Capturing the way in which risk appetite is integrated within the bid/ no bid heuristics of a contractor's business unit

Observing the decision making process about the acceptability of risks for bid/ no bid decisions related to construction projects

Master thesis

Author: Kees Morren

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Colophon

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Author	Ir. K. (Kees) Morren
Student number	S0145025
E-mail	k.morren@student.utwente.nl
University	University University of Twente
Program	Business Administration
Graduation committee	Dr. Ir. K. (Klaasjan) Visscher University of Twente School of management and governance Prof. dr. ir. J.I.M. (Joop) Halman University of Twente Construction Management & Engineering Ir. drs. C.A.B. (Cees) Luijendijk RC CMA Royal BAM Group Risk Management

Educational institution
University of Twente
School of management and governance
Program of Business Administration
P.O. Box 217
7500 AE Enschede
www.utwente.nl/mb

Principal institution
Royal BAM Group
Department of Finance
P.O. Box 20
3980 CA Bunnik
www.bam.nl

UNIVERSITY OF TWENTE.

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Summary

INTRODUCTION

A critical decision that have to be made by contractors in the construction industry is whether or not to bid for a new project when an invitation has been received. A bidding decision made on any one project has a significant influence on the short-term profit of the firm, with consequent impact on the firm's long term strategy and performance. Most contractors realize the importance of considering internal and external factors that affect the bid / no bid decision before committing themselves to a project. Based on these internal- and external factors, the risks and opportunities related to conducting a new project can be described and evaluated. During the evaluation of these risks and opportunities, a contractor wonders which types and amounts of risks and opportunities, and therefore which new projects, are acceptable to take with regard to our strategic objectives. Within Enterprise Risk Management (ERM) this challenge is captured by the concept 'Risk appetite', a concept that provides insights about which types and amounts of risks are acceptable to take for an entity in realizing their mission(s). Royal BAM Group, a Dutch contractor, aspires to further intensify their current ERM procedures with a special focus on shaping the concept 'Risk appetite'. However Royal BAM Group lacks insights about the way their business units arrive at their bid/ no bid decisions and the way risk appetite is integrated within these decisions. This research therefore aspires to capture the bid/ no bid decision making process of a contractor with a special focus on creating insights about the way risk appetite is integrated within this decision making process.

RESEARCH DESIGN

Royal BAM Group aspires to intensify its enterprise risk management by creating a better understanding of the way risk appetite is integrated within the bid/ no bid decision making processes of their business units and the effects of these bid/ no bid decisions on strategic performance. This thesis therefore aspires to obtain insights about the bid/ no bid decision making processes of business units of Royal BAM Group and the way risk appetite is integrated within these bid/ no bid decisions. This research objective will be realized by answering the following research question:

> *In which way is risk appetite integrated within the bid/ no bid heuristics of a business unit of Royal BAM Group?*

METHODOLOGY

This thesis consists of a theoretical and an empirical research. The theoretical research is conducted to determine the characteristics of risk appetite, the bid/ no bid decision making process of contractors and the way risk appetite can be integrated within this bid/ no bid decision making process. For the empirical research, which is conducted in the form of multiple case study, the bid/ no bid decision making processes of two business units of Royal BAM Group are observed and analyzed. For each case the data is collected and analyzed in 'within-case' and 'cross-cases' analyses. Based on the results of these analyses, discussions, conclusions and recommendations are described.

THEORY

The theoretical research is conducted to determine the characteristics of the concept 'risk appetite', the characteristics of a bid/ no bid decision making process and the way risk appetite can be integrated within the bid/ no bid decision making process. In this research risk appetite is defined as 'the amount and type of risk an organization is prepared to pursue or take, with regard to their strategic objectives'. In order to provide insights about the way risk appetite can be integrated within the bid/ no bid decision making process, it is necessary to capture the bid/ no bid decision making process. Because the usual practice is to make bid decisions on the basis of intuition derived from a mixture of gut feelings, experience and guesses, the bid/ no bid decision making process is captured by the 'adaptive toolbox' concept of Gigerenzer (1999). An adaptive toolbox consists of a collection of heuristics and building blocks which a decision maker has at its disposal, together

with the core mental capacities that building blocks exploit. Because in the bid/ no bid decision making process each tender can be considered as a risk or an opportunity for a contractor in realizing their strategic goals, the heuristics used by the decision makers are classified in line with the four types of opportunity-capture heuristics; selection-, procedural-, priority- and timing heuristics.

When the different types of opportunity capturing heuristics used by the decision makers are captured it is still unclear how risk appetite is or can be integrated within these heuristics. When researching the possible relation between risk appetite and heuristics, it is first important to recognize that risk appetite is intangible and cannot be measured directly. As suggested by Hillson & Murray-Webster (2012) risk thresholds are derived from risk appetite and are influenced by the chosen risk attitudes of stakeholders. To set up appropriate risk thresholds in a situation, they should be validated against risk capacity, the ability of an entity to bear risk. In researching the way how risk appetite is integrated within the bid/ no bid heuristics of business units of contractors, first the way how risk thresholds are integrated within the decision rules of the heuristics is researched. Subsequently the linkages of these identified risk thresholds with risk appetites and risk attitudes is researched. In Appendix III based on the couplings between risk thresholds and decision rules and risk thresholds and risk appetites and risk attitudes, the observation scheme for observing the bid/no bid decision making processes is presented.

DATA COLLECTION AND ANALYSIS

To collect and analyze the data, a multiple case study is chosen as a research strategy. Within this multiple case study two business units of Royal BAM Group are selected as cases: BAM Wegen Zuidwest and BAM Infratechniek Telecom. The first business unit is specialized in the design, the construction and the management and maintenance of roads, sewer, drainage cables and earthworks, while the second business unit provides communication infrastructure solutions for the Dutch telecommunication sector.

The research data is collected through observations, document study and semi-structured interviews. Observations in combination with semi-structured interviews are used to collect the heuristics used during the bid/ no bid decision making processes. The documents, which are related to the bid/ no bid decision making process, are studied for describing the effectiveness of the bid/ no bid decision making processes. The collected data is analyzed in two-steps. First, the data about the bid/ no bid decision making and the way risk appetite is integrated within this process is analyzed in a within case analysis. Secondly, a cross cases analysis is performed to compare the findings of the two cases with each other. Besides the insights about the heuristics used and the way risk appetite is integrated within these heuristics, also the effectiveness of the decision making processes is analyzed.

CONCLUSION

In arriving at their bid/ no bid decision the decision makers of both business units make use of all the four different types of opportunity-capture heuristics. However the use of the different types of opportunity-capture heuristics over the different selection moments within the bid/ no bid decision making process of each business unit is differentiated, as a possible consequence of differences in cognitive sophistication of the heuristics. Besides a differentiation in used types of heuristics for the different selection moments for each business unit, also differentiations in the numbers of different types of heuristics used are noticed between the two business units. These differentiations can be explained by the conditions of the market in which the business units operate, in line with the heuristic related concept ‘ecological rationality’. For both the business units, the decision makers make use of the cognitive capacities ‘Recognition’ and ‘Object tracking’ in searching for and deciding about cues.

Based on the identified search- and decision rules within the adaptive toolboxes of the four types of heuristics, risks, risk thresholds, risk attitudes and risk appetites are identified and analyzed. The majority of these identified risk thresholds aren’t traceable by searching within decision making related documents or by observing the decision making process, but are within the brains of the decision makers. With regard to the risk

thresholds there are differences in decision authority between the two cases, which has its influence on the degree of risk attitudes which aren't in line with the risk appetites. In more detail, for the business unit with a low degree of decision authority about their risk thresholds, there is a higher degree of risk attitudes which aren't in line with the risk appetites of decision makers which have decision authority.

Based on a reflection of the risk attitudes on the risk appetites of the two business units and on the risk appetites of other involved organizational layers, strategic issues are revealed. When looking at the way risk appetite relates to the bid/ no bid heuristics of the business unit, it can be stated that it is related to these heuristics by risk thresholds and it is revealed by constructive conflict. When there are mismatches between risk attitudes and risk appetites or between risk appetites at different organizational layers, the risk attitudes and risk appetites are discussed during the decision making process. Based on this it can be stated that a mismatch between risk attitudes and risk appetites or between different risk appetites is not something what should be avoided, because by constructive conflict the involved decision makers will make their risk appetites and risk attitudes explicit and start discussions. Providing and thinking about clear arguments which support the chosen risk attitudes and risk appetites is an aspect which can still be improved for both the business units. For future research it will also be interesting to research risk appetite in a normative way, by providing insights about which risk appetites result in high degrees of win-ratios for tenders and financial results of contracts won. In order to provide these insights, insights about the risk capacities of the business units should be created by monitoring the (un)managed risks and opportunities during the executions of contracts won.

RECOMMENDATIONS

This research offers various directions of future research related to the concepts 'risk appetite' and 'bid/ no bid decision making processes of contractors'. The first type of future research is related to creating insights about the effects of making the bid/ no bid heuristics and the risk appetites and attitudes within these heuristics explicit on the process and the effectiveness of the bid/ no bid decision making process. Second, the ecological rationality of the heuristics and risks appetites can be further researched and explained based on different typologies of environments or different typologies of strategies. Third, the dependencies between the four different types of opportunity-capture heuristics can be further analyzed. Fourth, the effect of constructive conflict on revealing the risk attitudes and risk appetites and the effect of constructive conflict on the effectiveness of the bid/ no bid decision making process can be further researched. Fifth, it can be interesting to research in which way it is possible to normatively judge the risk attitudes and risk appetites and arrive at 'effective' risk appetites. In researching these possibilities, further researching the linkages of risk appetites with risk capacity and risk appetites with strategic objectives can be interesting. Finally, the way in which effective heuristics can be designed based on the strategic objectives and the environments they are active for can be further researched.

The practical recommendations are mainly related to two cornerstones 'Insights about the selection-heuristics used' and 'Insights about the effectiveness of the heuristics'. First it is necessary for the business unit to have insights about the way their bid/ no bid decision making process takes place, but next to that insights about the effectiveness of their selection gate are required. These two cornerstones together can create a third cornerstone 'Possibilities to further optimize the selection gate'. Within this research insights are created about how these first two cornerstones can be captured, however in practice most of the business units do not possess knowledge related to the elements within the first two cornerstones. Because knowledge related to these first two cornerstones is missing, business units do not know if they should optimize their tender selection process but even more important they do not know how this process can be optimized.

First, it is recommended for each business unit to make their bid/ no bid decision making process, the heuristics used, the related risks, risk-thresholds, risk attitudes and risk appetites explicit. Secondly, it is recommended to create insights about the effectiveness of their selection gate. Based on the insights about the selection gates and their effectiveness it is possible in the future to (re)design heuristics and optimize the portfolio of search-, stopping- and decision rules within the heuristics.

PREFACE

This master thesis is the final proof of competence for obtaining the Master of Science degree for the program Business Administration at the University of Twente located in Enschede. The research has been supervised by Royal BAM Group and was conducted in Bunnik.

The conducted research aspires to create insights about the way risk appetite is integrated within the bid/ no bid decision making processes of business units of a contractor. In this study the business units BAM Wegen Zuidwest and BAM Infratechniek Telecom are used as case studies. I really appreciated many people who helped me at this project.

I would firstly thank my supervisor at Royal BAM Group, Cees Luijendijk, Corporate risk manager. He gave me a lot of trust and flexibility on the project. He not only provided me with the necessary support and information, but also provided me with many practical tips on how to send the message.

I also want to extend my gratitude to the other supervisors Klaasjan Visscher and Joop Halman. I am happy that they both supervised my thesis, from a business administration- and a construction management oriented view. Not only a lot of detailed instructions on my study were provided, but also many practical tips on how to implement the research project positivity contributed to the realization of this thesis.

Moreover, I want to thank Vivienne Klaassen-Acda and Jop van Veen for spending their time on this project and for providing me the necessary information related to the two case studies. Second there is special thanks to the CSR employees for providing me the necessary mental support, it was durable to work with you! Next to that I want to thank my fellow students for their support during this project but also for their support during the other years of study.

A final thanks in this preface goes out to my family and girlfriend who supported me on many different levels during this project, but even more they supported me within my other academic years as a student.

Enschede, 21 January 2014,

Kees Morren

'The only person who is educated is the one who has learned how to learn and change' – Carl Rogers

TABLE OF CONTENTS

1 INTRODUCTION

On 4 February 2013, Royal Imtech reported an unexpected write-off of at least EUR 100 million on the Adventure World Warsaw (AWW) project carried out by Imtech in Poland (Imtech, 2013). Imtech also faced considerable other issues in Germany. On 27 February they reported an increase of the write-off in relation to Imtech Poland to EUR 150 million as well as a preliminary write-off of EUR 150 million in relation to Imtech Germany. In the end the aggregate write-offs for Imtech Poland and Imtech Germany were confirmed to be about EUR 370 million (Imtech, 2013). These write-offs had and still have an immediate impact on Imtech's equity and debt financing.

When looking at the causes for these write-offs it can be stated that the primary cause for these substantial financial losses are fraudulent actions by the CEO's of Imtech Poland and Imtech Germany. Besides these fraudulent actions, it is also interesting to take a closer look at the AWW project carried out by Imtech Poland. The AWW project consisted of four projects, two for Adventure World Warsaw and two for biological waste treatment plants. As stated by Adventure World Warsaw, these projects will provide a unique guest experience combining a World-Class Destination Resort with over 50 guest experiences including surprising Outdoor Theme Park attractions and Winter Zone area covering 70% of the complex, Poland's largest one-of-a-kind indoor Water Park, as well as an exciting urban center, incorporating large-scale, well known branded shopping and dining, and top tier entertainment offerings. For Imtech, the AWW project was the largest project ever contracted within their company history. Imtech Poland was to act as general contractor for the AWW project by providing the complete project management for the entire Adventure World Warsaw, thereby stepping up from Imtech's usual role as contractor for the technical services it specializes in. In the end, the failure of the AWW project and the related write-offs by Imtech Poland can be largely explained by the inability of AWW to secure financing for the project and by Imtech's decision to start the project even though financing had not been obtained (Imtech, 2013).

When reflecting on these above facts with a risk management view, some interesting remarks can be made. First of all, Imtech Poland's decision to start the AWW project even though financing had not been obtained can be questioned based on risks reasoning. But secondly, even the choice to contract the AWW project, the largest project ever contracted by Imtech , in an unusual role as contractor can be noticed as a remarkable choice. Based on the available information right now, it is easy to say that Imtech Poland took too many risks in contracting the AWW project in a role as contractor. In order to manage these problems it could be interesting to ask the question; 'How much risks should we take as a company, or are acceptable, in certain projects or business areas?'

The Imtech story above shows the importance of the concept 'risk appetite', as defined as 'the amount and type of risk an organization is prepared to pursue or take, with regard to their strategic objectives', for a company or entrepreneur. This master thesis describes the way in which risk appetite is integrated within the bid/ no bid decision making processes of business units of a Dutch contractor. The thesis is conducted as part of the master Business Administration, with the specialization 'Innovation & Entrepreneurship', at the University of Twente. The researched topic 'Risk appetite' is closely related to the subject 'Entrepreneurship'. In order to realize strategic goals, each entrepreneur or each enterprise take some risks and/or capture some opportunities. Some of these risks and opportunities can be identified and managed in an adequate way which will positively affect the realization of the strategic goals, while other risks and opportunities can't be managed in an adequate way which will negatively affect the realization of the strategy. Each entrepreneur or enterprise aspires to minimize the negative effects, due to limited manageability, of risks and opportunities on their strategic goals. In order to minimize these negative effects, first of all it is necessary to have insights about which types and amounts of risks and opportunities are acceptable to take, also known as 'risk appetite'.

This chapter further introduces the topic of this thesis. First the motive of this research is discussed. Secondly the location were the research is conducted is described. Subsequently the relevance of this research is described and finally the outline of the report is presented.

1.1 MOTIVE

When looking at the current economic analyses of the Dutch construction industry, it can be stated that this industry is in a deep crisis (ABN-AMRO, 2013; ING, 2012). According to bank economists, the total construction output in 2012 fell by 8.6 percent compared to the previous year. This decline in output is mainly a result of a decline in output of 10.2 percent for the general civil and commercial construction. When looking at the whole Dutch economy, this economy has shrunk by 0.9 percent of which 0.44 percent is due to the decline in construction output (ABN-AMRO, 2013). Based on these figures it can be stated that the market conditions within the Dutch construction industry create challenges for contractors. Acquiring new projects by winning tenders will be hard, resulting in a decline of order books. As a consequence the margins will be compromised and the risks a contractor has to deal with will further increase. If something goes wrong in the construction industry, this has often a major impact on the success of the construction project, on the employees, but also on the reputation of a company. The Imtech Poland example mentioned in the introduction is a recent example in which something went wrong resulting in a huge impact on the company (Imtech, 2013). This recent example shows the importance of understanding the risks within the sector and managing these risks in an adequate way. The alignment of risks with strategy will be of crucial importance in reaching this adequate way.

Nowadays the concepts 'Risk management' and 'Strategic planning' are already connected to each other in Enterprise Risk Management (ERM). ERM adopts a structured and disciplined methodological approach that takes into consideration all of the aspects of firm management in order to understand and assess risk: strategies, market, processes, financial resources, human resources and technologies (O'Donnell, 2005; Verbano & Venturini, 2011). In this sense, it is possible to see an overlap between ERM and Strategic Risk Management (SRM) in that the theoretical matrix is strategic management. However the focus on risks within ERM is tied to a higher level of strategic choices (Verbano & Venturini, 2011). As an organization decides on its strategic choices, it should consider the risks involved, and its appetite for such risks, as a basis for making those important decisions. Without a clear organizational risk appetite there is a high chance that managers fail to use their capital wisely, by investing in the wrong businesses or investing too much or too little in specific businesses.

Within ERM the concept 'risk appetite' defines the amount and type of risk an organization is prepared to pursue or take, with regard to their strategic objectives (COSO, 2012). To effectively adopt risk appetite an organization must develop a view of the organization's risk appetite, translate this view in a written or oral statement that can be shared across the organization, and monitor the risk appetite over time. Risk appetite plays a crucial role in modern risk management practice and has recently become the object of academic research (Ashby & Diacon, 2010; AIRMIC, 2009; Power, 2009). Textbooks and standards for risk management invariably put risk appetite at the heart of good practice (AIRMIC, 2009). However there is also critique on the current conception of 'risk appetite', according to Power (2009) the predominantly focus on capital rather than human behavior is an important source of 'intellectual failure' within ERM which should be addressed by senior management and boards. There should be attention for the danger of a legitimacy-driven style of risk management, which has been extensively institutionalized, in which the important issues of 'risk appetite' will become lost in the procedural detail of organization-specific internal control, compliance and accounting systems (Power, 2009). Based on these critique it should be interesting to research what 'risk appetite' is really about, by focusing on how the concept risk appetite is used and interpreted in practice by the decision makers (Aven, 2013).

The importance of formally expressing risk appetite is emphasized by enterprise risk management standards, guidelines (HM Treasury, 2004), best practice studies (Collier, Berry, & Burke, 2006) and practitioners (EY, 2009). The ability to set risk appetite and manage risks in line with this policy has been cited as one of the least

mature competencies of organizations (RIMS, 2008). Practitioner literature suggests that formal statements of risk appetite should articulate the risk attitude of senior management (Barfield, 2005; Semple, 2007), that risk preferences should be elicited and integrated in risk acceptability statements, and mentions the need for independent validation of risk appetite (Pool & Kuijck, 2009). In the research of De Wild (2013) more insight is provided about the possibilities of measuring risk appetite by discussing models in decision theory and methods from expected value theory that ensure that organizational risk appetite both complies with the risk attitude of senior management and a rational model of decision-making. Next to that Hillson & Murray-Webster (2011) argue, based on their model, that the formulation of risk thresholds is a key step in ensuring that decision makers take risk appetite into account during the decision making process. When reflecting on the research efforts with regard to organizational risk appetite there is a focus on describing normative decision models. These models deliver guidelines of how decision making about risk appetite should take place or how risk appetite should be integrated within the decision making processes. However a clear overview of how decision-making about risk appetite take place and is integrated in practice within the decision making processes is missing.

Royal BAM Group aspires to further intensify their current risk management approach by implementing ERM within the organization in the coming five years and create awareness about a definition of organizational risk appetite. Because an organizational risk appetite is not determined yet and full awareness about the determinants is missing it will be hard to evaluate the decision making process about organizational risk appetite. However on a lower level each business unit also has to make decisions about the amount of risks that are acceptable for them during the bid/ no bid decision-making for construction projects. When reflecting on these bid/ no bid decision-making processes a clear and complete view about the way risk appetite is integrated within these processes for projects of business units is missing.

Within each bid/ no bid decision a business unit should also decide about the risks of making a bid or the risks of not making a bid and in special about the degree of acceptability of these risks. Literature about the bid/ no bid decision for construction projects show that this decision can be split in two related decisions: first, bid/ no bid decisions that consider factors would help to determine the benefit expected from a particular project and an appropriate bidding strategy; secondly, mark-up decision, which is one of the consequences of the bidding strategy (Bagies & Fortune, 2006). When looking at the literature concerned with bidding strategies, a great volume has focused on developing many bidding models (Wanous, Boussabaine, & Lewis, 2000). A small number of qualitative studies have looked at how actual bidding decisions have been made in practice. It has been found that most of these bidding models have concerned only the mark-up decision, the bid/no bid decision and the process of forming it have received less attention (Bagies & Fortune, 2006). In this research therefore there will be a focus on acquiring insights about this process of forming the bid/ no bid decisions.

In 1999 Fayek et al. surveyed the bidding practices of Canadian civil engineering construction contractors. Based on this survey they concluded that the decision-making process used in bidding is largely subjective and based on experienced judgment (Fayek, Ghoshal, & Abourizk, 1999). In this decision-making risk- and opportunity assessment are subjective and largely based on experience (Ahmad, 1990; Ahmad & Minkarah, 1998). Next to that the markup-size decision is critical to the success of a company in achieving its objectives and realizing a profit, markup setting is usually based on experience, with little or no formal methods of analysis (Fayek, Ghoshal, & Abourizk, 1999). When looking at the past fourteen years no new analyses have been conducted with regard to this decision making process, and so it is unknown if these decision making processes are still mainly based on experienced judgments or decision making methods and quantitative data are already integrated. Within the research of Fayek et al. (1999) a survey oriented research method was used to analyze the bidding practices of civil engineering construction contractors. In order to provide more detailed information about this decision making process, and the way risk appetite is integrated within this process, in this research there will be a focus on really observing the bid/ no bid decision making processes for construction projects.

1.2 RISK APPETITE WITHIN THE PROCESSES OF ROYAL BAM GROUP

This research is conducted within Royal BAM Group, an European construction group which is active in five home markets for the sectors construction and mechanical and electrical services, civil engineering, property and public private partnerships. Of these five home markets the Dutch construction industry is the biggest market with regard to realized turnover, this market represents 46% of the total turnover in 2012. When looking at the Dutch construction industry, it can be stated that this industry is in a deep crisis (ABN-AMRO, 2013; ING, 2012). According to bank economists, the total construction output in 2012 fell by 8.6 percent compared to the previous year. Based on these figures it can be stated that the market conditions within the Dutch construction industry create challenges for contractors. Acquiring new projects by winning tenders will be hard, resulting in a decline of order books. As a consequence the margins will be compromised and the risks a contractor have to deal with will further increase. If something goes wrong in the construction industry, this has often a major impact on the success of the construction project, on the employees, but also on the reputation of a company. The Imtech Poland example mentioned in the introduction is a recent example in which something went wrong resulting in a huge impact on the company (Imtech, 2013). This recent example shows the importance of understanding the risks within the sector and managing these risks in an adequate way. The alignment of risks with strategy will be of crucial importance in reaching this adequate way.

Royal BAM Group aspires to further intensify their current risk management approach by implementing ERM within the organization in the coming five years. In order to facilitate this process in 2011 a separate risk management group, within the finance department, is created as shown in figure 29 in Appendix I. One important aspect within the settlement of ERM will be the formulation of a risk appetite in line with their strategy. However nowadays an organizational risk appetite is not determined yet and full awareness about the determinants of organizational risk appetite and their effect on the decision making within the corporate risk evaluation processes is missing. Because of this lack of awareness and lack of information about the determinants of organizational risk appetite, it can be questioned that decision making about risk appetite on an organizational level is integrated within the daily routines and therefore it will be hard to observe this decision making and create insights about the determinants of risk appetite. However as shown by the example of Imtech, risk appetite also plays an important role in the selection of construction projects by a specific business unit. Each business unit within the Royal BAM Group decides about on which construction projects a bid should be placed. During these decision making processes they will decide about how much risk is acceptable to take based on specific parameters. However the business units of Royal BAM Group have not defined clear risk appetites for their bid/ no bid decision making processes. Besides that there are lack of insights about the way risk appetite is integrated within the bid/ no bid decision making process and about the way the bid/ no bid decision making process takes place.

In this research therefore there is a focus on creating insights about the way risk appetite can be and is integrated within the bid/ no bid decision making process of a business units of Royal BAM Group, by capturing these decision-making processes. This will be done by first conducting a theoretical research about the characteristics of the concept 'risk appetite', the characteristics of the bid/ no bid decision making process for construction projects, and the possibilities of capturing risk appetite within the bid/ no bid decision making process. Within the practical part, two business units within Royal BAM Group will be selected for conducting case studies in which the bid/ no bid decision making processes for construction projects will be observed.

1.3 RELEVANCE OF THE RESEARCH

The importance of this research is described for the Royal BAM Group, also known as the practical relevance of the research, but next to that also the theoretical relevance of this research is described below.

1.3.1 PRACTICAL RELEVANCE

The practical contribution of the research can be described as creating insights about the bid/ no bid decision making processes for construction projects of business units of Royal BAM Group. In creating these insights

there will be a special focus on creating insights about the way risk appetite is integrated within these decision making processes. Based on this research insights are acquired about which bid/ no bid heuristics are used, how these heuristics relate to risk/opportunities, and in which way risk appetite is integrated within these heuristics. Next to that also some first insights are created about the effectiveness of the bid/ no bid decision making processes, which can considered as 'selection gates'. By having insights about the selection gates, which is described by the used heuristics and the related risk appetites, and the effectiveness of the selection gates it is also possible in the future to further improve or optimize the selection gates, as shown in figure 1.

Figure 1: Possibilities to improve the bid/ no bid decision making process based on insights about the way this bid/ no bid decision making process takes place and its related effectiveness.

The focus on creating insights about the way risk appetite is integrated within the bid/ no bid decision making processes of business units can be considered as a first step in further optimizing the win-ratios of tenders and the financial results of contracts won. Each contractor, and its related business units, can realize its strategic goals by tendering on contracts. Each contract can be considered as a risk or an opportunity in realizing the strategic goals. The risk attitudes of decision makers determine on which amounts and types of risks and opportunities is tendered, and so on which contracts is tendered. After a bid is placed on a contract, the win ratio and the way in which the execution of the contract is managed will influence the realization of the strategic goals. The concept risk appetite can provide insights to business units which risk attitudes, and so which risks & opportunities and contracts, are acceptable to take with regard to the realization of the strategic goals. By reflecting risk appetites on risk attitudes the probability of winning the contract but more important the probability that the risks and opportunities within the contract stay within the risk capacity of the business unit during the execution of the contract can be increased. Improving these probabilities can positively affect the realization of the strategic goals and the further development of integrated thinking, as shown in figure 2.

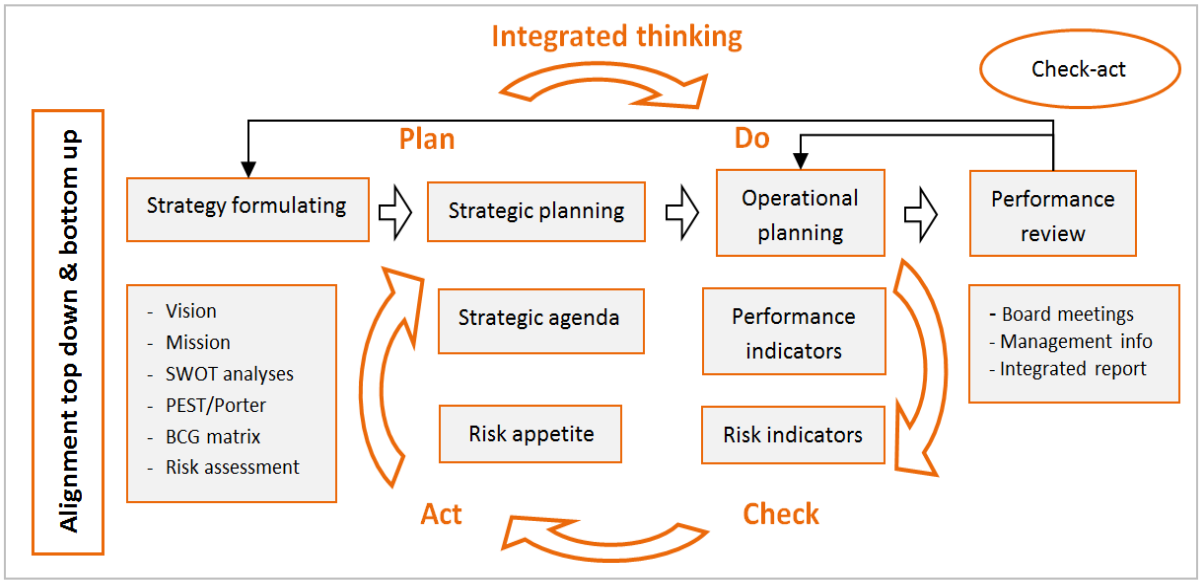

Figure 2: Framework of Royal BAM Group for integrated thinking about risks and opportunities

1.3.2 THEORETICAL RELEVANCE

Besides the practical relevance, the coming research also has scientific relevance in the field of research about risk appetite and research about the bid/no bid decision making process.

When reflecting on the literature about risk appetite, based on ERM theory, practitioner literature suggests that formal statements of risk appetite should articulate the risk attitude of senior management (Semple, 2007; Barfield, 2005), that risk preferences should be elicited and integrated in risk acceptability statements, and mentions the need for independent validation of risk appetite (Pool & Kuijck, 2009). In the research of De Wild (2013) more insight is provided about the possibilities of measuring risk appetite by discussing models in decision theory and methods from expected value theory that ensure that organizational risk appetite both complies with the risk attitude of senior management and a rational model of decision-making. Hillson & Murray-Webster (2011) argue, based on their model, that the formulation of risk thresholds is a key step in ensuring that decision makers take risk appetite into account during the decision making process. When reflecting on the research efforts with regard to risk appetite there is a focus on developing normative decision models, models that describe how risk appetite should be taken into account during decision making or risk evaluation. However understandings about the way risk appetite in practice is integrated within the decision making processes of business units are missing. This research will create some insights about the way risk appetite in practice is taken into account by the decision makers during the decision making processes. These insights can be used as input for improving the decision making models related to strategic choices or risk evaluation.

In the current literature about the bid/ no bid decision, researches about the decision-making processes of risk appetite are limited in numbers. In 1999 Fayek et al. surveyed the bidding practices of Canadian civil engineering construction contractors. Based on this survey they concluded that the decision-making process used in bidding is largely subjective and based on experienced judgment (Fayek, Ghoshal, & Abourizk, 1999). Risk and opportunity assessment is subjective and largely based on experience (Ahmad, 1990; Ahmad & Minkarah, 1998. When looking at the past fourteen years no new analyses have been conducted with regard to this decision making process, and so it is unknown if these decision making processes are still mainly based on experienced judgments or decision making methods and quantitative data are already integrated. Within the research of Fayek et al. (1999) a survey oriented research method was used to analyze the bidding practices of civil engineering construction contractors. In order to provide more detailed information about the decision making process, and the way risk appetite is integrated within this process, it is interesting to really observe the bid/ no bid decision making process for construction projects. Based on these insights it will be possible to really describe the subjective elements and the used reasoning principles within the bid/ no bid decision making process. These insights can be used as input for future research related to the effectiveness of these reasoning principles in this decision context.

1.4 OUTLINE

In this chapter the research is introduced by descriptions of the motive and the practical- and theorectical relevance. In chapter 2 the methodology, which consists of the problem definition, the research objective, the research questions and the research strategy, that is used in this research is discussed. Chapter 3 discusses the theoretical framework that concentrates on the concept risk appetite, the bid/ no bid decision making process and the way risk appetite can be integrated within this bid/ no bid decision making process. Chapter 4 contains the case descriptions, the within case analyses and the cross case analysis. In chapter 5 the results and the research are discussed in the discussion. Chapter 6 contains the conclusions, limitations of the research and relevance of the research. In chapter 7 the theoretical and practical recommendations are presented.

