.e. for anger). The authors Kuhnen and Knutson (2011) also investigated the effects of incidental as well as integral affect in risky financial decision making processes. The authors' findings are consistent with previous ones: positive affect (e.g. excitement) leads to higher risk-taking decisions and increased confidence in decisions, which is reversed while experiencing negative affect (e.g.

anxiety). Overall, even though not all findings show consistency, it was demonstrated across several researches that both incidental as well as task-related affect influence decisions.

Focusing more in depth on negative emotions, anger is for instance correlated positively with a risk-seeking attitude whereas sadness results in a risk-averse behaviour (Leith and Baumeister, 1996, Lerner & Keltner, 2001, cit. in Broman-Fulks et al. 2014). Even though both emotions implicate a negative valence, their consequences differ. In accordance with Lerner et al.'s (2015) ATF, these findings suggest that risk behaviour might not be influenced uniquely by an emotion's valence but that other factors play a role.

In the second experiment of their paper, Broman-Fulks et al. (2014) based on the *Iowa Gambling Task* (IGT) (Starcke & Brand, 2016; Bagnoux, Bollon & Dantzer, 2012; Broman-Fulks, 2014; Visser-Keizer et al., 2016), which can be described as participants choosing cards between four decks: two being profitable (C and D) and two unfavourable (A and B) in the long-term in terms of gains. Yet, the participants do not know the probabilities preliminary to the task and have to base their decision on the learning process. The task can be qualified as an ambiguous situation. Eventually, Broman-Fulks et al. (2014) confirmed a positive correlation between anxiety sensitivity and risk aversion. Moreover, their study also demonstrated that overall, anxious participants performed better than risk-seeking participants. Ortega et al. (2017) agree with anxiety being positively correlated with risk avoidance having conducted the *Balloon Analogue Risk Task* (BART). The latter consists of virtually pumping a balloon as much as possible without making it explode. Each pump is financially rewarded but simultaneously represents an increasing risk of losing the accumulated gain if it ends up exploding. Put simply, the more pumps are conducted, the bigger is the risk of losing the entire gain. Additionally, they analysed the effects of depression on risk behaviour and were also able to conclude that in contrast to anxiety, depression does not incur risk avoidance.

These findings pinpoint that scholars do not all agree on which theory might be the most accurate and it seems that not only the valence and arousal come into play. Instead, it seems that each emotion has different effects and that further factors might interfere.

4.1.2 Presentation format and context

Interestingly, Baumann and DeSteno (2012) analysed the effects of incidental anger by conducting a study basing on the *Columbia Card Task* (CCT), in which participants choose

the number of cards to flip. The deck is composed of both gain and loss cards and their respective probabilities and values are given. In other words, the decisions were made under risk. By dividing the experiment into a group conducting the *hot* CCT (i.e. participants get a feedback of their points after each turned card) and the *cold* CCT (i.e. they decide in the beginning the number of cards to turn), this study aims to demonstrate how anger depends on the context of risky decisions. As a result, the study concludes that in comparison to a neutral control group, in the more affect-based process (characterised by the hot CCT), anger leads to less risky choices, while resulting in riskier choices in the cold CCT. Not claiming that both processes (analytical versus affective) are mutually exclusive, the authors argue that the presentation format and the context of a decision might explain the type of information that will be favoured.

By contrast, focusing on sequential decision making, the findings of Rivers and Arvai (2007) showed that sequential repeated losses lead to higher risk avoidance and result in a depressed feeling, which in turn has negative repercussions on subsequent decisions and expectations. It is therefore to conclude that indeed, besides valence, the presentation format (including the frequency) plays a decisive role.

4.1.3 *Level and source of uncertainty*

Kugler, Connolly and Ordóñez (2012) also investigated the consequences of induced (i.e. incidental) negative emotions. The presented findings are consistent with the predictions based on the ATF: fear led to higher risk-aversion in the lottery-based task but to higher risk-taking in the person-based lottery, whereas anger led to opposite patterns, which implies that each emotion has to be investigated separately in relation to further factors.

Further, the authors FeldmanHall, Glimcher, Baker and Phelps (2016) focused their research on the arousal level of emotions while conducting a gambling experiment. The latter enabled them to find out that arousal affects risk behaviour differently depending on the level of uncertainty (i.e. ambiguity or risk): arousal increased risk-avoidance under high risk whereas it increased risk-taking behaviour under ambiguity. Overall, the authors thereby confirm that besides valence and arousal, emotions' consequences also depend on the context and the presentation of decisions (i.e. level of uncertainty). Lastly, one of these prevailing presentation effects is called the *framing effect* which represents a controversial topic regarding risk propensity. Therefore, the related findings will be presented in part 4.7 more explicitly.

In a further study focusing on sequential tasks, the authors Bagneux, Bollon and Dantzer (2012) relied on the Appraisal-Tendency Framework (ATF) of Han, Lerner and Keltner (2007), a prior version of the one presented in part 3.2, to base their research on. The latter assumes that “certainty-associated emotions” such as anger or happiness increase risk-taking behaviour contrasting with “uncertainty-associated emotions” such as fear (p.568). However, these presumably apply to static decision making processes only, not sequential ones. Thus, the authors Bagneux, Bollon and Dantzer (2012) studied risk behaviour in sequential decision making processes under risk by conducting the *Game Dice Task* (GDT) (Brand et al., 2005, cit. in Bagneux, Bollon & Dantzer, 2012). They demonstrated that in sequential decision making processes, in contrast to static decisions, induced certainty-associated emotions (e.g. anger and happiness) lead to less risky decisions than induced uncertainty-associated emotions (e.g. fear), which is consistent with Kahneman’s (2003, cit. in Bagneux, Bollon & Dantzer, 2012) theory that in the case of a certainty feeling, individuals tend to rely more heavily on heuristic processes whereas an analytical approach will be used in the case of higher uncertainty, which resulted in lower effectiveness in this experiment.

According to these studies, it is to notice that both the source and the level of uncertainty play an important role in emotions’ influence on decision making processes.

4.1.4 Performance

In Bagneux, Bollon and Dantzer’s (2012) study, fearful individuals relied less on their emotions and ended with lower results, contradicting with Broman et al.’s (2014) observations. Relying on the IGT and emotion recognition, and more specifically fear, Visser-Keizer et al. (2016) showed additional relevant findings. The research compared healthy participants and patients suffering from traumatic brain injury in their decision making process. Healthy participants showed better results in fear recognition. Fear recognition, in turn, led in both groups to a better decision making strategy (i.e. higher gains) and less risky choices towards the end of the task. The positive effects were strengthened with higher academic level. In a broader perspective though, the authors first and foremost confirm the dual-processing theory (Evans, 2011, cit. in Visser-Keizer et al., 2016), and claim that both cognitive and affective competencies seem necessary to achieve better results. Thus, managers might want to keep in mind that emotion (recognition) is used as an informative tool and guiding tool as presented in part 3.1 and appears to be necessary in order to achieve a more beneficial strategy.

4.1.5 Practical findings

Finally, if looking into more practical findings, the authors Riaz and Hunjra (2015) analysed the decision making process of Pakistani investors by conducting structured surveys. Doubting the fact that investors' decisions under risk are entirely rational, they investigated the role of risk propensity (i.e. willingness to take risks) and risk perception (i.e. risk estimation), as these are the two most important factors influencing risk behaviour according to them. The authors concluded that indeed, risk propensity is a key determinant in investment decisions having direct effects as well as indirect ones by impacting risk perception. Risk perception, in turn, is also affected by framing effects and information asymmetry. Simply put, investors' decisions-making processes are also influenced by non-rational factors. In relation to this paper's topic, this study is very interesting since risk propensity, as could be concluded by the several aforementioned studies, is undeniably affected by emotions respectively. Thus, logically, financial decisions, also defined as a part of strategic decisions in part 1.2, seem to be influenced by emotions and are only limitedly rational.

Further, when firms' risk behaviour is analysed from a strategic perspective, Mariadoss, Johnson and Martin (2014) came to insightful conclusions. Having investigated the manufacturing industry by conducting interviews and surveys among top executives, they analysed the factors enabling higher returns on investment and competitive advantages, which themselves are dependent on a firm's strategic 'intent' (i.e. its strategic combativeness). According to their findings, higher risk aversion fosters the choice of outcomes defined as certain and thus limits the preserved slack (that is, they will invest more). Secondly, risk aversion lowers investments in R&D to the advantage of alternative and less risky solutions such as building alliances. In sum, risk aversion would accordingly intensify the profitable effects of strategic intent on a firm's performance by decreasing reserves and internal investments in R&D. In fact, this is very relevant for the topic of this paper, as the analysis relied on surveys completed by senior executives highly involved in firms' strategic planning. More explicitly, as emotions and moods influence individuals' risk behaviour which in turn influences strategic performance, it could be deduced that emotions do affect managerial strategic decisions.

4.1.6 Sub-chapter summary

It would be utopic to try drawing a unique conclusion about the role of emotions on risk propensity. As was displayed in the results, there are several contradicting results and

exogenous variables. However, it can be said with certainty that affect-based heuristics cooperate with cognitive abilities in decision making processes by influencing more or less intensively individuals' risk behaviour, and subsequently affecting financial and/or strategic decisions. Indeed, their extent and influence goes beyond an analysis of their valence. The type of emotion, the context, the presentation format, the frequency, the source of risk and the level of uncertainty are additional aspects to take into consideration. For this reason, these most recurring factors of the existing literature will be investigated more in detail in the subsequent parts.

4.2 Anticipated Emotions

Traditional decision theory postulates that decision makers who are confronted with risky or ambiguous prospects evaluate the outcomes weighed by the expected probabilities and choose the “utility” maximizing alternative (Loewenstein & Lerner, 2003). Over the intervening years, however, research on decision making has increasingly acknowledged that this theory is too simplistic. In fact, people do not only take into account possible outcomes, but also their emotional reactions to those outcomes when making decisions (Zeelenberg, 1999). One of the most prominent feelings in this context is regret. According to the *Regret Theory*, the expected utility of a choice additionally depends on the regret one might experience by comparing the outcomes of the respective choice to the outcomes of a declined alternative. In case the declined option would have led to a superior outcome, regret is experienced whereas rejoicing is felt when the outcome of the declined alternative would have been worse. Although both feelings only occur after the outcomes of the decision are known, it is assumed that these emotions are anticipated and taken into consideration in the assessment of the different decision options. Consequently, regret theory suggests that human decision making is characterised by the aspiration to avoid negative emotions such as regret and to pursue positive emotions like rejoicing (Bell, 1982, Loomes & Sugden, 1982, cit. in Zeelenberg, 1999).

Janis and Mann (1977, cit. in Zeelenberg, 1999) – two psychologists who were already aware that fear for future regret influences decision making – even claimed that the anticipation of regret results in more ‘rational choices’. They argued that anticipated regret would induce people to think more elaborately prior to their ultimate decision. Similarly, Cheng (2014) maintains that the major function of anticipated emotions is to inform the cognitive system where attention is needed. Consequently, these emotions “assist organisms with limited resources in the management of multiple goals in an uncertain world” (Cheng, 2014, p.106).

Li, Ashkanasy, & Ahlstrom (2013) support this view by proposing that incidental emotions are likely to be irrational, whereas integral (and thus anticipated) emotions may serve the functional and expressive rationality, particularly in decision situations under uncertainty. Thus, one could argue that anticipated emotions do not only influence cognitive processes, but are strongly interwoven with them.

As further studies have found, anticipated regret not only affects the thoroughness of thinking, but especially influences risk behaviour as well. Given that regret is a highly unpleasant feeling, the anticipation of regret gives reason to avoid immoderate risk-taking (Loomes & Sugden, 1982, cit. in Lerner et al., 2015). These findings are in accordance with the Regret theory as people attempt to evade or minimise negative emotions. However, Zeelenberg (1999) demonstrated that the assumption of anticipated regret leading consistently to a risk-averse behaviour is incorrect. In fact, he provided evidence that anticipated regret may also result in a risk-seeking attitude. To elucidate this paradox, Zeelenberg (1999) emphasises the crucial importance of post-decisional feedback. He argues that anticipated emotions like regret and rejoicing emerge due to the comparison of actual decision outcomes with rejected decision outcomes. If, however, there is no feedback available on forgone outcomes, a comparison is not possible and consequently post-decisional regret cannot be experienced. Put succinctly, a decision maker who does not expect feedback on forgone outcomes has no reason to anticipate future regret.

To explain how feedback ultimately influences decision making, one has to keep in mind that people are regret-averse and thus strive to make regret-minimising choices. Often – and as it was the case in most of previous research studies – regret-minimising choices were at the same time risk-averse choices. In real life, though, situations might exist in which the risky decision alternative represents the regret-minimising option. This is the case when a choice between two options has to be made: a riskier option for which feedback on the outcome will always be available and a safer option for which feedback will only be experienced if this option is chosen. Such circumstances implicate that only a decision for the safer option carries the risk of experiencing regret. In contrast, when opting for the riskier option, one will never know what the outcome of the safer option would have been and thus regret can neither be experienced nor be anticipated. Taken together, people generally try to avoid post-decisional regret (Zeelenberg, 1999; Lashgari, 2015). As a consequence, people may either pursue a risk-averse or risk-seeking behaviour depending on which of the available decision alternatives is the regret-minimising choice (Zeelenberg, 1999).

Along with the discovery of the substantial influence of anticipated emotions, some researchers have dedicated to question whether such emotions may be beneficial or detrimental to decision making. Evidence suggests that the degree to which anticipated emotions are advantageous in decisions depends on the specific situation. Efendic and Drace (2015), for instance, concentrated on a specific subclass of decision tasks in their investigation that involves chance and probability. They conducted the so-called Monty Hall dilemma (MHD) with participants whereby one group was induced to rely on affective reactions in contrast to a neutral condition group. The MHD originally stems from a game show in which participants have the possibility to choose one out of three doors with only one door hiding a prize. After the participants have decided for a particular door, additional information is provided as one out of the two remaining doors (not the choice of the participant) is opened. It is however important to mention that the opened door does not contain the prize. In the next step, the participant is asked if he wants to stay with his/her initial choice or would like to switch to the remaining, unopened door. Although it might seem counterintuitive for many people, the most promising strategy is the switching strategy (Vos Savant, 1990, cit. in Efendic & Drace, 2015). The reason lies in the fact that this situation is characterised by a conditioned probability which means that probabilities change due to a previous event. Initially, the probability that any one of the doors hides the prize is $1/3$. Consequently, there is a $1/3$ probability that the chosen door contains the prize, whereas the probability that the other two doors (considered together) reveal the prize is $2/3$. When one of the two other doors (which accounted together for a $2/3$ winning probability) is opened, it is for sure that this door does not contain the prize. Therefore, the probability of the other remaining door has changed from $1/3$ to $2/3$. This implies that switching from the initially chosen door ($1/3$ winning probability) to the remaining door ($2/3$ winning probability) offers indisputably a higher chance of obtaining the prize.

To return to the question what role anticipated emotions play in this decision, it is highly instructive to consider the findings of Efendic and Drace (2015). As their study revealed, participants in the affective condition tended to opt for staying option more often than the neutral condition participants. According to the authors, regret avoidance is the main reason that explains the inefficient decision making. They state that “people ... feel more negative about switching and losing, than they feel positive about switching and winning” (p.137). Consequently, the reliance on affective reactions results in a stronger consideration of anticipated emotions – here regret – which ultimately leads to a detrimental behaviour in

decision tasks such as the MHD. Although these findings might seem to be irrelevant for managerial decision making at first sight, this is not the case. In fact, the insights gained from the MDH dilemma are of relevance for real world decisions as well. Whenever situations characterised by conditional probability arise, people run the risk of making disadvantageous decisions particularly when relying on their feelings and intuitive reactions. It might occur, for instance, that people make a choice or some kind of prediction and continue to stick to it, even if new information has emerged that would alter the initial circumstances. Such behaviour is not seldom observed in decision dilemmas in stock market trading, corporate finance or other gambling-like scenarios. Therefore, it becomes clear that this study – although addressing a rather special decision task – has implications going beyond the entertainment of a game show.

Apart from this study, Worthy, Byrne and Fields (2014) provided further evidence that negative anticipated emotions may potentially impair decision making. As their research results suggest, high levels of worry tend to adversely affect the ability of decision makers to engage in prospection. It was found that great worry induces people to prefer immediate rewards at the expense of larger rewards in the future. The authors argue that worry leads to a greater reluctance towards the uncertainty related to the future outcomes, which is the reason for the preference of immediate rewards. Hence, it can be concluded that high levels of worry are associated with reduced prospection, which ultimately prevents people to make the best long-term decisions. This knowledge is of exceptional importance for managers or any other persons involved in strategic decision making since this is exactly what strategic decisions aim for: to make the best and the most beneficial long-term decisions for the corporation.

Up to this point, research findings have shown that negative anticipated emotions may be detrimental to decision making. In contrast to previous findings, however, Harvey and Victoravich (2009) demonstrated that negative anticipated emotions may well have advantageous implications, whereas positive anticipated emotions are not always beneficial. These findings are related to the *escalation of commitment* phenomenon, which describes the tendency of decision makers to continue to invest additional resources in an obviously failing project. As the results of this study reveal, the level of progress and the existence of an alternative project influence the perceived uncertainty of decision makers. This in turn induces anticipatory emotions that may either be positive (e.g. as a result of a high level of project completion leading to hope or enthusiasm) or negative (e.g. due to the existence of an alternative project which increases the level of uncertainty and thus evokes a feeling of

anxiety or fear). Overall, it was found that low perceived uncertainty as well as higher levels of positive anticipatory emotions increase the probability of escalation of commitment. In contrast, high uncertainty and negative anticipatory emotions foster the tendency to terminate the failing project. To conclude, generalisations about the favourability of anticipated emotions must not easily be made since they have differential effects under specific circumstances and should therefore always be evaluated in their respective context.

4.2.1 Sub-chapter summary

Towards the end of this chapter, it has become clear that anticipated emotions can have a substantial impact on decision making under uncertainty. This relates to the first function presented in 3.1. Namely, emotions can be used as an informative tool prior to a decision.

In their study, Schlösser, Dunning, & Fetchenhauer (2013) acknowledged the significance of anticipated emotions, however they emphasised that people are not only influenced by emotions about potential outcomes, but also by immediate emotions. According to Loewenstein (2000) these are emotions which are experienced at the time of decision making. To further differentiate immediate emotions, one has to be aware that emotions can be either classified as integral or incidental. Whereas integral emotions arise from the decision or task at hand (e.g. anticipated emotions), incidental emotions are unrelated or not directly linked to the decision. As for Schlösser, Dunning and Fetchenhauer (2013), they decided to place the focus of their study on integral immediate emotions. In doing so, they propose that decision makers not only derive utility from the undetermined outcomes their choices may evoke. Additionally, they may derive utility in terms of pleasure or displeasure from the actions themselves. The authors illustrate this with a simple example: if a person has the choice to either flip the coin on a bet or not, this decision may evoke emotions which are unrelated to the anticipated outcomes. For instance, the option of flipping the coin might create a feeling of anxiety or thrill, whereas the option of not flipping it might cause relief or boredom. Consequently, such emotions are directly linked to the available actions and might influence the final decision. The next section continues to elaborate immediate emotions. However, the focus will be on incidental emotions, which have received considerable attention in decision making research.

4.3 Incidental Emotions

Although integral emotions emerging from the judgement or choice at hand have a strong impact on decision making, it was found that incidental emotions may influence decisions as

well. Incidental emotions or incidental affect can be described as “feelings at the time of decision not normatively relevant for deciding” (Lerner et al., 2015, p.803). This implies that incidental emotions can be transferred from one situational context to another and consequently affect decisions which ought to be unrelated to the original emotion (Lerner et al., 2015).

A prominent example of incidental emotions relates to the influence of pre-existing mood on decision making processes. Early research studies already posited that people in a good mood would be prone to optimistic judgements, whereas people in a bad mood are more likely to make pessimistic judgements. As an explanation, a valence-based approach was taken which categorises emotions into positive and negative classes, and hypothesises that emotions of the same valence exhibit similar effects (Lerner et al., 2015). More recent studies investigated the impact of incidental emotions particularly in the context of risk decision making and the findings seem to support the valence-based approach. As the study of Zhao et al. (2016) revealed, positive incidental emotions led to a risk-seeking behaviour in decision making. This mainly corresponds to the above-mentioned results of previous studies that happy people make more optimistic probabilistic judgements (Johnson & Tversky, 1983, Wright & Bower, 1992, cit. in Zhao et al., 2016). In association with financial decision making and stock markets, it was even found that emotions elicited by weather or sports results impact risk-taking behaviour (Edmans, Garcia & Norli, 2007, Hirshleifer & Shumway, 2003, cit. in Zhao et al., 2016). Bassi, Colacito and Fulghieri (2013) examined the link between weather, mood and risk-taking in more detail and provided evidence that bad weather increases risk aversion whereas sunlight and good weather promotes risk-taking behaviour. They argue that this correlation is due to the impact of the weather on mood. Consequently, good weather positively influences the mood resulting in a higher risk tolerance of people and a greater confidence in their ability to assess investment opportunities.

Despite the vast evidence of incidental affect influencing people’s risk-taking behaviour, it would be unwise to draw rash conclusions and generalisations. As it turned out, the extent to which persons are affected by incidental emotions differs among individuals and further depends on the circumstances. In a recent study, a significant gender difference was revealed when investigating the effect of mood on valuing risky prospects (Fehr-Duda et al., 2011). The findings provided evidence that women in a good mood tend to weigh probabilities relatively more optimistically. In contrast, men do not seem to be affected by incidental mood. According to the authors’ argumentation, this phenomenon occurs due to different

decision strategies between men and women: a substantial higher quota of men than of women made their decision by applying a defined criterion such as the maximisation of expected value. Consequently, the orientation towards decision rules, for instance the expected value criterion, seems to immunise individuals against the effect of incidental emotions. Hence, it can be noted that men are substantially more likely to consider the expected value under circumstances with objectively given probabilities. However, a subsequent study found that differences in valuations of uncertain prospects diminished considerably between genders when objective probabilities are not given any more. Interestingly, it is the male gender that is affected much more strongly by ambiguity than are women (Borghans et al., 2009, cit. in Fehr-Duda et al., 2011). These findings seem to be of importance for future business research given that management levels are increasingly characterised by gender diversity (McKinsey & Company, 2014). Thus, a more thorough understanding of how women and men employ diverse decision strategies under risk and uncertainty, particularly in the context of emotional arousal, will provide valuable insights.

As mentioned before, the impact of incidental emotions does not only differ among individuals or gender, but is also context-dependent. Kugler, Connolly and Ordóñez (2012) found that the effect of incidental emotions on risk-taking behaviour hinges on the class of uncertainty involved. In case the uncertainty stems from a randomizing device (e.g. in lottery-based choices), fearful people show a more risk-averse behaviour than angry participants. However, if the uncertainty is related to the unpredictable behaviour of another person, the reverse pattern was observed meaning that anger led to more risk aversion than fear. Although both emotions – anger and fear – are obviously negatively valenced, they evoke opposite reactions concerning risk-tendency under different circumstances. Consequently, the valence-based approach can no longer account for the findings in this study.

Instead, the ATF framework (see 3.2) appears to be more appropriate for explaining the outcomes of this study. In the gambling task, the results equalled the predictions of Lerner and Kelter (2001, cit. in Kugler, Connolly & Ordóñez, 2012). They stated that according to the ATF, anger is characterised by an appraisal pattern, which emphasises certainty and individual control. As a consequence, angry people tend to behave relatively risk-seeking and optimistic in risk assessment. In contrast, fearful people, whose appraisals accentuate low certainty and situational control (leading to a threatening and unpredictable perception of situations), show a more risk-averse behaviour. Thus, the findings in lottery-based choices confirm already existing evidence. The real contribution of this paper, however, was the

discovery of the reversed pattern in person-based choices. The authors argue that the ATF framework can still be applied in this situation since anger emphasises individual and therefore human control in general which leads to an increased awareness that other people might control the outcomes. Consequently, angry individuals might try to avoid control of others by deciding for the low-risk option. Since fearful people believe in situational control, they might not feel a need to evade control by other individuals and therefore act less risk averse than angry people (Kugler, Connolly & Ordóñez, 2012). These findings can be considered as highly relevant in managerial and organisational decision making as strategic decisions are not exclusively made under conditions in which uncertainty is characterised by “randomness”, but also in situations where the uncertainty is person-based. Already in 1994, Ackoff argued that enterprises should be regarded as social systems in which “people individually and collectively play [...] the major roles” (p.179). Moreover, he drew attention to social systems being part of larger systems (such as the society), which underscores the necessity of taking into account interpersonal relationships and interactions in decision making even more (Ackoff, 1994).

To give an interim conclusion, the majority of research articles in this systematic review has focused on the effects of incidental emotions and scrutinised particularly their consequences on risk decision making. Up to this point, diverse study results could be explained by or at least assigned to either the valence-based approach or the ATF framework. Apart from that, the findings of several research works were largely consistent with each other. However, the study of Bruyneel et al. (2009) represents a substantial contradiction to previous evidence. In their investigation, Bruyneel et al. (2009) found that negative affect leads to riskier decision making. This finding is unequivocally in contrast to the studies mentioned above (Lerner et al., 2015; Zhao et al., 2016; Bassi, Colacito & Fulghieri, 2013) stating that negative emotions or mood foster risk-aversion and whose interpretations draw on the valence-based approach. Interestingly, the authors of the contradictorily article posit that the increased risk propensity as a consequence of negative affect can be explained by the depletion hypothesis. The model claims that negative affect leads to mood regulation attempts of people, which ultimately provoke a state of depletion. This depletion, in turn, results in the failure “to resist the temptation of reward associated with the risky option” (Bruyneel et al., 2009, p.165).

Although Bruyneel et al.’s (2009) study is inconsistent with previous findings at first sight, one has to scrutinise the conditions under which the experiment was conducted. Indeed, it is striking that the researchers address negative affect in general, however the feelings induced

in this experiment were distress and upset. As has already been demonstrated by several studies, affective states of the same valence do not necessarily exhibit similar impacts on decision making, but can even lead to differential effects (Lerner & Keltner, 2000, 2001, Lerner, Small & Loewenstein, 2004, Raghunathan & Pham, 1999, cit. in Bruyneel et al., 2009; Kugler, Connolly & Ordóñez, 2012). Consequently, the controversial findings might be resolved by the fact that different types of negative affect trigger diverse behavioural reactions. To confirm this hypothesis, however, future research which does not investigate negative or positive affect in general, but examines the broad spectrum of emotional states in greater detail, will be necessary. Ultimately, it has to be mentioned that the reviewed article integrates emotion regulation as a main factor in its argumentation. This implies that not only incidental emotions affect decision making under uncertainty but additionally (conscious or unconscious) efforts to regulate those emotions play a role behavioural responses. Considering the complexity of influences, the topic emotion regulation is addressed more thoroughly in part 4.10.

4.3.1 Sub-chapter summary

To conclude, it can be emphasised that incidental emotions influence decision making under uncertainty. Most importantly, they affect risk decision making since those emotions often promote risk-seeking or risk-averse behaviour. However, the underlying reasoning for these effects is less clear as the valence-based approach cannot account for all occurring phenomena and even the ATF approach seems to be characterised by limitations – as the concerns of some researchers express (Yates, 2007, cit. in Kugler, Connolly & Ordóñez, 2012). Thaler and Johnson, who investigated the impact of incidental emotions already in 1990 once concluded: “[p]erhaps the most important conclusion to be reached from this research is that making generalizations about risk-taking preferences is difficult” (Thaler & Johnson, 1990, p.660, cit. in Fehr-Duda et al., 2011, p.23). Considering the outcomes of the systematic review of incidental emotions, it seems that their statement still holds true these days.

4.4 Information Processing

As the previous clusters have revealed, emotions can influence decision making in various ways. Interestingly, it was found that emotions also affect the depth of information processing related to decision making. Indeed, numerous studies have shown that positive affective states facilitate heuristic information processing whereas negative affective states promote systematic information processing (Mohanty & Suar, 2014; Bless et al., 1996, Bodenhausen

et. al, 1994, cit. in Lerner et al., 2015). The authors Mohanty and Suar (2014) explain this intriguing phenomenon by stating that a positive mood tends to indicate decision makers that all is well (Schwarz & Clore, 1983, cit. in Mohanty & Suar, 2014). This, in turn, induces people to favour simple, intuitive solutions to problems and to reach a decision faster on the basis of less information compared to persons in a neutral mood (Isen & Daubmann, 1984, cit. in Mohanty & Suar, 2014). In contrast, negative affective states provide information which signal an uncertain or problematic environment (Clore & Huntsinger, 2009, cit. in Mohanty & Suar, 2014). Consequently, negative mood results in a greater aversion of people to rely on their own judgements and leads them to engage in a more systematic and elaborate information processing. The study results of Frey, Hertwig & Rieskamp (2014) confirm these findings by proving evidence that fearful people sample considerable more information before making a decision than happy people.

Although these findings clearly support the emotional valence approach by revealing how positive versus negative affect influences the depth of information processing, exceptions have been discovered which contradict the valence-based predictions. One of those exceptions was found by Bachkirov (2015) who investigated the effects of incidental emotions on information processing in complex managerial decision making tasks. He demonstrated that happiness and anger – two contrarily valenced emotions – have the same impacts on cognitive performance. Both emotions lead to a processing of less decision-relevant information and a more heuristic approach. Whereas the results for happiness can be explained by the valence model, the effect of anger (which obviously represents a negatively valenced emotion) seem to be quite astonishing and contradictory.