2 RESEARCH DESIGN AND METHODOLOGY

This chapter describes the research design and the methodology. First the problem definition is discussed, followed by the research objective and the research questions. Subsequently the research strategy is discussed, which is followed by the sections about the data collection, the data analysis and the quality of the research. This chapter is concluded with the research model.

2.1 PROBLEM DEFINITION

In literature no recent and detailed overview of the decision making process within the bid/ no-bid decision for construction projects is available, specially it is unknown in which way and on which arguments bid/ no bid decision are made. Next to that, in literature it is unknown how risk appetite in practice is integrated within these bid/ no bid decision making processes. As stated before, Royal BAM Group aspires to further intensify their current risk management approach by, among other things, create awareness about a definition of organizational risk appetite for the different business units. However a clear and complete view about the way risk appetite is integrated within the current decision making processes of business units is missing. An important decision for the business units will be the decision whether or whether not a bid is placed on a tender. At Royal BAM Group and in literature a clear and complete view is missing about the way business units integrate their risk appetite within their bid/ no bid decision making process for construction projects. Therefore in this research there will be focus on the research problem:

> *Business units within Royal BAM Group have not defined a clear risk appetite for their bid/ no bid decision making process for construction projects and a clear view of how risk appetite is integrated within this bid/ no bid decision making process is missing.*

2.2 RESEARCH OBJECTIVE

This research will acquire knowledge about the way risk appetite is integrated within the bid/ no bid decision making process of a business unit of Royal BAM Group, and therefore focuses on the following main objectives:

Objective of research:

Obtaining insight about the way risk appetite is integrated within the tender selection heuristics of a business unit of Royal BAM Group.

Objective in research:

Capturing the bid/ no bid decision-making process for possible tenders within a business unit of Royal BAM Group.

2.3 RESEARCH QUESTIONS

Based on the above research objectives the following central research question and sub questions are derived:

Main question:

In which way is risk appetite integrated within the bid/ no bid heuristics of a business unit of Royal BAM Group?

Sub questions:

1.1 How can risk appetite be characterized?
1.2 How can the bid/ no bid decision making process for contractors be described?
1.3 How can the concept 'risk appetite' relate to heuristics?
1.4 Which bid/ no bid heuristics are used by business units of Royal BAM Group?
1.5 How does risk appetite relate to the bid/ no bid heuristics of business units?
1.6 How effective are the current heuristics?

In answering the research question in a valid and reliable way a research strategy is chosen. The next sections will discuss the chosen research strategy, the chosen methods of data collection and the chosen method of data analysis. The operationalization of the research will be finished by describing the overall research model.

2.4 RESEARCH STRATEGY

The purpose of this study is to create insights about the way risk appetite is integrated within the bid/ no bid decision making process for construction projects, that is based on a reconstruction of practices. This practice-based methodology is created by going back-and-forth between, on the one hand, what competent practitioners do during the decision making process , and on the other hand, a coherent set of rules that accommodates these practices as well as possible. In this way, a methodology on paper is created that reflects decision makers practices in use (Glaser & Strauss, 1967; Strauss & Corbin, 1990). In the terms used by Thagard (1988), this state, in which a methodology is brought in balance with actual practices, can be called a narrow reflective equilibrium. To construct robust methodology, he goes a step further, to a so-called wide reflective equilibrium (Thagard, 1988). This is a state in which the narrow equilibrium is supported by arguments concerning the productivity of the rules, their spread among practitioners, and their accommodation in a background theory, in this study, the theory related to heuristics and risk appetite. In this way, the normative claim of the decision making method is strengthened.

Although this research addresses a topic that is discussed in various studies already, not much research has been conducted on observing the way how risk appetite is integrated within the decision making process related to the bid/ no bid decision-making for construction projects, in special observing the way how risk appetite is integrated within the heuristics used by decision makers. A more in-depth approach is desirable to study these decision making processes and so create more insight about the way risk appetite in practice is integrated in the decision making process (Verschuren & Doorewaard, 2007). Therefore in this research data will be acquired by case studies.

The case studies can be considered as one research part. Based on the different research question the research can be subdivided into three main research parts, as presented in figure 3.

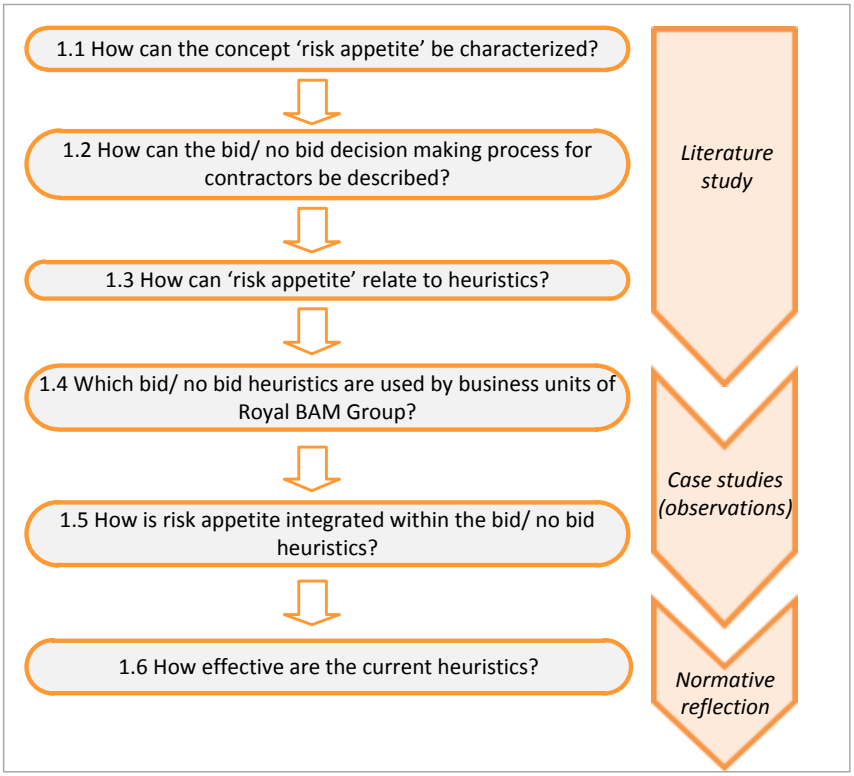

Figure 3: Schematic overview of research strategy

Within the first part of this research a literature study will be conducted, which will focus on describing the characteristics of the concept risk appetite, the characteristics of the bid/ no bid decision making process for construction projects, and the way how these two concepts relate to each other. In the literature review about the bid/ no bid decision making process there will be a special focus on describing the concepts 'Bounded rationality' and 'Heuristics'. After the literature review is conducted, the bid/ no bid decision making process for projects of a business unit will be researched in the form of multiple case studies. Within each case study the decision making process and the way in which risk appetite is integrated within the bid/ no bid decisions will be observed. Based on these observations a descriptive model will be presented that gives insight in the way risk appetite is actually integrated within the bid/ no bid decisions for construction projects. For the situations in which not all the arguments related to the decision making process can be observed, the involved decision-makers will be interviewed. Next to that, the interviews are also used to create insights about the different types of decisions rules underlying the actual decisions of the decision-makers. Based on the observations of the decision making process and the interviews with the decision makers, the way risk appetite is integrated within the bid/ no bid decision making process will be described. In the last part of the research the effectiveness of the bid/ no bid heuristics will be described by focusing on the win-ratio of the tenders, the profit of the tenders won and the differences between the identified risks during the tender stage and the exposed risks during the construction phase. The research will be concluded by describing normative oriented recommendations with regard to the way risk appetite is integrated within the bid/ no bid decision making process for construction projects.

In the next subsection the way data will be acquired by case study research is further described.

2.4.1 CASE STUDY RESEARCH

Case studies are widely used in organizational studies and across the social sciences. Case study research consists of detailed investigation, often with data collected over a period of time, of phenomena, within their context (Hartley, 2004). Case studies generally include multiple methods because of the research issues which can be addressed through this strategy. Participant observation, direct observation, interviews, focus groups, documentary analysis and even questionnaires may be used, or in combination.

A case study can have three different purposes; exploratory, descriptive and explanatory (Yin, 2003). When reflecting these three purposes on the research question of this thesis, the case study research will have an exploratory character since the objective of the research is to obtain insight about the way risk appetite is integrated within the tender selection heuristics of a business unit within Royal BAM Group by capturing the bid/ no bid decision-making process for possible tenders within a business unit.

When reflecting on the different types of case studies, in general two different types of case studies can be distinguished; the single case study and the multiple case study, also known as the comparative case study. While in a single case study one case is studied, in a multiple case study a small number of cases is studied. In both types of case studies one or more units of analysis can be researched. In this research a multiple case study will be used to research the way risk appetite is integrated within the bid/ no bid decision making process.

2.4.2 MULTIPLE CASE STUDIES

In a multiple case study, multiple cases are studied and compared with each other. The multiple case study can be more valuable than a single case study because data is collected from multiple cases, which contributes to the reliability (Yin, 2003). Although the analysis of multiple cases requires more resources and time, the differences and similarities in the cases raise the generalizability of the results (Miles & Huberman, 1994). In order to generate theory based on the case studies, Eisenhardt (1989) stated that a multiple case study consists of four till ten cases. If more than ten cases are studied it can be difficult to cope with the complexity of data and with less than four cases it is difficult to generate theory. In this research ten mini cases will be studied, which will be described in the next section.

2.5 DATA COLLECTION

This section describes which cases are selected, which units and levels of analysis are chosen and which research instruments are used to collect the data.

2.5.1 CASES

To build theory from cases, each case has to be selected (Eisenhardt, 1989). The cases in this research are strategically selected and not at random, since the case is used to build theory and further only a limited amount of cases can be studied in this research due to the available time and resources (Eisenhardt, 1989). In this research multiple bid/ no bid decision-making processes for construction projects will be researched within two different business units of Royal BAM Group. In selecting these business units for which the bid/ no bid decisions for possible tenders will be observed, the criteria 'Dutch- or English language' and 'decision making within a session', are used. In the next section the units and levels of analysis are described for these cases.

2.5.2 UNITS AND LEVELS OF ANALYSIS

The unit and level of analysis are important considerations in determining the scope of the research (Yin, 2003). The unit of analysis is the major entity that is studied and is based upon the defined research questions. In this research the decision making process about the bid/ no bid decision for construction projects within a business unit of Royal BAM Group will be the main unit of analysis. The actions of the involved decision makers during the decision making process, the different types of opportunity-capture heuristics, the building blocks of the heuristics and the underlying core capacities, the risks and opportunities related to the heuristics and the tolerances related to the heuristics are embedded units of analysis within the decision making process of the bid/ no bid decision.

The levels of analysis will be a business unit of Royal BAM Group in which decision making about the bid/ no bid choice for potential tenders takes place. The choice for this levels of analysis is based upon the assumption that each business unit of Royal BAM Group is liable, in a certain degree, for the selection of its construction projects and therefore the bid/ no bid decision takes place at the business-unit level.

2.5.3 RESEARCH INSTRUMENTS

As stated before case studies generally include multiple research instruments like e.g. interviews, questionnaires and observations. As stated by Yin (2003) one of the principles in properly doing case studies is the use of multiple sources of evidence. By using multiple research instruments these multiple sources of evidence are acquired.

In this research the necessary data is collected through observation, documentation in combination with semi-structured interviews. For each research instrument a procedure will be established on how to collect and to report the data (Yin, 2003).

2.5.3.1 Observation

The observation method is the most commonly used method in studies relating to behavioral sciences. Observation can be used as a scientific tool and a method of data collection for the researcher, when it serves a formulated research purpose, when it is systematically planned and recorded and when it is subjected to checks and controls on validity and reliability (Kothari, 2004). Under the observation method, the information is sought by way of investigator's own direct observation without asking from the respondent.

Observation methods can have different forms depended on their characteristics. In general, observations can have the forms of structured or unstructured, participant or non-participant oriented, controlled or uncontrolled (Kothari, 2004). Next to the different forms, there are also different strategies for observations. It is possible to record in terms of incidents, to record in short or long periods of time, or record in time samples.

In this research a structured, non-participant, uncontrolled oriented observation will be used in observing the decision making process about the bid/ no bid decision for one business unit within Royal BAM Group. First of all a structured method is chosen because based on the literature study a selection of observation units will be chosen which will be in line with the research questions of this research. Secondly the observations will be non-participant, because of the lower chance of influencing the decision-making process in comparison with the participant style. The observations take place in the natural setting so the observations also will have an uncontrolled character. With regard to the strategy there will be a focus on time sampling in special on 'scan sampling', by which the behavior/actions of the entire group of individual is recorded.

Central to any structured observation study will be the observation schedule or coding scheme (Bryman, 2008). This scheme specifies the categories of behavior that are to be observed an how behavior should be allocated to those categories. For a specific observation schedule it is possible that the observer in each and every minute write down an amount of numbers, each of which will relate directly to the coding scheme. In formulating the schedule, the considerations that should to be taken into account are quite similar to those involved in producing a structured interview schedule. In developing the schedule the following aspects should be taken into account (Bryman, 2008):

- A clear focus is necessary. For the observer it should be exactly clear who or what is to be observed.
- As with the production of a closed question for a structured interview schedule or self-completion questionnaire, the forms taken by any category of behavior must be both mutually exclusive, e.g. not overlap, and inclusive.
- The recording system must be easy to operate. Complex systems with large numbers of types of behavior will be undesirable.
- One possible problem with some observation schedules is that sometimes a certain amount of interpretation on the part of the observer is required. If such interpretation is required, there would need to be clear guidelines for the observer.

In this research based on the literature study and some exploratory talks with decision makers an observation schedule will be formulated which will be used for the observations. This observation schedule is presented in Appendix III.

2.5.3.2 Documentation study

The documentation study can be split into a literature study and a study of the project documentation. The literature study is used to create a theoretical framework and to determine the variables in the research. Next to the literature study the project documentation about the bid/ no bid decision making is used to provide some general insights about the process and the output. Later on, the records of the bid/ no bid decision-making processes will be analyzed and reflected on the observations. Some elements of the project documentation will be used as input for the development of the semi-structured interviews (Saunders, Lewis, & Thornhill, 2009).

2.5.3.3 Semi-structured interviews

In this research semi-structured interviews are used to acquire insights about some hidden search rules for cues and the decision rules related to these identified cues used by the decision makers during the bid/ no bid decision making process for projects. Sometimes it will not be possible to provide insights about the used decision rules for the cues and the related tolerances based on solely observing the decision making process. Therefore based on semi structured interviews insights are created about the used decision rules for cues and the related tolerances for these cues. Next to that, these interviews are also used to retrieve the used core capacities underlying the building blocks of the bid/ no bid heuristics. The choice to use semi-structured interviews is based upon the explanatory character of this research (Yin, 2003). Although the respondents are given the opportunity to talk freely about the decision-making processes, the questions are structured in line

with the elements within the decision making process of the bid/ no bid decision for construction projects (Saunders, Lewis, & Thornhill, 2009).

Four to seven semi-structured interviews per business unit are conducted with employees of the researched business units. The interviews ranged from 60 minutes to 90 minutes. The list of interviewees is presented in Appendix IV. The researcher took notes during the interview and then transcribed the interviews. The interviews are recorded in case of authorization for recording the interview and these recordings supplemented the transcripts.

2.6 DATA ANALYSIS

After the data is collected, in this research the data analyses will take place in two steps; data analysis within each case study, and searching for cross-case patterns among studies (Eisenhardt, 1989).

2.6.1 WITHIN-CASE ANALYSIS

The overall idea of the within-case analysis is to become familiar with each case as a stand-alone entity, and to allow the unique patterns of each case to emerge before it is possible to generalize across cases (Eisenhardt, 1989). Based on this acquired depth of understanding it is possible to perform cross-case analysis.

Having developed detailed case descriptions and coded the data, the first step is to analyze the pattern of data within cases (Voss, Tsikriktsis, & Frohlich, 2002). As stated by Voss et al. (2002) a very useful and common starting point is to construct an array or display of the data or to construct an analysis of the sequence of events. Once a display has been constructed, it is possible to seek for explanation and causality. In analyzing the data several methods can be used like; a case dynamics matrix, predictions, or a causal network (Miles & Huberman, 1994; Voss, Tsikriktsis, & Frohlich, 2002). The within case analysis in this research will focus on the following aspects:

1) A short introduction of the involved decision-makers, of the characteristics of the construction projects, and of the decision making context is described by using project documentation and semi-structured interviews.
2) The bid/ no bid decision process is described by describing the different steps the decision makers go through in realizing the bid/no bid decision. The analysis of the bid/ no bid decision process is based on observations.
3) The heuristics used by the decision makers during the bid/ no bid decision making process are described. These heuristics are described by describing their three building blocks; the search rule, the stopping rule, and the decision rule. The heuristics will be categorized into the four different opportunity-capturing heuristics; 'selection rules', 'procedural rules', 'timing rules' and 'priority rules'. Besides the three building blocks also the core capacities which are underlying the heuristics are described for each heuristic. These core capacities are categorized into the four main capacities; 'recognition memory', 'object tracking', 'frequency monitoring', and 'ability to imitate'.
4) For each heuristic the related risk/ opportunity will be described based on the cue searched for within the search rule and the twenty-eight risk categories of Royal BAM Group. The cues searched for are coupled to risks or opportunities and these couplings are reviewed by the decision makers.
5) For each heuristic the tolerances/thresholds which are related to the decision rules are described. These tolerances are categorized into three different categories; zero tolerance, critical tolerance, balanced tolerance.
6) For each threshold/ tolerance level the related risk attitude and risk appetites are described. The risk attitudes and risk appetites are described in a qualitative way. For each threshold level the related risk attitude will be reflected on the risk appetite.
7) Insights are created about the effectiveness of the heuristics by describing the win ratio for the placed bids and the financial results of the tenders won.

8) The possible improvements with regard to the current used heuristics, the tolerances, the argumentations for the tolerances, and the way these tolerances are aligned with risk appetite and risk attitude, are described for the business unit.

2.6.2 CROSS-CASE ANALYSIS

The systematic search for cross-case patterns is a key step in case research, because it can create insight about the generalizability of conclusions drawn from the cases. Cross-case analysis can also positively contribute to the internal validity of the findings. The use of multiple data sources or triangulation is important in case research. Deliberately seeking confirmation from multiple data sources leads to more reliable results (Eisenhardt, 1989).

There are a wide variety of methods and tools available for conducting a cross-case analysis (Voss, Tsikriktsis, & Frohlich, 2002). As within case analysis, the simplest and often most effective method is to construct an array. Having constructed an array, a simple but very effective analytical approach is to pick a group or category and to search within for group similarities or differences. Miles and Huberman (1994) suggest ordered displays as an effective method, displays in this can be ordered by concept, by case or by time. With well-coded and quantified case data, continuous measures or data ordered in sequences can be developed. This lends itself to simple analysis such as graphing and more sophisticated statistical tests.

Next to analyzing the cases separately, they will also be analyzed in a cross case context. The case-specific patterns are compared to each other. In the coming research, within the cross case analysis there will be a focus on the following aspects:

1) The involved decision-makers, the characteristics of the construction projects and the decision making context for the different cases are compared and analyzed with each other.
2) The bid/ no bid decision processes for the different cases are compared and analyzed with each other.
3) The building blocks of the bid/ no bid heuristics and the underlying core capacities are compared and analyzed with each other.
4) The risks/ opportunities related to the heuristic's building block 'search rule' are compared and analyzed with each other.
5) The tolerances/ thresholds related to the heuristic's building block 'decision rule' are compared and analyzed with each other.
6) The risk attitudes and risk appetites related to the tolerances/ thresholds are compared and analyzed with each other.
7) The effectiveness of the heuristics are compared and analyzed with each other.
8) The possible improvements are compared and analyzed with each other.

2.7 CONTROLLABILITY, RELIABILITY AND VALIDITY OF THE RESEARCH

Quality criteria are important to monitor and control the quality of the research (Yin, 2003). In this research three quality criteria are taken into account; controllability, validity and reliability (Yin, 2003).

To guarantee the controllability of this research a case study protocol is used to document how the research is conducted and how conclusions are made. Within paragraph 2.5 the data collection is described, while in paragraph 2.6 the data analysis is discussed. The obtained data is analyzed in the paragraphs 4.1 and 4.2, based on the described data analysis in paragraph 2.6. The conclusions are subsequently based on the within case analyses and the cross case analysis. On basis of the detailed description it is possible to reproduce the research.

The reliability of this research is guaranteed when the results in this research are not dependable on the researcher, the instrument, the respondents or the time and circumstances of the measurement. To increase the reliability a case study protocol is used and the transcripts of the interviews are fed back to the

interviewees. The reliability of the research instrument is increased to use multiple sources of information. In case of the respondents the reliability is increased by using multiple respondents, by verifying the descriptions of decision-making processes and by using two case studies.

The construct validity is guaranteed by using multiple sources of evidence in the form of project documentation, observation and semi-structured interviews which will establish a chain of evidence. Further the key informants reviewed the transcripts of the interviews and the draft versions of the report. Ultimately the external validity is increased by using two cases in the case study. However, the number of two case studies is not high enough to generalize the research results. However the research results can be used as a starting point for developing theory about the integration of risk appetite in heuristic oriented decision making processes.

2.8 OVERALL RESEARCH MODEL

The overall research model of the coming thesis can be subdivided into four parts; 'Theoretical research', 'Empirical research', 'Assembly of results' and 'Delivery of report', as shown in figure 30 in Appendix II.

2.8.1 THEORETICAL RESEARCH

The research will start with a theoretical research in which the problem statement, the research objective, the research questions and methodology are described. After this, a literature review will be conducted on the topics; 'characteristics of the concept 'risk appetite'', 'characteristics of the bid/ no bid decision making process for construction projects' and 'characteristics of bounded rationality'. Based on this review the research questions 1.1, 1.2 and 1.3 will be answered. The answers of these questions are used to formulate an observation scheme which will be used for observing the decision making process about the way risk appetite is integrated within the bid/ no bid heuristics for construction projects of a business unit of Royal BAM Group.

2.8.2 EMPIRICAL RESEARCH

Based on the outcomes of the theoretical research a selection of cases will be conducted based on a list of criteria. The multiple case studies in general will consist of four parts. In the first part general characteristics about each case are acquired by documentation studies and exploratory talks. In the second part the actual bid/ no bid decision making process for the construction projects is observed. Based on these observations a descriptive model of the bid/ no bid heuristics will be presented, which will provide an answer for research question 1.4. Besides the bid/ no bid heuristics also insights will be created about how risk appetite relates to these heuristics, by interviewing the decision makers. These interviews will focus on acquiring insights about the tolerances related to the decision rules within the heuristics and in special about the arguments underlying these tolerances. Based on these insights question 1.5 will be answered. At last insights are created about the effectiveness of the heuristics based on, among other things, statistics with regard to the win-ratio, the financial results of tenders won, the formulated tolerances and the arguments for the formulated tolerances. Based on these insights about the degree of effectiveness normative recommendations will be described. Both the insights about the effectiveness of the heuristics and the normative recommendations will answer research question 1.6.

2.8.3 ASSEMBLY OF RESULTS

In this third phase of the research the conclusion will be formulated based on the outcomes of the theoretical and empirical research. The conclusion will be used to answer the central research question and to discuss the generalizability of the outcomes for other business units.

2.8.4 DELIVERY OF REPORT

In the last phase of the research the findings of the previous phases will be further elaborated and finalized and combined into one report.

3 THEORETICAL FRAMEWORK

In this chapter the relevant literature regarding the central research question will be discussed. First within paragraph 3.1 the concept of risk appetite is discussed, followed by discussing the findings related to the bid/ no bid decision making process for construction projects within paragraph 3.2. Within paragraph 3.3 the possibilities in which risk appetite can be integrated within the bid/ no bid decision making process are discussed. Finally a concluded paragraph is presented that highlights the most important outcomes of the theoretical background.

3.1 CHARACTERISTICS OF THE CONCEPT 'RISK APPETITE'

Within this research there is a focus on the concept risk appetite, however this concept is not a stand-alone concept and it is embedded within Enterprise Risk Management (Razali & Tahir, 2011; Acharyya, 2010; Fraser & Simkins, 2010; Power, 2009). But next to that, risk appetite is also of importance within the traditional risk response process (De Wild, 2013). In this part, first the principles of Enterprise Risk Management (ERM) will be described, followed by the role of risk appetite within ERM. After this first introduction about the concept risk appetite, the definition of risk appetite will be reviewed.

3.1.1 ENTERPRISE RISK MANAGEMENT

In September 2004, the Committee of Sponsoring Organizations of the Treadway Commission (COSO) issued Enterprise Risk Management, to provide a model framework for ERM (Beasley, Clune, & Hermanson, 2005). In this framework ERM is defined as:

> *A process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives* (COSO, 2004).

Based on this definition it can be stated that the concept 'risk appetite' is an important element within ERM. Within this part first the origins and developments of ERM will be shortly described, followed by a description of the main elements of ERM and the role of risk appetite within ERM.

3.1.1.1 Origins of ERM

In the 1990's the idea that organizations should manage their risks holistically led to what is now commonly referred to as Enterprise Risk Management (ERM). The word enterprise for Enterprise Risk Management (ERM) itself shows a different meaning than Traditional Risk Management (TRM) (Razali & Tahir, 2011). Enterprise means to integrate or aggregate all types of risks; using integrated tools and techniques to mitigate the risks and to communicate across business lines or level compared to Traditional Risk Management (Maurer, 2009). Integration refers to a combination of modifying the firm's operations, adjusting its capital structure and employing targeted financial instruments.

Many researchers argued that the term ERM has quite similar meaning with Enterprise-Wide Risk Management (EWRM), Holistic Risk Management (HRM), Corporate Risk Management (CRM), Business Risk Management (BRM), Integrated Risk Management (IRM) and Strategic Risk Management (SRM) (D'Arcy, 2001; Hoyt & Liebenberg, 2006; Kleffner et al., 2003; Liebenberg & Hoyt, 2003; Manab et al., 2007; and Yazid et al., 2009). There are various definitions of ERM. CAS or Casualty Actuarial Society (2003) defines Enterprise Risk Management as disciplines by which an organization in any industry assesses, controls, exploits, finances, and monitors risks from all sources for the purposes of increasing the organization's short- and long-term value to its stakeholders.

Lam (2000) on the other hand, defines ERM as an integrated framework for managing credit risk, market risk, operational risk, economic capital, and risk transfer in order to maximize firm value. Makomaski (2008) defines Enterprise Risk Management as a decision-making discipline that addresses variation in company goals.

Alviunessen and Jankensgård (2009) point out that Enterprise Risk Management is concerned about a holistic, company-wide approach in managing risks, and centralized the information according to the risk exposures. They put emphasize on the term 'risk universe', which means that there is a focus on all the risks that might have an impact on the future cash flow, profitability and continued existence of a company. Therefore, ERM can be defined as a systematically integrated and discipline approach in managing risks within organizations to ensure that firms achieve their objectives, which are to maximize and create value for their stakeholders.

3.1.1.2 Important elements of ERM

According to Razali & Tahir (2011) there are two key points that can be highlighted according to the definitions given above. The first key point is the main role of ERM itself, it integrates and coordinates all types of risks across the entire organization. It means that risks cannot be managed in a silo approach. All risks occurred in the entity must be combined and managed in enterprise approach (Hoyt & Liebenberg, 2011). The second key point of using ERM is that users are able to identify any potential incidents that may affect the organization and know their risk-appetite (Lewin, 2006). If the risk-appetite is specifically known, any decision made by the organization to curb risks may be parallel with the firm's objective (Walker, Shenkir, & Barton, 2003).

As in the past, many organizations continue to address risk in 'silos', with the management of insurance, foreign exchange, operations, credit, and commodities each conducting their activities, in a narrowly focused and fragmented way (Gordon, Loeb, & Tseng, 2009). One of the major challenges in ensuring that risk management is adding value is the incorporation of ERM in business and strategic planning of organizations. The 'silos' that separate risk management functions in organizations also create barriers that separate strategic planning from ERM (Beasley & Frigo, 2010). In many cases, risk management activities are not linked or integrated with strategic planning, and strategic risks can be overlooked, creating dangerous 'blind spots' in strategy execution and risk management that can be catastrophic. The challenge, as well as opportunity, for organizations is to embed risk thinking and risk management explicitly into the strategy development and strategy execution processes of an organization so that strategy and risk mindsets are one and the same (Beasley & Frigo, 2010).

In order to embed risk management within strategy development and strategy execution process, ERM is represented as a three-dimensional matrix of eight elements, which are essential for achieving strategic, operational, reporting and compliance goals (COSO, 2004). The eight different elements can be described as follows:

1) Firstly, the internal environment determines how risk is perceived and addressed by the organization, defining its approach to risk management.
2) Objective setting is the process by which the entity's goals are defined and communicated across the organization.
3) Event identification encompasses the recognition of internal and external events (both risks and opportunities).
4) Risk assessment is the analysis and evaluation of potential risks, considering their frequency of occurrence and their impact.
5) Risk response covers the identification of proper actions for responding to risks, and aligning them with the organization's risk appetite.
6) Control activities are the policies and procedures for ensuring that risk responses are effectively carried out.
7) Information and communication denotes the mechanisms for ensuring effective communication and flows of information across the organization.
8) Finally, monitoring refers to the ongoing management activities for verifying the effectiveness of the processes put in place.

These eight different steps within the COSO standard impose a quite mechanical form of control that is defined in a top down manner and abstracted from organization processes (Power, 2007). For a more dynamic horizontal oriented organization these eight different steps could be different (Arena, Arnaboldi, & Azzone, 2010).

3.1.1.3 Role of risk appetite within ERM

As mentioned in the above section, the second key point of using ERM is that the users are able to identify any potential incidents that may affect the organization and know their risk-appetite for these incidents. If the risk-appetite is specifically known, any decision made by the organization to control risks may be parallel with the firm's objectives (Walker, Shenkir, & Barton, 2003).

Every decision or action carries both the potential for positive and negative effects on operational objectives and ultimately for the organization's corporate objectives, within it (Del Bel Belluz, 2010). The challenge of effective management at both the enterprise- and operational level is to take decisions and actions that strike an appropriate balance between potential upside and downside effects. It is this balance that will be reflected in the organization's risk appetite and risk tolerances. Risk appetite refers to how much risk an organization is willing to take to ensure it has sufficient opportunity to achieve its objectives (Del Bel Belluz, 2010). When making a decision, managers and employees need to understand the organization's risk appetite in order to distinguish between which are the good risks and which are bad risks to take, in other words, where the organization will and will not go in the pursuit of its objectives. Making this decision can be compared with the decision if you want to go fishing on a small lake or the ocean. The larger body of water has more fish and therefore offers more opportunity than if you were to fish in a lake. But it also requires more equipment and has more dangers.

In this research there will be a further focus on the concept 'risk appetite'. As a start, in the next section the definition of this concept will be reviewed in literature.

3.1.1.4 Definition of risk appetite

There are a large number of internet pages and a large number of references in professional literature which pay attention to the concept risk appetite, which shows that the topic has not been wanting in attention (EY, 2009; Power, 2009; Styhr Petersen, 1989). However when looking at the amount of scientific literature it can be stated that this amount is small (De Wild, 2013). Within the studies about risk appetite, many researcher refer to COSO's definition of risk appetite in order to define the concept (Ashby & Diacon, 2010; De Wild, 2013; Power, 2009):

> *"Risk appetite is the broad-based amount of risk an entity is willing to accept in pursuit of its mission/vision* (COSO, 2004)*".*

In the COSO's framework the concept risk appetite applies to appetite for downside risk only because by COSO risk is defined as the possibility that an event will occur and adversely affect the achievement of objectives. COSO defines risk appetite as follows:

COSO's definition clearly states that any appetite for downside risk is contingent on the value that is being pursued. Another, closely related term, risk tolerance, is reserved for describing the acceptable variation relative to the achievement of an objective (COSO, 2004). Where risk appetite pertains at a high level to the entity as a whole, risk tolerance relates to specific objectives (Del Bel Belluz, 2010; COSO, 2004). By requiring organizations to become more explicit about defining and monitoring their risk appetite, COSO creates a new object of attention for management and regulatory bodies and signifies a new 'organizational consciousness' of risk appetite (Power, 2007). The COSO (2004) framework specifically refers to risk appetite as an acceptable 'amount of risk' which suggests a purely quantitative interpretation of the term. While this suits many financial service providers that express risk appetite as the maximum allowable probability of ruin before their risk capacity, the financial buffer, is depleted, this interpretation does not always fit well for organizations with a

different quantitative culture (De Wild, 2013; Mikes, 2009). It appears that organizations tend to interpret risk appetite both qualitatively as a component of a 'boundary system' or quantitatively as part of a 'diagnostic control system' (De Wild, 2013; Simons, 1995).