However, another approach – the cognitive appraisal framework – was suggested to shed light on these findings. This appraisal theory (see part 3.2) differentiates emotions based on several cognitive-appraisal dimensions. To account for the effects of anger it is argued that the cognitive-appraisal dimension of (un)certainty associated with a particular emotion plays a uniquely important role in the emergence of different processing patterns (Bachkirov, 2015). Indeed, it could be demonstrated that, independent of valence, emotions related to certainty appraisals (e.g. anger, happiness) promote a heuristic and intuitive processing, whereas uncertainty-associated emotions (e.g. fear, hope) encourage a systematic and deliberative processing (Bagneux, Font & Bollon, 2013; Tiedens & Linton, 2001). It was proposed that emotions characterised by certainty appraisals induce the decision maker to feel certain. This certainty, in turn, is interpreted as “an internal cue” suggesting the decision maker that he

opted for the correct choice and that further deliberation or search for new important information is not necessary (Bachkirov, 2015; Kuhnen & Knutson, 2011). For uncertainty-associated emotions, the reverse argumentation is assumed.

Although the logic of the cognitive-appraisal framework seems to be able to explain the impact of anger on heuristic processing, it has to be mentioned that anger – according to previous research – is associated with certainty only to a low to moderate degree. Consequently, the validity of this explanation is questionable. Interestingly, another attempt to clarify the unusual nature of the emotion anger involves the valence model even though anger contradicted the valence-based predictions. Lerner and Tiedens (2006, cit. in Bachkirov, 2015) posited that anger, which has always been regarded as a negative emotion, should be re-defined as a positive emotion. This would resolve the contradiction. However subsequent research on anger seems to rebut this suggestion (Carver & Harmon-Jones, 2009, cit. in Bachkirov, 2015). Thus, an obvious and coherent explanation is not yet available. Admittedly, it should be noted that both approaches already account for a large part of emotional effects, but still: some inconsistencies should be further investigated.

Although research has clearly shown that emotions may either trigger systematic or heuristic processing, it should be noted that there is not necessarily a type of processing that is generally more preferable. For instance, it was found that systematic processing which stems from the impacts of negative effect can exacerbate anchoring effects due to a stronger focus on the anchor (Bodenhausen et al., 2000, cit. in Lerner et al., 2015). Moreover, current research indicates that anxiety, a negative high-arousal emotion characterised by low-certainty appraisals, enhances the anecdotal bias in risky choice situations. Thus, individuals rely more heavily on subjective anecdotal information instead of more factual statistical information which may strongly impair their decision making (Yang, Saini & Freling, 2015). This finding is particularly surprising since anxiety as a negative and uncertainty-appraised emotion should be expected to result in systematic processing– according to both the valence approach and the cognitive-appraisal approach. However, Finucane (2001, cit. in Bachkirov, 2015) emphasises that high-arousal negative emotions impede information processing and therefore represent a boundary condition to the valence model. In this context, it was also found that high levels of negative arousal (e.g. emotional stress) are not only related to less analytical processing of information, but also lead to narrowing of attention, limited information search and finally the selection of simpler decision strategies (Scheibehenne & von Helversen, 2015; Wichary, Mata & Rieskamp, 2016).

Apart from this exception which constitutes a detrimental heuristic, Bagneux, Font and Bollon (2013) showed that heuristic processing can also be beneficial in sequential tasks. In the IGT (see part 4.1), in which participants have to consider emotional cues from prior decisions to be successful, it was found that certainty-associated feelings would encourage intuitive processing and therefore result in more advantageous decisions of participants compared to uncertainty-related emotions. A completely different view, in turn, is provided by Fischer, Fischer, Weisweiler and Frey (2010). They differentiate between three modes of decisions: deliberate, intuitive, and distraction. Whereas the previous presented studies mainly emphasised the differences between heuristic and systematic processing, the authors of this research point out similarities of those two processing modes. It was found that both, intuitive and deliberative decision modes lead subsequently to higher levels of confirmatory information processing. That is, decision makers tend to actively seek information that is consistent with their initial decision and neglect decision-inconsistent information. It is argued that in both decision modes individuals are provided with either a cognitive or affective reason which enables them to assign their decision to a specific cause. This consequently results in a higher perceived decision certainty which provokes an increase in confirmatory information processing. In contrast, when decision makers are distracted during the decision process, they experience a feeling of uncertainty regarding the validity of their decision. As a result, they process decision-consistent as well as decision-inconsistent information more equally. In sum, it became obvious that systematic processing is not automatically more desirable than heuristic processing, nor the other way around. Ultimately, it depends on the situation and the type of decision task which information processing is more advantageous for decision making.

Interestingly, it was found that in addition to emotions, the age of decision makers plays a role in the effectiveness of information processing as well. As the study of Huang, Wood, Berger and Hanoch (2015) revealed, older adults (average age = 75,28) exhibit declines in deliberative decisional capacities, which leads to impairments in deliberate processing. In comparison to younger adults (average age = 24,50), elderly people took into account fewer pieces of information in description-based tasks. However, results indicated that in experience-based tasks, older and younger adults showed similar risk performances. Consequently, the affective and experiential abilities of older people seem to remain intact enabling affective processing almost as good as those of young adults. Although this study did not concentrate on specific emotions, it would be interesting to investigate whether

negative or uncertainty-associated emotions induced to older people would counteract the deficient deliberative capabilities to a certain degree and result in a greater consideration of informational cues. Future research could address this question.

4.4.1 Sub-chapter summary

To conclude, diverse emotions can induce people to engage in either systematic or heuristic processing during decision making. Two major models attempt to provide an explanation for this: the valence approach and the cognitive appraisal approach. Although evidence for both models was found, it is still not certain how valid they are given that some inconsistencies have emerged. This clearly offers opportunities for further research. In contrast to the theoretical significance, the practical implications can be considered as less controversial. For instance, Bachkirov (2015) emphasised the importance of managers to be aware which impacts emotions can have on their information processing in “complex multi-attribute, multi-alternative [decision] situations” (p.869). It might be, for example, that a feeling of happiness or anger adversely affects the accuracy of decisions by processing information in a less careful and profound way. On the other hand, when time is paramount, fear or anxiety could retard the decision making as a consequence of the extensive amount of information which is contemplated by the decision maker. Therefore, it is of high relevance for managers to bear in mind how emotions can influence their information processing and to know when those emotional effects can be beneficial or detrimental – depending on the decision task at hand and the type of processing which is favourable for it.

4.5 Prior Outcomes

Even though Pachur and Spaar’s (2015) study was already presented in the beginning of this paper, it is perceived as important to analyse their results more in detail. Beside the fact that the extent of affect-based processes differs across domains, the authors also found an explanation to *why* this occurs. In their experiment, participants had to make decisions across six distinctive domains while rating their level of expertise and appraise what process they rely on between an intuitive one and a deliberate one. Consequently, the authors demonstrated that the level of expertise is correlated positively with the use of more affect-based abilities. They present experience as the most valid explanation for the results. Indeed, the more experience one accumulates in a particular domain, the surer an individual will feel about his/her intuitions. They believe that one key determinant to gain experience is the frequency of the same type of decisions. Nevertheless, they mention that another responsible factor increasing confidence in a decision may be the amount of information collected at the time of

a decision: if a decision can have costly consequences, individuals will tend to search for more information and thus increase their expertise.

According to Herbert Simon (1987, cit. in Pachur & Spaar, 2015), in a managerial context, the outcome's characteristics might define which decision style (affect-based or deliberate) has to be privileged. However, this certainly does not state that they are mutually exclusive - on the contrary. This, in turn, is also consistent with Baumann and DeSteno's (2012) view (see part 4.1) and many others by acknowledging a dual decision making process. Mitchell, Shepherd and Sharfman (2011) also support this view with similar findings. By analysing the decisions 64 CEOs of small and medium-sized firms made, they demonstrated that higher metacognitive experience results in a greater consistency of strategic decisions. Metacognitive experience can be defined as the process in which prior experiences (cognitive and affective) can be applied to present decision processes (Flavell, 1987, cit. in Mitchell et al., 2011). As stated by Mintzberg (1987, cit. in Mitchell et al., 2011), consistency is crucial for the effectiveness of strategic decisions and desirable outcomes. Thus, in combination with Pachur and Spaar's (2015) findings, it is to conclude that previous experiences incurred from previous outcomes and their related feelings not only play an important role, but also drive more effective and efficient decisions.

In a further study, the authors Barreda-Tarrazona, Jaramillo-Gutierrez, Navarro-Martinez and Sabater-Grande (2014) investigated the role of emotions and prior outcomes in relation to risk propensity and decision making processes under risk. Their experiment is compared to the "Deal or No Deal" show: the participants disposed of 10 boxes, 50% of them containing a prize of 100€ and the other half containing 0€. After each step, the candidate could decide between moving further and accepting an offer representing 80% of the remaining boxes' value. If the participant agreed to move to the next round by declining the offer, one of the boxes would be eliminated automatically. This process reiterates until the participant either opens the final box or accepts an offer. What is of interest with these two experiments is that in the first one, participants were responsible for each decision whereas in the second one, they were only able to decide in the last step of the process if they wanted to take or leave the deal. After the first experiment, the authors were able to conclude that in the study in which participants had the opportunity to decide at each step to take an offer or to continue, regret (or more broadly said negative feelings) would lead to a lower risk aversion. By contrast, positive feelings (e.g. satisfaction) would lead to higher risk avoidance. More specifically, regret emerges when better offers have been presented previously whereas satisfaction occurs

when participants encountered worse opportunities before that. This study demonstrates that missed opportunities related to prior outcomes influence risk behaviour and decisions in the case of individuals being responsible for those previous choices. Intriguingly, however, when individuals are not responsible for a decision path, the effects of missed opportunities are significantly weaker. Thus, the authors claim that emotions such as regret and satisfaction resulting out of previous choices have an impact on later decisions.

In opposition to that view, Weber and Zuchel (2005) state that having the responsibility for prior outcomes does not change one's risk behaviour. In fact, by experimenting the role of prior outcomes in a portfolio and in a lottery format, they argue that it is the presentation format that counts, no matter if the first choice was fixed or free. According to their findings, in the portfolio format, losses consequently lead to a risk-seeking behaviour whereas individuals will be more risk seeking after gains in the lottery format. This is quite interesting, as the authors state that most of real world investments are presented in the form of a portfolio decision, which implies that individuals would become more risk averse after prior gains. Yet, on the basis of these findings, one can question if it is the format or the personal responsibility that plays a larger role. As stated in the beginning of this paper already, the role of emotions can differ among individuals and domains and therefore, no generalizable conclusion can be provided. Nonetheless, managers might want to consider that, mediated by emotions, prior outcomes influence their decisions.

Although it did not analyse the effects of prior outcomes under the same light, the study of Rivers and Arvai (2007) should be mentioned here as well. In their research, they demonstrate that chronic losses incur a feeling of depression, higher risk avoidance as well as acceptance for lower outcomes when compared to the control group or the one experiencing wins. It is interesting that the negative affect of depression leads to higher risk aversion whereas according to Barreda-Tarrazona et al. (2014), regret reduces risk aversion. Indeed, it cannot be said that both experiments are comparable. However, it could be concluded that even though emotions (e.g. negative) resulting out of prior outcomes belong to the same valence, here again differing behaviours can be observed. More importantly, these findings also support the idea that prior outcomes bias consecutive decisions. For this reason, managers might have to appraise the objectivity of their decision process constantly.

4.5.1 Sub-chapter summary

It can be concluded that prior outcomes do not all incur the same emotions, which in turn results in different effects on decision making. Again, a single conclusion cannot be drawn out of the current results. Nonetheless, it can still be summarised that experience and prior outcomes do play a role in subsequent decisions, since individuals rely on experiential cues in their decision making process. Furthermore, a parallel to managerial strategic decisions is quite self-explaining: as showed by Mitchell, Shepherd and Scharfman (2011), metacognitive experience is necessary in achieving better results and thus, using emotions associated to prior outcomes might be vital in order to achieve better performing decisions. However, not only prior outcomes affect decisions. In the following part, it shall be discussed how outcomes appeal to emotions and thereby can bias probability weighting.

4.6 Probability Weighting

In their study, Pachur and Galesic (2013) analysed the different decision making styles by focusing on two types of outcomes (affect-rich and affect-poor outcomes) in combination with the role of numeracy, in other words one's competence to use mathematical information. In their experiment, affect-rich decisions related to medical decisions while affect-poor ones were reflected by monetary decisions (represented here with a lottery task). Probabilities were given in both cases and thus, it can be said that decisions were made under risky circumstances. The four decision styles taken into consideration were the following ones: the *expected value strategy*, the *least-likely* heuristic, the *minimax* heuristic and the *affect* heuristic (Finucane et al., 2000, cit. in Pachur & Galesic, 2013). The first one takes into consideration both probability and outcome to qualify the attractiveness of an outcome's expected value (i.e. is a so-called compensatory strategy), while the second one is a probability-based heuristic, implying that the option with the smallest probability generating the worst result would be chosen. The two final ones are qualified as *outcome-based heuristics*: the *minimax heuristic* evaluates the worst possible outcome of each possibility and selects the most appealing one while the *affect heuristic* adopts the option promising the lowest negative affect. It is important to state that in comparison to the *minimax heuristic*, the *affect heuristic* does not focus on financial aspects. As a result, the authors could only partially confirm their hypotheses. In fact, more numerate people did base their choice on a probability-based compensatory strategy. However, less numerate participants did not primarily use the *minimax heuristic* but mainly relied on the *least-likely strategy* and therefore, the assumption that less numerate individuals would avoid a numerical thinking

style was not confirmed. Surprisingly though, in the case of affect-rich outcomes, both types (numerical and not numerical participants) used the minimax heuristic, implying that probabilities and numeracy do not have a heavy influence in affect-rich decisions. In a second step, the authors concentrated on the role of affect heuristics in affect-rich decisions. Consistent with their predictions, the more numerate participants continued using minimax heuristics while less numerate individuals used the affect heuristic more frequently. Thus, it is important to bear in mind that for affect-poor outcomes, depending on their level of numeracy, individuals will tend towards strategies based on numeracy whereas in the case of affect-rich outcomes, outcome-based heuristics will be privileged (minimax and affect heuristics respectively). An overall reversal in the decision-style is herewith noticeable and in sum, less numerate people will tend to use more simplistic strategies in the case of affect poor decisions (i.e. monetary ones) when compared to more numerate individuals. Yet, in affect-rich decisions, little attention is given to numbers by either of the two groups. In relation to the topic of this paper, it is legitimate to presume that managers would belong to the numerate group. Following this line of reasoning, one could therefore assume that probabilities have importance in managerial decision making processes.