While within the COSO framework a definition about risk appetite is presented, clear methods of how to describe risk appetite are missing. Next to that within the COSO framework, the definition of 'risk' diverts attention from opportunities and from uncertainties that fall outside its closed rational systems perspective (Williamson, 2007). Within the study of Paape & Speklé (2012) no evidence is found that the application of the COSO framework improves ERM effectiveness. Neither they found support for the mechanistic view on risk management that is implicit in COSO's recommendations on risk appetite and tolerance (Paape & Speklé, 2012).

Within the Federation of European Risk Management Associations' (FERMA) risk management standard, four possible methods to describe risk appetite and risk tolerance are presented. However in this standard there is no clear distinction between the two terms, 'risk appetite' and 'risk tolerance' (FERMA, 2003). The standard prescribes that an organization's risk management policy should set out its appetite for risk. An important premise underlying the standard is that a subset of all downside risks is acceptable to bear and that its unacceptable complement should be treated.

While in the above two frameworks only the downside of risks is mentioned within the definition of risk appetite, in the ISO 31000 (2009) both the upside and downside risks are applied to the principles and guidelines on risk appetite. In this standard, risk appetite is defined as the 'amount and type of risk that an organization is prepared to pursue, retain or take' (ISO, 2009). Even though the principles and guidelines do not make any other explicit reference to risk appetite, its concept is implicitly embedded in the process of risk evaluation in order to determine whether risk is acceptable or not (De Wild, 2013).

Within this research both the downside and upside risks will be taken into account within the definition of risk appetite and therefore the definition within the ISO 31000 guide will be used. As stated by De Wild (2013) even though guidelines about risk management do not make any reference to risk appetite, its concept can be embedded in the process of risk evaluation in order to determine the acceptability of risk.

Within the risk evaluation process another term is often used which is related to the acceptable level of risk, namely the concept 'risk tolerance'. With regard to risk appetite, the concept risk tolerance is a closely related term for describing the acceptable variation relative to the achievement of an objective. Where risk appetite pertains at a high level to the entity as a whole, risk tolerance relates to specific objectives (COSO, 2004). Risk tolerance is not defined as a single finite number, but rather as a tolerable zone or range of values where an operational risk is neither under-managed nor over-managed (De Wild, 2013; Del Bel Belluz, 2010). When a risk is undermanaged, existing management activities and practices around that risk do not produce enough certainty that operational objectives will be achieved. When a risk is over managed, the amount of certainty produced by existing management activities and practices does not merit the investment of time, effort, and resources dedicated to the risk and would be better applied elsewhere (Del Bel Belluz, 2010). Employees and managers need to understand the organization's criteria for risk tolerance to ensure that their decisions lead to the most efficient and effective use of resources and balance potential upside and downside effects (Del Bel Belluz, 2010).

Risk appetite and risk tolerance are not usually derived empirically. They could be statements of the organization's or the decision maker's values about what is appropriate, fair, and desirable behavior. An explicit understanding of risk appetite and risk tolerance is fundamental to enable an organization to implement systematic operational risk management. Yet many organizations, or more precisely their leaders, find it difficult to explicitly define and actively communicate about risk tolerance.

According to Del Bel Belluz (2010) there are three common reasons that organizations fail to articulate their risk appetite and risk tolerances. The first reason is that many executives fall prey to the mistaken belief that

articulating risk appetite or tolerance actually gives permission for risky behavior. The second reason is they don't know how to develop a reliable scale of risk tolerance. The third challenge is that it is not always clear how to align risk tolerance and risk appetite with organizational objectives and strategies at the operational level (Del Bel Belluz, 2010). To improve the alignment of risk tolerance and risk appetite with organizational objectives and strategies, it is important to weave them into performance management and reporting systems. For instance, risk appetite can be worked into operational performance management by ensuring that performance targets encourage people to take on the amount of risk necessary to achieve the organization's objectives. Risk tolerance levels can be woven into the reporting system by using the boundaries of the tolerable zone as the triggers for escalating and reporting on problems and opportunities (Del Bel Belluz, 2010).

By making use of risk appetite and risk tolerances during the decision making, this does not mean that mistakes or misjudgments may not occur, but it means that the process ensured the consideration of the correct elements with the goal of optimizing the risk-return profile of the organization (Shortreed, 2010). The concept risk appetite defines the amount and type of risk that an organization is prepared to pursue, retain or take. When taking a closer look at this definition, within this definition there is a clear distinction between 'the amount of risk' and 'the type of risk' an organization is prepared to pursue, retain or take. So based on this definition the output of risk appetite will be formulated in the form of 'amounts of risk an organization is willing to pursue, retain or take for different types of risks'.

It is clearly important to take proper account of risk appetite when setting risk thresholds but according to Hillson & Murray-Webster (2012) this is not the whole story. In every case, it is people who take decisions on what level of risk exposure is appropriate, working either as individuals or in groups. Despite claims to the contrary, people are not dispassionate rational actors who make decisions based on perfect economic utility calculations. Instead we bring a range of overt and hidden influences to our decision-making, including subconscious cognitive biases and psychological heuristics, as well as affective emotional factors. It is not possible to set appropriate risk thresholds without considering these influences on our perception of risk, which in turn affects individual and group risk attitude. It is therefore necessary to add risk attitude back into the picture, producing the Informed Scenario. According to Hillson & Murray-Webster (2012) organizations might set their risk thresholds in three different scenarios:

1. **Unmanaged**: where risk thresholds are set by the organization with no reference to risk appetite or risk attitude
2. **Constrained**: where risk thresholds are consciously modified by the inherent risk appetite
3. **Informed:** taking account of the chosen risk attitudes of key stakeholders as well as wider organizational factors when setting risk thresholds.

The 'Informed Scenario' shows how managed risk attitude offers a point of choice and intervention in the decision-making process. The "risk attitude-risk actions-risk evaluation" control loop allows the chosen risk attitude to be changed in order to keep actions in line with risk thresholds. As a result an alignment of risk thresholds with objectives, internal coherence with risk culture, and a high degree of effectiveness of risk actions can be reached.

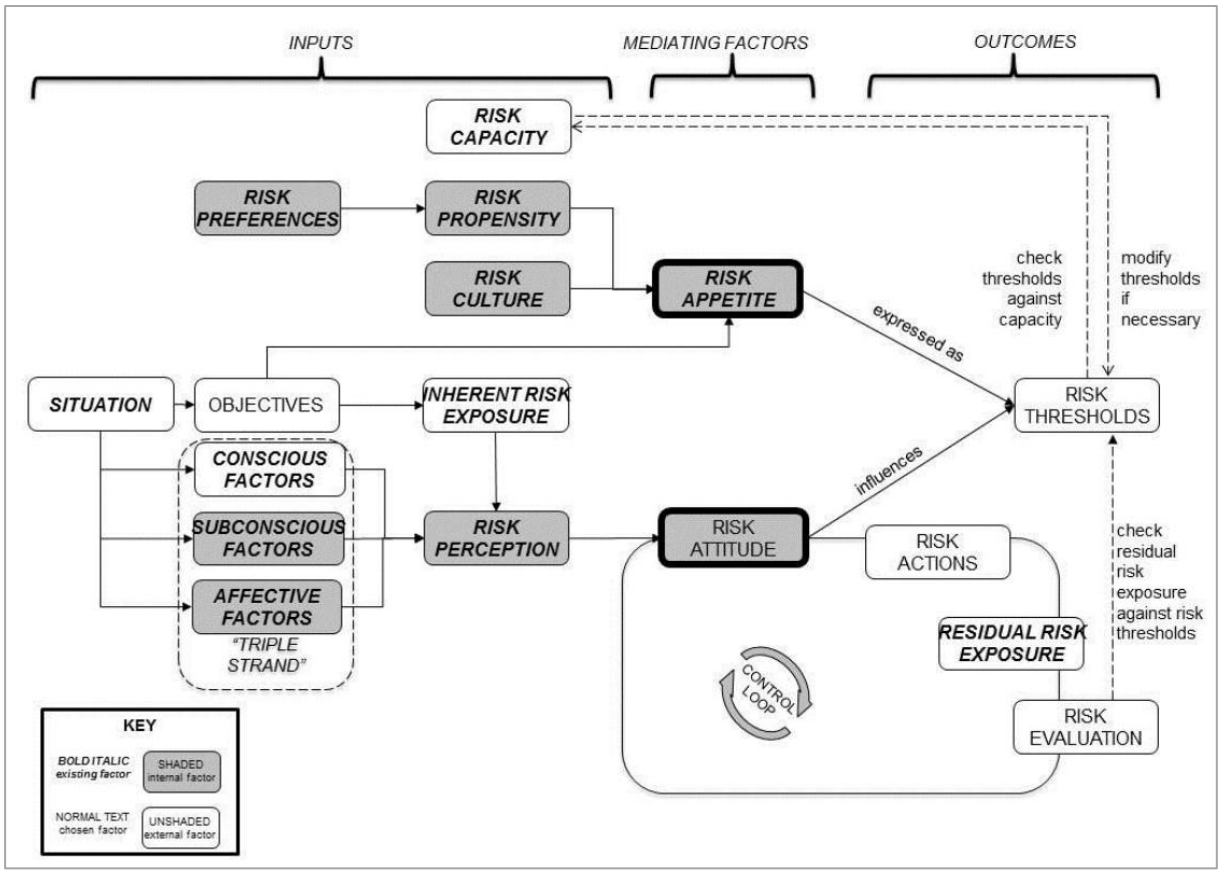

Figure 4: The informed scenario **Source: (Hillson & Murray-Webster, 2012)**

In line with Hillson & Murray-Webster's (2012) formulated input variables for risk appetite, as presented in figure 4, Yener (2010) also states that culture, strategy, and competitive position all influence risk appetite. This also means that different firms will have different tolerances for different risk types. Furthermore, within a firm, appetite may differ between business units (Yener, 2010).

Because of the limited availability of time for this research and because of an organizational risk appetite is not determined yet for Royal BAM Group, it will be hard to evaluate the decision making process about organizational risk appetite. However on a lower level each business unit also has to make decisions about the amount of risks that are acceptable for them during the bid/ no bid decision-making for construction projects. A clear and complete view about the way risk appetite is integrated within the bid/ no bid decision making processes of different business units is missing. Therefore in this research there will be a focus on creating insight about the way risk appetite is integrated within the decision making processes of a business unit by capturing the bid/ no bid decision-making process for construction projects of a business unit of Royal BAM Group. Therefore this research has a descriptive character by describing what people actually accomplish in case of decision-making. In creating this insight, first some more insights are needed about the way a bid/ no bid decision is made by contractors. Therefore in the next part the literature about this decision making process will be reviewed.

3.2 DESCRIBING THE BID/ NO BID DECISION MAKING PROCESS OF CONTRACTORS

One of the most critical decisions that have to be made by contractors in the construction industry is whether or whether not a bid should be placed on a contract (Egemen & Mohamed, 2007; El-Mashaleh, 2010). Smart contractors realize the importance of considering the risks for the bid/ no bid decision before committing themselves to a contract (Bagies & Fortune, 2006). The decision making at this pre-tendering phase in general is accomplished by two related decisions: first, bid/ no bid decisions that consider the risks and values for a particular project and an appropriate bidding strategy; secondly, mark-up decision, which is one of the

consequences of the bidding strategy. Because of the limited availability of time for this research, in this research there will only be a focus on the bid/ no bid decision with a special interest for the way in which risk appetite is integrated within this bid decision.

For any construction company, being able to deal successfully with various bidding situations is of crucial importance, especially in today's highly competitive construction market (Wanous, Boussabaine, & Lewis, 2000). According to Johnston & Mansfield (2001), this decision is about the following two questions: 'Is the project to bid the kind of work our company has been successful at completing to the owner's satisfaction, and will our company make a reasonable profit for that work?' (Johnston & Mansfield, 2001). The decision is thus not considering only the probability to win the tender but also taking into account the probability to finish the project as planned with the expected profit. Besides these two factors, decision makers make use of many other factors and models to arrive at the bid/ no bid decisions. In the next section these different factors and thoughts about the decision models related to the bid/ no bid decision making process are shortly described.

3.2.1 MAIN FACTORS AND DECISION MODELS RELATED TO THE BID/ NO BID DECISION

Within the study of Bagies & Fortune (2006), based on a literature review, ninety-four factors were found which can affect a contractor's bid/ no bid decision. Within the study of Egemen & Mohamed (2007) based on surveys among eighty contracting organizations from Northern Cyprus and Turkish construction markets, the key determining factors and their importance weights that characterize the bid/ no bid and the mark-up decision were presented. For the bid/ no bid decision process, the most important factors were found to be mostly related to 'need for work', 'project profitability', 'strength of firm' and 'client's financial situation' (Egemen & Mohamed, 2007). Based on these identified factors Egemen & Fortune (2007) proposed a knowledge-based system model for the bid/ no bid and the mark-up decision. Surveys by Ahmad and Minkarah (1988) have identified thirty-one factors that were thought to influence bidding decision in the US. Subsequently, Ahmad (1990) adopted a utility value approach and proposed a bidding methodology based on the decision analysis technique for dealing with bid/ no bid problem. Seydel & Olson (2001) have modeled the competitive bidding problem according to three criteria, which are profitability, risk exposure and continuity. Chua and Li (2000) concentrated on bidding decisions and recognized important factors that led contractors to focus their attention on construction projects where their resources can be utilized effectively. Lin and Chen (2004) identified six main criteria for making a decision in the selection of construction project, including capabilities and resources, reputation of company, mission of company, probability of project go-ahead, and risks and competition of project. Cheng and Li (2005) provided an application example to demonstrate main steps of the analytic network process (ANP) method in the selection of construction project. However, they took the view that companies should extend their individual sets of defined criteria, particularly when they should put further attempts to investigate the complex nature of a construction project. In the study of Ravanshadnia et al. (2011) a construction project selection model is proposed that considers the influences of the current projects of a company and uses a multiple stage fuzzy multi-attribute decision making (MADM) method to identify whether one should offer or not offer a tender and to select a project by considering probable policies. Next to proposing a method based on current projects, it is also possible to propose a method based on previous considerations of bidding opportunities. El-Mashaleh (2010) proposed a data envelopment analysis (DEA) approach for the bid/ no bid decision. Based on a contractor's database of previous considerations of bidding opportunities. DEA creates a 'favorable frontier' that consists of favorable bidding opportunities (El-Mashaleh, 2010). New bidding opportunities are evaluated in reference to this 'frontier' and the bid/ no bid decision is consequently made. This proposed approach also incorporates subjective management expertise. Mohanty (1992) designed a model based on the AHP method for assessing project proposals. This model is a structured sequential heuristic procedure for evaluating acceptability indices that includes the identification of the project selection, the identification of intrinsic and extrinsic criteria, the analysis and adoption of these criteria, and the pairwise comparison of these criteria with reference to the project selection.

Laryea & Hughes (2010) also state that analytical models may be too time-consuming, too complex and insensitive to the commercial exigencies of bidding practice. Clearly, risk is an important factor in the bid process of contractors, which often takes place in a short time frame and competitive market environment. Therefore Laryea & Hughes (2010) argue that perhaps a simple table of risk factors, which could be location/project-specific, which indicates a scale or factor by which contractors could easily and flexibly adjust an estimate for risk may be handier and even appropriate. These thoughts are in line with the findings of Ahmad & Minkarah (1998). Bidding is a very complex decision requiring simultaneous assessment of large number of highly inter-related variables to arrive at a decision (Chua, Li, & Chan, 2001; Laryea & Hughes, 2010). For the senior management team it is difficult to consider all the related factors and their combined impact for bid/no bid and mark-up decisions in the limited amount of time they have for every single tender offer. In addition, a decision maker can hardly consider all of the relevant variables due to one's bounded rationality and limited capacity of information processing (Deng, 1994). Therefore in practice, these decisions are made in a largely subjective manner, sometimes even without any reasonable basis (Ahmad & Minkarah, 1998). The usual practice is to make bid decisions on the basis of intuition derived from a mixture of gut feelings, experience and guesses (Ahmad, 1990).

3.2.2 *Visions of reasonableness underlying a decision making process*

When reflecting these above findings on the possible different visions of rationality underlying a decision making process, it can be stated that the bid/ no bid decision is highly related to the models of bounded rationality.

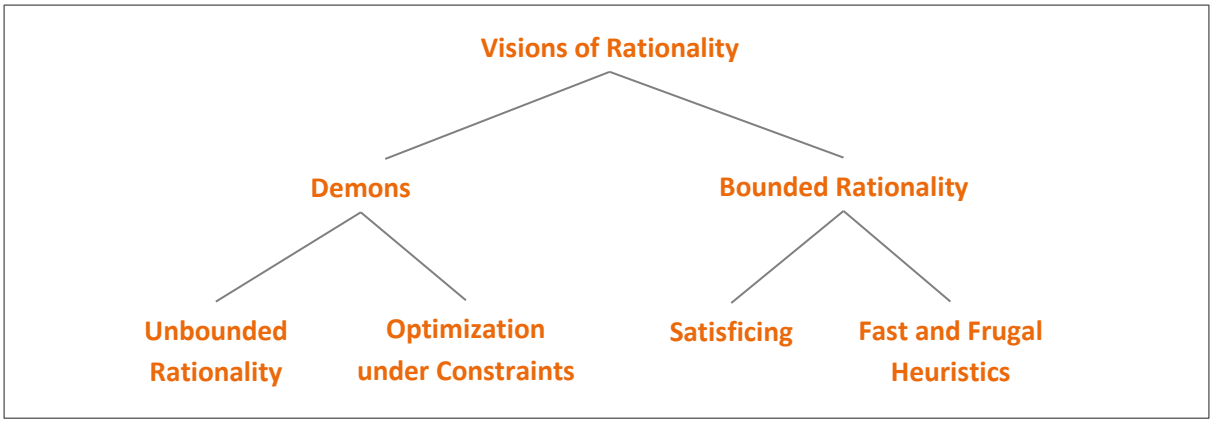

Figure 5: Visions of rationality **Source: (Gigerenzer, 1999)**

Rationality comes in many forms. As shown in figure 5 the first split separates models that assume the human mind has essentially unlimited demonic or supernatural reasoning power from those that assume we operate with only bounded rationality (Chase, Hertwig, & Gigerenzer, 1998; Shakun, 2001). There are two species of demons: those that exhibit unbounded rationality, and those that optimize under constraints (Todd & Gigerenzer, 2000). Unbounded rationality encompasses decision-making strategies that have little or no regard for the constraints of time, knowledge, and computational capacities that real humans face (Kahneman, 2002). Unbounded rationality is traditionally modeled by probability theory. Its best-known realizations are the maximization of expected utility and Bayesian models. There are also two main forms of bounded rationality: satisficing heuristics for searching through a sequence of available alternatives, and fast and frugal heuristics of decisions.

Deviations from unbounded rationality and optimization under constraints became routinely interpreted as judgmental biases and attributed to cognitive heuristics (March, 1978). The bottom line was that people often rely on heuristics, but they would be better off in terms of accuracy if they did not. As Kahneman (2002) explained in his Nobel Memorial Lecture: 'Our research attempted to obtain a map of bounded rationality, by exploring the systematic biases that separate the beliefs that people have and the choices they make from the

optimal beliefs and choices assumed in rational-agent models' (Kahneman, 2002). In Kahneman's research, it is assumed that the conditions for rational models hold and can thus define optimal reasoning. The 'father' of bounded rationality, Simon (1989), however, asked a fundamentally different question; 'How do human beings reason when the conditions for rationality postulated by the model of neoclassical economics are not met?'

When people are faced with a complicated judgment or decision, they often simplify the task by relying on heuristics, or general rules of thumb (Aumann, 1997; Glöckner & Betsch, 2008; Plous, 1993; Reyna, 2004). Tversky & Kahneman (1974) have proposed that decision makers use heuristics to arrive at their judgments. The advantage of heuristics is that they reduce the time and effort required to make reasonably good judgments and decisions (Goldstein & Gigerenzer, 2002; Tversky & Kahneman, 1974). In most cases, rough approximations are sufficient, just as people often satisfice rather than optimize. Normally, heuristics yield fairly good estimates (Anufriey & Hommes, 2012; Goldstein & Gigerenzer, 2002). However using heuristics can also have disadvantages, for certain instances heuristics could lead to systematic biases (Tversky & Kahneman, 1973; Tversky & Kahneman, 1974). Some events are more available than others not because they tend to occur frequently of with high probability, but because they are inherently easier to think about, because they have taken place recently, because they are highly emotional, and so forth.

So far there is no complete theory of bounded rationality. Nevertheless, three classes of processes can be specified that models of bounded rationality typically specify (Gigerenzer & Gaissmaier, 2011):

1. Simple search rules: The process of search is modeled on step by step procedures, where a piece of information is acquired , or an adjustment is made, and then the process is repeated until it is stopped.
2. Simple stopping rules: Search is terminated by simple stopping rules, such as to choose the first object that satisfies an aspiration level. Simple stopping rules do not involve optimization calculation, such as computations of utilities to determine the optimal stopping point.
3. Simple decision rules: After search is stopped and a limited amount of information has been acquired, a simple decision rule is applied, like choosing the object that is favored by the most important reason, rather than trying to compute the optimal weights for all reasons.

The process of search distinguishes two classes of models of bounded rationality: those that search for alternatives, also known as the class 'Satisficing', and those that search for cues, also known as the class 'Fast and frugal heuristics'.

When reflecting these two classes of models on the bid/ no bid decision making process, it looks like the class 'Fast and frugal heuristics' can be of added value in creating insights about why certain decisions are made. As stated before bidding is a very complex decision requiring simultaneous assessment of large number of highly inter-related variables to arrive at a decision (Chua, Li, & Chan, 2001; Laryea & Hughes, 2010). However for the senior management team it is difficult to consider all the related factors and their combined impact for bid/no bid and mark-up decisions in the limited amount of time they have for every single tender offer. In addition, a decision maker can hardly consider all of the relevant variables due to one's bounded rationality and limited capacity of information processing (Deng, 1994). Therefore in practice the decision making process takes place on a limited amount of variables. Because the class 'fast and frugal heuristics' focuses on creating insights about which cues are searched for during the decision making process, this class can provide some insights about on which rules decision making takes place and how these rules of thumb are selected in response to a goal. Therefore in the next section the class 'Fast and frugal heuristics' will be described in more detail.

3.2.3 FAST AND FRUGAL HEURISTICS

Fast and frugal heuristics refer to simple, task-specific decision strategies that are part of a decision maker's repertoire of cognitive strategies for solving judgment and decision tasks (Garcia-Retamera, Hoffrage, & Dieckmann, 2007; Gigerenzer, Todd, & the ABC Research Group, 1999). Fast and frugal heuristics are simple to

conduct because they limit information search and do not involve much computation (Todd & Gigerenzer, 2000). Unlike many decision-making models in the behavioral sciences, models of fast and frugal heuristics describe not only the outcome of the decision-making process but also the process itself.

The research on fast-and-frugal heuristics has three goals: the first is descriptive, the second is normative, and the third is one of design or engineering (Brandstätter, Gigerenzer, & Hertwig, 2006; Gigerenzer, 2008):

1) The adaptive toolbox; The descriptive goal is to analyze the content of the 'adaptive toolbox', that is, the heuristics, their building blocks, and the evolved and learned core capacities on which heuristics operate. Examples of building blocks are search rules, stopping rules and decision rules. Core capacities include for instance recognition memory, frequency monitoring, object tracking and the ability to imitate the behavior of others. The descriptive study of the adaptive toolbox examines its phylogenetic, ontogenetic and cultural development, as well as question of how heuristics are selected in response to a goal. The main methods are observation and experimentation.
2) Ecological rationality: The normative goal is to determine the environmental structures in which a given heuristic succeeds or fails, that is, the match between mind and environment. A heuristic is ecologically rational to the degree that it is adapted to the structure of an environment (Todd & Gigerenzer, 2007). Because ecological rationality dispenses with optimization, it can be applied to both small and large worlds. The study of ecological rationality results in statements about how well a heuristic functions compared to competing strategies in a given environment. This analysis extends to the co-evolution of heuristics and environments. The main methods are computer simulation and mathematical analysis.
3) Intuitive design: The engineering goal is to apply the results from (a) and (b) to design heuristics and/or environments for improving decision making in applied fields such as health care, law and business. We refer to this goals as 'intuitive design' because it relies on heuristics that reflect the way that the human mind works rather than on standard statistical software programs, which many professionals such as medical and legal decision makers find obscure.

When looking at the bid/ no bid decision, in literature and in practice it is unclear which building blocks of heuristics are used by decision-makers to arrive at a final bid status. Therefore in this research there is a focus on the first of the above goals, to analyze the content of the 'adaptive toolbox', that is the heuristics, their building blocks, and the evolved and learned core capacities used during the bid/ no bid decision making process. In the next section therefore the main characteristics of the adaptive toolbox will be described.

3.2.3.1 Adaptive toolbox

As described above, the fast and frugal heuristics consist of simple step-by-step rules that function well under the constraints of limited search, knowledge, and time (Gigerenzer, 2004; Gigerenzer & Selten, 2002). The portfolio of these rules available to a decision maker at a given point is called it 'adaptive toolbox'. According to Gigerenzer & Stelten (2001) the concept of an adaptive toolbox can be described by four characteristics. First it refers to a collection of rules of heuristics rather than a general-purpose decision-making algorithm. Second, these heuristics are fast, frugal, and computationally cheap rather than consistent, coherent, and general (Bröder, 2003). Third, these heuristics are adapted to particular environments, past or present, physical or social. This 'ecological rationality', the match between the structure of a heuristic can be fast, frugal and accurate all at the same time by exploiting the structure of information in natural environments (Todd & Gigerenzer, 2003). Fourth, the bundle of heuristics in the adaptive toolbox is orchestrated by some mechanism reflecting the importance of conflicting motivations and goals. These mechanisms are not understood well yet.

As shown in figure 6, the adaptive toolbox consists of three building blocks which give search a direction, stop search, and make a decision. These heuristics operates on specific core capacities, which can be described as preexisting mental skills or capabilities of certain decision makers. Some examples of core capacities are

recognition memory, frequency monitoring, object tracking, and the ability to imitate (Gigerenzer, 1999; Gigerenzer & Brighton, 2009). The core capacities differ between decision makers.

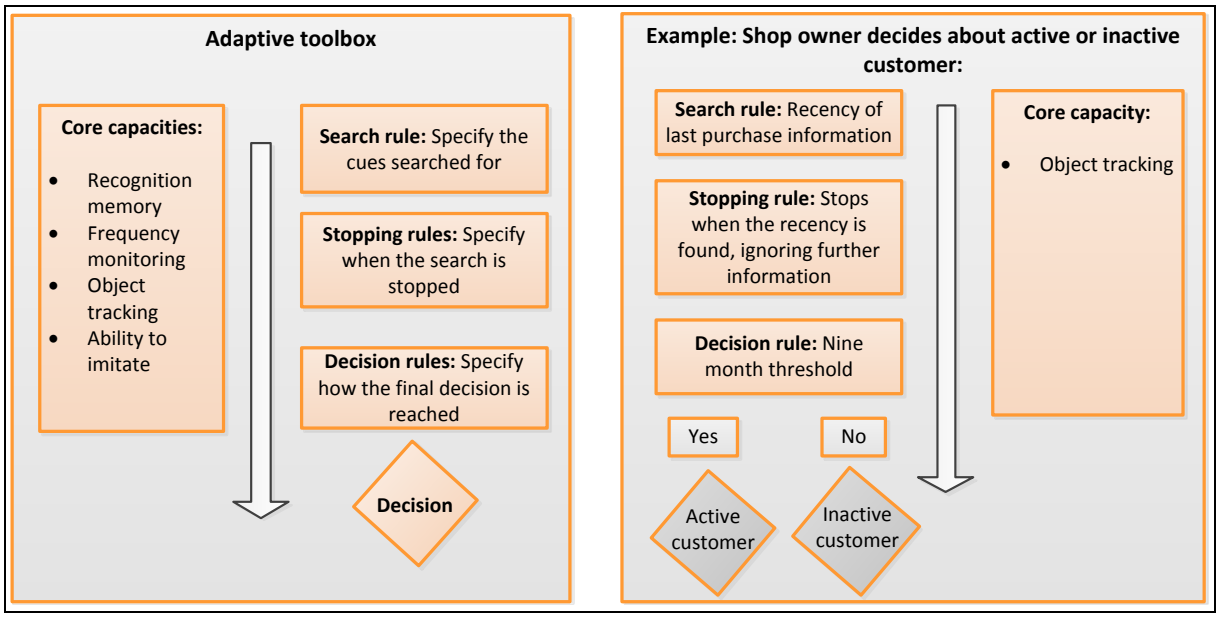

Figure 6: Overview of the building blocks and the core capacities within the adaptive toolbox **Source: (Gigerenzer, 1999)**

In this research insights about the three building blocks and the core capacities underlying the bid/ no bid decision making processes of business units, will be created. However it is unclear if there are specific types of heuristics that can be used during the bid/ no bid decision making process. To create insights about the use of heuristics in relation to the bid/ no bid decision making process, in the next section the use of heuristics is reflected on this decision making process by further reviewing the literature related to the topic 'capturing opportunities'.

3.2.4 Reflection of heuristics on bid/ no bid decision making process

In reflecting the use of heuristics on the bid/ no bid decision making processes for construction projects, the opportunity-capture heuristics proposed by Bingham & Eisenhardt (2011) can be of added value. Because a contractor can reach its strategic goals by realizing projects, each project can be considered as an opportunity. Bingham & Eisenhardt (2011) state that heuristics that relate to capturing opportunities have a common structure.

This common structure is captured by four different types of opportunity- capture heuristics; selection, procedural, temporal and priority. First of all the selection heuristics guide, based on rules of thumb, for which sets of product or market opportunities to pursue, and which to ignore. Second, the procedural heuristics guide the execution of a selected opportunity. Knowledge research identifies the importance of declarative and procedural knowledge categories (Grant, 1996; Moorman and Miner, 1998; Reagans *et al.*, 2005). Third, the temporal heuristics can be considered as rules for opportunity capture that relate to time, such as sequence, pace, and rhythm. At last the priority heuristics can be considered as rules that rank some acceptable opportunities as more important than others.

Table 1: Overview of the four different types of opportunity-capture heuristics Source: (Bingham & Eisenhardt, 2011)

	Types of opportunity-capturing heuristics:			
	Selection	***Procedural***	***Priority***	***Temporal***
Definition	Rules of thumb that guide the choice of opportunities (i.e. which opportunity sets to pursue and which to ignore)	Rules of thumb detailing the actions to conduct a particular opportunity within a selected set	Rules of thumb that specify the ranking of opportunities or actions within a selected set	Rules of thumb that relate to timing of opportunities or actions such as sequence, rhythm, or pace
Examples	• Restrict internationalization to Europe • Only enter English-speaking markets	• Use direct sales approach • Use acquisitions to enter new countries • Use implementation partners	• Stay more focused on Scandinavian markets than other markets • Place greatest priority on government accounts	• Enter one continent at a time • Use U.K. as launching pad into large markets in continental Europe.
Cognitive sophistication	Lower order: Does not require understanding of how multiple opportunities relate. Rather, heuristic centers on selection of one focal opportunity	Lower order: Creation does not require in-depth evaluation of how actions interrelate over time. Like selection heuristics, focus is on one focal opportunity.	Higher order: Creation requires thoughtful evaluation and comparison of multiple opportunities and/ or actions so as to select better opportunities and actions first.	Higher order: Creation requires understanding of rhythms, sequences, and time required such that firms can link multiple opportunities and/or actions together.
Why important	Helps executives allocate scarce resources to an advantageous opportunity set. Without selection heuristics, leaders may chase too many opportunities, chase poor opportunities, or become confused about which opportunities to pursue and so do nothing.	Helps executives organize their actions to conduct the opportunity. Without procedural heuristics, leaders may increase time for decision making due to lack of coherence or understanding regarding the execution of opportunities	Targets organizational efforts on most attractive opportunities within selected sets. Without priority heuristics, leaders may pursue lower-value opportunities when higher-value opportunities within the set exist.	Helps regulate tempo and maintain momentum of actions so as to avoid misalignment and wasted effort. Without temporal heuristics, leaders may conduct actions in the wrong order. Or they may not switch well from one opportunity to another.

These four different types of heuristics are learned in a specific developmental order (Bingham & Eisenhardt, 2011). Based on the findings within their study, Binghman & Eisenhardt (2011) state that firms begin with less cognitively sophisticated heuristics, like selection and procedural heuristics, that address single opportunities. These firms then add more cognitively sophisticated heuristics, like priority and temporal, that relate to several opportunities at once. The cognitive formation of heuristics follows a path of increasing difficulty, in line with findings in cognitive science research (Spelke, 1999).