In the following year, Pachur, Hertwig and Wolkewitz (2014) conducted a similar experiment but did not focus on the influence of numeracy. Instead, they emphasised how the ‘affect gap’ (i.e. the process characterised by individuals reversing their perception of probabilities depending on the outcome’s level of affect) correlates with the affect-rich and -poor outcomes, disregarding if negative or positive. In this study as well, the authors use the expected value strategy as well as two outcome-based heuristics: the minimax and maximax heuristics. Relying on the same logic as the minimax, the maximax heuristics means that individuals base their choice on the most appealing best outcome. The results of Pachur, Hertwig and Wolkewitz (2014) are indeed consistent with and similar to the ones of the previous research. Apparently, affect does play an important role when it comes to a so-called rational probability weighting regarding affect-laden decisions: affect-rich outcomes incur outcome-based heuristics whereas affect-poor ones activate compensatory strategies (i.e. expected value strategy). Combining both studies, it is to conclude that an increased affect does reduce the importance attributed to probabilities and thus to rational thinking. This is summarised as the “*probability neglect*” (Sunstein, 2002, cit. in Pachur, Hertwig & Wolkewitz, 2014, p.65). Interestingly, the authors refer to the functions of emotions that were also presented in this paper in part 3.1 to explain the phenomena. Expressly, they recall both

functions of emotions: to guide information assimilation and act as an informative tool and emphasise their validity in decisions comprising affect-rich outcomes.

If, however, the majority of the scholars agree on that perspective, one might wonder if individuals (and in particular managers) would qualify strategic decisions as affect-rich or poor. In fact, since these studies were not conducted within a managerial context, it might be hard to appreciate the extent to which these conclusions are applicable. As March and Shapira declare (1987, cit. in Atanasov & Kunreuther, 2016), it is likely that managers do not attribute much attention to probabilities. More likely, they aim to avoid the option with the worst outcome. Thus, one could hypothesise that the affective significance of outcomes is tightly intertwined with anticipatory as well as integral emotions and reflects on information processing. Therefore, it would not be safe to assume that managers are totally rational in the context of decision-making and that they might rely on outcome-based heuristics. Nevertheless, the kind of heuristics (minimax or affect-based) used in managerial contexts remains undetermined. This might represent a future research topic.

Overall, it seems clear that emotions alter one's outcome perception and the related probability weighting. In decisions under uncertainty, it may be helpful to understand the more explicit consequences of altered probability weighting on risk propensity. Having inquired this exact relation more thoroughly, Mukherjee (2011) conducted an experiment which consisted of choice tasks related to lottery decisions after having reduced cognitive capacity and operated affective manipulations to foster participants' affective thinking style. More specifically, it is the impact of the affective thinking style that is put under scrutiny, as the type of outcomes remains the same. Partially basing on previous literature, the author hypothesises that affective thinking would lead to overweighting small probabilities and underweighting large ones. Consistently, the author demonstrated that both value and probabilities of an outcome are significant factors of a decision making process under risk. Solely in the case of small probabilities, it was found that greater affect results in overweighting. This is explained by a larger impact of the 'hope' feeling and therefore, individuals will show a stronger risk seeking behaviour. However, if this effect is counter-balanced by the increased concavity of the value function³ representing individuals' risk

³ The utility function of gains is concave, which can be translated in a higher risk-avoidance. Thus, a more distinct curvature equals a higher risk aversion. The same reasoning is applied to the convexity of the utility function of losses (Sokol-Hessner et al., 2016).

behaviour, this can in turn lead to a stronger risk aversion. Thus, it shall be retrieved from this study that both probability and value play a role in the decision making process under risk and that both factors are influenced by affect, thereby influencing one's risk inclination in both directions.

Consistent with the several previous findings, Chanel and Chichilnisky (2009) compared the rationality of decisions under uncertainty based on an experiment where participants are faced with lotteries involving catastrophic (i.e. kidnapping possibility) and non-catastrophic incidences. The degree of rationality is measured by using the expected utility framework (i.e. an outcome's value). Not quite surprisingly, when non-catastrophic events were part of the lottery, the large majority took its decision based on rational thinking. However, in the catastrophic scenario, fear was taken into consideration and affected individuals' decisions. This was reflected by an inconsistency with their previous decision making style. Indeed, even if not all of them, a high numbers of participants did not proceed rationally in the catastrophic scenario and accorded much more weight to the fearful event. Thus, it is concluded that the negative emotion of fear does impact the probability weighting, even if small, which is in line with Mukherjee's (2011) findings. More precisely, it could be said that fear strengthens risk aversion, or at least in this experiment by overweighting it. Finally, in the study of Fehr-Duda et al. (2011) that was already presented in previous parts, the authors only partially confirm that individuals are affected by incidental mood in decision making processes and probability weighting. They find that only women are affected by good mood in weighting probabilities whereas this effect is not remarkable in men under risk, who stand by basing their decisions on outcomes' expected value. Interestingly, taking an example of the real world, only 4,2% women were CEOs in the Fortune 500 firms for the year 2016 (Zarya, 2016). It is not said that the level of rationality is the sole factor to attain this position. It could be, however, attempted to inquire if the thinking style of these CEOs might be correlated with emotions, rationality or both and how it influences probability weighting.

4.6.1 Sub-chapter summary

All in all, it can be said that affect and emotions do interfere in the evaluation of outcomes. Not only does the affect level of outcomes influence one's decision-making style, but emotions reciprocally intervene in the perception of probabilities. The key takeaways are that on the one hand, affect-rich outcomes more likely engender outcome-based heuristics in opposition to affect-poor decision outcomes. On the other hand, affect (positive or negative)

moderates the perception of probabilities and thereby influence risk behaviour. This leads to the next chapter presenting how framing is another factor able to alter risk perception.

4.7 Framing Effect

Considering the vast amount of research that has been conducted on decision making under uncertainty, one of the central findings is the framing effect. The framing effect describes the phenomenon that individuals are likely to make risk-seeking choices when the outcome is formulated in terms of losses whereas a formulation in terms of gains leads to more risk-averse choices (Habib, Cassotti, Moutier, Houdé & Borst, 2015). This phenomenon is widely acknowledged and has been demonstrated in various domains of real-world decision making (Stanton, Reeck, Huettel & LaBar, 2014). However, the question whether emotions or affect have impacts on the framing effect has only recently been investigated.

By exploring this question in more depth, it was found that positive emotions can increase individuals' responsiveness to decision frames (Cheung & Mikels, 2011; Gosling, Moutier, Rotshtein & Mirabella, 2017; Stanton et al., 2014). According to Cheung & Mikels (2011), positive affect was related to risk seeking in loss frames (thereby increasing the framing effect), however, it did not influence risk aversion in gain frames. These results were reinforced by the study of Gosling et al. (2017) which showed that positive emotions resulted in higher choices of the riskier option solely in the loss frame. The fact that the influence of positive emotions was limited to the loss frame might be explained by *loss aversion* (Tversky & Kahneman, 1991, cit. in Cheung & Mikels, 2011). Since people are much more sensitive towards losses than towards gains, the loss frame may be more efficacious in evoking affective responses to risk. To put it in other words, individuals might experience disproportionately more positive emotions toward the (risky) gamble option in a loss frame compared to a gain frame (Cheung & Mikels, 2011). Interestingly, however, the research results of Gosling et al. (2017) indicated that positive emotions only elicited a risk-seeking behaviour in the loss frame in case of a high probability of gain. In contrast, low probabilities of gain did not lead to an enhanced framing effect. As the authors suggest, these results support the assumption that low probabilities of gain inhibit the framing effect since they do not elicit positive emotions in terms of gain anticipation.

Although the studies described above mainly correspond in their findings, severe discrepancies have been found in other research results. On the one hand, Druckman and McDermott (2008) have shown that individuals who are placed in a positive emotional

context exhibit a higher risk propensity in the gain frame, thus eliminating the framing effect. On the other hand, Cassotti, Habib, Poirel, Aïte, Houdé and Moutier (2012) revealed as well that that positive emotional context cancelled the framing susceptibility. However, they stated that the elimination of the framing effect stems from a decreased risk-taking in the loss frame instead of an increased risk-taking in the gain frame (as Druckman & McDermott (2008) posited). In any case, these findings strongly contradict the previous research results that positive affect is likely to increase the susceptibility to framing. Gosling et al. (2017) hypothesise that these discrepancies might be explained by the use of different probabilities in the studies: whereas Cassotti et al. (2012) conducted their study under low, medium and high probabilities, Druckman & McDermott (2008) only used a medium probability. Nevertheless, this is only an assumption and should be further investigated.

In terms of negative emotions and their impact on framing, the emergence of inconsistencies seems to continue. Although two studies revealed that fear and distress would enhance the framing effect whereas anger would suppress it, the more detailed results are not in accordance with each other. In particular, it is astonishing that Druckman and McDermott (2008) showed that the effects of distress and anger on frames would be especially pronounced in the negative frame. In contrast, Habib et al. (2015) found that fear and anger had an impact on risk taking in the gain frame, but not in the loss frame. It has to be mentioned, however, that not only these study results are confusing. Indeed, there are further research works that are inconsistent with each other. For instance, Seo, Goldfarb and Barrett (2010) propose that affective experiences generally attenuate decision frames. This tendency to mitigate the framing effect was observed in in the loss frame when experiencing either pleasant or unpleasant feelings, as well as in the gain frame when experiencing pleasant feelings. As opposed to these findings, another study posits that emotional choices are commonly more susceptible to framing compared to rational choices (Wang, 2006). Then again, Mohanty & Suar (2014) conversely maintain that the framing effect is a phenomenon that occurs irrespective of the mood state. In other words, they suggest that emotions do not have an impact on framing susceptibility at all.

4.7.1 Sub-chapter summary

Altogether, the only unambiguous statement that can be made is that the current state of research has not yet provided clear and consistent evidence how emotions influence the framing effect. Instead, several research findings seem to contradict each other. Whereas it has been attempted to explain the reasons for individual research results, those hypotheses are

not suitable to account for other research evidence. As it might be that specific mechanisms are responsible for the apparently contradictory results, future research has to scrutinise those inconsistencies and further explore under which conditions emotions may (or may not) have impacts on people's framing susceptibility.

4.8 Interpersonal Relations

Under unknown circumstances and more precisely uncertainty, another important aspect of managerial and strategic decisions under risk certainly are the external perceptions and predictions of others' decisions and particularly competitors (Faro & Rottenstreich, 2006) as well as the internal and team relations (Schweiger & Sanberg, 1991, cit. in Dooley & Fryxell, 1999).

From an external perspective, making these predictions consists of evaluating the next moves and risk preferences of unknown and less predictable individuals (Faro & Rottenstreich, 2006). In their study, the authors refer to one important aspect of Kahneman and Tversky's (1979; 1986) prospect theory to build on their experiments of gains and losses. Following the theory, they assume that individuals tend to be risk seeking in terms of gains with low probabilities and risk-averse for small probability losses. The reverse pattern is observed in the case of large probabilities. They further rely on two concepts, namely Loewenstein's et al. (2001; 1996) risk-as-feelings and empathy gap respectively, not ruling out that there may be further non-affective factors. Simply put, under uncertainty, individuals tend to take decisions in line with their emotions (e.g. excitement, fear) but fail considering this dimension when predicting others' risk inclination (due to the empathy gap). Consequently, the authors predicted that risk behaviour for individuals themselves would be consistent with the prospect theory but that their predictions for others would be much more regressive (i.e. more neutral). The experiment consisted of individuals (part of them MBA students) making own choices and predictions for others in the context of decisions under uncertainty. At the end of the experiment, the assumptions of both authors were confirmed. Indeed, in their predictions, individuals assumed others to have a risk propensity similar to their own's: when one would make risk-seeking decisions for him-/herself, the same propensity would be observed in the predictions for others. Moreover, the risk behaviour in the different scenarios was consistent with the prospect theory. However, the most important finding of this study is that in predicting unfamiliar others' risk preferences, individuals will be far more regressive and make inaccurate predictions. This results out of the empathy gap and the inability to project the "risk-as-feeling" principle on others. However, when expressly asked to appeal to their

emotions in the context of a prediction, the predictions' accuracy increased. Finally, a close correlation was found between accuracy and empathy. Simply put, these findings are of relevance, as it stresses how emotions are crucial for an accurate evaluation and prediction of others' risk preferences, which in turn is tightly linked to successful strategic decisions under risk.

The study of Faro and Rottenstreich (2006) provided valuable insights regarding the outside-based perspective, yet without regard to the influence of emotions with others inside a company, and more precisely within a strategic decision making team. In relation to the internal perspective, the study of Dooley and Fryxell (1999) basing on the examination of strategic decision making teams in the healthcare industry is worth considering. The focus of their inquiry is put on dissent and how trustworthiness (consisting of loyalty and commitment) within teams can overcome the risk of poor decision quality by fostering the benefits of a wider information access. Indeed, to relate it to the topic of this paper, it is important to note that trustworthiness relies on affective perceptions (i.e. loyalty, based on emotional attachment) and cognitive ones (i.e. competence, based on technical abilities) (McAllister, 1995, cit. in Dooley & Fryxell, 1999; Lewis & Weigert, 1985, cit. in Olson, Bao & Parayitam, 2007). For instance, according to Gibb (1964, cit. in Dooley & Fryxell, 1999), loyalty is key to foster communication and consideration of ideas among members and thereby increase the quality of decisions, especially in the case of uncertainty (Ashby, 1956, Galbraith, 1973, cit.in Dooley & Fryxell, 1999). This is explained by the fact that if members are not perceived as loyal, their ideas might be assumed as opportunistic and harmful to the group and will eventually be ignored (Dooley & Fryxell, 1999). The other investigated aspect of the study is competence. Here, it is assumed that in the case of divergent opinions, competence estimation and commitment are positively correlated since team members will believe in the team's capacities accordingly. In sum, it is demonstrated that higher perceived levels of loyalty and competence among team members increase information processing and in turn, the effectiveness of strategic decisions. Therefore, diverging opinions are seen as a positive influence on strategic performance. This implies that the aforementioned affective and cognitive perceptions building trustworthiness are at hand. As one can notice, affect does play a role in qualifying the trustworthiness of team members and ultimately decision quality. In an additional study relying on a similar research approach, Parayitam and Dooley (2007) come to similar conclusions. One the one side, affect-based trust will hinder a cognitive conflict evolving into an affective one that by contrast to a cognitive conflict, is detrimental

(Amason, 1996, cit. in Parayitam & Dooley, 2007). On the other side, cognition-based trust will mediate cognitive conflicts and in turn increase a team members' acceptance, engagement and decision quality.

Nevertheless, the applicability of this theory might be limited. Having focused on the top management level in Chinese firms, Olson, Bao and Parayitam (2006) demonstrated that in contrast to Western countries, cognitive diversity is detrimental to commitment and decision quality, since Chinese culture heavily relies on harmony and uncertainty aversion. However, the authors argue and confirm that cognition-based trust attenuates the negative effects of cognitive divergence on commitment while affect-based trust more strongly mitigates the negative effects of cognitive heterogeneity on decision quality. Here again, even in cultures praising cognitive homogeneity, it is acknowledged that the mediating role of emotions undermines the negative effects of diversity and enhances the quality of strategic decisions. Consistent with this view, Zhou, Long and Hao (2016) investigated team dynamics from a leadership perspective by surveying teams of Chinese firms across various industries. The authors not only found out that self-sacrificial leadership triggers the same committed attitude within teams. More importantly, they state that this is due to the moderating effect of positive affect, generated by the positive behaviour of their leader. This effect is even stronger in unstable conditions, since followers become more sensitive to their leader's behaviour under uncertainty. Thus, in this study as well, it is shown that affect plays a big role also when it comes to more hierarchical relations within teams. In line with the previous findings, it could be hypothesised that self-sacrificial behaviour will eventually lead to higher affect-based trust, which in turn, as could be seen in Dooley and Fryxell (1999), helps achieving higher strategic performance by enhancing decision quality.