3.2.4.1 Adaptive toolboxes within the four types of opportunity capturing heuristics

The common structure for opportunity capture heuristics, proposed by Binghman & Eisenhardt (2011) will be used to categorize the identified bid/ no bid heuristics. In order to describe the rules of thumb within each type of opportunity capturing heuristic, the adaptive toolbox concept is used.

Within each type, a search take place for obtaining insights about the value of a specific indicator or variable, and based on the acquired information a decision will be made. In knowing for what indicators to search for, how information can be acquired, and which decisions should be made based on this information the cognitive capacities of the decision makers are of importance. The structure for capturing the rules within the four different types of opportunity capturing heuristics with adaptive toolboxes, is illustrated within figure 7.

When insights are created about the different rules of thumb, consisting of search-, stopping-, and decision rules, and used cognitive capacities for the four different types of opportunity capturing heuristics, it is still unclear how risk appetite is integrated within these heuristics. In section 3.3 therefore the possible relation between risk appetite and the heuristics will be described.

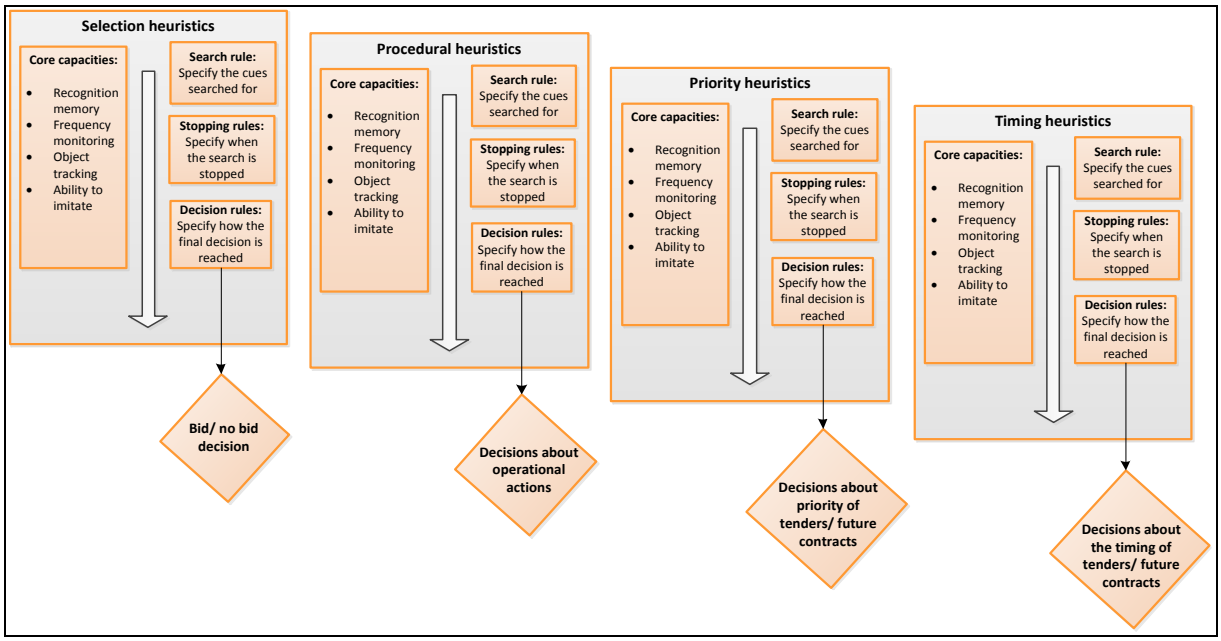

Figure 7: Overview of the structure for capturing the rules within the four different types of opportunity capturing heuristics with the 'adaptive toolboxes'.

3.3 RELATION BETWEEN RISK APPETITE AND HEURISTICS

When researching the possible relation between risk appetite and heuristics, it is first important to recognize that risk appetite is intangible and cannot be measured directly. This can be illustrated by the analogy of physical appetite or hunger, which cannot be directly quantified. Instead figures of speech can be used to express physical appetite. In response to the question "How hungry are you?" it is possible to answer with, "I could eat a horse" or perhaps "I fancy a doughnut". These quantified expressions are not direct statements of appetite, but through this measurable proxy it is possible to assess it. In the same way, risk appetite requires a proxy measure. According to Hillson & Murray-Webster (2012) this proxy measure can be represented by risk thresholds, which are the expression of a risk appetite in ways that can be measured externally and objectively. Risk thresholds, as the quantified measures, represent upper and lower limits of acceptable tolerance around objectives. Some organizations choose to use the term risk tolerance as an alternative to risk thresholds. Either can be used, because risk tolerance indicates upper and lower limits of variability around a risk threshold.

As suggested by Hillson & Murray-Webster (2012) risk thresholds are derived from risk appetite and are influenced by the chosen risk attitudes of stakeholders, as illustrated in figure 4. To set up appropriate risk thresholds in a situation, they should be validated against risk capacity, the ability of an entity to bear risk. The ideal situation is for risk thresholds to be set which properly reflect both the inherent risk appetite of the organization and also the chosen risk attitude in a given situation. This alignment will maximize the chances for the organization to achieve its objectives by taking the right amount of risk consistent with the desired outcomes.

When reflecting these thoughts about risk appetite, risk attitude and risk thresholds on the adaptive toolboxes within the four types of opportunity-capture heuristics, it can be argued that risk thresholds could relate to the building block 'decision rules' and the identified risks to the building block 'search rules'. As described earlier each type of opportunity capturing heuristics consist of the three building blocks; search rules, stopping rules and decision rules. In the first building block, the search rule determines for which cues are searched for with regard to the selection, necessary procedures, priority and timing of tenders. These cues searched for can be related to risks and opportunities within the tenders. In the building block 'Decision rule' it then can be decided if the information around the cues is acceptable or unacceptable for an organization. This decision can be based on a reflection of the found information for cues on the formulated thresholds for these cues.

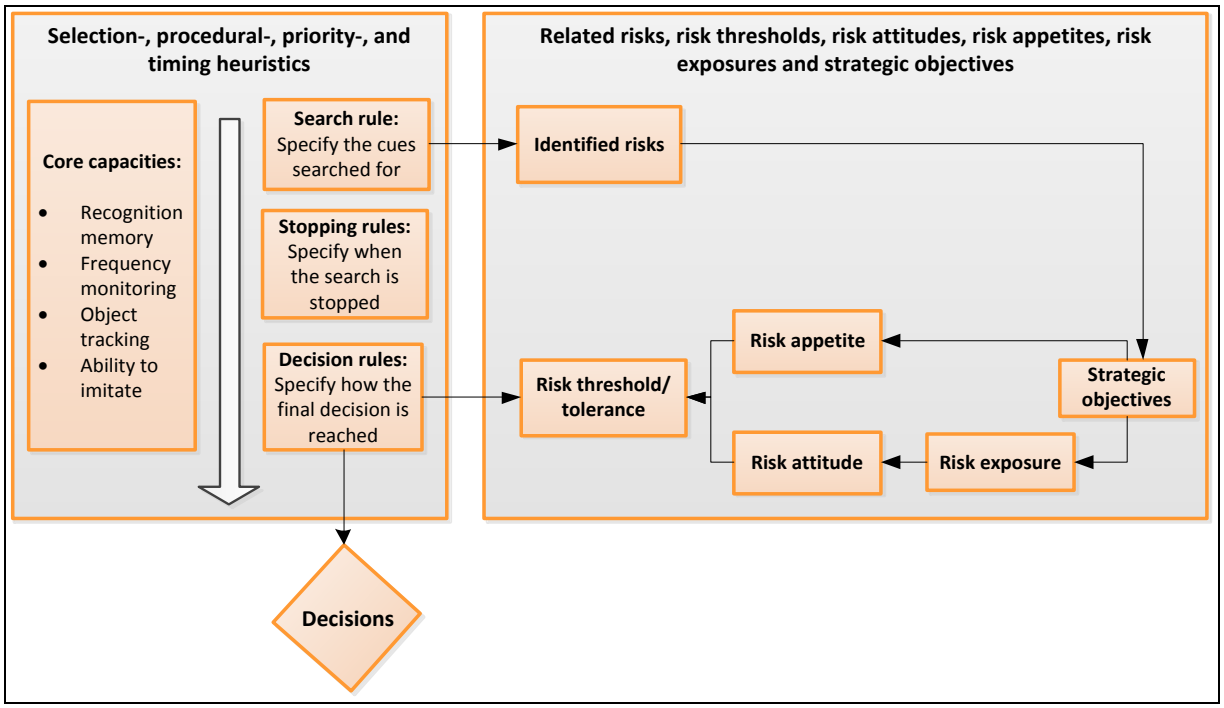

Figure 8: Proposed structure for identifying the risks, risk thresholds, risk appetite, risk attitude, risk exposure and strategic objectives within the adaptive toolbox.

In researching the way how risk appetite is integrated within the bid/ no bid heuristics of business units of contractors, first the way how risk thresholds are integrated within the decision rules of the heuristics should be researched. For these identified risk thresholds it is possible to research the linkages with risk appetite and risk attitude. Do these risk thresholds properly reflect both the inherent risk appetite of the organization and also the chosen risk attitude in a given situation?

3.4 CONCLUSIONS OF THEORETICAL FRAMEWORK

As described within paragraph 2.8 'Overall research model' three research questions are formulated to provide insights about the theoretical background of the research topic:

- How can risk appetite be characterized?
- How can the bid/ no bid decision making process for contractors be described?
- How can the concept 'risk appetite' relate to heuristics?

Within this paragraph, the answers for these three research questions are described.

CHARACTERISTICS OF RISK APPETITE

In this research risk appetite is defined as the 'the amount and type of risk an organization is prepared to pursue or take, with regard to their strategic objectives'. Risk appetite can be embedded in the process of risk evaluation in order to determine the acceptability of risk. Because risk appetite in itself is intangible and cannot be measured directly, risk thresholds can be used a proxy measure. Culture, strategy and competitive position all influence risk appetite, what means that different firms can have different thresholds for different types of risks. Even within the same firm there can be differences in risk appetites for different departments.

Risk appetite can be of value for the organization in maximizing the probability of achieving the strategic objectives by taking the right amount and right types of risk consistent with the desired objectives. Although risk thresholds are derived from risk appetite, risk thresholds are also influenced by the chosen risk attitudes of stakeholders. In order to maximize the probability that the risk attitudes will positively affect the realization of the strategic goals, the attitudes can be reflected on a proxy acceptability measure 'risk thresholds'. As described above these 'risk thresholds' are a result of explicit risk appetites.

DESCRIBING THE BID/ NO BID DECISION MAKING PROCESS FOR CONTRACTORS

The bid/ no bid decision making process for contractors can be described by first describing the different steps within the process and the involved decision makers or involved organizational layers. In this research there is a further focus on capturing the reasoning perspectives within the bid/no bid decision making process. Based on literature it can be stated that the usual practice is to make bid decisions on the basis of intuition derived from a mixture of gut feelings, experience and guesses. In this research these intuitions will be captured by making use of the 'Adaptive toolbox' concept, which consists of a collection of different heuristics together with the cognitive capacities that these heuristics exploit. Each heuristic is further revealed by describing the search-, stopping- and decision rules. Because each new project can be considered as an opportunity for a contractor in realizing their strategic objectives, the adaptive toolbox concept is applied to four different types of opportunity capturing heuristics; selection-, procedural-, priority- and timing heuristics.

RELATION BETWEEN RISK APPETITE AND THE BID/ NO BID HEURISTICS

The concept risk appetite can relate to heuristics by risk thresholds which are related to the decision rules within the heuristics. Each type of opportunity capturing heuristics consist of the three building blocks; search rules, stopping rules and decision rules. In the first building block, the search rule determines for which cues are searched for with regard to the selection, necessary procedures, priority and timing of tenders. These cues searched for can be related to risks and opportunities within the tenders. In the building block 'Decision rule' it then can be decided if the information around the cues is acceptable or unacceptable for an organization. This decision can be based on a reflection of the found information for cues on the formulated thresholds for these cues.

In researching the way how risk appetite is integrated within the bid/ no bid heuristics of business units of contractors, first the way how risk thresholds are integrated within the decision rules of the heuristics should be researched. For these identified risk thresholds it is possible to research the linkages with risk appetite and risk attitude. In Appendix III based on the couplings between risk thresholds and decision rules and risk thresholds and risk appetite and risk attitude the observation scheme for observing the bid/no bid decision making processes is presented.

4 CASE STUDIES

Within this research multiple bid/ no bid decisions are observed for the business units 'BAM Wegen Zuidwest' and 'BAM Infratechniek Telecom'. These two business units are first shortly introduced by describing their context, followed by an analysis of the data within these cases and across cases.

4.1 CONTEXT OF CASES

For both the cases the context is described by describing the characteristics of the organization, the market in which the business units operate, the provided services/ products and the strategic mission of the business units. Within the sections below the main characteristics of the contexts are described, a more extensive description of the context and details about the organization, the market, the provided services/ products and strategic missions can be found in Appendix V.

4.1.1 BAM WEGEN ZUIDWEST

The business unit BAM Wegen Zuidwest is specialized in the design, the construction and the management and maintenance of roads, sewer, drainage cables, parking garages, impermeable floors and earthworks in the Dutch provinces 'Zeeland' and 'Noord-Brabant'. BAM Wegen Zuidwest has employed around 90 employees, of which 40 are employed as constructors. The main office is located in Bergen op Zoom in the Netherlands.

BAM Wegen Zuidwest is operating in a competitive market in which the large majority of the 'construct-only' oriented contracts are awarded to contractors based on a realization of the lowest cost price. In the last year, 2012, hundred percent of the turnover is realized by 'construct only' contracts. The large majority, ninety-four percent, of these contracts can be explained by requests from governmental parties. Sixty-six percent of the contracts won are procured in a public way, while the other thirty-four percent can be explained by private procurement with competition. When looking at the distribution of turnover over the year, it can be stated that there is uneven distribution. In the first quarter of the year, the amount of turnover stays fifteen percent behind of the turnover levels in the other quarters. Within the third quarter of the year, the highest amount of turnover is realized.

Of the annual realized turnover, the large majority (around eighty percent) can be explained by turnover related to the construction and maintenance of road. The other twenty percent can be explained by turnover related to site preparation (around eight percent), to the construction and maintenance of sewage (around six percent) and to the concepts of area development (around 4 percent). When looking at the strategic objectives of BAM Wegen Zuidwest, besides the turnover target also the financial results of contracts won, the customer satisfaction score, the (lean) performance, the entry of the maintenance- and private oriented market, and the degree in which the contracts contain high amounts of asphalt are taken into account.

4.1.2 BAM INFRATECHNIEK TELECOM

The business unit 'BAM Infratechniek Telecom' provides communications infrastructure solutions for the Dutch telecommunications-sector. BAM Infratechniek Telecom was established since the first of January 2013 by the merger of the companies 'Van den Berg Infrastructuren' and 'Ravesteyn Kabel- en Montagewerk'. The organization has permanent employed around the four hundred employees and during periods in which many contracts should be conducted this number can be increased by flexible employees to eleven hundred employees. The office of BAM Infratechniek Telecom is located in the Dutch village 'Zwammerdam'.

When looking at the Dutch telecommunications infrastructure market, the demand side of the market is dominated by major telecommunications companies and cable operators. Next to that, municipalities, like Almere, Amsterdam, Utrecht, also take initiatives with regard to the development of local Fiber to the Home networks. Also ICT oriented companies can be considered as clients in the market of the Wide Area Networks (WAN's). For the last year, 2012, more than eighty percent of the turnover of tenders on which a bid is placed

by BAM Infratechniek Telecom can be assigned to private companies, while six percent can be assigned to municipalities and twelve percent to business units within BAM Group.

4.2 'WITHIN CASE' ANALYSIS OF DATA

For the two business units insights are created about their bid/ no bid decision making process, their used heuristics, the risks which are related to these heuristics, the tolerances/ thresholds related to the decisions, the risk attitudes and risk appetites which are related to the tolerances/thresholds and the effectiveness of the heuristics. These different aspects, as shown in figure 9, are based on the observation scheme which is presented in Appendix III.

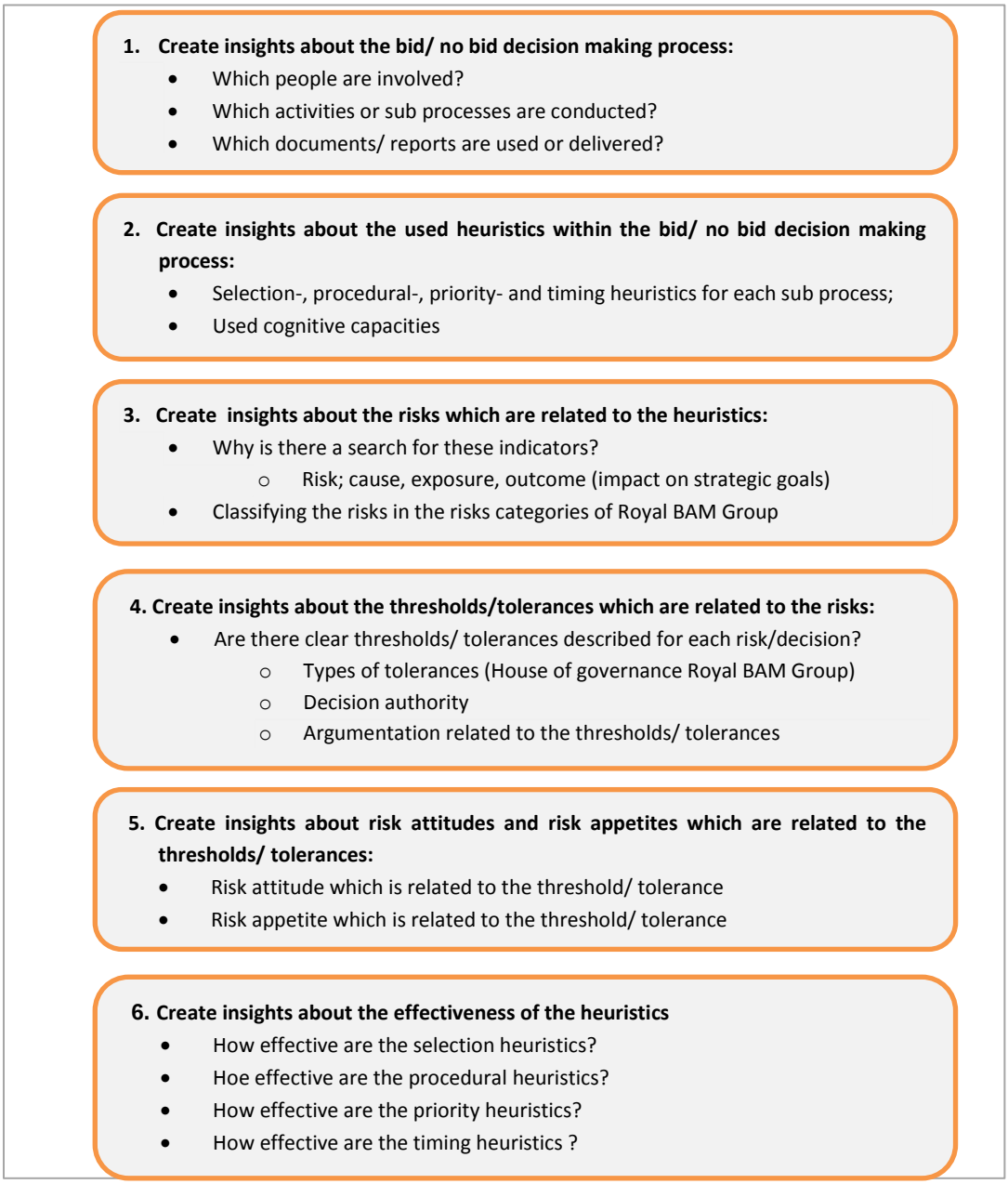

Figure 9: Overview of elements of the within case studies analysis.

4.2.1 THE BID/ NO BID DECISION MAKING PROCESS

The bid/ no bid decision process is described by describing the different steps, the duration of each of these steps, the number of discussions within each step. The analysis of the bid/ no bid decision process is based on observations.

4.2.1.1 BAM Wegen Zuidwest

For the region Southwest within the business unit 'BAM Wegen' each week, the manager of the business office formulates a preliminary list of tenders. For each tender the client, the estimated amount of turnover, the calculator, the type of contract, the type of procurement, the deadline of the tender, the required materials, the bid/ no bid status, and the priority for bidding are described. When this list is formulated, a team of four experts decides, during their weekly meeting, on which tenders to bid and with what priority. In this team the region director, the adjunct region director, the manager of the business office, and the manager of business development all together discuss the possible tenders within their region. After this meeting the preliminary list becomes a reviewed list, in which there is consensus about the bid/ no bid status and the related priority for tenders. Before this list is finalized, this reviewed list will be reviewed once more by the director of 'BAM Wegen'. Based on certain indicators this director decides if the bid/ no bid states and the related priorities for tendering are approved. The whole decision making process related to the bid/ no bid decision is illustrated within figure 10.

Figure 10: Overview of decision making process of business unit 'BAM Wegen Zuidwest'.

4.2.1.2 BAM Infratechniek Telecom

The bid/ no bid decision making process for tenders of BAM Infratechniek Telecom consists of three selection rounds, as presented within figure 11. The decision making process starts with the inventory of received or collected public- or private invitations for tendering. For each invitation the head of the Project Office determines at first sight if a bid should be placed for this tender and so if this tender should be further elaborated. When the head of the Project Office believes that a bid should be placed on the tender, he will assign a cost engineer who will be responsible for the whole elaboration of the tender. Depended on the complexity of and the degree of inexperience with the tender area, it is determined if an engineer is deployed who will collect information about the direct environment of the contract. Based on the available information the cost-engineer, or the cost-engineer together with the engineer, complete a preliminary checklist about the risks and opportunities within the tender. This checklist is then used as input for the second selection moment. During this second selection moment the head of the Project Office, the cost-engineer, the contract manager, and if necessary the engineer will decide if this tender should be put on the agenda of the weekly meeting of the Management Team. Among other things, the elaborated checklists are used as input for making this

decision. As output a list of tenders on which a bid should be placed is presented. During the third selection moment the Management Team of BAM Infratechniek Telecom, which consists of the adjunct director, the commercial manager, the manager 'Engineering, Materials & Lean, and the manager of the project office, the purchasing department & logistics, decides during their weekly meeting on which of the preferred tenders a bid is placed.

Figure 11: Overview of decision making process of business unit 'BAM Infratechniek Telecom'.

When looking at the two decision making processes it is still unclear on which arguments or on which indicators each organizational level arrives at the bid/ no bid status and, in the case of BAM Wegen Zuidwest, arrives at the priority levels. Next to that it is unclear if also procedures with regard to the execution of the tender and aspects related to the timing of tenders are taken into account.

4.2.2 THE ADAPTIVE TOOLBOX FOR OPPORTUNITY-CAPTURING HEURISTICS

To create insights about how the different business cases arrive at their bid/ no bid decision, the decision making process is captured by applying the 'adaptive toolbox' concept for the opportunity-capturing heuristics. For the four different types of opportunity-capturing heuristics the three building blocks, the search-, the stopping-, and the decision rules, and the underlying cognitive capacities are described.

4.2.2.1 The three building blocks for the four different types of opportunity-capturing heuristics

For both the cases 'BAM Wegen Zuidwest' and 'BAM Infratechniek Telecom' the way how these business units arrive at their bid/ no bid decision is captured by observing which types of opportunity-capture heuristics are used within the decision making process. Each type of opportunity-capture heuristic is further captured by describing the three building blocks, the search-, the stopping-, and the decision rules, and the underlying used cognitive capacities.

4.2.2.1.1 BAM Wegen Zuidwest

Within this section the way how BAM Wegen Zuidwest arrives at their bid/ no bid decision is described by the identified search-, stopping- and decision rules within the selection-, procedural-, priority- and timing rules. In this section the findings are shortly described, a full description of the search-, stopping- and decision rules can be found in Appendix VI. Based on the identified three building blocks of the heuristics, fast and frugal decision trees are formulated for the four different types of opportunity capturing heuristics which are presented in figure 37 and 38 in Appendix VII.

Selection heuristics

In order to make the decision whether or whether not a bid should be placed on a tender, BAM Wegen Zuidwest searches for six indicators one after the other:

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Reflecting on these selection rules, it can be stated that a bid is placed on tenders with the following characteristics:

In order to conduct these tenders and contracts, for tenders won, the required actions or procedures are taken into account by BAM Wegen Zuidwest during the bid/ no bid decision making process. In the next section these procedural rules are described in more detail.

Procedural heuristics

Based on eleven rules, which can be subdivided among five subjects, BAM Wegen Zuidwest decides about their procedures. These five subjects, with the related rules, are described below:

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Priority heuristics

Within the bid/ no bid decision making process BAM Wegen Zuidwest prioritize its tenders by assigning a priority number, within a range from 1 (highest priority) till 4 (lowest priority). By taking the way in which this priority number is determined into account, two different reasoning perspectives can be distinguished. Within the first reasoning perspective the tender has a high priority because the tender has a large positive effect on the realization of the strategic goals, and because of this large positive effect for BAM Wegen Zuidwest there is a high need to distinguish themselves from the competitors. However there are also tenders which acquire a high priority number because BAM Wegen Zuidwest can distinguish themselves from the competitors, so the priority number in this case is assigned based on a high estimated win-ratio for the tender. Based on these two different reasoning perspectives the priority rules of BAM Wegen Zuidwest are described below.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

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[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Timing heuristics

Based on four rules, which can be subdivided among two subject, BAM Wegen Zuidwest decides about the timing of their tenders. These two subjects, with the related rules, are described below:

[redacted]

[redacted]

Differences in rules for different hierarchical levels

As described in the decision making process, different hierarchical organizational levels are involved within the bid/ no bid decision making process for tenders of BAM Wegen Zuidwest. Based on observations and interviews insights are acquired about the used search-, stopping- and decision rules at these different organizational levels. Within the legends of figures 37 and 38 for each search rule it is shown at which organizational level these rules are used. Based on these insights, an overview of the used types of opportunity capture heuristics for the different organizational levels of BAM Wegen Zuidwest within the bid/ no bid decision making process is presented within figure 12.

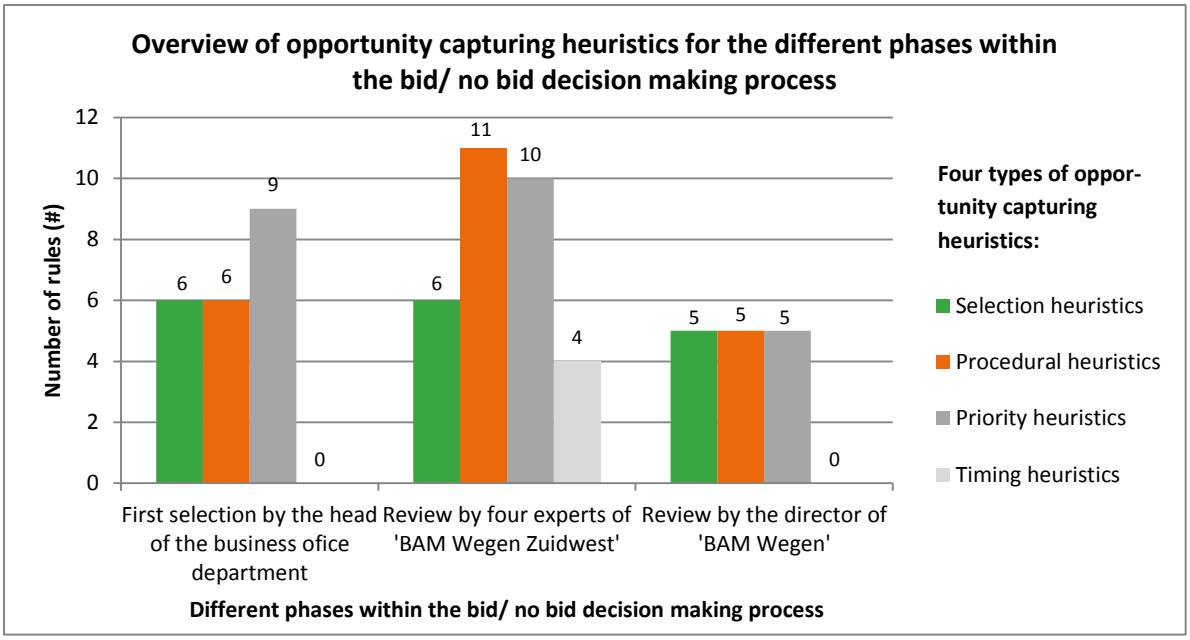

Figure 12: Overview of the number of rules, categorized on the four different types of opportunity capturing heuristics, used by the three different organizational levels within the bid/ no bid decision of BAM Wegen Zuidwest.

With regard to the selection heuristics used, there are no significant differences between the three different organizational levels. When taking the procedural heuristics into account, the team of four experts make much more use of procedural rules than the Head of Production & Planning and the director of BAM Wegen. With regard to the use of timing rules, it can be stated that only the team of four experts make use of them. Both the Head of Production & Planning and the team of four experts make use of a higher number of procedural heuristics than the director of BAM Wegen. Possible explanations for these differences are further discussed within the fifth chapter 'Discussion of the results'.

4.2.2.1.2 BAM Infratechniek Telecom

Within this section the way how BAM Infractechniek Telecom arrives at their bid/ no bid decision is described by the identified search-, stopping- and decision rules within the selection-, procedural-, priority- and timing rules. In this section the findings are shortly described, a full description of the search-, stopping- and decision rules can be found in Appendix VI. In the same way as for BAM Wegen Zuidwest, based on the identified three building blocks of the heuristics, fast and frugal decision trees are formulated for the four different types of opportunity capture heuristics which are presented in figure 39 and 40 in Appendix VII.

Selection heuristics

In order to make the decision whether or whether not a bid should be placed on a tender, BAM Infratechniek Telecom searches for four indicators, one after the other:

Procedural heuristics

[redacted]

[redacted]

[redacted]

Priority heuristics

[redacted]

[redacted]

[redacted]

[redacted]

Timing heuristics

[redacted]

[redacted]

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[redacted]

Differences in heuristics for different hierarchical levels

As described in the decision making process, different hierarchical organizational levels are involved within the bid/ no bid decision making process for tenders of BAM Infratechniek Telecom. Based on observations and interviews, insights are acquired about the used search-, stopping- and decision rules at these different organizational levels. Within figures 39 and 40 for each search rule it is shown at which organizational level these rules are used. Based on these insights within figure 13, an overview of the different types of opportunity capturing heuristics for the different organizational levels within the bid/ no bid decision making process is presented.

With regard to the selection-heuristics used, there are no differences between the three different organizational levels. When taking the use of procedural heuristics into account, the highest number (14) of used heuristics is realized during the second selection moment, while during the first selection moment no procedural heuristics are used and in the third selection round seven procedural heuristics are used. The use of the priority- and timing heuristics over the three different selection moments is low. When looking at the distribution of these two types of heuristics over the different selection-moments, it can be stated that within the first selection moment no timing heuristics are used and in the second selection moment the highest number (3) of timing heuristics is used. In the third selection moment the highest number of priority heuristics (3) is used in comparison to the other two selection-moments. Possible explanations for these differences are further discussed within the fifth chapter 'Discussion of the results'.

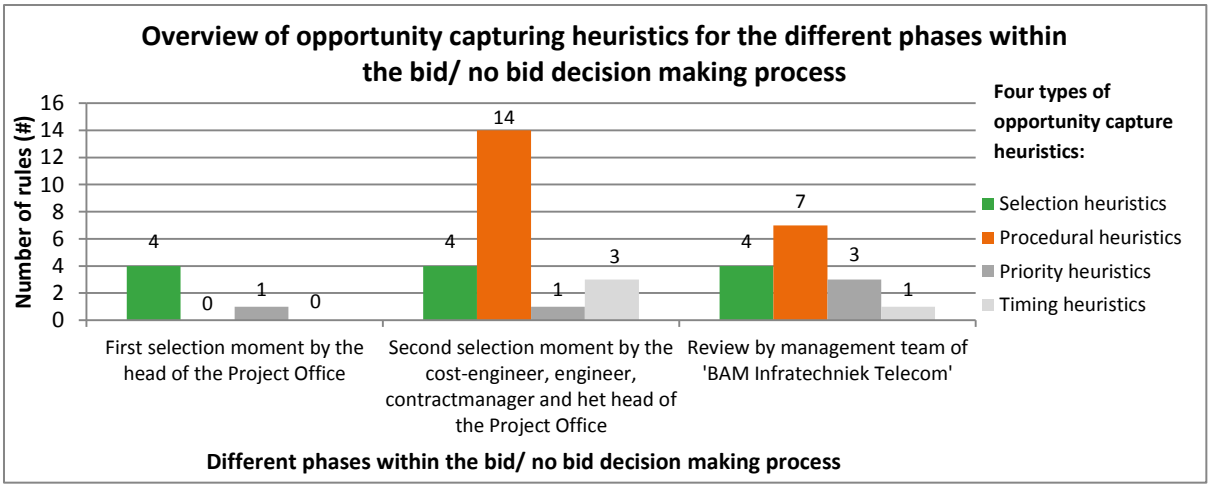

Figure 13: Overview of the number of different opportunity capture heuristics which are used by the three different organizational levels within the bid/ no bid decision of BAM Infratechniek Telecom.

4.2.2.2 The core capacities

Within this section the underlying cognitive capacities which are used within the three building blocks of the heuristics are described for each case. As described within the theoretical framework of this report, the cognitive capacities are categorized into four different types of capacities: 'Recognition', 'Object tracking', 'Frequency monitoring', and 'Ability to imitate'. Within Appendix VIII for each search rule the used cognitive capacities are described. Because the search rules can be categorized on the four different types of opportunity capturing heuristics, in the next subsections for both the cases an overview of the underlying cognitive capacities for the different types of opportunity capturing heuristics is presented.

4.2.2.2.1 BAM Wegen Zuidwest

When looking at the underlying cognitive capacities used by BAM Wegen Zuidwest for the different types of opportunity capturing heuristics, the cognitive capacities 'Recognition' and 'Object tracking' are dominant. As shown within figure 14 for all the four types of heuristics both the capacities 'Recognition' and 'Object tracking' are used.

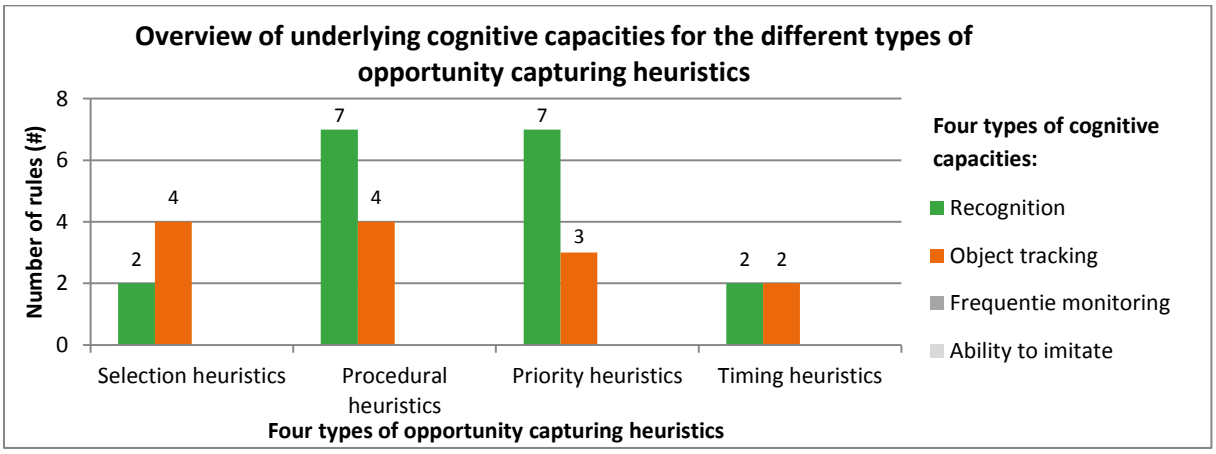

Figure 14: Overview of the used cognitive capacities by BAM Wegen Zuidwest for the different types of opportunity capturing heuristics.

4.2.2.2.2 BAM Infratechniek Telecom

When looking at the underlying cognitive capacities used by BAM Infratechniek Telecom for the different types of opportunity capturing heuristics, the cognitive capacities 'Recognition' and 'Object tracking' are dominant. As shown within figure 15 for the selection-, procedural- and priority heuristics both the capacities 'Recognition' and 'Object tracking' are used, while for the timing heuristics only the capacity 'Object tracking' is used.

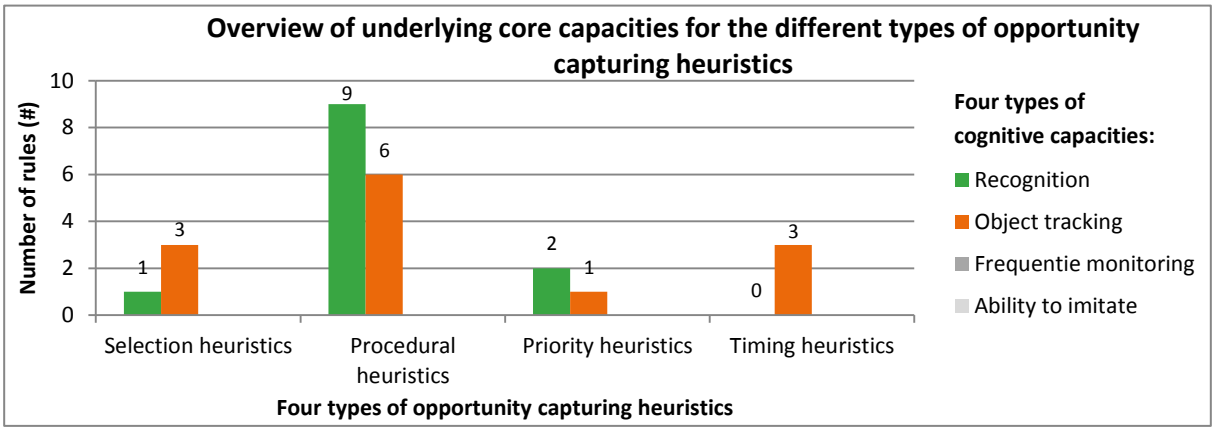

Figure 15: Overview of the used cognitive capacities by BAM Infractechniek Telecom for the different types of opportunity capturing heuristics.

4.2.3 IDENTIFIED RISKS BY THE HEURISTICS

Now insights are obtained about the heuristics and underlying cognitive capacities which are used by the two business units, it is interesting to search for the underlying arguments why these heuristics are used. In explaining these heuristics, in this research the heuristics are analyzed on risks.

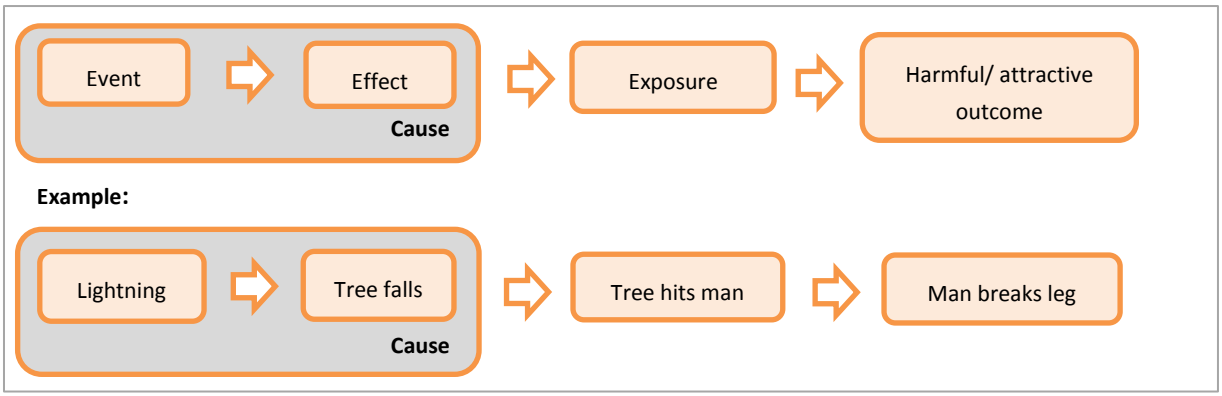

Figure 16: Risks considered as a chain of cause, exposure and harmful or attractive outcomes.

Risks can be seen as a chain of cause, exposure and harmful or attractive outcome (Rowe, 1977). For each search rule it is determined which risks, in the form of cause, exposure and harmful or attractive outcome, can be related to these rules, as shown in figure 16. Within the outcome part, each exposure is coupled to the possible impact on the strategic objectives of the business unit. In order to create a shared risk management language Royal BAM Group implemented the use of categorizing the risks into twenty-eight risk categories. In supporting this use of a shared risk management language, in this research each risk is classified in one or several categories of the twenty-eight risk categories. In the sections below for the two cases, the risks related to the search rules are described.

4.2.3.1 BAM Wegen Zuidwest

For BAM Wegen Zuidwest for each search rule the identified risks are described in the form of cause, exposure and harmful and attractive outcome, as shown in Appendix IX. Next to that each risk is classified in line with the twenty-eight risk categories of Royal BAM Group, as shown in figure 17. Within this section the relations between the heuristics and the twenty-eight risk categories and the heuristics and the realization of the strategic goals are described.

4.2.3.1.1 Heuristics related to the twenty-eight risk categories of Royal BAM Group

When taking the relation of the heuristics with the twenty eight risk categories of Royal BAM Group in general into account, it can be stated that most of the heuristics are respectively related to the risk categories;

Figure 17: Overview of which risk categories are related to the four different types of opportunity capturing heuristics for BAM Wegen Zuidwest.

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4.2.3.1.2 Heuristics related to the realization of the strategic goals

Because in the risk analysis for each heuristic the related risk are described by the cause, the exposure and the harmful or attractive outcome in relation to the realization of the strategic goals, it is also possible to present the degree in which the heuristics are related to the realization of the strategic goals.

Within figure 18 it is shown that the distribution of the four different types of opportunity capturing heuristics among the first three strategic goals are almost similar. For the fifth strategic goal the number of related procedural heuristics is higher, which can be explained by the orientation of this goal on 'excellent performance/ lean'. The current heuristics are not related to the realization of the fourth strategic goal. With regard to the sixth strategic goal, it can be stated that two selection- and one priority heuristics are related to the realization of this goal.

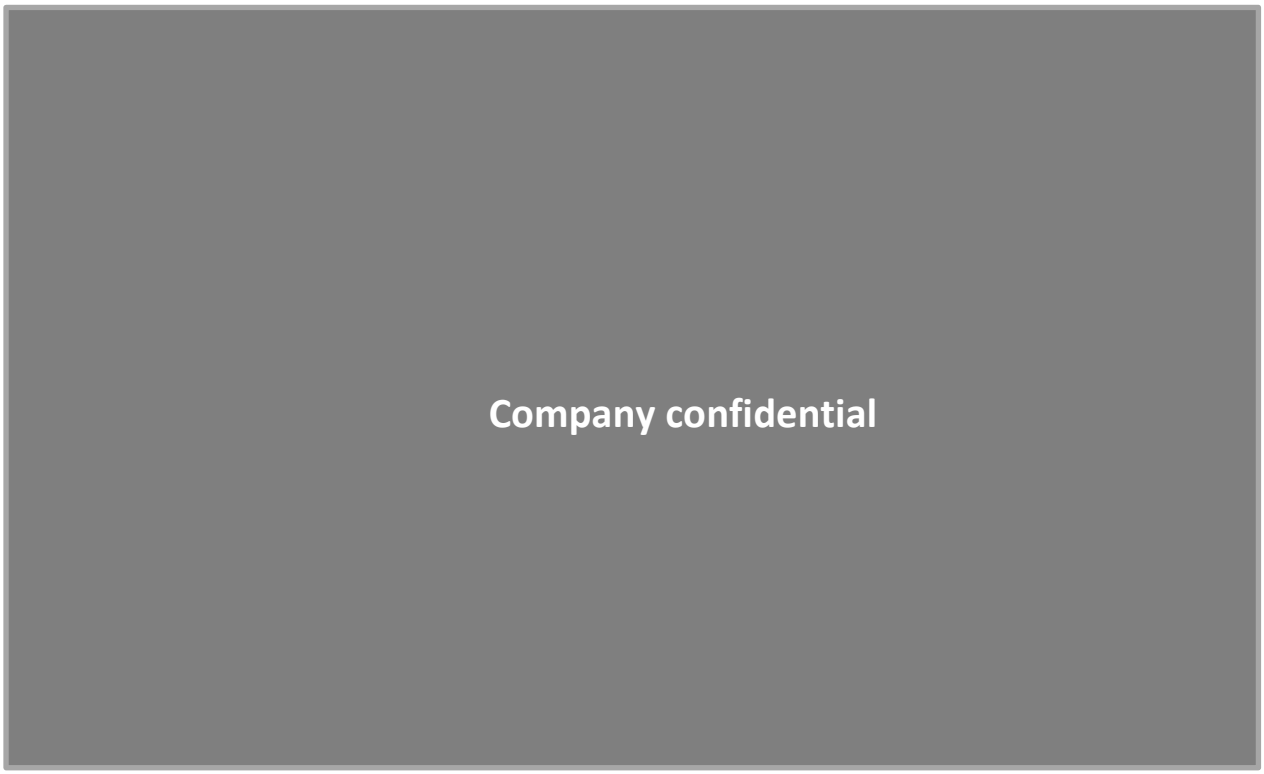

Figure 18: Overview of the number of heuristics which are related to the different strategic goals of BAM Wegen Zuidwest for the four different types of heuristics.

4.2.3.2 BAM Infractechniek Telecom

For BAM Infratechniek Telecom for each search rule the identified risks are described in the form of cause, exposure and harmful and attractive outcome, as shown in Appendix IX. Next to that each risk is classified in line with the twenty-eight risk categories of Royal BAM Group, as shown in figure 20.

4.2.3.2.1 *Heuristics related to the twenty-eight risk categories of Royal BAM Group*

When taking the relation of the heuristics with the twenty eight risk categories of Royal BAM Group in general into account,

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4.2.3.2.2 *Heuristics related to the realization of the strategic goals*

Because in the risk analysis for each heuristic the related risk are described by the cause, the exposure and the harmful or attractive outcome in relation to the realization of the strategic goals, it is also possible to present the degree in which the heuristics are related to the realization of the strategic goals.

Figure 19: Overview of the number of heuristics which are related to the different strategic goals of BAM Infratechniek Telecom for the four different types of heuristics.

Figure 20: Overview of which risk categories are related to the four different types of opportunity capturing heuristics for BAM Infratechniek Telecom.

Now the different heuristics, in special the search rules within these heuristics, are related to risks, it is also possible to take a closer look at the decision rules and the way these rules are related to risk thresholds or risk tolerances.

4.2.4 RISK TOLERANCES/ THRESHOLDS, RISK APPETITE AND RISK ATTITUDE

In order to capture the risk appetite and risk attitude related to a decision rule, first there should be insights about a threshold value or tolerance level. Because for each search rule the related risks are identified it is also possible to search for risk thresholds or tolerances which are related to the decision rules. As stated in the theoretical framework risk appetite can be expressed by a threshold or tolerance, and these thresholds or tolerances can be influenced by a risk attitude. After the risk thresholds and tolerances are identified, the risk appetites and risk attitudes which are related to the these thresholds and tolerances are identified and described for both the cases.

4.2.4.1 Risk tolerances/ thresholds

For each decision rule the risk thresholds are described for BAM Wegen Zuidwest, as shown in Appendix X. Besides this description also the decision authority, in the form of the organization level which decides about the threshold, and the related type of tolerance category of Royal BAM Group are described. Royal BAM Group formulated within their House of Governance three different levels of tolerances; 'Zero tolerance', 'Critical tolerance', and 'Balanced tolerance'. First for the level 'Zero tolerance' no tolerances are allowed which means that there is a specific threshold value, and values beneath or above this threshold are not acceptable. With regard to the business principles of Royal BAM Group and the compliance with laws for instance there are assigned zero tolerance levels. Secondly for the level 'Critical tolerance' the decision about the acceptability of the risk cannot be made by the business unit itself but it should be reviewed by a higher hierarchical level. This higher hierarchical level decides in the end about the acceptability of the risks and opportunities. For the third type of tolerance level 'Balanced tolerance', the business unit can make decisions by themselves about the acceptable amount of risk, no review is necessary and the decision authority is within the business unit.

When looking at the boundaries for the decision rules for these cases only thresholds are used. All the search rules are answered by yes or no, which means that it is below or above a specific value/ threshold. Reflecting this thought on the different types of tolerances within the house of governance it can be stated that all these thresholds can be categorized as zero tolerance. However there are some differences in decision authority for deciding about the thresholds and therefore the different types of tolerances within the House of Governance of Royal BAM Group in this research are mainly interpret on their differences in decision authority. In the next two sections, for the two cases for each decision rule the threshold is acquired and described. Depended on the differences in decision authority the thresholds are classified into the three different types of tolerance of the House of Governance of Royal BAM Group.

4.2.4.1.1 <u>BAM Wegen Zuidwest</u>

For all the decision rules within the four different types of opportunity capture heuristics the risk thresholds are described for BAM Wegen Zuidwest. A complete overview of the descriptions of these thresholds is presented within table 15 of Appendix X. Besides the descriptions of these thresholds, the decision authority is described. For this case, the decision authority can be at BAM Wegen Zuidwest or at a higher organizational level in the form of BAM Wegen. Depended on these decision authorities the thresholds are classified into the two categories 'Critical tolerance' and 'Balanced tolerance'. When the decision authority is at BAM Wegen the threshold is classified as 'Critical tolerance', a decision authority for the threshold at BAM Wegen Zuidwest is classified as 'Balanced tolerance'. The different decision authorities for the thresholds and the related tolerance categories, in line with the House of Governance of Royal BAM Group, are described within table 15 of Appendix X.

An overview of the distribution of tolerance levels over the decision rules within the four different types of opportunity capturing heuristics is presented within figure 21. For the selection-, procedural-, priority- and

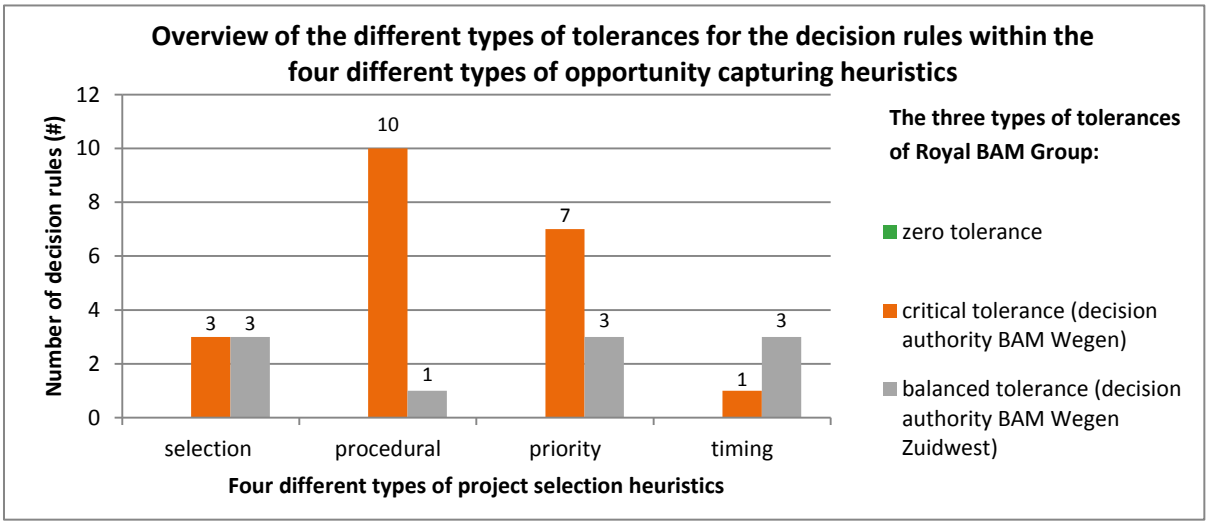

Figure 21: Overview of the different types of tolerances for the decision rules, of BAM Wegen Zuidwest, within the four different types of opportunity capturing heuristics.

timing heuristics there are both 'critical' and 'balanced' tolerance levels for the decision rules. For the procedural- and priority heuristics the number of critical tolerance levels is highly dominant over the number of balanced tolerance levels. This means that the decisions related to the required procedures for - and assigned priority for tenders of BAM Wegen Zuidwest are reviewed by BAM Wegen most of the times. For the selection heuristics there is an even distribution of 'balanced'- and 'critical' tolerance levels, while for the timing heuristics the 'balanced' tolerance levels are dominant over the 'critical' tolerance levels.

4.2.4.1.2 BAM Infratechniek Telecom

In the same way as for BAM Wegen Zuidwest, for all the decision rules within the four different types of opportunity capture heuristics the thresholds are described for BAM Infratechniek Telecom. A complete overview of the thresholds descriptions for the decision rules, the decision authorities for these thresholds and the types of tolerance levels for these thresholds, is presented within table 16 of Appendix X. For BAM Infratechniek Telecom the decision authority can be at themselves or at BAM Infratechniek. When the decision authority for a threshold is at BAM Infratechniek, the threshold is classified as 'Critical tolerance'. The threshold is classified as 'Balanced tolerance' when the decision authority for a threshold is at BAM Infratechniek Telecom.

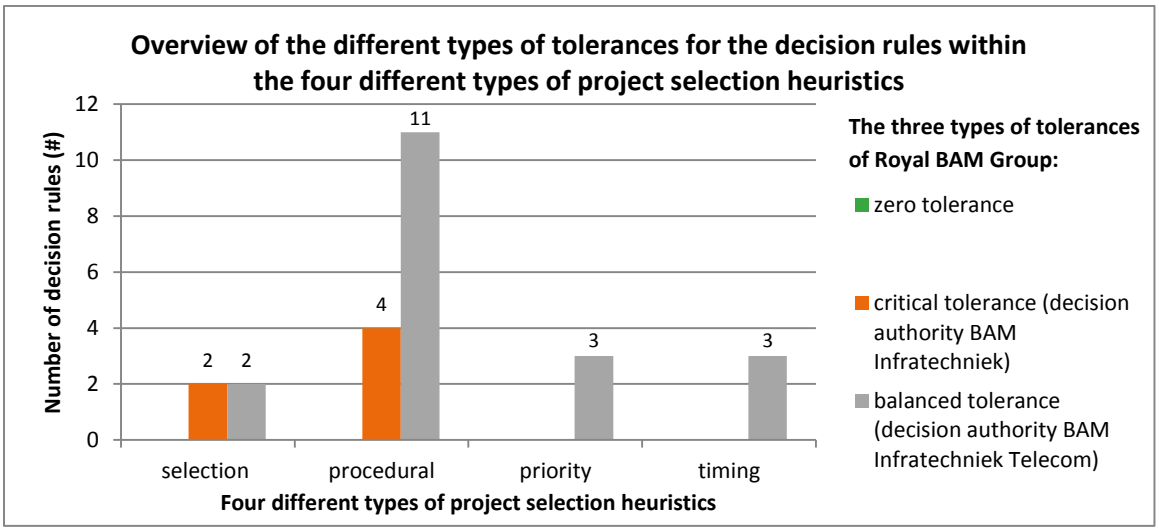

Figure 22: Overview of the different types of tolerances for the decision rules, of BAM Infratechniek Telecom, within the four different types of opportunity capturing heuristics.

An overview of the distribution of tolerance levels over the decision rules within the four different types of opportunity capturing heuristics is presented within figure 22. For the selection- and procedural heuristics there are both 'critical' and 'balanced' tolerance levels, while for the priority- and timing heuristics there are only balanced tolerances for the decision rules. For the selection heuristics the number of critical- and balanced tolerances are in balance. For the procedural heuristics the number of critical tolerance levels is highly dominant over the balanced tolerance levels. In general it can be stated that the number of balanced tolerance levels is dominant over the number of critical tolerance levels for the thresholds of decision rules for the four different types of opportunity capturing heuristics of BAM Infratechniek Telecom. This means that the decisions related to the selection of, required procedures for, the assigned priority for, and the assigned timing for tenders of BAM Infratechniek Telecom aren't reviewed by BAM Infratechniek most of the times.

4.2.4.2 Related risk appetites and risk attitudes to the risk thresholds

For both the cases, for each threshold value the related risk attitude of the business unit and the related risk appetites of the business unit are described in a qualitative way. As described earlier within the theoretical part, in order to realize the strategic objectives of the company the risk attitude and risk appetite should ideally be in line with each other. Hereby assuming that the risk appetite is formulated in line with the current market conditions and the ambition level of the strategic objectives. By reflecting the risk attitudes on the risk appetites for different thresholds within the decision rules, the differences and similarities between the risk attitudes and risk appetites are revealed. When the risk attitudes are in line with the risk appetites, the business unit is operating within the risk capacity and there are at first sight no strategic issues. There will be a higher focus for the business unit and Royal BAM Group on acquiring insights about the risk attitudes that are not within the boundaries of risk appetite, and so within their risk capacity. This because these risk attitudes have a relatively high probability for negatively affecting the realization of the strategic goals.

4.2.4.2.1 BAM Wegen Zuidwest

For BAM Wegen Zuidwest for each threshold value the risk attitude and the risk appetite of BAM Wegen Zuidwest are described. However, as described earlier the decision authority for some thresholds is not at BAM Wegen Zuidwest but at BAM Wegen and therefore only describing the risk attitude and risk appetite of BAM Wegen Zuidwest for these thresholds is not enough. For the thresholds for which the decision authority is at BAM Wegen, also classified as 'critical tolerance', also the risk appetite of BAM Wegen is described. In order to provide insights about the degree in which the risk attitudes of BAM Wegen Zuidwest are in line with the risk appetites of BAM Wegen Zuidwest and BAM Wegen, each risk attitude is reflected on the risk appetites. This reflection is described as 'Strategic issues', based on the thought of risk appetites which are outside the risk appetites. When the risk attitudes are in line with or inside the risk appetites, there are at first sight no strategic issues. A complete overview of the risk attitudes of BAM Wegen Zuidwest, the risk appetites of BAM Wegen Zuidwest and BAM Wegen, and the strategic issues which are related to the risk thresholds is presented within table 17 of Appendix XI.

Based on the descriptions within table 17, within figure 23 an overview of coherences between the risk attitude of BAM Wegen Zuidwest and their risk appetite and between the risk attitude of BAM Wegen Zuidwest and the risk appetite of BAM Wegen is presented. In this figure, the coherences between the risk attitudes of BAM Wegen Zuidwest and risk appetites of BAM Wegen are described by the classifications 'in line with each other' or 'not in line with each other'. Depended on these coherences, the number of strategic issues are also presented within figure 23.

As shown in figure 23, of the total number of thirty-one thresholds, thirty-one risk attitudes of BAM Wegen Zuidwest are in line with the risk appetites of BAM Wegen Zuidwest. Of the thirty-one thresholds, twenty-one thresholds are classified as 'critical tolerance' which means that decision authority for these thresholds is at BAM Wegen. For these twenty-one 'critical' thresholds, fifteen risk attitudes of BAM Wegen Zuidwest are in line with the risk appetites of BAM Wegen and six risk attitudes of BAM Wegen Zuidwest aren't in line with the risk appetites of BAM Wegen. Of these six risk attitudes which are outside the risk appetite of BAM Wegen, one

attitude mismatch is located within the selection heuristics, four attitude mismatches are located within the priority heuristics, and one mismatch is located within the timing heuristics. In the next section 'strategic issues' these mismatches are further described.

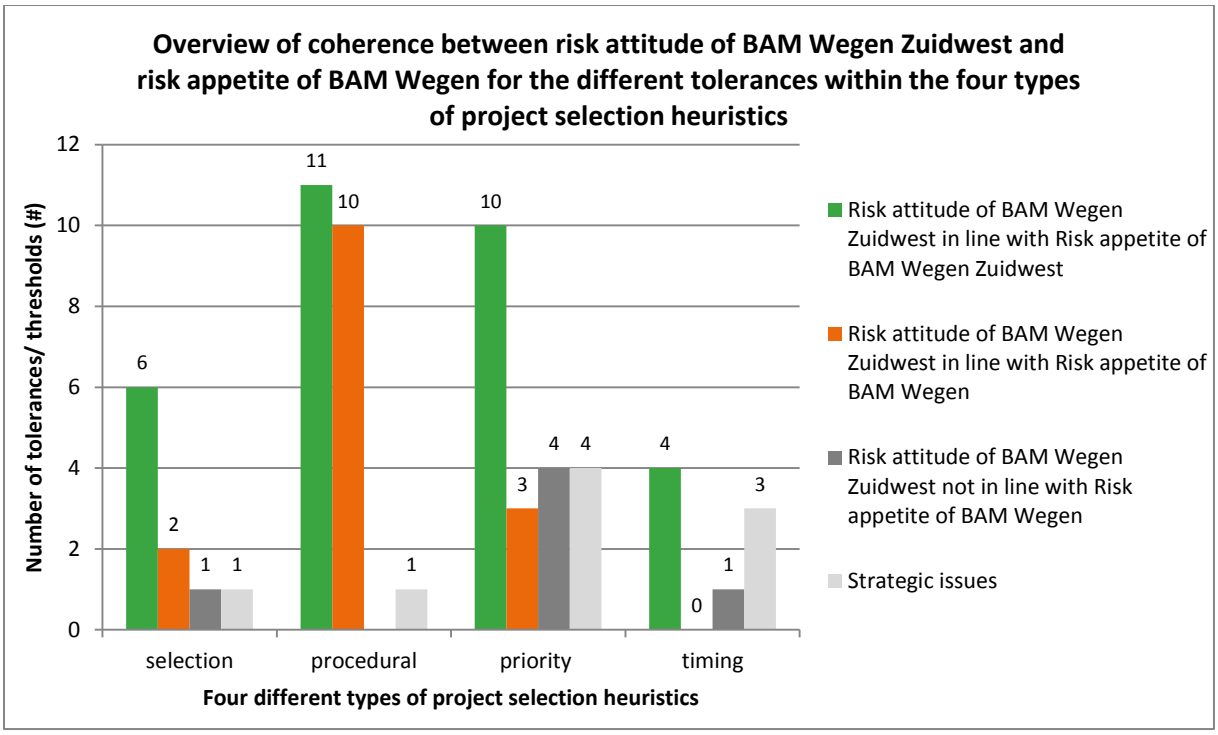

Figure 23: Overview of the coherence between the risk attitudes of BAM Wegen Zuidwest and the risk appetites of BAM Wegen for the different tolerances within the four types of opportunity capturing heuristics.

Strategic issues

Based on the reflection of risk attitudes of BAM Wegen Zuidwest on risk appetites of BAM Wegen Zuidwest and BAM Wegen insights about the strategic issues are acquired. When the risk attitudes of BAM Wegen Zuidwest are outside the boundaries of the risk appetites, it is interesting to search for the reasons why these risk attitudes are not in line with the appetites. These reasons are described as strategic issues. Within this study it is also possible that there is a strategic issue when the risk attitude is in line with the risk appetite because not all the organizational levels within Royal BAM Group were researched. In this situation this strategic issue will be an issue for the Board of Directors of Royal BAM Group.

Strategic issue within the selection heuristics

[redacted]

Strategic issue within the procedural heuristics

[redacted]

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[redacted]

Strategic issues within the priority heuristics

[redacted]

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[redacted]

4.2.4.2.2 BAM Infratechniek Telecom

In the same way as for BAM Wegen Zuidwest, for BAM Infratechniek Telecom for each threshold value the risk attitude and the risk appetite of BAM Infratechniek Telecom are described. However, as described earlier the decision authority for some thresholds is not at BAM Infratechniek Telecom but at BAM Infratechniek and therefore only describing the risk attitude and risk appetite of BAM Infratechniek Telecom for these thresholds is not enough. For the thresholds for which the decision authority is at BAM Infratechniek, also classified as 'critical tolerance', also the risk appetite of BAM Infratechniek is described. In order to provide insights about the degree in which the risk attitudes of BAM Infratechniek Telecom are in line with the risk appetites of BAM Infratechniek Telecom and BAM Infratechniek, each risk attitude is reflected on the risk appetites. A complete overview of the risk attitudes of BAM Infratechniek Telecom, the risk appetites of BAM Infratechniek Telecom and BAM Infratechniek, and the strategic issues which are related to the risk thresholds is presented within table 18 of Appendix XI.

Based on the descriptions within table 18, within figure 24 an overview of coherences between the risk attitude of BAM Infratechniek Telecom and their risk appetite and between the risk attitude of BAM Infratechniek Telecom and the risk appetite of BAM Infratechniek is presented. In this figure, the coherences between the risk attitudes of BAM Infratechniek Telecom and risk appetites of BAM Infratechniek are described by the classifications 'in line with each other' or 'not in line with each other'. Depended on these coherences, the number of strategic issues are also presented within figure 24.

As shown in figure 24, of the total number of twenty-five thresholds, twenty-five risk attitudes of BAM Infratechniek Telecom are in line with the risk appetites of BAM Infratechniek Telecom. Of the twenty-five thresholds, six thresholds are classified as 'critical tolerance' which means that decision authority for these thresholds is at BAM Infratechniek. For these six 'critical' thresholds, six risk attitudes of BAM Infratechniek Telecom are in line with the risk appetites of BAM Infratechniek. Nevertheless there are still two strategic issues which are related to the risk appetites at a higher organizational level in the form of the board of Royal BAM Group. In the next section 'strategic issues' these two issues are described.