Combining both perspectives (external and internal), Gong, Baron and Kunreuther (2009) qualify uncertainty as an influencing force on group behaviour and cooperation. Comparing group and individual behaviour basing on the Prisoner's Dilemma, they point to two key findings. First, in a context with certain payoffs, individuals tend to cooperate more than groups. Nonetheless, the opposite pattern is observed under risk. Thus, group behaviour can be qualified as more risk averse than the individual risk preference. Atanasov and Kunreuther (2016) came to a similar conclusion in their study. In fact, what makes these findings significant is the reason behind this reversal: namely guilt and blame aversion (Gong, Baron & Kunreuther, 2009). In relation to the topic of this paper, it demonstrates how emotions

interfere also on interpersonal decisions and might reduce a risk-seeking behaviour in comparison to individual decisions.

Finally, from a practical perspective, an additional study analyses the dilemma teams encounter when it comes to strategic decisions: exploit current competences and routines or exploit new ones. Theorising that emotions and performance influence such decisions, Døjbak Håkonsson et al. (2016), only find partial confirmation to their hypotheses. Indeed, positive emotions only marginally enhance the adoption of a new routine. Instead, a decline in performance will be responsible for such a decision. If the new routine enables a positive performance development, this will in turn affect emotions among team members positively. Thus, even though only weakly, it could be assumed that positive emotions might iteratively foster the adoption of an innovative routine.

4.8.1 Sub-chapter summary

Simply put, it can be seen that both from an external and internal perspective, emotions act as a mediator and allow reaching a better strategic performance. However, the iterative character of the process should not be neglected: performance will reciprocally influence emotions.

4.9 Time Pressure and Stress

Often appearing in uncertain situation, one feels overburdened and that is when the feeling of stress occurs (Dickerson & Kemeny, 2004; Koolhaas et al., 2011, cit. in Starcke & Brand, 2016). According to Sokol-Hessner, Raio, Gottesman, Lackovic and Phelps (2016) risky decisions are repeatedly made under the affective state of stress. However, they do not find any correlation between induced stress and risk behaviour in the context of monetary decisions under risk. Nor does a correlation to loss avoidance or consistency in risky decisions exist. Having also investigated the effects of stress more in depth, the authors Starcke & Brand (2016) oppose Sokol-Hessner et al.'s (2016) view and posit a negative repercussion of stress on decision making: detrimental and higher risk-seeking decisions were in part caused by stress.

Consistent with Starcke and Brand's (2016) findings, Byrne, Silasi-Mansat and Worthy (2015) found that neuroticism, which is related to high anxiety, leads to a decreased performance in decision-making under social and time pressure, assuming here that pressure triggers the affective state of stress. Further, FeldmanHall, Raio, Kubota, Seiler and Phelps (2015) support this view and demonstrate that the feeling of stress leads to a more irrational

thinking style. In comparison to a control group, individuals under stress have proven to bet more money in an uncertain lottery game than in a trust game where the outcome depended on someone else's propensity to cooperate. It was found that that stress impacts risk attitude when an outcome is person-based by altering trust and taking into account irrelevant information from past experiences in consecutive decisions. Thus, these results could imply that the affective state of stress alters both affect and cognition under uncertainty, and that some traits such as anxiety might be more sensitive to such conditions. Nuancing these findings though, Hu, Wang, Pang, Xu and Guo (2015) revealed that time pressure (here interpreted as interchangeable with stress) strongly polarises the effects of emotions on decision making. That is, the effects were more pronounced on the negative ones, leading to a higher risk aversion.

These differing results could be due to the fact that FeldmanHall et al.'s study focused on ambiguous conditions whereas the study of Sokol-Hessner et al. was conducted under risk. The level of uncertainty seems thereby to influence the impacts of stress. Though this remains only an assumption of this paper's authors, it might inspire some further researches.

4.9.1 Sub-chapter summary

Even though this sub-chapter might be less extensive than others, this does not signify that the affective state of stress shall be neglected. On the contrary, as Sokol-Hessner et al. (2016) stated, risky decisions and stress often come in pair. Some results are contradicting but overall, it is shown that stress can have consequences on uncertain decisions by influencing risk behaviour and performance. Reminding one of the functions of emotions presented in part 3.1 (i.e. gaining time and ease the decision making process), it would be consistent that under the feeling of stress, cognitive processes are possibly inhibited (Hu et al., 2015) and individuals rely even more on their emotions in order to accelerate the process. Especially, this will be prominent in interpersonal relations and the related risk assessment, as individuals will in part follow their affective trust perceptions. From a managerial point of view, it might be interesting to observe if affective states, among the others presented throughout the paper, can be attenuated in order to privilege a rational thinking style. This will be the focus of the following part.

4.10 The Regulation of Emotions

Undoubtedly, research has demonstrated that emotions influence decision making under uncertainty – sometimes in an advantageous way, at other times in a detrimental way. Aiming

to mitigate especially the deleterious emotional effects on decision making, various studies have examined strategies which have the potential to meet those requirements. The most intensively studied strategies often attempt to minimise the magnitude of the emotional reaction (Lerner et al., 2015). In the following, research findings regarding the effectiveness of emotion regulation (ER) strategies such as time delay, suppression, reappraisal or induction of a counteracting emotional state are scrutinised in more detail.

One of the simplest strategies for reducing emotional effects consists in letting time pass prior to a decision. Considering the fact that full-blown emotions are transient and physiological reactions vanish quickly, this strategy could – at least from a logical point of view – contribute to bring the emotional condition of individuals back towards its initial state (Wilson & Gilbert, 2005, cit. in Lerner et al., 2015). Indeed, it was found that under specific circumstances induced anger may immediately motivate people to alter their decision, whereas this effect does not occur when the decision was made only after a 10-minute postponement in regards to the emotional induction (Gneezy & Imas, 2014, cit. in Lerner et al., 2015). Although delay as an emotion regulation strategy is suitable to counteract the effects of many emotional states, this strategy is only seldom applied. Given that emotional states provoke immediate behavioural responses, it is very challenging for most people to wait until their emotional state has reverted back to its baseline (Loewenstein, 1996, cit. in Lerner et al., 2015). Thus, the time delay strategy is very effective in theory, however in reality decision makers are usually incapable to exercise patience while being confronted with inciting emotions.

Besides time delay, there are two emotion regulation strategies that have gained particular attention in the research literature: expressive suppression and cognitive reappraisal. The first strategy represents a response-focused strategy. That is, suppression involves the ability to inhibit behaviours that are related to emotional responses (e.g. facial and verbal expressions or gestures) (Gross, 2002, cit. in Heilman, Crişan, Houser, Miclea & Miu, 2010). Cognitive reappraisal, on the other hand, is an antecedent-focused strategy which attempts to reframe a situation and its meaning in order to modify the emotional impact (Gross, 2002, cit. in Panno, Lauriola & Figner, 2013). As recent research on those strategies has revealed, reappraisal and suppression can have differential effects on decision making and vary in their effectiveness. Whereas both ER strategies reduce the expressive behaviour of emotions, the subjective experience of an emotion is influenced more successfully by reappraisal than by suppression (Heilman et al., 2010). Wenzlaff & Wegner (2000, cit. in Lerner et al., 2015) even suggest

that suppression can lead to counterproductive effects by reinforcing the very emotions that were intended to be controlled. However, this predicted behaviour does not apply in all circumstances. Evidence suggests that both reappraisal and suppression effectively reduce the experience of positive emotions. Conversely, in the case of negative emotions, only cognitive reappraisal is able to effectively decrease the related emotional experience (Heilman et al., 2010).

Apart from the respective effectiveness of ER strategies to minimise the experience of an emotion, they can simultaneously affect decision making under uncertainty by influencing risk-taking levels, loss aversion or the arousal associated with losses (Panno, Lauriola & Figner, 2013). For instance, Miu and Crisan (2011) found that the use of reappraisal – in contrast to suppression – reduces the susceptibility to framing effects in risky decision making. It is assumed that reappraisal is able to provoke this effect by successfully regulating the emotions associated with the decision frames. Besides the framing effect, however, a large part of research focused especially on how ER strategies affect risk taking behaviour in decisions. As Heilman et al. (2010) have shown, cognitive reappraisal of negative emotions increases risk taking, whereas expressive suppression does not exhibit this effect. The authors state that the initially induced feelings fear and disgust (which are both associated with risk aversion) are effectively regulated through reappraisal by decreasing the experience of those emotions. Consequently, the related risk aversion of those feelings is mitigated. In contrast, expressive suppression has proven to be ineffective in regulating unpleasant emotions and is therefore not able to provoke a compensatory effect in risk-taking behaviour. The results of another study confirmed the findings that reappraisal is a highly effective strategy in down-regulating negative emotional states and enhances risky choices (Szasz, Hofmann, Heilman, & Curtiss, 2016).

Nevertheless, the results of this research which investigated especially the impacts of ER on sadness and anger were astonishing to some extent: although anger is an emotion which – contrarily to most other negative emotions – is associated with increased risk-taking, cognitive reappraisal does not result in a reduced risk propensity (as one might expect). Instead, reappraisal of anger shows the same consequences as reappraisal of sadness, disgust or fear. A possible explanation for this matter of fact is provided by Panno, Lauriola and Figner (2013). In their study, they examined whether individual differences in the use of habitual emotion regulation strategies affect risky choices in deliberative decision making. Their research revealed that stronger habitual use of cognitive reappraisal was associated with

increased risk-seeking behaviour while stronger habitual use of suppression was related to reduced risk taking. The authors posit that people who apply a reappraisal strategy would comparatively take more risk in their decisions since they probably focus more on positive emotions provoked by potentially positive outcomes. On the other hand, the use of suppression is assumed to cause less risky decision making because people employing this strategy are more likely to concentrate on evading negative emotions provoked by potentially negative outcomes. This explanation would accord well with the initially astonishing results regarding the reappraisal of anger. Moreover, Gross and John (2003, cit. in Lerner et al., 2015) provided evidence that individuals who make use of strategic reappraisal usually exhibit more positive emotional experiences, which supports the assumption that reappraisers focus in particular on positive emotions and outcomes.

Having scrutinised three different emotion regulation strategies, a further approach has to be mentioned which stems from a separate literature on mood repair. The so called “dual-emotion solution” proposes the possibility to counteract unwanted influences on decisions triggered by a certain emotion by inducing another emotion. For this purpose, the emotion intended to induce has to cause opposite tendencies than the original emotion and should consequently lead to a neutralisation of the initial emotional state (Lerner et al., 2015). Although this approach is rather unusual, evidence has been provided that the induction of an appropriate emotion may mitigate a prevalent bias (Lerner et al., 2013, DeSteno et al., 2014, cit. in Lerner et al., 2015). In addition, Graupmann, Erber and Poe (2011) found that individuals who are confronted with emotional influences that are incongruent with their current mood were better able to identify irrelevant information in high risk decisions. Therefore, this study suggests that a neutral affective state (realised through the attenuation of initial emotions) enables the selection of the most important information and leads to a more efficient decision-making process.

Although emotion regulation strategies may benefit managers by regulating their own emotions and possible detrimental effects of them, such strategies might as well help subordinates to increase their performance on complex tasks. For this reason, Thiel, Connelly and Griffith (2012) propose that leaders should be able to identify the emotional states of their subordinates and help them manage their feelings. Ostell (1996, cit. in Thiel, Connelly & Griffith, 2012) even claimed that different leadership-facilitated ER strategies are necessary to successfully regulate different emotional states. In the study at hand, two specific strategies were investigated: reappraisal and Downward Social Comparison (DSC). In contrast to

reappraisal, DSC is less effortful and involves the situational comparison of an individual with someone less well off (regarding the same situation). This implies that DSC enables a new reference point and changes a person's perception, however this strategy is not suitable to change the underlying emotions (Thiel, Connelly & Griffith, 2012). To examine how different regulation strategies suggested by leaders affect the subordinates' performance on planning – a crucial and complex organisational task – the effect of reappraisal and DSC were investigated after subordinates experienced anger or pessimism. The results indicated that leader-facilitated DSC resulted in a better identification of opportunities and constraints as well a better plan quality for pessimistic individuals compared to the reappraisal strategy. However, the findings regarding angry individuals show a reverse pattern. Indeed, leader-facilitated reappraisal led to the greatest level of planning improvement and consequently represents a superior regulation strategy for angry persons than DSC. As the authors argue, the inefficiency of reappraisal regarding pessimism might stem from the fact that emotions that are characterised by a heavy cognitive load (such as pessimism) would not benefit from a strategy that involves a vast amount of information processing (such as reappraisal) (Thiel, Connelly & Griffith, 2012).

4.10.1 Sub-chapter summary

It can be noted that a large variety of emotion regulation strategies exist which differ in their effectiveness to regulate the expression as well as the experience of emotions. Although cognitive reappraisal is often touted as one of the most promising ER strategies in current research, it has to be emphasised that there may not be a single strategy which is overall superior. Rather, research suggests that different ER strategies are required for different emotions.

Overall, these numerous findings are very complex and tightly intertwined. Therefore, a simplified self-developed framework will be presented in the next chapter. The latter displays the most important findings and interrelations found throughout this chapter.