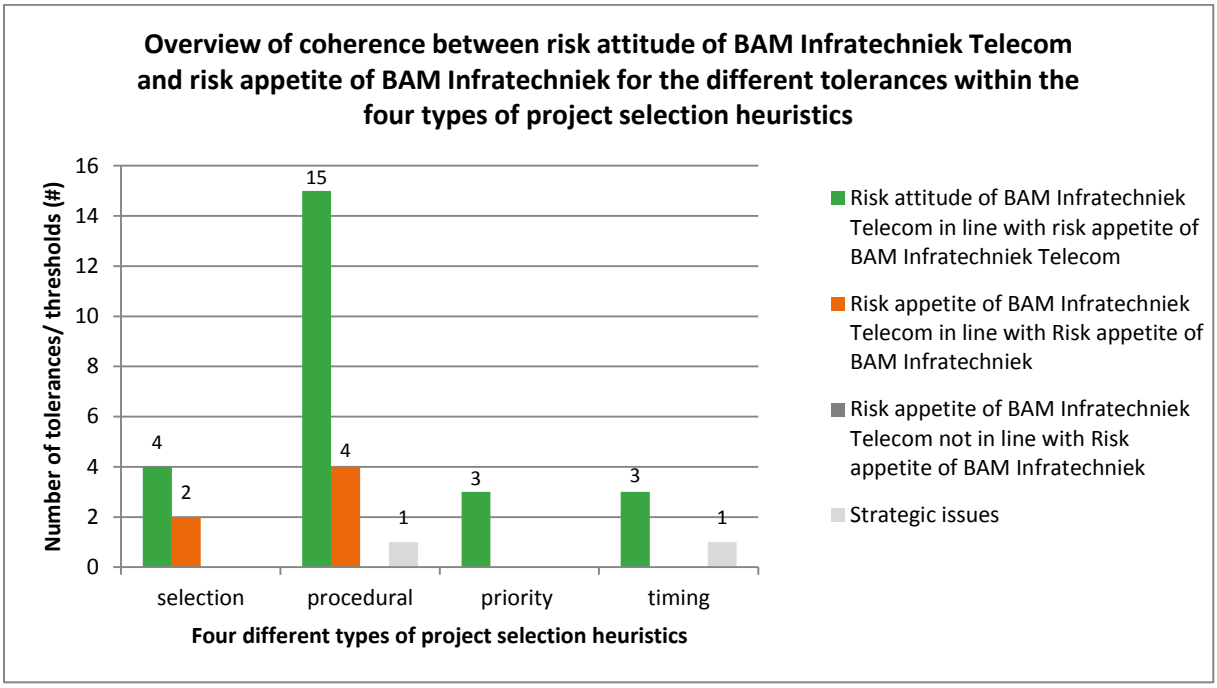

Figure 24: Overview of the coherence between the risk attitudes of BAM Infratechniek Telecom and the risk appetites of BAM Infratechniek Telecom and BAM Infratechniek for the different tolerances within the four types of opportunity capturing heuristics.

4.2.4.2.2.1 Strategic issues

Based on the reflection of risk attitudes on risk appetites no strategic issues are present as a consequence of a mismatch between risk attitudes and risk appetites. However within this study there are two strategic issues which are a result of the risk appetite of the board of Royal BAM Group.

Strategic issue within the selection heuristics

There are no strategic issues within the selection heuristics.

Strategic issue within the procedural heuristics

[redacted]

Strategic issues within the priority heuristics
There are no strategic issues within the priority heuristics.

Strategic issues within the timing heuristics
[redacted]
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4.2.5 EFFECTIVENESS OF HEURISTICS

Within the research related to heuristics, there is a high interest for researching the relation between mind and environment rather than between mind and logic (Gigerenzer, Todd, & Group, 1999; Gigerenzer & Selten, Rethinking rationality, 2001).Humans, and decision makers, have evolved in natural environments, both social and physical. To survive and reproduce, the task is to adapt to these environments or else to change them. In Simon's words: "Human rational behavior is shaped by a scissor whose two blades are the structure of task environments and the computational capabilities of the actor" (Simon H. A., 1990). Just as one cannot understand how scissors cut by looking only at one blade, one will not understand human behavior by studying either cognition or the environment alone. The two related key concepts are 'adaptive toolbox' and 'ecological rationality'. The analysis of the adaptive toolbox is descriptive, whereas that of ecological rationality is normative.

When reflecting the thought of 'ecological rationality' on the adaptive toolboxes used by the two cases in determining the bid/ no bid decision for tenders and contracts, there should be parameters available which can describe the effectiveness of the toolboxes. The two researched business units aspire to realize their strategic goals, which are determined based on the business areas they are operating in. In order to realize their strategic goals, first of all the tenders and related contracts should be won. This percentage of tenders won can be described as 'win-ratio'. However the effectiveness of the heuristics can not only determined by describing the 'win-ratios' for the tenders and contracts, this because the execution of the contract can positively or negatively affect the realization of the strategic goals. Winning tenders and contracts is one important aspect, but conducting these contracts in a successful way which will positively affect the realization of the financial result targets is a second important aspect. So besides the win-ratio for tenders also the financial results of contracts won are used as input for determining the effectiveness of the used heuristics. Within the following two sections the win-ratios and the financial results of contracts won are described for the two cases.

4.2.5.1 BAM Wegen Zuidwest

In this section, first of all the win-ratios for tenders are described for BAM Wegen Zuidwest followed by a description of the financial results of contracts won.

4.2.5.1.1 Win-ratios for tenders

In describing the win-ratios for tenders on which BAM Wegen Zuidwest have placed a bid, a distinction is made between the win-ratios for tenders within the different business segments of BAM Wegen Zuidwest and the win-ratios for tenders with different levels of turnover.

Win-ratios for tenders within the different business segments

Within table 2 the cumulative turnover of tenders on which a bid is placed, the cumulative turnover of contracts won, and the win-ratios for tenders on which bids are placed for the year 2012 are presented for the different business segments of BAM Wegen Zuidwest.

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Table 2: Overview of cumulative turnover of tenders on which a bid is placed, cumulative turnover of contracts won, and win-ratios for tenders on which a bid is placed for different business segments of BAM Wegen Zuidwest.

Within the figures 43 and 44 in Appendix XIII the cumulative turnover levels for tenders on which bids are placed, the cumulative turnover of contracts won and the win-ratios for the different business segments of BAM Wegen Zuidwest are presented in graphs.

Win-ratios for tenders with different levels of turnover

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Table 3: Overview of the cumulative turnover of tenders on which bids are placed, the cumulative turnover of contracts won, and the win-ratios for tenders on which bids are placed for different turnover levels of tenders of BAM Wegen Zuidwest.

Within the figures 46 and 47 in Appendix XIII the cumulative turnover levels for tenders on which bids are placed, the cumulative turnover of contracts won and the win-ratios and the win-ratios for the different turnover levels of tenders of BAM Wegen Zuidwest are presented in graphs.

4.2.5.1.2 Financial results of contracts won

Besides capturing the win-ratios for tenders on which bids are placed by BAM Wegen Zuidwest, BAM Wegen Zuidwest already captures the financial results of contracts won. In this section the financial results of contracts won for the year 2012 are described for BAM Wegen Zuidwest. The financial results are described as percentages of result with regard to the turnover level of the tender.

As shown in table 4, the contracts won in 2012 can be classified based on the different degrees of performance.

Table 4: Classification of contracts won in 2012 based on the different degrees of performance.

4.2.5.2 BAM Infratechniek Telecom

In this section, first of all the win-ratios for tenders are described for BAM Infratechniek Telecom followed by a description of the financial results of contracts won.

4.2.5.2.1 Win-ratios for tenders

The win-ratios for tenders on which BAM Infratechniek Telecom have placed a bid are described for the different business segments of BAM Infratechniek Telecom. For the top three business segments the win-ratios for tenders are further specified for the different levels of turnover.

Win-ratios for tenders within the different business segments

As described within the context description, BAM Infratechniek Telecom provides their services within six different business segments. Within this section the win-ratios for tenders within these different business segments are described. In table 5 the cumulative turnover of tenders on which a bid is placed, the cumulative turnover of contracts won, and the win-ratios for tenders on which bids are placed for the year 2012 are presented for the different business segments of BAM Infratechniek Telecom.

Table 5: Overview of cumulative turnover of tenders on which a bid is placed, cumulative turnover of contracts won, and win-ratios for tenders on which a bid is placed for different business segments of BAM Infratechniek Telecom.

Within the figures 53 and 54 in Appendix XIII the cumulative turnover levels for tenders on which bids are placed, the cumulative turnover of contracts won and the win-ratios for the different business segments of BAM Infratechniek Telecom are presented in graphs. In the next section the win-ratios for the top three business segments, based on the cumulative turnover of tenders on which bids are placed, are further specified on the different turnover levels of the tenders.

Win-ratios for tenders, within the top three business segments, specified for different turnover levels

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Table 6: Overview of the cumulative turnover of tenders on which bids are placed, the cumulative turnover of contracts won, and the win-ratios for tenders on which bids are placed for different turnover levels of tenders related to the segment .

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Table 7: Overview of the cumulative turnover of tenders on which bids are placed, the cumulative turnover of contracts won, and the win-ratios for tenders on which bids are placed for different turnover levels of tenders related to the segment

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Table 8: Overview of the cumulative turnover of tenders on which bids are placed, the cumulative turnover of contracts won, and the win-ratios for tenders on which bids are placed for different turnover levels of tenders related to the segment '

4.2.5.2.2 Financial results of contracts won

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4.3 'CROSS CASES' ANALYSIS OF DATA

In this paragraph the cross-case analysis is performed to compare the two business cases 'BAM Wegen Zuidwest' and 'BAM Infratechniek Telecom' on the variables on which the cases are analyzed in the within-case analysis: context of cases, the bid/ no bid decision making process, the adaptive toolbox for opportunity-capturing heuristics, identified risks by the heuristics, risk tolerances/ thresholds & risk attitudes and risk appetites, and effectiveness of the heuristics. In this chapter the findings are only analyzed and presented.

4.3.1 CONTEXT OF CASES

The contexts of the two cases are described by the characteristics of the organizations, the characteristics of the markets, the provided services/products, and their strategic missions. Within this section the two cases are compared with each other for these four aspects.

4.3.1.1 Organizations

When taking the characteristics of the organizations of the two cases into account, it can be stated that BAM Infratechniek Telecom has employed a much higher number of employees (1100) than BAM Wegen Zuidwest (90). Of these 1100 employees of BAM Infratechniek Telecom, around 40% is employed on a fixed basis while 60% is employed on a flexible basis. By having this flexible layer of employees, BAM Infratechniek Telecom can manage fluctuations in the amount of tenders and contracts. The percentage of employees employed on a flexible basis within BAM Wegen Zuidwest is very low, but for the next years BAM Wegen Zuidwest aspires to further increase this percentage up to 20%.

4.3.1.2 Markets

When comparing the characteristics of the markets in which the two cases are operating, some differences can be noticed. First of all the scale of the markets is different for the two cases, BAM Wegen Zuidwest only operates within the southwest region of the Netherlands while BAM Infratechniek Telecom provides their services to clients within the Netherlands. Second, there are some differences in the distribution of tenders among the different types of clients for the two cases. For BAM Wegen Zuidwest ninety-four percent of the turnover can be explained by contracts of the government, while for BAM Infratechniek Telecom the majority (81,2%) of their turnover can be explained by tenders and contracts of private companies. Third, there are some differences in the type of contracts which are on the market, in the year 2012 hundred percent of the turnover of BAM Wegen Zuidwest can be explained by 'construct-only' contracts which are mainly acquired by public procurement (66,4%) and private procurement with competition (33,6%). For BAM Infratechniek

Telecom there are no statistics available which are related to the different types of contracts and types of procurement, however based on qualitative statements of BAM Infratechniek Telecom it can be stated that the majority of the contracts can be classified as 'construct-only' and are acquired by private procurement without and with competition. Fourth, there are some differences in the turnover levels of the tenders and contracts. The average turnover level of tenders for BAM Wegen Zuidwest is 0,50 MIO € while the average turnover level for BAM Infratechniek Telecom is 0,27 MIO €. However for both the cases it can be stated their markets are mainly dominated by tenders with low turnover levels, for BAM Wegen Zuidwest and for BAM Infratechniek Telecom respectively sixty-five and ninety-two percent of the total number of tenders has a turnover level which is below 0,5 MIO €.

Besides the differences in the market conditions there is also a similarity. Both the markets of the cases are characterized by an uneven distribution of turnover over the year. For both the cases the amount of turnover in the first quarter of the year stays behind of the turnover levels in the other quarters, due to differences in weather conditions over the year.

4.3.1.3 Services/products

When comparing the provided services and products of the two cases with each other, it can be stated that both the cases provide only services to their clients. Next to that both the cases provide multiple services to the market. When looking at the degree of diversity of the provided services it can be stated that the services of BAM Wegen Zuidwest have a higher degree of diversity than those of BAM Infratechniek Telecom. Besides the services 'construction and maintenance of roads' also services like 'site preparation', the 'development of concepts for area development', the 'construction of parking places or garages' and the 'construction of impermeable floors' are provided by BAM Wegen Zuidwest while BAM Infratechniek Telecom only provides communication infrastructure solutions. When taking the distribution of turnover among the provided services of the two cases into account, for both the cases it can be stated that the majority of the turnover of tenders is related to one business segment. For BAM Wegen Zuidwest the service 'Construction of asphalt roads' and for BAM Infratechniek Telecom the service 'Fiber to the x' represents respectively 62% and 65% of the cumulative turnover of tenders in the year 2012.

4.3.1.4 Strategic missions

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4.3.2 THE BID/ NO BID DECISION MAKING PROCESS

In the 'within case-analysis' the bid/ no bid decision making processes are described for both the cases. In this section these processes are compared with each other and the differences and similarities are described in a qualitative way.

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4.3.3 *THE ADAPTIVE TOOLBOX FOR OPPORTUNITY-CAPTURING HEURISTICS*

In order to provide insights about the used heuristics within the decision making processes of the two cases, insights are acquired about the used adaptive toolboxes for the four different types of opportunity-capturing heuristics. In this paragraph the adaptive toolboxes for the opportunity-capturing heuristics of the two cases are compared with each other. First the three building blocks are compared with each other, followed by a comparison of the cognitive capacities used within the two cases.

4.3.3.1 The three building blocks for the four different types of opportunity-capturing heuristics

For both the cases, the way how these business units arrive at their bid/ no bid decision is captured by observing which types of opportunity-capture heuristics are used within the decision making process. Each type of opportunity-capture heuristic is further captured by describing the three building blocks, the search-, the stopping-, and the decision rules. In this section the used opportunity-capture heuristics within the two cases are compared with each other.

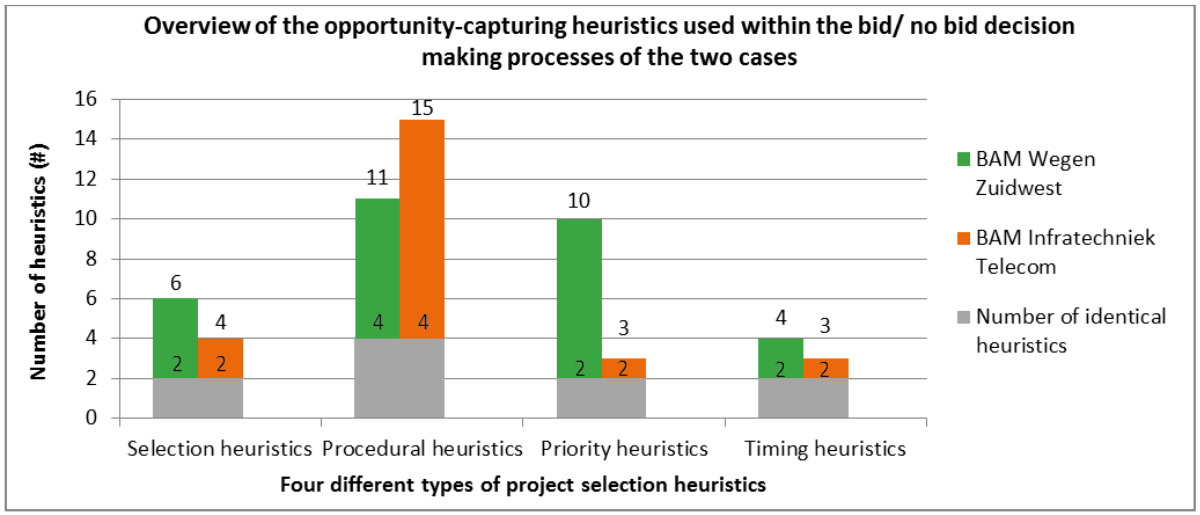

Figure 25: Overview of the opportunity-capturing heuristics used within the bid/ no bid decision making processes of the two cases.

As presented within figure 25, both the two researched business units make use of all the four different types of opportunity-capture heuristics in arriving at their bid/ no bid decisions for tenders. However there are some differences between the two cases with regard to number of different types of opportunity-capture heuristics used within the bid/ no bid decision making processes. When taking the used number of selection- and timing heuristics into account for the two cases, there are no big differences in these used numbers for the two cases. When looking at the number of procedural heuristics used within the two cases, it can be stated that BAM Infratechniek Telecom uses a higher number of procedural heuristics than BAM Wegen Zuidwest in arriving at their bid/ no bid decision. When comparing the used priority heuristics within the two cases with each other, it can be stated that BAM Wegen Zuidwest makes use of a higher number of priority heuristics in comparison to BAM Infratechniek Telecom.

In searching for explanations for these differences, the environment, in special the market, in which the business units operate can provide insights. As mentioned by Gigerenzer et al. (1999) the development of heuristics is influenced by the environment in which these heuristics are active. In the study of ecological rationality of heuristics, the ecological rationality is captured by taking into account the degree in which the heuristic is adapted to the structure of its environment. When reflecting these thoughts about ecological rationality on the differences in used numbers of heuristics between the two cases, the differences in the market conditions for the two cases can provide explanations for these differences.

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4.3.3.2 The cognitive capacities

For each case the underlying cognitive capacities for the adaptive toolbox are identified and described, and within this section the used cognitive capacities within both the cases are compared with each other.

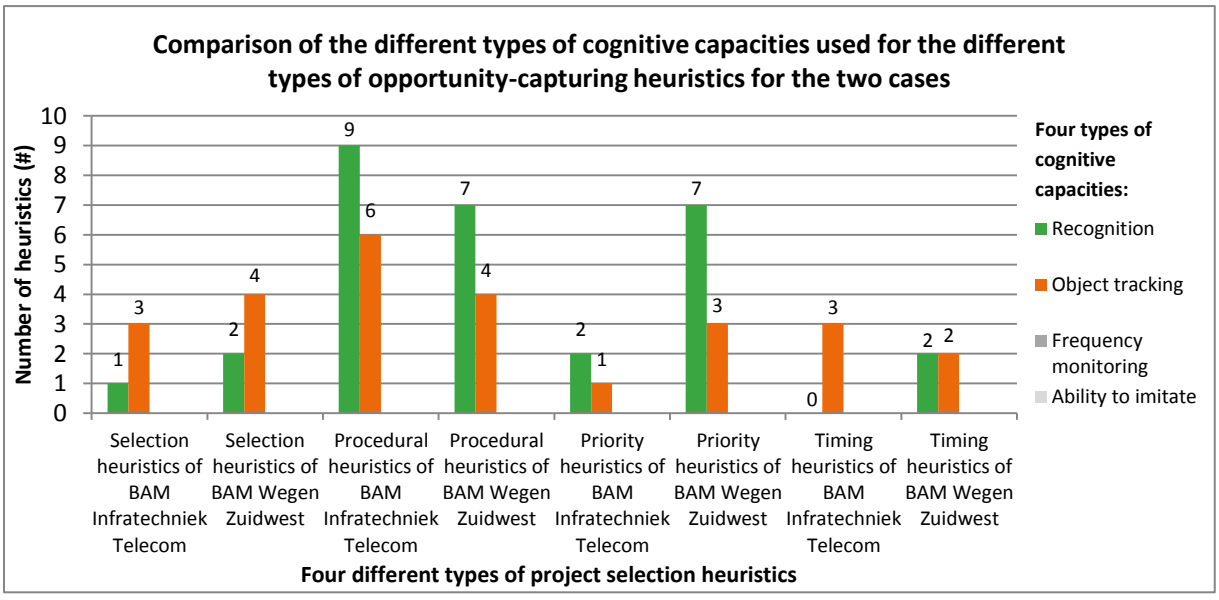

Figure 26: Comparison of the different types of cognitive capacities used for the different types of opportunity-capturing heuristics for the two cases.

In figure 26 the different types of cognitive capacities used for the different types of opportunity-capturing heuristic for the two cases are compared with each other. For both the cases it can be stated that only the cognitive types 'Recognition' and 'Object tracking' are used within the adaptive toolboxes. When taking a closer look at the used cognitive capacities for the different types of opportunity-capture heuristics, it can be stated that for both the cases the use of object tracking is dominant over recognition within the selection-heuristics. For both the cases for the procedural- and priority heuristics, it can be stated that decision makers make more use of recognition than object tracking. Within the timing heuristics, BAM Infratechniek Telecom only makes use of object tracking while BAM Wegen Zuidwest makes use of object tracking and recognition.

4.3.4 IDENTIFIED RISKS BY HEURISTICS

In order to create insights about the reasons why these identified heuristics are used by the decision makers within the two cases, in this research the heuristics are analyzed on risks. In this section the identified risks by heuristics for the two cases are compared with each other. This comparison takes place for the two sub-categories 'heuristics related to the twenty-eight risk categories of Royal BAM Group' and 'heuristics related to the realization of the strategic goals'.

4.3.4.1 Heuristics related to the twenty-eight risk categories of Royal BAM Group

In the within-case analysis for both the cases the relations between the identified risks, for the four different types of opportunity-capturing heuristics, and the twenty-eight risk categories of Royal BAM Group are taken into account. In this section for each different type of opportunity-capturing heuristic the related risks for the both cases are compared with each other.

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Creating insights about which risks are coupled to heuristics can be of added value for business units in order to create insights about the completeness of the identified and managed risks and opportunities. In this research the risks are described and coupled to the heuristics, however for the business units it can also be interesting to describe and couple heuristics to their identified risks and opportunities. In this last way it becomes clear if all the identified risks and opportunities are also captured by the heuristics used. Because of the limited available time, no reflection on this completeness of identified risks and opportunities is conducted. When reflecting the identified risks and opportunities within the two cases on the described risk factors of the bid/ no bid decision found in literature, the identified risks and opportunities are in line with the ninety-four factors of Bagies & Fortune (2006).

4.3.4.2 Heuristics related to the realization of the strategic goals

[redacted]

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4.3.5 Risk tolerances/thresholds, Risk attitudes and Risk appetites

In order to capture the risk attitudes and risk appetites which are related to the decision rules within the adaptive toolboxes of the business units, first there should be insights about a threshold value or tolerance level. In the 'within-case' analysis for each case for each decision rule the related risk thresholds, risk attitudes and risk appetites are identified and described. Within this paragraph the findings within the two cases with regard to these three topics are compared with each other.

4.3.5.1 Risk thresholds

For each case, in the 'within-case' analysis for each decision rule the related risk thresholds are described and classified in line with the three types of tolerances of Royal BAM Group. In this section the risk thresholds for

the two cases are compared with each other. Within figure 27, an overview of the different types of tolerances for the decision rules within the four types of opportunity-capturing heuristics are presented for the two cases.

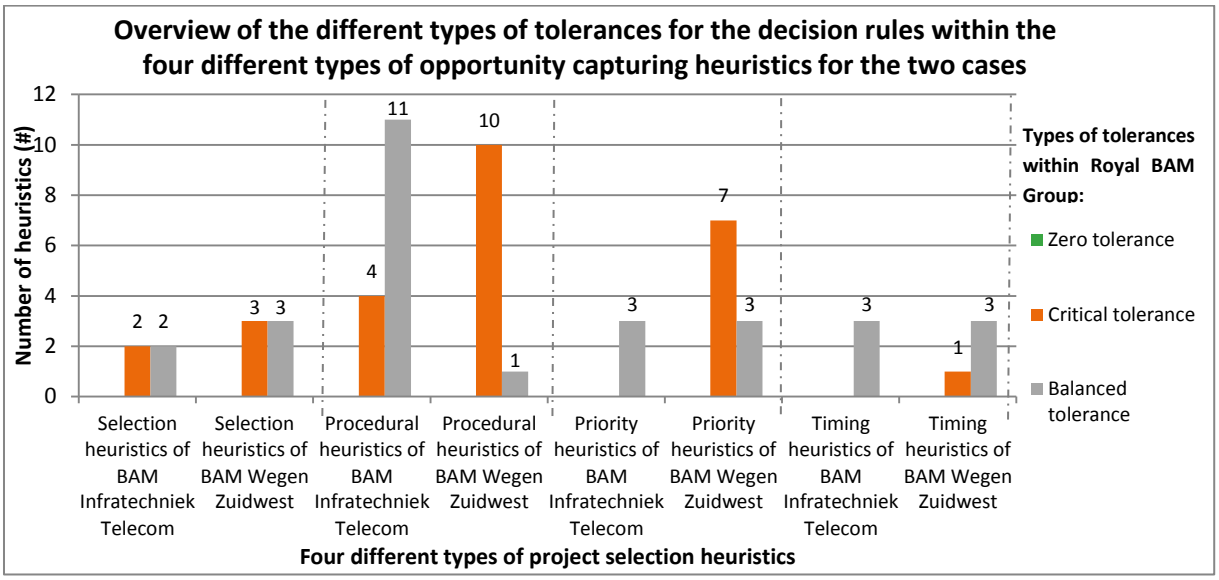

Figure 27: Overview of the different types of tolerances for the decision rules within the four different types of opportunity capturing heuristics for the two cases.

When taking the boundaries for the decision rules within the adaptive toolboxes of the two cases into account, it can be stated that only thresholds are used. All the search rules are answered by yes or no, which means that an acquired value or perception is below or above a specific value/threshold. For both the cases there are differences in decision authority for the decision rules within the adaptive toolboxes. Based on these differences in decision authority the thresholds are classified by the three different 'tolerances' levels of Royal BAM Group. In this section the different tolerance levels for the two cases are compared with each other.

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4.3.5.2 Risk attitudes and risk appetites

In the 'within case' analysis for both the cases for each risk threshold the related risk attitudes and risk appetites are described in a qualitative way. Subsequently each risk attitude is reflected on each risk appetite and based on these reflections insights are acquired about strategic issues based on misalignments between risk attitudes and risk appetites. In this section the reflections of risk attitudes on risk appetites and the acquired insights about misalignments for the two cases are compared with each other.

When comparing the reflection of risk attitudes on the risk appetites for the two cases with each other, there are some differences in degrees of misalignments between the risk attitudes and risk appetites for the two cases. For BAM Wegen Zuidwest of the thirty-one risk attitudes and risk appetites, fifteen risk attitudes of BAM Wegen Zuidwest are in line with the risk appetites of BAM Wegen and six risk attitudes aren't in line with the risk appetites. In total there are nine identified strategic issues. When looking at the twenty-five risk attitudes and risk appetits of BAM Infratechniek Telecom, six risk attitudes of BAM Infratechniek Telecom are in line with BAM Infratechniek and twenty-five risk attitudes of BAM Infratechniek Telecom are in line with the risk appetites of BAM Infratechniek Telecom. However there are still two strategic issues for BAM Infratechniek Telecom which are a result of misalignments with a higher organizational decision level, the management board of Royal BAM Group.

When looking at possible explanations for this difference in mismatches between the two cases, the difference in decision authority about the risk thresholds can be a possible explanation. For many of the risk thresholds of BAM Wegen Zuidwest the decision authority is at a higher hierarchical level, BAM Wegen. The acceptability of most risks is therefore determined based on the risk appetites of BAM Wegen. However, there can be discussions about the risk appetites between BAM Wegen and BAM Wegen Zuidwest for specific decisions. Based on these findings it can be suggested that by constructive conflict, insights about the risk appetites and risk attitudes of decision makers are acquired but more important differences in risk appetites are discussed. Constructive conflict refers to conflicts which generate productive, mutually beneficial, shared decisions. In the situation of BAM Infratechniek Telecom, which possesses a high degree of decision authority, less mismatches between the risk attitudes and risk appetites are noticed. However based on the findings of this research it is not possible to determine if the risk appetites of BAM Infratechniek Telecom also results in a higher degree of effectiveness of the bid/ no bid decision making process in comparison with the risk appetites of BAM Wegen Zuidwest. In future research more insights can be acquired about the effect of risk appetite on the effectiveness of the decisions, with a special focus on the impact of constructive conflict on this effect.

4.3.6 EFFECTIVENESS OF THE HEURISTICS

Besides creating insights about the adaptive toolboxes, the related risks, risk thresholds, risk attitudes and risk appetites for the two cases, in the 'within-case' analysis also insights are created about the effectiveness of the heuristics for the two cases. Insights about the effectiveness of the heuristics are acquired by describing the win-ratios for the tenders and the results of contracts won. In this section the effectiveness of the heuristics for both the cases are compared with each other by comparing the win-ratios for the tenders and the financial results of contracts won with each other.

4.3.6.1 Win-ratios for the tenders

4.3.6.2 Financial results of the contracts won

Besides the win-ratios for the tenders also the financial results of the contracts won are of importance in describing the effectiveness of the heuristics. Because the financial results of the contracts won by BAM Infratechniek Telecom aren't collected and available it is not possible to compare the financial results of the contracts won for both the cases. The financial results of the contracts won for BAM Wegen Zuidwest are described in the 'within-case' analysis.

4.4 CONCLUSIONS OF EMPIRICAL RESEARCH

As described within paragraph 2.8 'Overall research model' three research questions are related to the empirical research:

- Which bid/ no bid heuristics are used by business units of Royal BAM Group?
- How does risk appetite relate to the bid/ no bid heuristics of business units?
- How effective are the current heuristics?

Within this paragraph, the answers for these three research questions are described.

BID/ NO BID HEURISTICS USED BY THE BUSINESS UNITS

In arriving at their bid/ no bid decision the decision makers of both business units make use of all the four different types of opportunity-capture heuristics. However the use of the different types of opportunity-capture heuristics over the different selection moments within the bid/ no bid decision making process of each business unit is differentiated, as a possible consequence of differences in cognitive sophistication of the heuristics. Besides a differentiation in used types of heuristics for the different selection moments for each

business unit, also differentiations in the numbers of different types of heuristics used are noticed between the two business units. These differentiations can be explained by the conditions of the market in which the business units operate, in line with the heuristic related concept 'ecological rationality'. For both the business units, the decision makers make use of the cognitive capacities 'Recognition' and 'Object tracking' in searching for and deciding about cues.

RISK APPETITES WITHIN THE BID/NO BID HEURISTICS

Based on the identified search- and decision rules within the adaptive toolboxes of the four types of heuristics, risks, risk thresholds, risk attitudes and risk appetites are identified and analyzed. The majority of these identified risk thresholds aren't traceable in an explicit way within documents or by observing the decision making process, but are implicit within the brains of the decision makers. With regard to the risk thresholds there are differences in decision authority between the two cases, which has its influence on the degree of risk attitudes which aren't in line with the risk appetites. In more detail, for the business unit with a low degree of decision authority about their risk thresholds, there is a higher degree of risk attitudes which aren't in line with the risk appetites of decision makers which have decision authority.

When looking at the way risk appetite relates to the bid/ no bid heuristics of the business unit, it can be stated that it is related to these heuristics by risk thresholds and it is revealed by constructive conflict. When there are mismatches between risk attitudes and risk appetites or between risk appetites at different organizational layers, the risk attitudes and risk appetites are discussed during the decision making process. Based on this it can be stated that a mismatch between risk attitudes and risk appetites or between different risk appetites is not something what should be avoided, because by constructive conflict the involved decision makers will discuss the differences and reach consensus. Providing and thinking about clear arguments which support the chosen risk attitudes and risk appetites is an aspect which can still be improved for both the business units.

EFFECTIVENESS OF THE CURRENT HEURISTICS

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In the next chapter the findings which are presented in the 'within-case'- and 'cross-case' analyses are discussed.

5 DISCUSSION OF THE RESULTS

This research started with the statement that there are lack of insights in literature and practice about how contractors or business units of contractors arrive at their bid/ no bid decision for tenders and how risk appetite is taken into account in this decision making process. To create insights about these two aspects, the bid/ no bid decision making processes of two business units are analyzed and compared to each other. In this chapter the key findings of these analyses and the validation of these findings are discussed.

5.1 DISCUSSING THE FINDINGS OF THE WITHIN- AND CROSS CASE ANALYSIS

In the next sections the key findings in the within-case and cross-case analyses will be discussed according to the same outline that is used in the two analyses:

- Decision making process
- Adaptive toolboxes
- Identified risks
- Thresholds, Risk appetite & Risk attitude
- Effectiveness of heuristics

5.1.1 DECISION MAKING PROCESS

In the 'within-case' analysis insights are acquired about the bid/ no bid decision making processes of the two business cases, and within the 'cross-case' analysis these two processes are compared with each other. When looking at these two decision making processes it can be stated that these processes consist of multiple selection moments for which different decision makers and different hierarchical levels within the organization are involved.

Capturing the different selection moments and involved decision makers

Based on the acquired insights in the within- and cross cases analyses it can be stated that both the business units arrive at a bid/ no bid decision by three main selection moments in which different decision makers are involved. These different steps within the bid/ no bid decision making process, with the involved decision makers, aren't described in documents yet. Describing the decision making process can improve the transparency and traceability of how the business units arrive at the bid/ no bid decisions, for different organizational hierarchical levels. Next to that by describing the decision making process, the structure is clear for all the decision makers which can positively affect the consistency of the process over time.

When looking at the differences in the decision making process for the two cases, differences in traceability of arguments and differences in involved organizational layers can be noticed. BAM Infratechniek Telecom makes use of nine questions checklist to underpin the first and second selection moments of tenders. For BAM Wegen Zuidwest at the first selection moment directly the bid/ no bid status and the related priority level are described, the decision makers at the subsequent selection moments have limited insights about the arguments for the bid/ no bid decision or priority level. Improving the degree of transparency about the used arguments and the traceability of how these arguments result in the decision can positively affect the degree of understanding about the decisions made at different hierarchical levels. Improving the degree of understanding about the decisions made at the different hierarchical levels is especially important for BAM Wegen Zuidwest, because in their decision making process also decision makers from BAM Wegen are involved.

In order to create insights about the way business units arrive at their bid/ no bid decision for tenders, creating insights about the different selection moments, the involved decision makers or involved organizational layers is a necessary start. However for the different selection moments it is also necessary to acquire insights about the used reasoning perspectives by the different decision makers. In the next section the way how these reasoning perspectives are captured is further discussed.

5.1.2 ADAPTIVE TOOLBOXES

In this research the reasoning perspectives which are used by the decision makers within the bid/no bid decision making process of the two business units are captured by the concept 'heuristics'. In order to capture these heuristics, in this research the 'adaptive toolbox' concept is applied. Because each tender can be considered as an opportunity for the contractor to realize their strategic goals, in this research the heuristics are further categorized in line with the four different types of opportunity-capturing heuristics; selection-, procedural-, priority- and timing heuristics. In this section some

From implicit intuitions to explicit heuristics

Based on the observations of the bid/ no bid decision making processes it can be stated that decision makers arrive at their decisions on the basis of implicit intuitions derived from gut feelings, experiences and guesses, in line with the findings of Ahmad (1990). In this research these implicit intuitions are made explicit by applying the adaptive toolbox concept for the selection-, the procedural-, the priority- and the timing heuristics. For each type of heuristic, based on the search-, the stopping, and the decision rules, fast and frugal decision trees are formulated which provide insights about the underlying arguments related to the selection of tenders, the required procedures, the priority of tenders and the timing of tenders.

By making the implicit intuitions used by the decision makers explicit through heuristics, a first necessary hurdle in improving the bid/ no bid decision making process is taken. In improving or maintaining the bid/ no bid decision making process insights about the heuristics used and the effectiveness of these heuristics are required. However not all the decision makers are eager to provide insights about their intuitions. Besides that, initially not all the decision makers or are convinced of the thought that the decision making process can be captured by a portfolio of heuristics. Based on the findings in this research no clear explanations for the resistance of decision makers for revealing their intuitions can be provided. In searching for possible explanations for this resistance maybe the concepts 'accountability' and 'limited trust on the effectiveness/ correctness of own intuitions' can provide insights. In making implicit intuitions explicit in a successful way, it is necessary that the decision makers are convinced of the aspiration of improving the bid/ no bid decision making process in line with the principles of ecological rationality. Heuristics are not good or bad, rational or irrational, only relative to an environment.

Cognitive capacities

Each adaptive toolbox consists of a collection of heuristics and building blocks which a decision maker has at its disposal, together with the core cognitive capacities that building blocks exploit. As described many times in this research the concept 'risk appetite' is about the acceptability of risks and opportunities related to the strategic goals of an organizational entity. As mentioned by Aven & Kristensen (2005) during the assessment and evaluation of risks the four aspects 'Potential consequences', 'Uncertainty about consequences', 'Reliability of information about consequences', and 'Manageability of consequences', should be taken into account. When taking the used cognitive capacities during the decision making process into account, it can be stated that these capacities are related to the concept 'reliability of information'.

Based on the findings in the within- and cross-cases analyses it can be stated that both business units make only use of the cognitive capacities 'Recognition' and 'Object tracking' in exploiting the building blocks. In this research no clear insights are provided about the reliability and effectiveness of these two types of cognitive capacities, however in this section these topics are shortly discussed. When taking the degree of reliability of the capacity 'Recognition' into account, this degree of reliability is depended on the competences, experiences and biases of the decision maker. The cognitive capacity 'Object tracking' has in most situations a higher degree of reliability and effectiveness because of its objective orientation. As stated by Eisenhart et al. (1997) working with more information is better, if the data are objective and up-to-date, because it encourages decision makers to focus on issues rather than personalities. Facts let people move quickly to the central issues surrounding a strategic choice, decision makers don't become bogged down in arguments over what the facts might be. Based on the degree of objectivity, the use of object-tracking is preferred above recognition.

However facts are not always available to decision makers, especially in uncertain environments, and acquiring these facts could be a time-consuming activity. In these situations making use of recognition can be of value for a decision maker. Making use of the capacity 'Recognition' does not mean that this automatically result in a low reliability, the reliability of recognition can still be improved by applying peer reviews.

Besides the objective orientation also the degree in which the facts or insights are up-to-date is of importance. When decision makers are operating in a highly dynamic environment the use of the cognitive capacity 'frequency monitoring' can provide some insights about the reliability of the information. By just tracking once a value of an object in a highly dynamic environment will probability not result in a reliable value about this object because there is a high probability that this value will change over time.

Besides these three cognitive capacities there is also a fourth cognitive capacity 'Ability to imitate'. Although the decision makers within the two cases do not make use of this cognitive capacity, it can be stated that the ability to imitate internally can be of added value for decision makers in arriving at decisions within changed or new environments. In developing search- and decision rules for changed or new environments (e.g. innovations, entry of new markets) the best practices (cues searched for, decisions about cues) of other business units or regions within business units can be of added value. In sharing these best practices, it is necessary to take the transferability of the best practices into account by looking at the similarities and differences between the internal- (e.g. organization) and external (e.g. market) environments of the business units. Nowadays it will be hard to transfer best practices of heuristics among business units of Royal BAM Group, because the business units lack insights about in what environments a given heuristic will work and can be used (ecological rationality).

Cognitive sophistication

As presented in the within- and cross cases analyses, there are differences in the used types and numbers of opportunity capturing heuristics over the different selection moments within the bid/ no bid decision making process. In providing explanations for or normatively discuss these differences in heuristics over the bid/ no bid decision making process, the concept 'cognitive sophistication' can provide some insights.

In the within-case analyses differences in the types of heuristics used at the different selection moments in the decision making process of the two cases are noticeable. Based on the current findings for both cases it can be stated for the selection moments for which multiple decision makers are involved all the four types of opportunity capturing-heuristics are taken into account while for the selection moments for which only individuals are involved not all the four types are used. In providing explanations for these differences in types of heuristics used over the bid/ no bid decision making process, according to Bingham & Eisenhardt (2011) cognitive sophistication can provide some insights. As stated in their research business units learn specific types of opportunity capture heuristics in a developmental order of increasing cognitive sophistication. Temporal and priority heuristics involve relationships among opportunities and so require more experience to learn. Decision makers often need to learn about single opportunities before they can relate those opportunities to one another by ranking or sequencing them. In contrast selection and procedural heuristics relate to single opportunities and so require less experience to learn. Heuristics that involve relationships among opportunities require not only more experience, but also more cognitive sophistication to learn. Individuals must simultaneously keep in mind information about several experiences while making cognitive links among them, which can make it difficult to cognitively connect experiences. In group oriented decision making processes, the cognitive sophistications of all individuals can be used and experiences can be connected with each other more easily which can explain the use of all the four types of opportunity capture heuristics.

Based on the insights about cognitive sophistication and the current insights about the different selection moments within the bid/ no bid decision making process, it can be wisely to consider at least the selection-, and procedural heuristics within the first selection moment which is conducted by an individual decision maker. During the second group oriented selection moment, all the four types of heuristics can be taken into

account. In upcoming selection moments it can be wisely to take at least the timing- and priority heuristics into account so each type of heuristic is reviewed.

Ecological rationality

In the cross-cases analysis mainly differences in the used number of heuristics for the different types of heuristics are noticeable for the two cases. BAM Wegen Zuidwest uses a higher number of priority heuristics in comparison with BAM Infratechniek Telecom. BAM Infratechniek Telecom uses a higher number of procedural heuristics in comparison to BAM Wegen Zuidwest. In searching for explanations for these differences, the ecological rationality of the heuristics can provide insights. Ecological rationality implies that a heuristic is not good or bad, rational or irrational, only relative to an environment. Heuristics can exploit particular environmental structures or change an environment. The characteristics of and developments within business environments can provide explanations for the different types and numbers of heuristics and developments of the heuristics. In this research it looks like the main differences in the number of priority- and procedural heuristics used by the two business units can be explained by differences in the market conditions which result in differences in risks and opportunities, however a clear proof of evidence is missing in this research.

5.1.3 IDENTIFIED RISKS

Now there are insights about the used adaptive toolboxes by the two business units for the four different types of opportunity-capturing heuristics, it is still unclear why each heuristics is used. In searching for explanations why these heuristics are used, in this research the heuristics are analyzed on risks. In the coming sections the identification of risks based on the heuristics is further discussed.

Capturing the risks and opportunities searched for by bid/ no bid heuristics

When discussion the coupling of the heuristics with the risk/ opportunities, it can be stated that not all the decision makers are aware or conscious about the fact that they are searching for risks and opportunities. In this research insights are acquired about the risks and opportunities searched for by the bid/ no bid heuristics, by describing them as a chain of cause, exposure and attractive or negative outcome with regard to the realization of the strategic goals. Describing the risks in this way create insights about the possibilities of managing these risks by making use of measures which focus on the cause, on the exposure or on the outcome of the risk. In describing the risks and in a later stadium, capturing the risk attitudes and risk appetites, it is of importance to describe the outcomes in relation to the realization of the strategic goals. By knowing which risks affect which strategic goals it is also possible for business units to decide about their risks attitude and risk appetite.

Completeness of identified risks and opportunities

As shown in the within- and cross cases analyses, the risks and opportunities related to the heuristics of the two business units are presented in line with the twenty-eight risk categories of Royal BAM Group. Based on the presented risks and opportunities which are related to the heuristics, insights about the completeness of the identified risks and opportunities within the tender selection processes of the business units can be acquired. In this research the risks are described and coupled to the heuristics, however for the business units it can also be interesting to describe and couple heuristics to their identified strategic risks and opportunities. In this last way it becomes clear if all the earlier identified risks and opportunities are also captured by the bid/ no bid heuristics. When reflecting the identified risks and opportunities within the two cases on the in literature described factors which can affect the bid/ no bid decision, the identified risks and opportunities are in line with ninety-four factors of Bagies & Fortune (2006). Because of the limited available time the completeness of the risks and opportunities which are related to the bid/ no bid heuristics is not taken into account in this research.

Key risks and opportunities

Besides creating insights about the completeness of the identified risk and opportunities with the bid/ no bid heuristics also insights are acquired about the key risks and opportunities of the bid/ no bid heuristics. In the

diagrams which present the couplings of the heuristics to the different risks categories of Royal BAM Group, the number of heuristics related to each risk category is presented. In discussing the numbers of heuristics related to each risks category, it cannot be stated directly that a higher number of heuristics related to a risk category results in higher degree of effectiveness with regard to the management of this risk category. It can also be possible to manage risks and opportunities in an adequate way by a low number of heuristics. However by having insights about the number of heuristics related to specific risk categories, the key risk categories for a business unit can be revealed.

In this research, the differences and similarities between the key risks and opportunities within the bid/ no bid heuristics for the two business units are not fully explained because of the limited timeframe of the research. In providing explanations for these key risks and opportunities, comparing the strategic objectives and the characteristics of the business environments of the two business units will likely provide some insights.

5.1.4 RISK TOLERANCES/ THRESHOLDS, RISK ATTITUDES & RISK APPETITES

Besides the risks also the risk thresholds are identified and coupled to each decision rule. For each risk threshold, the risk attitudes and risk appetites are identified and described in a qualitative way. For each heuristic the risk attitudes are reflected on the risk appetites and strategic issues are described. In this discussion the findings in the 'within-case' and 'cross-cases' analyses are discussed.

From implicit risk thresholds to explicit risk thresholds

The majority of these identified risk thresholds aren't traceable in an explicit way within documents or by observing the decision making process, but are implicit within the brains of the decision makers based on earlier experiences of the business unit. In this research, for each decision rule the related risk thresholds are described and these thresholds are classified in line with the three different 'tolerances levels' of Royal BAM Group. Because for both the cases only risk thresholds are of use, the classification of the three different tolerances levels is only based on differences in decision authority. Based on the comparison of the different types of tolerances levels in the two cases, it can be stated that BAM Infratechniek Telecom has much more decision authority about their decision rules than BAM Wegen Zuidwest. Based on the acquired insights in this research it is unknown if these different structures are a result of the chosen strategy or that the strategies are adapted to the structures. However based on the risk culture of the board of Royal BAM Group it looks like these structures are a result of the strategies. The management board of Royal BAM Group aspires the integration of the thought 'It should not be possible that one tender or contract will bring our organization down to bankruptcy' within their business activities and structures. In order to support this thought several review moments and differences in decision authority are implemented within the structure. In providing an explanation for the differences in decision authority between the two cases, the fact that the business unit BAM Wegen Zuidwest is considered as a region within the business unit BAM Wegen can be a possible explanation. BAM Infratechniek Telecom can be considered as an element of the business unit BAM Infratechniek, however BAM Infratechniek Telecom is not further subdivided in several regions and maybe therefore they possess a high degree of decision authority.

When taking a closer look at the described risk thresholds, it can be stated that not all these risk thresholds are described and used in line with the SMART principles. Based on the SMART principles it is advised to describe the be specific, measurable, assignable, realistic and time-related. In some of the risk thresholds there are descriptions, like 'high degree of unusual risks', or 'high amount of turnover', which can result in differences in interpretations among decision makers and so in inconsistent decisions over time. However it can be discussed if these thresholds should be described and used in line with the SMART principles. On the one hand it can improve the consistency of decision making, however on the other hand it can negatively affect the simplification of the decision making process and the ideology behind the use of heuristics. In this research no insights are acquired which can be used as input for this discussion.

Argumentation for risk thresholds by risk attitudes or risk appetites

Not all of the identified risk thresholds are supported by clear arguments in the form of well-founded risk attitudes and risk appetites. In this research no insights are acquired about the building blocks of risk attitudes and risk appetites and next to that no insights are acquired about which risk attitudes and risk appetites positively affect the effectiveness of the bid/ no bid decisions. In order to start a discussion about the risk attitudes and risk appetites the decision makers should be aware of the building blocks of these two concepts. These building blocks then can be elaborated by decision makers for decisions for which there is no consensus. Nowadays the awareness about the building blocks of risk appetites and risk attitudes among the decision makers within the business units of Royal BAM Group can be further improved. The schematization of the 'informed scenario' developed by Hillson & Murray-Webster (2011), as shown in figure 4, can provide some directions for these building blocks. When insights about these building blocks are acquired it can also be interesting which blocks or which ratio of blocks positively affect the construction of 'effective' risk appetites.

Constructive conflict

For each identified risk threshold, the related risk attitude and risk appetite are described for the involved organizational levels. Each risk attitude is reflected on the risk appetite and based on this reflection the strategic issues are described. When comparing the alignments between the risk attitudes and risk appetites for the two cases, it can be stated that number of mismatches between the risk attitudes and risk appetites is higher for BAM Wegen Zuidwest than for BAM Infratechniek Telecom. When looking at possible explanations for this difference in mismatches between the two cases, the difference in decision authority about the risk thresholds can be a possible explanation. For many of the risk thresholds of BAM Wegen Zuidwest the decision authority is at a higher hierarchical level, BAM Wegen. The acceptability of most risks is therefore determined based on the risk appetites of BAM Wegen. However, there can be discussions about the risk appetites between BAM Wegen and BAM Wegen Zuidwest for specific decisions. Based on these findings it can be suggested that by constructive conflict, insights about the risk appetites and risk attitudes of decision makers are acquired but more important differences in risk appetites are discussed. Constructive conflict refers to conflicts which generate productive, mutually beneficial, shared decisions. In the situation of BAM Infratechniek Telecom, which possesses a high degree of decision authority, less mismatches between the risk attitudes and risk appetites are noticed. However based on the findings of this research it is not possible to determine if the risk appetites of BAM Infratechniek Telecom also results in a higher degree of effectiveness of the bid/ no bid decision making process in comparison with the risk appetites of BAM Wegen Zuidwest. In the next paragraph this possible effect of constructive conflict on the effectiveness of risk appetites is further discussed.

5.1.5 EFFECTIVENESS OF HEURISTICS

In the 'within-case' analyses the effectiveness of the bid/ no bid decision making processes are described for the two business units. This degree of effectiveness is captured by describing the win-ratios for tenders and the financial results of contracts won. Because BAM Infratechniek Telecom has not collected data about the financial results of their contracts won, only the win-ratios for tenders of the two business units are compared with each other in the 'cross-cases' analysis.

Room for improvements

Based on the current acquired insights about the effectiveness of the bid/ no bid decision making process of BAM Wegen Zuidwest it can be stated that the effectiveness of the bid/ no bid heuristics with regard to the financial results of contracts won can be further improved. When looking at the effectiveness of the heuristics with regard to the realized turnover, it can be stated that only the bid-decisions are captured and monitored by the business units. In order to create insights about the consistency and effectiveness of the bid/ no bid decisions, it can be wisely to also capture the no bid decisions and their related characteristics.

Based on the current findings it is not possible to capture the heuristics which negatively affected the effectiveness of the decision making process, because it is unknown which factors caused the negative financial

results of contracts won. Although it is not possible to provide recommendations for improving the current heuristics, based on the current finding it is already possible to discuss the factors which can have an effect on this effectiveness. Subsequently the factors 'Effectiveness of search rules of heuristics', 'Effectiveness of stopping rules of heuristics' 'Effectiveness of decision rules of heuristics (risk appetite)' and 'Effect of constructive conflict on effectiveness of decision rules of heuristics' are discussed below.

Effectiveness of search rules of heuristics

Based on the current insights it isn't possible to determine the effectiveness of each search rule within a heuristic, because it is unknown which (risk/ opportunity) factors affected the win-ratios for tenders and which factors affected the financial results of contracts won. In discussing the effectiveness of a search rule within a heuristic a decision maker can reflect on the differences between the initial identified risks and opportunities by the heuristics and the actual occurred risks and opportunities during the award of the contract and during the construction of contracts. Are the key risks and opportunities within our business environment covered by our search rules? Do we need to add new search rules or can we skip specific search rules, depended on changes in the business environment or changes in the strategic objectives?

Effectiveness of stopping rules of heuristics

Besides the effectiveness of the search rules, also the effectiveness of the stopping rules of heuristics can be taken into account by decision makers. In discussing the effectiveness of the stopping rules a decision maker can reflect on the reliability and completeness of the acquired information with regard to the search rules. Is the acquired information up-to-date and objective? Can we take another snap-shot of the value of the object? Can we conduct a peer review internally? Did we collected all the information to make a decision?

Effectiveness of decision rules of heuristics (risk appetite)

When a decision maker has searched for specific risks and opportunities within the tender and has acquired information related to these risks and opportunities, in the end a decision about these risks and opportunities has to be made. In discussing the effectiveness of the decisions made a decision maker can reflect on the effectiveness of its risk appetites. Within each heuristic the risk appetite determines which risk attitude and so which types and amounts of risks/opportunities are acceptable to take for a business unit, resulting in a certain decision. A decision maker can ask himself; Are our decisions made in line with our risks appetites? As suggested by Hillson & Murray-Webster (2012) effective risk appetites, are appetites which are within the risk capacity boundaries. Risk capacity can be defined as the ability of an entity to bear risk, quantified against objectives. Based on these insights also the question 'Are our formulated risk appetites within our risk capacity boundaries?' can be asked.

Effect of constructive conflict on effectiveness of decision rules of heuristics

The results of the case studies show that for a business unit in which several hierarchical organizational levels are involved with the decision making there are much more discussions about alignment of risk attitudes with risk appetites than for a business unit which has their own decision authority. As described earlier these discussions do not have to be qualified as a negative aspect, by constructive conflict it is possible to generate productive, mutually beneficial shared decisions. It could be even likely that by constructive conflict a higher degree of effectiveness of risk appetites can be acquired in line with the findings of Eisenhardt et al. (1997). Eisenhardt et al. (1997) found in their study that the teams that engaged in healthy conflict over issues, made better decisions and also moved more quickly as well. Without conflict, groups lose their effectiveness because they forget to consider key issues or were simply unaware of important aspects of their strategic situation.

6 CONCLUSION

To obtain insights about the way risk appetite is integrated within the bid/ no bid decision making processes of business units of a contractor, this research is conducted at Royal BAM Group. In this chapter the conclusions, the theoretical- and practical relevance, and the limitations of this research are presented.

6.1 CONCLUSIONS

As presented within the second chapter, based on a problem definition, a research objective and a central research question are formulated. The central research question is further subdivided in six sub questions. The first three sub questions are answered in the conclusion of the theoretical research, while the other three questions are answered in the conclusion of the within- and cross cases analyses. All these conclusions can be considered as elements within the final answer of the central research question.

Because business units within Royal BAM Group have not defined a clear risk appetite for their bid/ no bid decision making process for construction projects and a clear view of how risk appetite is integrated within this bid/ no bid decision making process is missing, in this research insights are created about the way risk appetite is integrated within the tender selection heuristics of a business unit of Royal BAM Group. In this research therefore the following research question is answered:

> *In which way is risk appetite integrated within the bid/ no bid heuristics of a business unit of Royal BAM Group?*

In order to create these insights about the way risk appetite is integrated within the tender selection process of a business unit of Royal BAM Group, first insights are acquired about the characteristics of the concept risk appetite followed by insights about the characteristics of the bid/ no bid decision making processes of a contractor. Based on the acquired insights in literature the concept risk appetite is captured by the proxy measure 'risk thresholds'. The bid/ no bid decision making process is captured by adaptive toolboxes, consisting of search-, stopping- and decision rules and cognitive capacities, for four types of opportunity-capture heuristics; selection-, procedural-, priority- and timing heuristics. To capture risk appetite within these four types of heuristics, in this research it is proposed that risk thresholds could relate to the building block 'decision rules' and the identified risks to the building block 'search rules'. For the identified risk thresholds it is subsequently possible to research the linkages with risk appetites and risk attitudes.

In this research for the business units BAM Wegen Zuidwest and BAM Infratechniek Telecom insights are acquired about the heuristics used during their bid/ no bid decision making processes and the way in which risk appetite is related to these heuristics.

In arriving at their bid/ no bid decision the decision makers of both business units make use of all the four different types of opportunity-capture heuristics. However the use of the different types of opportunity-capture heuristics over the different selection moments within the bid/ no bid decision making process of each business unit is differentiated, as a possible consequence of differences in cognitive sophistication of the heuristics. Besides a differentiation in used types of heuristics for the different selection moments for each business unit, also differentiations in the numbers of different types of heuristics used are noticed between the two business units. It looks like these differentiations can be explained by the conditions of the markets in which the business units operate, in line with the heuristic related concept 'ecological rationality'. However as described in the discussion, because of the limited available time in this research no clear proof of evidence is provided for explaining the use of heuristics by the business units based on the characteristics of the environment.

In order to exploit heuristics, decision makers make use of cognitive capacities. For both the researched business units, the decision makers make use of the cognitive capacities 'Recognition' and 'Object tracking' in searching for and deciding about cues. In this research no clear insights are provided about the reliability and

effectiveness of these two types of cognitive capacities, however in the discussion already some insights are provided about possible directions. Working with objective and up-to-date data can positively affect the effectiveness and efficiency of the decision making process. Related to the up-to-date aspect, the cognitive capacity 'frequency monitoring' can be of added value. In situations in which decision makers have to make decisions within changed or new environments, the use of the cognitive capacity 'ability to imitate' internally can be of added value. However in order to transfer best practices of heuristics among business units, it is necessary to acquire insights about in what environments a given heuristic will work and can be used (ecological rationality).

Based on the identified search- and decision rules within the adaptive toolboxes of the four types of heuristics, risks, risk thresholds, risk attitudes and risk appetites are identified and analyzed. The majority of these identified risk thresholds aren't traceable by searching within decision making related documents or by observing the decision making process, but are within the heads of the decision makers. By making the risk thresholds explicit, it becomes possible to discuss them and reflect on them based on the strengths and weaknesses of the business unit. With regard to the risk thresholds there are differences in decision authority between the two cases, which has its influence on the degree of risk attitudes which aren't in line with the risk appetites. In more detail, for the business unit with a low degree of decision authority about their risk thresholds, there is a higher degree of risk attitudes which aren't in line with the risk appetites of decision makers which have decision authority.

Based on a reflection of the risk attitudes on the risk appetites of the two business units and on the risk appetites of other involved organizational layers, strategic issues are revealed. When looking at the way risk appetite relates to the bid/ no bid heuristics of the business unit, it can be stated that it is related to these heuristics by risk thresholds and it is revealed by constructive conflict. When there are mismatches between risk attitudes and risk appetites or between risk appetites at different organizational layers, the risk attitudes and risk appetites are discussed during the decision making process. Based on this it can be stated that a mismatch between risk attitudes and risk appetites or between different risk appetites is not something what should be avoided, because by constructive conflict the involved decision makers can discuss the differences and reach consensus. Providing and thinking about clear arguments which support the chosen risk attitudes and risk appetites is an aspect which can still be improved for both the business units.

Besides creating insights about the heuristics used and their related risk thresholds, risk attitudes and risk appetites in this research also some first insights are created about the effectiveness of the bid/ no bid heuristics of the business unit. In this research it wasn't possible to determine the effectiveness of the heuristics based on the win-ratios for tenders and financial results of contracts won, because insights about the (risk/ opportunity) factors which caused these ratios and results were missing. Although the effectiveness of the heuristics is not determined within this research, in the discussion some possible directions of determining the effectiveness are discussed. Because each heuristic consists of a search-, stopping-, and decision rule, it is proposed that the effectiveness of a heuristic can be captured by the efficacies of the search rule, the stopping rule and the decision rule. By acquiring insights about the causes of win-ratios for different types of tenders and the causes of the different results of contracts won, insights about the interpretations of the management of risks and opportunities within the tender and insights about the actual management of risks and opportunities can be acquired. Based on these insights, some first insights about the effectiveness of the search-, stopping and decisions rules can be acquired. The effectiveness of the search rules can be related to the completeness of risks and opportunities searched for, while the effectiveness of the stopping rule can be related to the reliability and completeness of the acquired information. The effectiveness of the decision rules can be related to the degree in which the decisions are made in line with 'effective' risk appetites.

6.2 THEORETICAL RELEVANCE

This research makes several contributions to the literature on bid/ no bid decision making processes for contractors and the integration of risk appetite within decision making processes.

In this research, insights are created about the way in which risk appetite is integrated within the bid/ no bid decision making processes of two business units of a contractor. In order to create these insights both the bid/ no bid decision making processes of the two business units are described and possibilities to capture risk appetite within these processes are described. The bid/ no bid decision making processes of the business units is captured by creating insights about the used heuristics by applying the 'adaptive toolbox' concept. In order to capture risk appetite within these adaptive toolboxes, the decision rules are coupled to risk thresholds. Each risk threshold is subsequently coupled to risk attitudes and risk appetites of the decision makers. The results show that there are differences in used heuristics among business units, differences in decision authorities related to thresholds, and differences in the alignment between risk attitudes and risk appetites for differences in decision authorities. Also insights about the effectiveness of the bid/no bid decision making are created, however it was not possible to determine the effect of the heuristics used on this effectiveness.

First this research creates insights about how the bid/ no bid decision making process can be captured by heuristics. Since Friedman's (1956) model the literature has been flooded with many rational oriented bidding models (Bagies & Fortune, 2006). Sadly, the evidence suggests that practitioners have made relatively little use of those models and most of these models continued in academic circles and did not apply into the practical world (Wanous, Boussabaine, & Lewis, 2000). Because the bid/ no bid decision making process can be considered as a complex process and the involved decision makers are bounded in their rationality, the use of heuristics in arriving at their decisions is more likely than complex rational models. In order to capture the heuristics the concept 'Adaptive toolbox' as presented by Gigerenzer & Gaissmaier (2011) is combined with the concept 'Opportunity-capturing heuristics' as presented by Bingham & Eisenhardt (2011). The four different types of opportunity-capturing heuristics can cover the strategic aspects related to the selection of tenders and the adaptive toolbox concept creates insights about the search-, stopping-, and decision rules and cognitive capacities used within these four types of opportunity-capturing heuristics.

Second this research shows that there are differences in the number of opportunity capturing heuristics used by business units. In the research of Bingham & Eisenhardt (2011) it is stated that firms learn opportunity-capture heuristics in a specific developmental order. They begin with less cognitively sophisticated heuristics that address single opportunities (selection and procedural heuristics). Then more cognitively sophisticated heuristics (priority and temporal heuristics) are added that relate to several opportunities at once. Based on the insights in this research it can be stated that the development of the four types of opportunity-capture heuristics for tenders is also depended on the environment in which they are active. So besides a development on differences in cognitively sophistication, the opportunity-capture heuristics are also developed based on their ecological rationality, the degree to which the heuristics are adapted to the structure of its environment.

Third, in this research insights are acquired of how risk appetite can be captured within heuristic oriented decision making. In order to capture the risk appetites and risk attitudes of decision makers within their used adaptive toolboxes, elements from the concept 'Informed scenario' of Hillson & Murray-Webster (2011) are combined with the concept 'Adaptive toolbox' of Gigerenzer & Gaissmaier (2011). In more detail the search-rules within the adaptive toolbox are coupled to risks and the decision rules are coupled to risk thresholds. Subsequently in line with the 'informed scenario' of Hillson & Murray-Webster (2011) these risk thresholds are coupled to risk attitudes and risk appetites.

Fourth, in this research insights are acquired about the differences in alignment between risk attitudes and risk appetites for differences in decision authority. As stated by Hillson & Murray-Webster (2011) and Del Bel Belluz (2010) for a firm the risk attitudes should be in line or within the risk appetites in order to improve their

strategic performance. However when different organizational levels are involved within the decision making process, different strategic objectives are involved and therefore decision makers with different risk appetites can be involved. However because of these differences, by means of constructive conflict these appetites are further discussed by the different organizational levels and in the end also further developed. For future research it can be interesting to research if differences in risk appetites in the end result in a higher degree of 'correct' risk appetite and also in a higher degree of effectiveness of the tender selection process, by means of constructive conflict.

Finally, this research tried to describe the effectiveness of the bid/ no bid decision making process in order to describe the relation between the used heuristics and strategic performance. Although the effect of the heuristics on the strategic performance of the business units is not determined in this research, the research provides directions for researching this effect by classifying the heuristics in line with the four types of opportunity-capture heuristics and capturing the efficacies of the search-, stopping- and decision rules within the four types of heuristics.

6.3 PRACTICAL RELEVANCE

This research shows several outcomes that have practical relevance regarding the decision making processes which are related to the selection of tenders and the way risk appetite is integrated within the tender selection decision making processes.