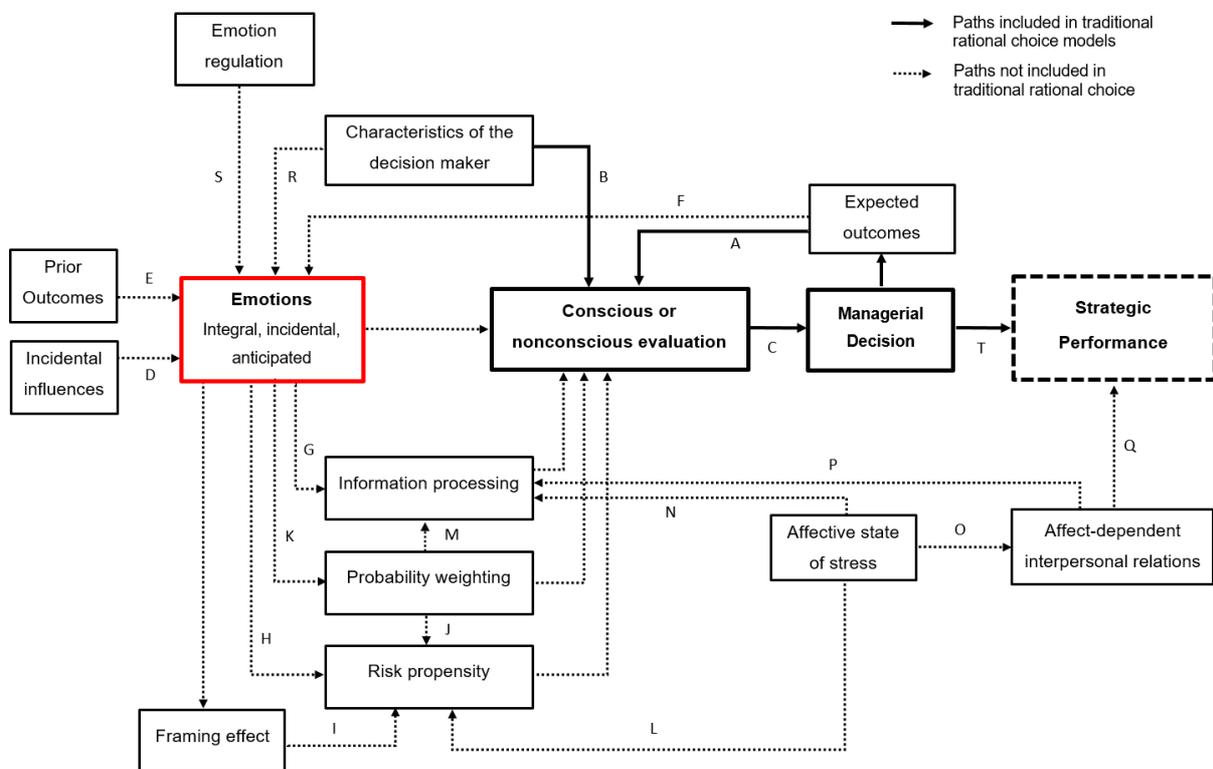
5 ANALYSIS AND DISCUSSION

In the previous chapter, the in-depth and systematic review of the existing research literature has provided a vast number of findings. Although these findings have deliberately been orchestrated into clusters to enable a coherent and logical analysis, it may be challenging for the reader to grasp the overall picture. Therefore, this chapter aims to synthesise the previous findings by proposing a framework which elucidates through which mechanisms emotions directly or indirectly influence managerial decision making under uncertainty. More specifically, this framework helps to expose existing interrelations and interdependencies between the clusters and provides a comprehensive overview of the investigated topic.

5.1 Synthesis of Research Findings

The framework presented in Figure 5 takes into account both traditional inputs (which advocate rational decision making behaviour) and emotional inputs which primarily emerged during the ‘emotions revolution’. Consequently, the new evidence regarding emotional influences is used to extend traditional, normative choice models.

Figure 5: Framework - Interrelations of emotions and managerial decision making processes under uncertainty



(Authors' own illustration)

By extending traditional models, this framework will contribute to a better understanding of how human and managerial decision making processes take place in reality – that is under the influence of emotions. It has to be mentioned that the framework deliberately draws inspiration from previous models, particularly the emotion-imbued choice (EIC) model (Lerner et al., 2015). Nevertheless, this elaborated framework adds to the model by incorporating the newest findings from analysing the clusters and by demonstrating in greater detail the effects of emotions in the managerial decision making process.

To begin with the explanation of the framework, it is important to first mention which commonalities the suggested framework and earlier rational choice models (e.g. expected utility theory) share. As the solid lines in Figure 5 demonstrate, the decision maker has to evaluate diverse decision options by appraising the utility for all possible expected outcomes (line A). This evaluation is further influenced by the characteristics of the decision maker since different personalities and individual preferences lead to different behaviours (line B). For instance, some people might – by nature – be more risk averse than others which affects the evaluation process. Subsequent to the overall evaluation, the decision option which is expected to result in the best outcome is chosen (line C). Ultimately, the accumulated managerial decisions contribute to the overall strategic performance of a company (line T).

Although these processes which characterise traditional choice models are taken as a basic assumption in the presented framework, it is obvious at first sight that emotions definitely play a crucial role in managerial decision making and exhibit complex relations. Thus, as Lerner et al. (2015) put it, emotional effects are “neither random nor epiphenomenal” (p. 816). In the following, the underlying mechanisms through which emotions affect managerial decision making will be elucidated in more detail.

As the systematic literature review revealed, emotions come in different forms. They can be either classified as integral, in case they arise from the decision at hand, or as incidental when the emotions are unrelated to the decision. The latter type of emotions may for instance stem from incidental influences of unrelated events such as the weather or pre-existing mood, which may carry over to the current decision (line D). On the other hand, integral emotions strongly and routinely affect decision making. A person who, for instance, feels anxious about a possible outcome in a risky decision situation might opt for the safer option than for a potentially more profitable option (Lerner et al., 2015). Moreover, integral emotions can arise from prior outcomes of similar decision situations. Given that experiences of past decisions

are often exploited in present decision situations, the feelings related to those prior outcomes can have an impact on further decisions as well (line E).

Whereas the emotions described up to this point are felt at the time of decision, there are also emotions which are of an anticipatory nature. Indeed, individuals do not only evaluate expected outcomes, but also consider their emotional reactions to those outcomes (line F). Consequently, these emotions are anticipated and can – although they are not yet experienced at the time of decision making – affect decision making. An emotion which is very often anticipated is regret. Since people can generally be characterised as regret-averse, they may pursue either a risk-seeking or risk-avoiding decision behaviour contingent on which is the regret-minimizing option. As anticipated emotions are related to the decision at hand, they are classified as integral emotions.

After having elucidated how prior outcomes, expected outcomes and incidental influences contribute to the very nature of an emotion, the authors of this thesis would like to emphasise the importance of the distinction between different kinds of emotions. Although it is still controversial in contemporary research if emotions are rational or irrational in decision making and if they are on an equal footing with cognitive processes, the authors strongly support the view of Li, Ashkanasy, & Ahlstrom, (2013). According to their line of reasoning, emotions can be both – rational and irrational. It is argued that incidental emotions which are carried over from previous events are irrelevant to the decision situation itself and thus their elicited effects can be regarded as irrational. In contrast, however, integral emotions can fulfil an important function of sense-making in an uncertain world and furthermore help to express the inherent desire and preferences of individuals regarding uncertain choices. Consequently, emotions that are relevant for the decision at hand, for instance feelings related to the risk of potential losses, are neither haphazard nor irrational. For this reason, the writers of this paper would like to highlight how important it is that managers (but also researchers) are aware of the distinction between incidental and integral emotions. Whereas the influence of incidental emotions should always be critically questioned, particularly the automatic adoption of those feelings for the respective decision tasks, integral emotions may well exert a signalling function and could thus be worth considering when making decisions.

To return to the framework and its components, it is apparent that emotions ultimately have an impact on decision making by influencing the evaluation process – either directly or indirectly. As can be seen in Figure 5, emotions affect several domains respectively cluster. It

should be noticed that two domains were of particular importance in the existing research literature. With 15 out of 80 articles, “Risk propensity” represents the topic which was most often researched in relation with emotions, followed by “Information processing” which took the second place with 12 articles. Indeed, the authors believe that these domains are not only most popular in current research, but also represent the most crucial factors which shape the decision-making process under emotional influences. Whereas information processing is essential in terms of how profound and extensive the evaluation is carried out and which types of inputs are used for it, risk propensity can be regarded as rather output-oriented. That is, risk propensity strongly affects the final choice of available decision options depending on the willingness of an individual to take a chance associated with the danger of possible losses. Given that managerial decisions under uncertainty often require to either take or not to take risks, this aspect seems to be of even greater importance.

To recapitulate the effects of emotions on information processing, research provides evidence that emotions may either trigger a systematic or heuristic processing (line G). The valence-based approach posits that positive (negative) affective states encourage heuristic (systematic) processing and has been supported by several studies. However, this approach is not able to account for the effects of anger, or other negative high-arousal emotions. More recent research has developed further theories, such as the Appraisal Tendency Framework, which is currently deemed as one of the most promising theories. In any case, due to the previous findings, the authors suggest that valence represents only one out of several emotional dimensions or aspects which determine the resulting effect on information processing.

When examining further impacts of emotions, it becomes clear that most of the effects revolve around risk propensity. Indeed, one could argue that risk propensity represents the central topic in regards to emotions and their impact on decision making under uncertainty. As can easily be seen in the framework, risk propensity (as well as information processing) exhibits the largest number of incoming arrows (4) compared to other investigated clusters. In other words, emotions may not only directly trigger a risk-averse or risk-seeking behaviour in decision making (line H), but can also affect risk propensity indirectly through resulting effects of probability weighting, stress/time pressure or the framing effect (line I, J, L). However, many controversial research results and competing theories exist regarding how different emotions affect the tendency to take risks. At this point, the authors have to mention once again that it is highly likely that the prevailing conditions as well as external factors determine the specific effect of an emotion. For instance, it was found that certainty-

associated emotions lead to increased risk-taking behaviour in static decision tasks, whereas they show a reverse pattern in sequential decision making processes (resulting in a higher risk-aversion). This constitutes a perfect example of how external conditions can shape and even alter the influential impacts of emotions.

Regarding the remaining clusters, the framing effect represents by far the most controversial issue since existing research studies strongly seem to contradict each other. Although the framing effect constitutes a cognitive bias, emotions may as well exert an influence on it. Classically, the framing effect describes the tendency of people to behave risk-averse when a decision is formulated in terms of potential gains and to behave risk-seeking if it is framed in potential losses. As some research works have revealed, specific emotions may contribute to increase or to eliminate the framing susceptibility and therefore directly affect risk propensity (line D). Still, no unequivocal conclusions can be drawn which is why the authors see a strong need to further investigate this topic.

Furthermore, emotions influence probability weighting. In general, it was found that increased affect mitigates the importance attributed to probabilities thereby impeding rational thinking (line K). Additionally, negative or positive emotions manipulate the perception of probabilities and consequently have an impact on risk propensity, as already mentioned (line J). Indeed, the risk assessment of potential outcomes bases on probability weighting and mainly remains task of strategic decision makers. Thus, a biased probability perception might impair the validity of a decision, as the inaccurate weighting will in turn alter the information processing (line M).

Just like probability weighting, affective states of stress may have an effect on risk propensity as well (line L). As research indicates, stress and risky decisions are often correlated. Furthermore, evidence exists that feelings of stress may inhibit cognitive processes and result in a greater reliance on emotions. Thus, the direct link to information processing is obvious (line N). Ultimately, stress has an impact on interpersonal relations since in a social context higher levels of stress are likely to decrease trusting behaviour (line O). This diminished trust behaviour, in turn, may not only affect relations (for instance in within an organisational team or with regards to external stakeholders), but also simultaneously influences risk attitudes. Lastly, it has to be mentioned that the authors deliberately decided to treat the element “affective state of stress” separately, although it could be argued that stress should be included in the central block of emotions. Given the fact, however, that the cluster of stress is

closely linked to time pressure, the authors consider it as reasonable not to add it to the general emotions.

A further important aspect of this framework is the role of emotions in interpersonal relations. On the one hand, it was shown that affect is necessary to evaluate the risk preferences of others (i.e. competitors) more accurately, which in turn enhances a firm's competitiveness and broader said, its strategic performance (line Q). On the other hand, emotions affect relations within a strategic decision making team. Indeed, it was shown that both affect-and cognition-based trust are necessary to exploit the advantages of cognitive diversity, which enhances the information processing's efficiency and effectiveness (line P).

Regarding the characteristics of the decision makers, which are even considered in rational choice models, this framework adds to the traditional conception by emphasising their interplay with emotions in decision making. On the one hand, the characteristics may directly alter the basic value of emotions, for instance through a chronic anxiety or depression (Lerner et al., 2015). On the other hand, an individual's characteristics may in interaction with emotions elicit specific behaviours in decision making. To provide an example, this literature review revealed that women in a good mood tend to weigh probabilities significantly more optimistically than men in situations under risk. Furthermore, research indicates that age might be another characteristic which – in conjunction with emotions – could affect decision making under uncertainty. Given that these characteristics have only marginally been considered in current research, the authors thereby want to underscore the potential of this promising research area.

Ultimately, it has to be emphasised that not only emotions per se can have considerable impacts on managerial decision making under uncertainty, but also the attempts to regulate these emotions (line S). In general, strategies that strive for regulating the experience of an emotion and not solely its expression appear to be more successful. Nevertheless, research indicates that different strategies might be necessary to eliminate the unwanted effects of different, specific emotions.

Overall, this framework revealed how emotions exert influence on managerial decisions within a strategic context – mainly through (consciously or unconsciously) affecting the evaluation itself. Considering that those managerial decisions under uncertainty jointly

contribute to the overall and long-term performance of an organization, one can state that the effects of emotions ultimately shape the strategic performance.

5.2 Limitations of the Framework

To point out the limitations, it has to be mentioned that the authors neither claim this framework to be complete nor that it might not require further development. For instance, the authors are aware that the “framing effect” counts to one of the most controversial research issues with some researchers even maintaining that emotions do not influence the framing effect at all. Still, it was decided to include it in this framework as the vast evidence of other research (although often contradictory) increases the likelihood of an existing emotional impact. Likewise, the framework makes no claim to completeness, but rather provides a basic structure to build upon. Therefore, this framework calls for future research that identifies further links between the clusters, detects new influences and eliminates current inconsistencies in the field of emotions and decision making under uncertainty.

Furthermore, the authors acknowledge that the framework only shows relations between emotions and decision making on a macro level, however it is not appropriate to account for phenomena and processes on a micro level. Put succinctly, it is not possible to derive in which way specific emotions (such as anger, fear, happiness etc.) impact managerial decision making and whether they have favourable or deleterious effects. By taking into consideration that emotions can have various effects on decision making and that additionally, current research does not always confirm previous findings on the same topic, it would be difficult to illustrate all emotional mechanisms at the current state of research. In any case, the authors take the view (based on the research evidence) that specific emotions do not have a uniform impact on decision making, but may vary under different circumstances. It is thus the task of future research to pinpoint the exact circumstances and reasons that trigger the specific effects of emotions. The authors of this paper are convinced that successful investigations of the circumstances and context under which emotions are experienced will contribute to resolve existing contradictions in current research findings.

5.3 Chapter summary

The aim of this chapter was to provide an overall framework that summarises and synthesises the extensive findings of this systematic literature review. The framework – which unites the basics of traditional choice models with the most recent evidence – shows the complex influences and interrelations between emotions and managerial decision making and was

elucidated in detail. Ultimately, it has become clear that emotions influence managerial decision processes in various (sometimes still unexplored) ways, particularly under situations characterised by uncertainty. In the end, it is precisely these emotional influences which can play a crucial role in determining managerial decisions, thus contributing to shape the overall strategic performance.

6 CONCLUSION

Since the 1980s (Böhm & Brun, 2008), it was shown that the role of emotions on decision making received a great amount of attention across different research fields and culminated in common agreement: individuals are only limitedly rational (Simon, cit. in Lerner et al., 2015). Some even speak of ‘affective rationality’ (Slovic et al., 2002, cit. in Peters et al, 2006), implying that deliberate and affective processes co-operate (Slovic et al., 2005). However, if the reader recalls Mosier and Fischer’s (2010) hypotheses, a lot of researches contributed to ‘judgment and decision making’, neglecting the emotional impact on experts’ supposedly rational decision making processes. Further, it was emphasised that management faces complex and risky decisions while rarely having access to complete information, driving executives to partially rely on other mechanisms to determine strategic decisions under prevailing uncertainty (Steptoe-Warren, Howat & Hume, 2011; Kim, Payne & Tan, 2006).

6.1 Research Aims

Following that line of reasoning, one might wonder what role is played by emotions in the managerial context. Thus, basing on the findings of current literature, this paper aimed to objectively investigate the existing knowledge, explicate interrelations and causal links, shed light on inconsistencies and identify relevant gaps in the research. The final goal was to provide valuable insights for the top managerial level (i.e. strategy makers) while at the same time supporting the academic research field by emphasising current gaps and proposing further research areas.

6.2 Research Objectives

Overall, this paper had the objective to answer *how and to what extent emotions influence managerial decision making under uncertainty* and to depict the final findings in a self-developed framework.

Even though the majority of the scholars differ in their findings regarding the exact effects of emotions and their aspects to take into consideration (e.g. valence, arousal), it is widely acknowledged in the academic field that emotions - anticipated, incidental as well as integral - influence decisions taken under uncertainty. It has to be noted, though, that it is not claimed that emotions are the dominant forces in decision making process. Rather, it is presented as a parallel concept that co-operates with analytical and deliberate abilities. Recalling the statement of Steptoe-Warren, Howat, Hume (2011) and Kim, Payne, Tan (2006) that strategic

decision makers use further mechanisms when access to complete information is lacking, it seems undeniable that emotions interfere with more analytical processes also in a managerial context.

Indeed, two of the four functions presented at the beginning of this paper were recurrently confirmed. First, emotions act as an information tool by triggering a feeling of pleasure or displeasure prior to a decision. Secondly, they will guide the information processing (Pfister & Böhm, 2008; Peters et al., 2006). However, their influence is much broader than this. As could be displayed in the final framework, they also affect decision making by prominently interacting with risk propensity. Likewise, emotions moderate factors such as framing and probability weighting, which in turn influence risk propensity. Subsequently, risk propensity alters decision making and thus, indirectly affects the strategic performance.

Though the results on the mechanisms were more or less unambiguous, the conclusions available from the existing literature regarding their extent remain limited. Indeed, many inconsistencies were uncovered. Not only did same emotions lead to different consequences on risk propensity depending on other interacting factors, their extent was also mediated by exogenous variables. For instance, while Pachur and Spaar (2015) argued that an increased expertise in a specific domain enhanced a more experiential and affect-based decision mode, others affirmed that the presentation format would be the origin of a more deliberate or emotional thinking style (Baumann & DeSteno, 2012). Further, their extent might depend on many additional contextual and personal factors such as one's level of numeracy (e.g. Pachur & Galesic, 2013), gender (e.g. Fehr-Duda et al., 2011), the outcome itself (e.g. Pachur, Hertwig & Wolkewitz, 2014), the level of uncertainty (e.g. FeldmanHall et al., 2016), the source of uncertainty (e.g. Kugler, Connolly & Ordóñez, 2012), the frequency (e.g. Bagnoux, Bollon & Dantzer, 2012), or even the age (e.g. Huang et al., 2015). But first and foremost, the importance accorded to emotions varies across individuals and to the extent they are taking them into consideration (Lacasse, 2015; Slovic et al., 2005). On the other hand, some argue that emotions can be appraised and regulated.

Though it started more than 30 years ago, it seems obvious that research about this topic needs to be further developed. As could be retrieved from our findings, too many inconsistencies and contradictions are remaining.

6.3 Practical Implications

Applied to managerial strategic decision making under different levels of uncertainty, these findings pinpoint that managers need to be aware of their emotions, regardless if they are incidental, integral or anticipated. Indeed, by influencing information processing (e.g. Bachkurov, 2013), sensitivity to presentation format (e.g. framing effect) or probability weighting (e.g. Mukherjee, 2011), their impact might be beneficial (e.g. Visser-Keizer et al., 2016) or detrimental (e.g. Worthy, Byrne & Fields, 2014) on a firm's risk attitude and thereby, its strategic performance. Thus, a conscious appraisal of these emotions and regulating them if needed might be an option.

Further, emotions related to prior outcomes can have a significant impact on subsequent decisions (e.g. Mitchell et al., 2011) by biasing one's beliefs. Thus, it might be important to consider if other variables were playing a role in those previous outcomes in order to avoid negative effects of emotions. In similar lines, not only are emotions related to prior outcomes affecting decisions, so are potential outcomes if affect-laden. Indeed, affect-rich outcomes might impact managers' thinking style and reduce his/her objectivity by overweighting small probabilities (e.g. Chanel & Chichilnisky, 2009). Thus, one might want to appraise if a project has a high emotional significance that could possibly alter his/her risk perception.

Last but not least, it was concluded that affect also plays a major role in interpersonal relations. More precisely, affect- and cognitive-based trust enhances strategic teams' decision quality and commitment, which subsequently reflects on a firm's strategic performance. Therefore, by integrating and hiring new people, one might want to consider other aspects (i.e. soft skills) than mere technical competences.

6.4 Future Research

As might have been noticed throughout our findings, however, these implications rely mainly on laboratory experiments. Most of them were implicating gambling tests or lotteries and were conducted on random participants (mostly students). For this reason, the findings' applicability and generalizability to the managerial context are limited.

Consequently, the authors of this paper primarily recommend future research to be carried on the field. Put in other words, this would imply following top managers and executives over several months or even years in order to investigate and refine this paper's findings. Evidently, this is a very ambitious task. But surprisingly, in comparison to other domains such

as entrepreneurship (e.g. see Fodor et al., 2016; Saes, Martins & Schnaider, 2013; Fernandez-Perez et al., 2016; Brundin & Gustafsson 2013) or finance (e.g. Riaz & Hunjra, 2015), management has received very little consideration. Further, such a study could be conducted across different fields or industries. This would shed light on the extent of emotions and if the working branch might be an additional variable. Lastly, as already mentioned, the majority of participants were of a young age. Assumed that top executive are older, and by the majority men (Zarya, 2016), it would be worth considering to inquire more in depth the effect of age or gender on the integration of emotions in the decision making process.

Naturally, beside this rather large research inquiry, some other research topics emerged over the chapters. First, future research might be able to clarify what type of process (deliberate or affective) leads to a better performance in the managerial strategic context. More precisely, it is to question if rationality still is a crucial competence to look for in executives or if a wise command and appraisal of emotions would be more advantageous. This relies on inconsistent results regarding the performance of decisions.

Second, as could be observed over the analysis of the several studies, most of them focused on incidental emotions. However, similar to Mosier and Fischer's (2010) claim, it might be of great interest to conduct further research about task-related as well as anticipated emotions. More precisely, it is advised to investigate if their impact varies, if and how managers are able to differentiate them and how managers use or suppress them.

Finally, it is recommended to study the effects of the different intermediate factors presented in a single study. In the existing literature, emotions were often analysed in relation to only one of those factors at a time (e.g. framing, uncertainty level). However, as could be retrieved from this review's results, these factors are tightly intertwined and not easily isolatable as it was assumed until today. Thus, a larger study comprising several variables (e.g. presentation format, level of uncertainty) at the same time might be an interesting starting point to depict their reciprocal effects and to understand some of the inconsistent findings. This especially applies to the framing effects, as not even a tendency towards a common agreement was found.

6.5 Chapter Summary

In this chapter, the major findings were summarised and it was shown that the research question could be answered. This study majorly contributed to the status quo of this research

topic by combining the findings of different research fields and displaying the underlying mechanisms between multiple factors analysed separately until now. Subsequently, derived from the analysis and the self-developed framework, practical implications were presented and insightful inputs regarding future research were provided. However, it is striking how this research field remains rare in the managerial context although it is a crucial aspect of it. It is to hope that this paper has shed light on this too long neglected aspect in the academic world and that managers will work on acknowledging the influence of their emotions.

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APPENDIX A: Cluster classification

Study	Authors	Year	Research Design	Key findings	Cluster
'O Sole Mio: An Experimental Analysis of Weather and Risk Attitudes in Financial Decisions	Bassi, Colacito, Fulghieri	2013	Quantitative study	This study relates to the influence of mood on decisions: bad weather increases risk aversion whereas good weather conditions facilitate risk-taking behaviour.	Incidental emotions
Acute stress does not affect risky monetary decision making	Sokol-Hessner, Raio, Gottesman, Lackovic, Phelps	2016	Quantitative study: experiment	The study states there is no correlation between induced stress and risk behaviour in financial decisions under risk.	Time pressure and stress
Affect and the Framing Effect Within Individuals Over Time: Risk Taking in a Dynamic Investment Simulation	Seo, Goldfarb, Barrett	2010	Quantitative study	Framing effects, by the mediation of emotions, influence decisions under risk.	Framing effect
Affect Regulation and Decision Making: Risk as a Social Constraint	Graupmann, Erber, Poe	2011	Quantitative study	A neutral affective state leads to a more effective processing in high risk decisions, since it fosters the use of the most relevant information.	Emotion regulation
Affect, Empathy, and Regressive Mispredictions of Others' Preferences Under Risk	Faro & Rottenstreich	2006	Quantitative study: experiment	It is stated that individuals evaluate others' risk preferences in a more regressive and inaccurate manner, mainly due to the empathy gap and lacking competence to apply the "risk-as-feelings" principle on others.	Interpersonal relations
Age differences in experiential and deliberative processes in unambiguous and ambiguous decision making	Huang et al.	2015	Quantitative study	Older adults tend will more likely use affective processes in comparison to the younger participants, which leads to more or less successful outcomes depending on the task.	Information processing
Anticipated Regret, Expected Feedback and	Zeelenberg	1999	Review of empirical	Focus: anticipation of regret on decision making under uncertainty	Anticipated emotions

Behavioral Decision Making			studies	Outcome: Anticipated regret can result in risk-averse and risk-seeking decision behaviour depending on which of the choices is the regret-minimizing option	
Anxiety sensitivity and risk-taking behavior	Broman-Fulks, Urbaniak, Bondy, Toomey	2014	Quantitative study: experiment	The study demonstrates a positive correlation between anxiety sensitivity and risk aversion.	Risk propensity
Asymmetric effects of positive and negative affect on decision making	Cahir & Thomas	2010	Quantitative study: experiment	A positive affect leads to risk-averse decisions but so does negative affect - maintenance theory is herewith confirmed.	Risk propensity
Attaining Decision Quality and Commitment from Dissent: The Moderating Effects of Loyalty and Competence in Strategic Decision making Teams	Dooley & Fryxell	1999	Quantitative study: experiment	Trustworthiness within teams enhances decision quality and commitment. More precisely, loyalty enhances decision quality and competence the team's engagement.	Interpersonal relations
Cautious Defection: Group Representatives Cooperate and Risk Less than Individuals	Atanasov & Kunreuther	2016	Quantitative study: experiment	Under uncertainty, groups will tend to cooperate more than individuals whereas reversed patterns are shown in the case of certainty.	Interpersonal relations
Cognitive reappraisal reduces the susceptibility to the framing effect in economic decision making	Miu & Crişan	2011	Quantitative study	Key finding presents that emotion regulation reduces the sensitivity to the presentation frame.	Emotion regulation
Context explains divergent effects of anger on risk taking	Baumann & DeSteno	2012	Quantitative study: experiment	Depending on which thinking mode is triggered by the presentation format (rational vs. affective), anger leads to more or less risk propensity.	Risk propensity
Decision making under uncertainty and information processing in positive and negative mood states	Mohanty & Suar	2014	Quantitative study	1. Participants prefer cautious choices regarding gains and risky choices reg. losses irrespective of their mood state 2. A negative (positive) mood state facilitates systematic (heuristic) information processing.	Framing effect Information processing

Decision making under uncertainty the impacts of emotional intelligence and behavioral patterns	Lashagari	2015	Qualitative review	Due to the ambiguous nature and the uncertainty in financial markets, investors may strive for avoiding losses and minimizing regret in contrast to maximizing gain.	Anticipated emotions
Decision Utility and Anticipated Discrete Emotions: An Investment Decision Model	Cheng	2014	Qualitative review: theoretical study	The paper's contribution is the development of a decision utility model for investment decisions which integrates anticipated discrete emotions and proposes a two-way and iterative relationship between emotions and cognitive appraisals.	Anticipated emotions
Do (un)certainity appraisal tendencies reverse the influence of emotions on risk taking in sequential tasks?	Bagneux, Bollon & Dantzer	2012	Quantitative study: experiment	Angry and happy participants make more risk averse decisions than fearful participants in sequential tasks. This is explained by the emotions' level of certainty.	Risk propensity
Effect of regulating anger and sadness on decision making	Szasz, Hofmann, Heilman & Curtiss	2016	Quantitative study	The study examined the effects of reappraisal, acceptance and rumination relating to anger or sadness on decision making. Reappraisal was found to be the most effective strategy to down-regulate sadness and anger. Moreover, reappraisal enhanced risky choices and led to a more adaptive decision making behaviour.	Emotion regulation
Effects of emotion on prospection during decision making	Worthy, Byrne & Fields	2014	Quantitative study	High levels of worry tend to maximize immediate rewards at the expense of larger rewards in the future → The findings suggest that high levels of worry may adversely affect people's ability to engage in prospection and to make the best long-term decisions	Anticipated emotions
Effects of induced moods on economic choices	Stanton, Reeck, Huettel, LaBar	2014	Quantitative study	Outcome: Happiness increases risk-taking and subjects' responsiveness to decision frames (in comparison to sad mood)	Framing effect
Effects of stress on decisions under uncertainty: A meta-analysis	Starcke & Brand	2016	Quantitative study: meta-analysis	The authors conclude that stress is positively correlated with reward seeking, higher risk propensity and unprofitable decisions.	Time pressure and stress

Emotion and decision making	Lerner et al.	2015	Qualitative review	This study provides a model depicting how emotions interplay with a more rational thinking. This article provides a broad overview of different aspects of emotions and their role.	Incidental emotions Information processing Emotion regulation
Emotion and decision making under uncertainty: Physiological arousal predicts increased gambling during ambiguity but not risk	FeldmanHall, Glimcher, Baker & Phelps	2016	Quantitative study: experiment	Depending on the level of uncertainty, arousal has different consequences on one's risk propensity. Arousal increases risk taking in ambiguous conditions but the contrary is observed under high risk.	Risk propensity
Emotion and the Framing of Risky Choice	Druckmann & McDermott	2008	Quantitative study: experiment	The study provides evidence that emotions have an impact on both individuals' propensity to risk taking and the effect of a frame on risky choices. For instance, anger promotes riskier decision making, whereas distress leads to a more cautious approach.	Framing effect
Emotion regulation and decision making under risk and uncertainty	Heilman, Crişan, Houser, Miclea & Miu	2010	Quantitative study	Two emotion regulation strategies for decision making under risk and uncertainty are examined. Outcome: Cognitive reappraisal of negative emotions mitigates risk aversion, whereas suppression is ineffective in reducing negative emotions. In terms of regulating positive emotions, both ER strategies are effective in abolishing the effect of risk aversion.	Emotion regulation
Emotion regulation and risk taking: Predicting risky choice in deliberative decision making	Panno, Lauriola & Figner	2013	Quantitative study	This study examined if the use of regulation strategies affects deliberative process in high risk decisions. Greater use of reappraisal was correlated with a higher risk taking behaviour while greater use of suppression was related to lower risk propensity.	Emotion regulation
Emotion, decision, and risk: Betting on gambles versus betting on people	Kugler, Connolly & Ordóñez	2012	Quantitative study: experiment	The impact of incidental emotions on risk-taking behaviour depends on the source of uncertainty: in lottery-based tasks, fearful people are more risk-averse than angry participants. The reverse pattern was discovered when uncertainty is	Incidental emotions Risk propensity

				person-based.	
Emotions within reason: Resolving conflicts in risk preference	Wang	2006	Quantitative study: experiment	Emotional and rational preferences have different impacts on risky choice. Emotional choices were more risk seeking in the study than rational choices and more susceptible to framing.	Framing effect
Erratic strategic decisions: when and why managers are inconsistent in strategic decision making	Mitchell, Shepherd & Sharfman	2011	Qualitative study: interviews	The results suggest that metacognitive experience plays an important role in strategic decision making. Namely, greater metacognitive experience is correlated positively with a better strategic performance.	Prior outcomes
Exploration versus exploitation: Emotions and performance as antecedents and consequences of team decisions	Døjbak Håkonsson, Eskildsen, Argote, Mønster, Burton & Obel	2016	Quantitative study: experiment	Positive affect is only marginally correlated with the adoption of new routines compared to performance. If an increase of the performance is following, this will in turn also affect a team's emotional state positively.	Interpersonal relations
Fear and anger have opposite effects on risk seeking in the gain frame	Habib, Cassotti, Moutier, Houdé & Borst	2015	Quantitative study: experiment	It was examined whether incidental negative emotions affect framing susceptibility and risk-taking identically. Outcome: Fear and anger had an impact of risk taking in the gain frame, but not in the loss frame. In the gain frame, fear increased risk-averse decisions and thus amplified the framing affect. In contrast, anger decreased risk-averse choices and thus suppressed the framing effect.	Framing effect
Fear shapes information acquisition in decisions from experience	Frey, Hertwig & Rieskamp	2014	Quantitative study	Fearful people (in comparison to happy people) sample considerably more information before making a decision. Due to the difference in exploration, fearful people experienced rare events (relevant to the decision problem) more frequently which had an impact on final choices.	Information processing

Group cooperation under uncertainty	Gong, Baron & Kunreuther	2009	Quantitative study: experiment	Under uncertainty, groups will cooperate more than individuals. This is mainly explained by blame and guilt aversion.	Interpersonal relations
High But Not Low Probability of Gain Elicits a Positive Feeling Leading to the Framing Effect	Gosling & Moutier	2017	Quantitative study	The study examined the influence of emotions on framing susceptibility for high and low probabilities of gain. → Positive emotion led to a risk-seeking behaviour in the loss frame, but only in case of a high probability of gain. Overall, it was found that low probabilities of gain suppress the framing effect since they don't elicit positive emotions in terms of gain anticipation.	Framing effect
How Anxiety Leads to Suboptimal Decisions Under Risky Choice Situations	Yang, Saini, Freling	2015	Quantitative study	It was found that anxiety (whether incidental or integral) enhances the anecdotal bias in risky choice situations, thus impairing decision making.	Information processing
How Do Prior Outcomes Affect Risk Attitude? Comparing Escalation of Commitment and the House-Money Effect	Weber & Zuchel	2005	Quantitative study: experiment	The effect of prior outcomes on risky choice is dependent of the presentation format of the decision (in this case, portfolio vs. lottery) but not on one's responsibility for prior choices.	Prior outcomes
I felt low and my purse feels light: depleting mood regulation attempts affect risk decision making	Bruyneel, Dewitte, Franses & Dekimpe	2009	Quantitative study: laboratory study	The study shows that negative affect leads to riskier decision making. As an explanation, the depletion hypothesis is proposed which states that negative affect leads to mood regulation attempts resulting in a state of depletion. This depletion, in turn, results in the failure to resist temptations of reward leading to riskier choices.	Incidental emotions
I'm feeling lucky: The relationship between affect and risk-seeking in the framing effect	Cheung & Mikels	2011	Quantitative studies	The present research suggests that positive affect fosters risk-seeking behaviour in the framing effect.	Framing effects
Incidental emotions associated with uncertainty appraisals impair decisions in the Iowa Gambling Task	Bagneux, Font & Bollon	2013	Quantitative study	The study provides evidence that certainty-associated emotions lead to an intuitive processing, whereas uncertainty-associated emotions engage people in a more deliberative processing. In the Iowa Gambling Task, participants induced to feel certainty were found to make more advantageous decisions than those with uncertain	Information processing

				feelings.	
Incidental emotions influence risk preference and outcome evaluation	Zhao, Gu, Tang, Yang & Luo	2016	Quantitative study: experiment	The study reveals that positive incidental emotions lead to a risk-seeking behaviour, whereas no effect of negative emotions was observed.	Incidental emotions Risk propensity
Judgment under emotional certainty and uncertainty: The effects of specific emotions on information processing	Tiedens & Linton	2001	Quantitative study	The study provides evidence that emotions related to certainty appraisals enhances heuristic processing, whereas emotions characterised by uncertainty appraisal promote systematic processing. Further, it was found that certainty associated with an emotion influences the certainty perceived in subsequent situations.	Information processing
Leadership and emotion management for complex tasks: Different emotions, different strategies	Thiel, Connelly, Griffith	2012	Quantitative study	The study investigated the effect of leader-facilitated regulation strategies on the specific effects of discrete emotions of subordinates with respect to planning. It was found that – after subordinates experienced anger or pessimism – diverse regulation strategies employed by leaders had impacts on the planning performance (the effectiveness of a particular ER strategy depends on the type of emotion).	Emotion regulation
Managerial decision making under specific emotions	Bachkirov	2015	Quantitative study	Happiness and anger lead to a processing of less decision-relevant information, whereas fear triggers a more detail-oriented processing. Both, the valence model as well as the cognitive-appraisal framework are used to elucidate the results.	Information processing
Negative Affect, Decision Making, and Attentional Networks	Ortega, Ramirez, Colmenero & García-Viedma	2017	Quantitative study: experiment	The study demonstrates a higher risk aversion in the anxious group but not in the depressive group.	Risk propensity
Original article: Domain-specific preferences for intuition and deliberation in decision making	Pachur & Spaar	2015	Quantitative study: experiment	The use of affect is correlated positively with one's prior experience constituting expertise in a specific domain.	Prior outcomes
Positive Affect, Environmental Uncertainty, and Self-Sacrificial	Zhou, Long &	2016	Qualitative study: survey	The paper presents that leaders receive more team support when showing a self-sacrificial behaviour, especially under	Interpersonal relations

Leadership Influence Followers' Self-Sacrificial Behavior	Hao			uncertainty. This is intermediated by the positive affect.	
Positive emotional context eliminates the framing effect in decision making	Cassotti et al.	2012	Quantitative study	The framing effect was absent after a positive emotional state, however positive affect did not have consequences on risk-taking attitude but decreased risk-seeking behaviour in the loss frame.	Framing effect
Probabilistic Inferences Under Emotional Stress: How Arousal Affects Decision Processes	Wichary, Mata & Rieskamp	2016	Quantitative study	The attention-narrowing hypothesis is more likely in the state of emotional stress.	Information processing
Relationship between Psychological Factors and Investment Decision Making: The Mediating Role of Risk Perception	Riaz & Hunjra	2015	Quantitative study: structured questionnaire	Important factors influencing investment decisions are risk perception, risk propensity, presentation format and available information. Even investment decisions are limitedly rational according to this article.	Risk propensity
Risk and rationality: The effects of mood and decision rules on probability weighting	Fehr-Duda, Epper, Bruhin & Schubert	2011	Quantitative study: experiment	The study examines the effects of induced good mood on probability weighting. It was shown that women in a good mood tend to weigh probabilities more optimistically. In contrast, men do not seem to be affected by incidental mood under risk.	Incidental emotions Risk propensity Probability weighting
Risk Aversion and Emotions	Nguyen & Noussair	2014	Quantitative study: experiment	The study found that an overall positive emotional state results in greater risk taking. But the study results also conclude that fear, happiness, anger and surprise are also positively correlated with risk aversion.	Risk propensity
Selecting decision strategies: The differential role of affect	Scheibehenne & von Helversen	2015	Quantitative study	It is stated that positive affect enhances the search of more information whereas the negative state tends to decrease the search spectrum.	Information processing
Selective exposure to information: how different modes of decision making affect subsequent confirmatory information	Fischer, Fischer, Weisweiler & Frey	2010	Quantitative study	Depending on the level of confidence in their decisions, individuals will search for more or less new information.	Information processing

processing					
Strategic decision making within Chinese firms: The effects of cognitive diversity and trust on decision outcomes	Olson, Bao & Parayitam	2007	Quantitative study: survey	Both affect- and cognition-based trust appears to decrease some of the negative consequences of cognitive heterogeneity on decision outcomes.	Interpersonal relations
Strategic intent and performance: The role of resource allocation decisions	Mariadoss, Johnson & Martin	2014	Mixed methods: qualitative (interviews) & quantitative (survey)	The research states that higher firm risk aversion results in higher performance, as it fosters the positive effects of strategic aggressiveness.	Risk propensity
Strategy Selection in Risky Choice: The Impact of Numeracy, Affect, and Cross-Cultural Differences	Pachur & Galesic	2013	Quantitative study: experiment	When outcomes are affect-rich, less attention is given to probabilities in comparison to affect-poor outcomes. Moreover, some differences are observed across different numeracy levels when it comes to adopt a thinking mode.	Probability weighting
The affect gap in risky choice: Affect-rich outcomes attenuate attention to probability information	Pachur, Hertwig & Wolkewitz	2014	Quantitative study: experiment	Affect-rich decisions do not accord that much importance to probabilities. More precisely, affect-poor outcomes lead to probability-based heuristics while affect-rich ones lead to outcome-based ones, neglecting probabilities.	Probability weighting
The effect of emotion and time pressure on risk decision making	Hu, Wang, Pang, Xu & Guo	2015	Quantitative study: experiment	The study examined how emotion and time pressure influence decision making. The study indicates that emotions affect risk behaviour and that time pressure polarises these effects.	Time pressure and stress
The effects of social context and acute stress on decision making under uncertainty	FeldmannHall, Raio, Kubota, Seiler & Phelps	2015	Quantitative study: experiment	The study investigated how stress affects decision making under uncertainty in both a lottery- and person-based context. It was found that stress decreased risk taking in the person-based task compared to the lottery-based task.	Time pressure and stress
The Influence of Affect on Beliefs, Preferences, and Financial Decisions	Kuhnen & Knutson	2011	Quantitative study: experiment	Positive affect will lead to riskier choices while the opposite is observed in negative affect states.	Information processing Risk propensity
The influence of affect on suboptimal strategy choice	Efendic &	2015	Quantitative study	Anticipated emotions can be detrimental. For instance, in the case of the Monty Hall Dilemma, regret avoidance is not	Anticipated emotions

in the Monty Hall dilemma	Drace			efficient.	
The influence of fear in decisions: Experimental evidence	Chanel & Chichilnisky	2009	Quantitative study: experiment	The study shows that affect-rich outcomes influence the decision making process: under uncertainty, individuals overweight the probability of fearful events.	Probability weighting
The Influence of Forward-Looking Antecedents, Uncertainty, and Anticipatory Emotions on Project Escalation	Harvey & Victoravich	2009	Quantitative study	This study examined how anticipatory emotions affect the escalation of commitment phenomenon of decision makers regarding failing projects. It was found that level of progress and the existence of an alternative project influence the perceived uncertainty which in turn affects anticipatory emotions. Low perceived uncertainty as well as higher levels of positive anticipatory emotions increased the probability of escalation of commitment.	Anticipated emotions
The rationality of emotions: A hybrid process model of decision making under uncertainty	Li, Ashkanasy & Ahlstrom	2013	Qualitative study: theoretical study	The paper provides a hybrid process decision making model which comprises cognition and emotion depending on the level of uncertainty. It is posited that emotions can play both an irrational or a rational role in the decision making process.	Anticipated emotions
The relationship between conflict and decision outcomes: Moderating effects of cognitive- and affect-based trust in strategic decision making teams	Parayitam & Dooley	2007	Quantitative study: survey	The study shows that affective and cognitive trust among strategic teams can mitigate affective conflicts and enhance strategic decision making processes.	Interpersonal relations
The role of forgone opportunities in decision making under risk	Barreda-Tarrazona, Jaramillo-Gutierrez, Navarro-Martinez & Sabater-Grande	2014	Quantitative study: experiment	The study investigated whether missed opportunities influence decision making under risk. It was found that worse prior opportunities enhance an individual's risk aversion, whereas prior better options reduce it. The study proposes that emotions (regret and satisfaction) play key roles in this process.	Prior outcomes
Thinking styles and risky decision-making: Further exploration of the affect-probability weighting link	Mukherjee	2010	Quantitative study: experiment	The article proposes that different thinking styles affect risky decision making behaviour and demonstrates that affective thinking can lead to overweighting small probabilities and influence one's risk behaviour.	Probability weighting

To Fear Is to Gain? The Role of Fear Recognition in Risky Decision Making in TBI Patients and Healthy Controls	Visser-Keizer, Westerhof-Evers, Gerritsen, van der Naalt & Spikman	2016	Quantitative study: experiment	The study investigated how recognition of fear affects risk behaviour. The results revealed that a better fear recognition is related to the development of more profitable strategies and to higher risk avoidance.	Risk propensity
What a Feeling: The Role of Immediate and Anticipated Emotions in Risky Decisions	Schlösser, Dunning & Fechtenhauer	2013	Quantitative study	This study provides evidence that decision behaviour in risky situations is not only influenced by anticipated emotions, but also by immediate emotions. The authors propose that individuals do not only consider their emotional state concerning anticipated outcomes, but also, they derive utility (e.g. pleasure or displeasure) from the available actions themselves.	Anticipated emotions Incidental emotions
Who chokes under pressure? The Big Five personality traits and decision making under pressure	Byrne, Silasi-Mansat & Worthy	2015	Quantitative study: experiment	The study concludes that neurotic people will be more affected by pressure, which will subsequently affect the performance of their decisions.	Time pressure and stress
Win Some, Lose Some: The Effect of Chronic Losses on Decision Making Under Risk	Rivers & Arvai	2007	Quantitative study: experiment	Chronic losses lead to trigger higher risk avoidance, lower expectations and negative affect (i.e. depressed state).	Prior outcomes Risk propensity