First, in the research insights are acquired about the way business units arrive at a selection of tenders on which bids are placed. These insights are acquired by creating insights about the used structures within the bid/ no bid decision making processes by describing the different selection moments, the involved decision makers and the involved organizational levels. Subsequently insights are created about the used reasoning perspectives by the decision makers for the different selection moments. These reasoning perspectives are classified in line with the four types of opportunity-capturing heuristics. Because there are risks and opportunities related to the selection of tender, the different heuristics are analyzed on their risks and opportunities. Insights are created about the risks and opportunities searched for by the decision makers during their tender selection process. But more important also insights are created about the degree of acceptability of the identified risk and opportunities by creating insights about the risk thresholds, risk attitudes and risk appetites which are related to the decision rules. Based on reflections of risk attitudes on risk appetites insights about strategic issues are acquired for the different business units. Nowadays most of the above insights are implicit within the heads of the decision makers, by making these insights explicit it is also possible to reflect on these insights by starting discussions. All these insights, the heuristics used and the risk analysis of these heuristics, together can be used as input for the consolidation or optimization of the tender selection processes of business units.

Second, in this research insights are obtained about the effectiveness of the bid/ no bid decision making processes of the business units. These insights are created by describing the win-ratios for tenders within the different business segments of the business unit and with different turnover levels. Besides these insights about win-ratios for tenders, also insights are created about the financial results of the contracts won for one business unit. In the future the collection of data for the win-ratios and results of contracts won can be further enriched by further specifying these ratios and results for tenders with different types of clients, different types of contracts, different types of procurement, different numbers of competitors etc. Although insights about the effectiveness of the bid/ no bid decision making processes of the business units are acquired, it was not possible to determine the effectiveness of the bid/ no bid heuristics because insights about the causes of win-ratios for tenders and the causes of different financial results of contracts won are not available. In the discussion already some possible directions are described in capturing the effectiveness of the heuristics by unraveling the efficacies of the search-, stopping- and decision rules within the heuristics.

Third, by creating insights about the used heuristics by decision makers during the tender selection process and the effectiveness of the bid/ no bid heuristics, insights are created about the possibilities of further optimizing the search-, stopping- and decision rules within the heuristics. Based on the current insights it is suggested that the optimization of the search rules is related to the degree of completeness of identified risks and opportunities during the tender selection phase. The optimization of the stopping rules is related to the degree of reliability and completeness of the acquired information on which decisions are based. Finally the optimization of the decision rules is related to the degree in which decisions are made in line with 'effective' risk appetites.

6.4 LIMITATIONS OF THE RESEARCH

Within this research there were several limitations that could have affected the results.

First, in this research only two business cases were studied. This number of studied cases is too low to generalize the results of this research for other contractors within the construction industry. Due to practical limitations it was not possible to study more business cases. Nevertheless, the insights acquired by this research can be used as a start for future research on this topic.

Second, in this research it was not possible to fully explain the ecological rationality of the heuristics. In was not possible to explain the development of heuristics over time, by the developments within the business environment of the decision makers. Within this research the heuristics are revealed for strategies which focus on short term survival or small growth, due to an economic recession within the Netherlands. Based on the outcomes of this research it is unclear in which way the heuristics will be different for different strategies, markets and technologies. Therefore based on the findings of this research no wide reflective equilibrium is realized about the distribution of heuristics and the integration of risk appetite within the decision making process depended on the strategy- and market characteristics.

Third, in this research data was collected about the underlying reasoning perspectives which were used by decision makers during the research. Because these underlying reasoning perspectives cannot be described on observation, these data was collected through semi-structured interviews with the involved decision makers. Because the reasoning perspectives behind most of the decisions are not described in documents, the only form in which data could be collected was by using interviews. Consequently, the data about these reasoning perspectives used by decision makers have a subjective character. For future researches, it is suggested to collect the data about the reasoning perspectives by participation during the observations and by letting the decision makers describe their reasoning perspectives in documents.

Fourth, based on the acquired data limited insights are acquired about how the dependencies between risk attitudes and decision rules influence the decisions made. Within the fast-and-frugal decision trees some dependencies between and weights for decision rules are presented, however in special for the priority rules there are no insights about the dependencies between and weights for decision rules. In future research also the effect of the dependencies between the four types of opportunity-capturing heuristics on the bid/ no bid decision can be further researched.

Fifth, in this research it was not possible to determine the effect of the heuristics used on the performance of the tender selection processes. There are multiple heuristics used by the decision makers which in the end result in certain decisions, however in this research the effect of these decisions on the win-ratios of the tenders and the financial results of contracts won is not taken into consideration. In order to research this effect, insights should be acquired about the underlying conditions when tenders are or aren't won and when and why positive or negative financial results are achieved for contracts won. When insights about these conditions and reasons are acquired it is possible to reflect them on the used heuristics and create insights about the effectiveness of heuristics.

7 RECOMMENDATIONS

Based on the discussion and the conclusions, within this chapter theoretical- and practical recommendations are described. Within the theoretical recommendations several directions for future research are described while the practical recommendations provide future directions for Royal BAM Group with regard to their tender selection processes.

7.1 THEORETICAL RECOMMENDATIONS

Several directions for future research in the field of the bid/ no bid decision making process for contractors and risk appetite emerge from the results and the limitations of this research.

First, as mentioned in the limitations of this research the number of studied cases is too low to generalize the results. In future research, more cases can be studied which provide insights about the generalizability of the results. In these studies also more insights can be acquired about differences in heuristics used by analyzing the differences in characteristics of the environments in which these heuristics are active. With regard to the differences in heuristics used, both the differences in which types of opportunity-capture heuristics are used by decision makers as well as the differences between the number of different types of opportunity-capture heuristics used can be analyzed. It can be interesting to research and analyze the heuristics used for differentiated product-market and technology strategies within or outside the construction industry.

Second, in this research limited insights are created about how the dependencies between risk attitudes and risk appetites and decision rules influence the decisions made. In this research some first insights are created about the dependencies between the four different types of opportunity-capture heuristics, however in future research it can be interesting to analyze how the timing- and procedural heuristics influence the selection- and priority heuristics, with a special focus on the decision rules in these heuristics.

Third, in this research insights are acquired about the way risk appetites and risk attitudes can be revealed based on the risk thresholds for decision rules. For decision making processes at which different organizational levels are involved, there can be differences between risk appetites or risk appetites and risk attitudes among the different organizational levels. For future research it can be interesting to research the effect of constructive conflict on revealing the risk attitudes and risk appetites of the decision makers. Besides that, the effect of constructive conflict on the alignment of risk attitudes on risk appetites and on the effectiveness of the bid/ no bid decision making process can be further researched.

Fourth, in this research only insights are acquired about the heuristics used, the related risks, risk thresholds, risk attitudes and risk appetites. Besides that also some first insights are acquired about the effectiveness of the bid/ no bid decision making process by describing the win-ratios for tenders and the financial results of contracts won. However in this research it was not possible to determine the effectiveness of the bid/ no bid heuristics. In the discussion it is proposed to capture the effectiveness of heuristics by determining the efficacies of the search-, stopping-, and decision rules. In these efficacies, the effectiveness of search rules is related to the completeness of risks and opportunities searched for, the effectiveness of the stopping rules is related to the reliability and completeness of the acquired information and the effectiveness of the decision rules is related to the degree in which the decisions are made in line with ‘effective’ risk appetites. In future research it can be interesting to further research these propositions with regard to the conceptualization of the efficacies of the search-, stopping-, and decision rules. In this research there can be a special focus on acquiring insights about how it is possible to normatively judge the risk attitudes and risk appetites and arrive at ‘effective’ risk appetites. In researching these possibilities, further researching the linkages of risk appetites with risk capacity and risk appetites with strategic objectives can be interesting.

7.2 PRACTICAL RECOMMENDATIONS

Based on the conclusions of the research and observations during the research, practical recommendations are described for Royal BAM Group with regard to the integration of risk appetite within their bid/ no bid decision making processes for tenders. As shown in figure 28 the practical recommendations for Royal BAM Group can be captured by three main- and fifteen sub categories. These different categories are further described in the next sections. The practical recommendations can be considered as recommendations for both Royal BAM Group as well as for their business units.

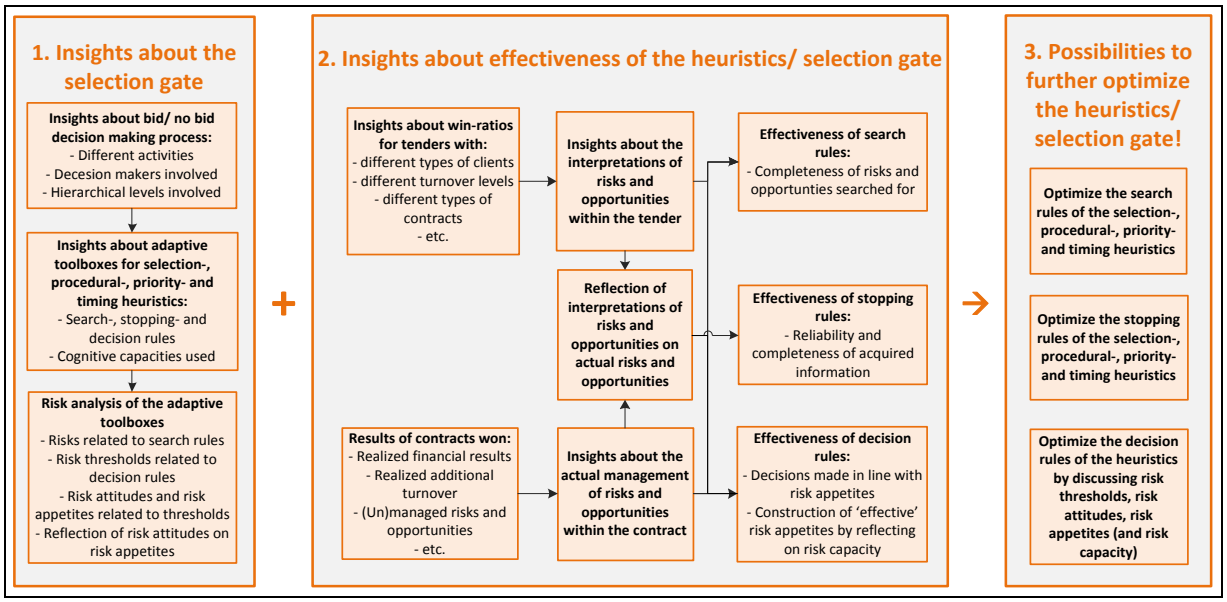

Figure 28: Overview of the practical recommendations for Royal BAM Group

As mentioned before in the introduction, each contractor would like to select the tenders which positively affect the realization of their strategic goals. In selecting these tenders the initial bid/ no bid decision making process is of importance, because here the business units decide, depended on their risk attitudes and risk appetites, on which tenders a bid will be placed. Depended on the effectiveness of this decision making process the business units want to maintain or optimize this process. In order to create insights about the possibilities to maintain or further optimize their tender selection processes, two cornerstones are needed. First the business unit should have insights about the way their bid/ no bid decision making process takes place, second they should have insights about the effectiveness of their selection gate. These two cornerstones together can create a third cornerstone 'Possibilities to further optimize the selection gate'. Within this research insights are created about how these first two cornerstones can be captured, however in practice most of the business units do not possess knowledge related to the elements within the first two cornerstones. Because knowledge related to these first two cornerstones is missing, business units do not know if they should optimize their tender selection process but even more important they do not know how this process can be optimized. In this section therefore recommendations are presented which provide insights about how the business units can create insights about the first two cornerstones 'Insights about their selection gate' and 'Insights about the effectiveness of their gate' and so arrive at the third cornerstone 'Optimizing their selection gate'.

INSIGHTS ABOUT THE SELECTION GATE

When looking at the selection gates of the researched business units of Royal BAM Group it is clear on which tenders a bid is placed and some business units even describe the priority level for this tender. However the way how these business units arrive at this bid/ priority decision is unclear, for which indicators/risks are searched for and which sub-decisions are made? These insights can be created by creating insights about the bid/ no bid decision making process of a business unit, the adaptive toolboxes for the selection-, procedural-, priority- and timing heuristics and the risks which are related to these adaptive toolboxes.

In order to create insights about the selection gate, at first it is recommended to create insights about the bid/ no bid decision making process. These insights can be created by describing the process based on the activities within this process, the involved decision makers, the documents/ reports used, the involved organizational layers. When insights are created about this decision making process it is still unclear which decisions are made based on which arguments. In order to provide insights about these decisions and underlying arguments, as shown in the research, the 'adaptive toolbox' concept can be of added value.

In order to create insights about the decisions made, with the related argumentations, during the bid/ no bid decision making process, the concepts 'heuristics', 'adaptive toolbox', 'opportunity-capturing heuristics' can be used. Based on the search-, stopping- and decision rules and underlying cognitive capacities for the selection-, procedural-, priority and timing heuristics insights can be acquired about the way how bid/ no bid decisions are made.

In deciding about on which tenders to bid, the risk attitudes and risk appetites of decision makers and business units play a role. However the researched business units are not directly aware of the risks searched for during this decision making process, and more important not aware of their appetite and attitude to these risks. In order to create insights about the risks and opportunities searched for and decided about during the bid/ no bid decision making process, the search rules can be linked to risks, the decision rules can be linked to risk thresholds, the risk thresholds can be linked to risk attitudes and risk appetites and last the risk attitudes can be reflected on the risk appetites.

INSIGHTS ABOUT THE EFFECTIVENESS OF THE SELECTION GATE

The researched business units are not fully aware of the effectiveness of their selection gate and do not collect data in structured way. They only capture the bid decisions and their related win-ratios and financial results, however it is recommended to also capture the no-bid decisions in order to create insights about the consistency and effectiveness of these bid/ no bid decisions. Next to that, in order to create insights about the effectiveness of selection gates in a more structured way it is recommended to collect the causes of the win-ratios for different types of tenders and the causes of the different results of contracts won. Based on these causes, insights about the interpretations of risks and opportunities within the tender and insights about the actual risks and opportunities within the contracts won are acquired. Based on these two insights it will be possible to reflect on the effectiveness of the heuristics.

As is proposed within the discussion chapter of this thesis, the effectiveness of a heuristic can be determined by the efficacies of the search-, stopping- and decision rules within each heuristic. The effectiveness of the search rules can be related to the completeness of risks and opportunities searched for, while the effectiveness of the stopping rule can be related to the reliability and completeness of the acquired information. The effectiveness of the decision rules can be related to the degree in which the decisions are made in line with 'effective' risk appetites. In order to acquire insights about the way 'effective' risk appetites can be defined and realized, the concepts 'risk capacity' and 'constructive conflict' can be of added value.

POSSIBILITIES OF FURTHER OPTIMIZING THE SELECTION GATE

Based on the insights about the selection gate and the effectiveness of this selection gate it will be possible to create insights about the possibilities of further optimizing this selection gate. In optimizing the selection gate it is possible to optimize the search rules, the stopping rules and the decision rules within the four different types of heuristics.

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APPENDICES

APPENDIX I: ORGANIZATIONAL STRUCTURE OF ROYAL BAM GROUP

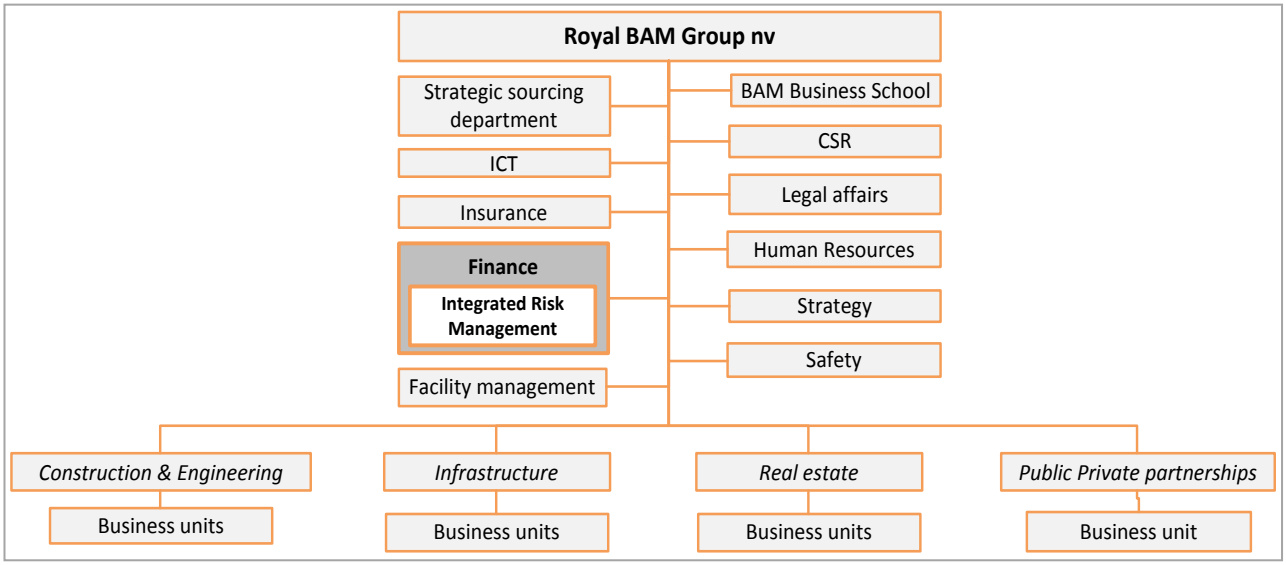


Figure 29: Organizational structure Royal BAM Group nv.

APPENDIX II: OVERALL RESEARCH MODEL

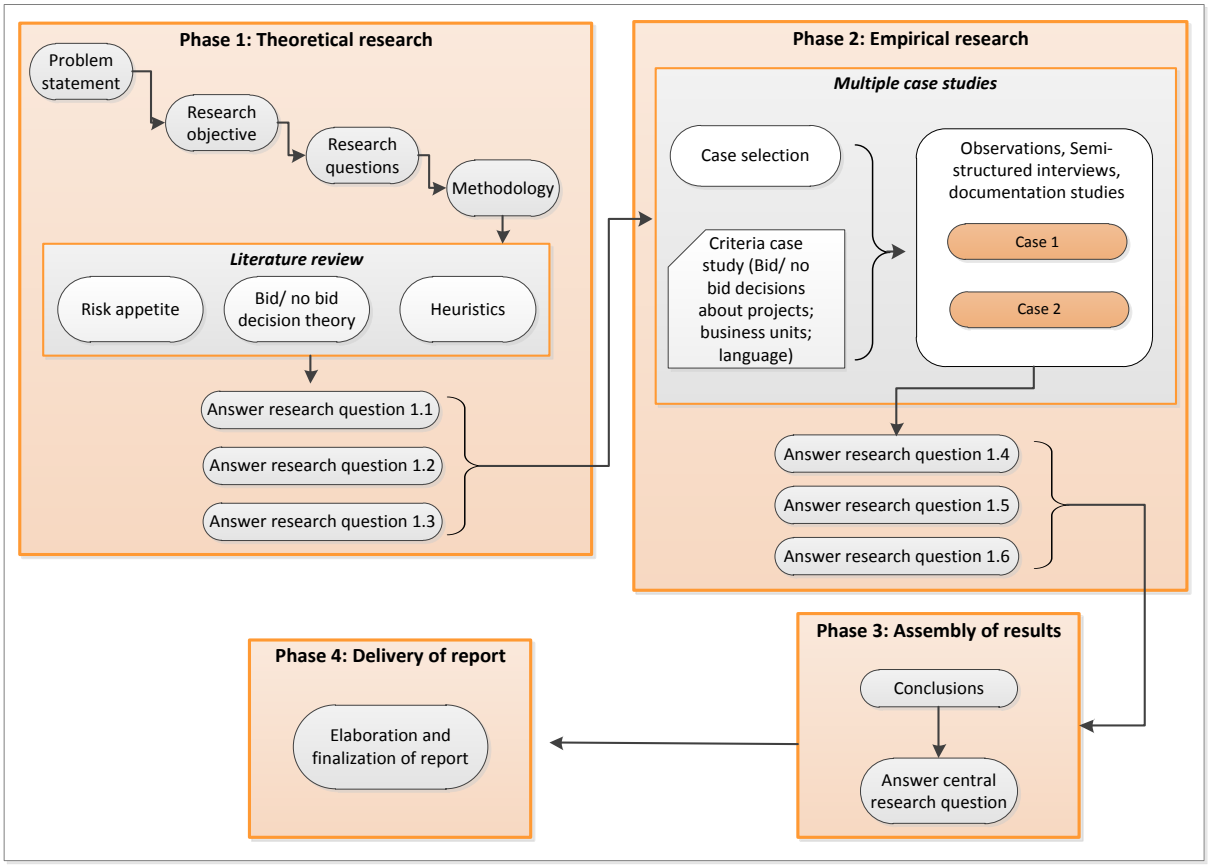


Figure 30: Overall research model

APPENDIX III: OBSERVATION SCHEME

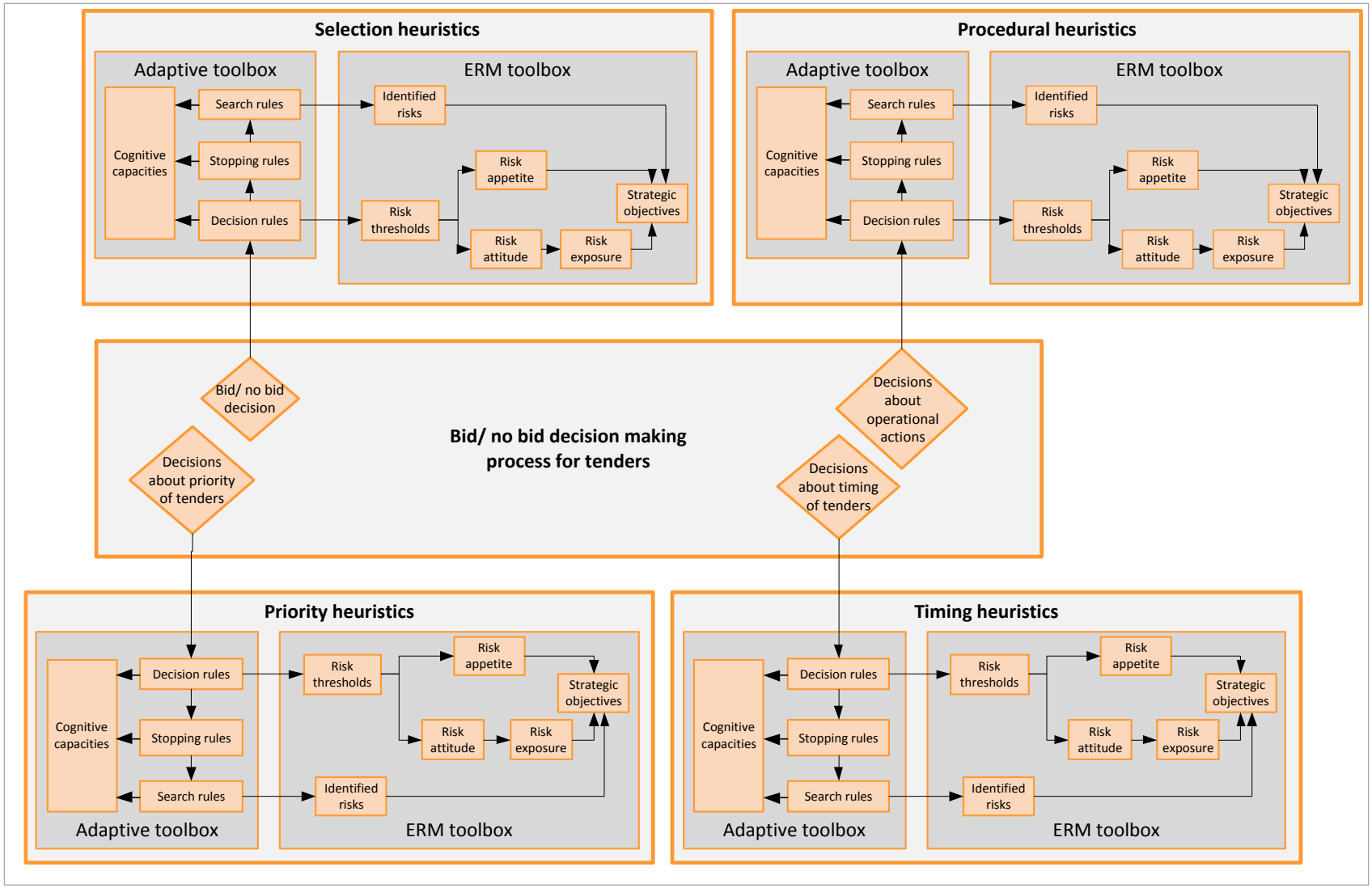


Figure 31: Observation scheme based on the findings within the theoretical research.

APPENDIX IV: LIST OF INTERVIEWED PERSONS

INTERVIEWED PERSONS WITHIN THE CASE STUDIES

- BAM Wegen Zuidwest

Name:	Function:	Time:	Date(s):
Ron van Soelen	Head of Business department	1 hrs	4-9-'13 11-9-'13
Vivienne Klaassen-Acda	Director	1 hrs	9-7-'13 22-8-'13 11-9-'13
Wim Konings	Director of BAM Wegen	1 hrs	21-10-'13

- BAM Infratechniek Telecom

Name:	Function:	Time:	Date(s):
Jop van Veen	Manager of Project-, Purchasing- and Logistics department	1,5 hrs	23-08-'13 11-10-'13
Frans Bolleboom	Head of Project department	1 hrs	04-11-'13
Jeroen Wijnen	Adjunct-director	1 hrs	04-11-'13

INTERVIEWED PERSONS OUTSIDE THE CASE STUDIES

- BAM International

Name:	Function:	Time:	Date(s):
Pablo Jaureguiberry Stagnaro	Engineer	1 hrs	26-8-'13
Leo van Druenen	Area manager Americas	1,5 hrs	26-8-'13
Erik Beek	Director Finance & Procurement	1,5 hrs	16-10-'13
Michael van den Hoonaard	Tender manager	1 hrs	9-10-'13

- BAM Galère

Name:	Function:	Time:	Date(s):
Nathalie Vandenbroucke	Head of Service (Assurances & Risk management)	1 hrs	3-7-'13

REVIEW OF THESIS

- BAM Wegen Zuidwest

Name:	Function:	Time:	Date:
Ron van Soelen	Head of Business department	1 hrs	11-9-'13
Vivienne Klaassen-Acda	Director	1,5 hrs	22-11-'13

- BAM Infratechniek Telecom

Name:	Function:	Time:	Date:
Jop van Veen	Manager of Project-, Purchasing- and Logistics department	1 hrs	13-12-'13

APPENDIX V: CONTEXT DESCRIPTIONS OF CASES

For both the cases the context is described by describing the characteristics of the organization, the market in which the business units operate, the provided services/ products and the strategic mission of the business units.

'BAM WEGEN ZUIDWEST'

The business unit 'BAM Wegen' is specialized in the design, the construction and the management and maintenance of roads, sewer, drainage cables and earthworks in the Netherlands. The activities within this business unit are further subdivided among six different regions. In this research the bid/ no bid decision making process is captured for the region 'Southwest'.

ORGANIZATION

The organization BAM Wegen Zuidwest consists of 90 employees, of which 40 are employed as constructors. The main office is located in Bergen op Zoom in the Netherlands. The organization provides their services to clients within the Dutch provinces 'Zeeland' and 'Noord-Brabant'.

MARKET

Within the Dutch Road construction half of the turnover is achieved by 'construct only' contracts. For small companies this percentage is even higher, up to eighty percent. When looking at the distribution of turnover over different types of clients, seventy percent of the turnover can be explained by contracts of the government. Next to the different types of contracts and the different types of clients, also the average amount of turnover for each tender/ contract is a characteristics of the market. Large contractors realize eighty till ninety percent of their turnover by contracts with a turnover value beneath the five MIO euros. For small companies this percentage is up to hundred percent. When looking at the distribution of turnover over the year, it can be stated that there is uneven distribution. In the first quarter of the year, the amount of turnover stays fifteen percent behind of the turnover levels in the other quarters. Within the third quarter of the year, the highest amount of turnover is realized by the contractors.

When reflecting these figures on the market of BAM Wegen Zuidwest the same directions can be observed, however the actual percentages differ. Within the year 2012, hundred percent of the turnover is realized by 'construct only' contracts. As shown in figure 32, sixty-six percent of the turnover of tenders for which a bid is placed can be explained by public procurement, while the other thirty-four percent can be explained by private procurement with competition.

Figure 32: Overview of the distribution of cumulative turnover of tenders for which a bid is placed for different types of procurement for BAM Wegen Zuidwest

When looking at the distribution of turnover of tenders on which a bid is placed for different types of clients, ninety four percent of the turnover can be explained by contracts of the government, as shown in figure 33. Of

these governmental contracts, forty-eight percent can be assigned to small municipalities, twenty-three percent to provinces, fourteen percent to polder boards and nine percent to large municipalities.

Figure 33: Overview of distribution of cumulative turnover of tenders on which a bid is placed for different types of clients of BAM Wegen Zuidwest

When looking at the turnover levels of the tenders on which a bid is placed by BAM Wegen Zuidwest, hundred percent of these tenders/ contracts have a value beneath five MIO euros.

SERVICES/PRODUCTS

The business unit BAM Wegen Zuidwest offers the following services to their clients:

- Developing concepts for area development;
- Supporting the development of new objects or the renovation/ exploitation of existing objects;
- Consultancy;
- Site preparation;
- The construction or maintenance of sewage;
- The construction of asphalt roads or roads consisting of other materials;
- The construction and design of parking places or garages;
- The construction of impermeable floors.

Within figure 34, the distribution of cumulative turnover of tenders for which a bid is placed for the different business segments of BAM Wegen Zuidwest is presented.

Figure 34: Overview of the distribution of cumulative turnover of tenders for which a bid is placed for different business segments of BAM Wegen Zuidwest

MISSION

The mission of BAM Wegen Zuidwest for the year 2013 can be described by the following aspects:

These strategic targets will be used in section 4.2.3 for determining the related risks for the search rules.

'BAM INFRATECHNIEK TELECOM'

The business unit 'BAM Infratechniek Telecom' provides communications infrastructure solutions for the Dutch telecommunications-sector. Below the characteristics of the organization, the market, the provided services and products and the mission are described.

ORGANIZATION

BAM Infratechniek Telecom was established since the first of January 2013 by the merger of the companies 'Van den Berg Infrastructuren' and 'Ravesteyn Kabel- en Montagewerk'. The organization has permanent employed around the four hundred employees and during periods in which many contracts should be conducted this number can be increased by flexible employees to eleven hundred employees. The office of BAM Infratechniek Telecom is located in the Dutch village 'Zwammerdam'.

MARKET

The demand side of the market of telecommunications- and cable TV networks is dominated by major telecommunications companies and cable operators. The main clients in this market are: KPN Telecom, T-Mobile, British Telecom, UPC, Ziggo, Tele 2/Versatel, BBNed and Euro Fiber/ Reggefiber. Next to that, municipalities, like Almere, Amsterdam, Utrecht, also take initiatives with regard to the development of local Fiber to the Home networks. Also ICT oriented companies can be considered as clients in the market of the Wide Area Networks (WAN's). As shown in figure 35, more than eighty percent of the turnover of tenders on which a bid is placed by BAM Infratechniek Telecom can be assigned to private companies, while six percent can be assigned to municipalities and twelve percent to business units within BAM Group.

Figure 35: Overview of distribution of cumulative turnover of tenders on which a bid is placed for different types of clients

On the supply side of the market twenty large installation companies and many smaller companies are active. The market for cable television networks is dominated by 20 till 40 companies.

In the last ten years some large shifts have been taken place in the market. First of all a concentration of clients can be noticed, such as Casema/ Essent Cablecom and Tele 2/ Versatel. Second the municipalities are active in the market by managing the development of Fiber to Home projects. Third investors, like Reggefiber, are developing and managing the installation of optic fiber.

For the next years, three different categories of important projects can be distinguished, which will claim the organizational capacity and installation capacity of the installation companies active in the market:

1) Fiber to the home (FTTH) of the 'vitrification' of the network to the front door;
2) The upgrading of the conventional copper networks;
3) Upgrading the wireless UMTS/ GPS Network by installing the WiMAX network.

SERVICES/PRODUCTS

BAM Infratechniek Telecom provides communication infrastructure solutions for the Dutch telecommunications sector. Every year hundreds of miles of cable for fiber optic-, coaxial- and copper networks are placed. Next to that the realization of electricity networks, data cabling and trenchless drilling and pressing techniques are part of their portfolio. The provided services cover the entire supply chain, from design and engineering to the realization and maintenance of the projects.

Within figure 36, the distribution of cumulative turnover of tenders for which a bid is placed for the different business segments of BAM Infratechniek Telecom is presented.

Figure 36: Overview of the distribution of cumulative turnover of tenders for which a bid is placed for different business segments of BAM Infratechniek Telecom

MISSION

The mission of BAM Infratechniek Telecom for the year 2013 can be described by the following aspects:

Company confidential

These strategic targets will be used in section 4.2.3 for determining the related risks for the search rules.

APPENDIX VI: OVERVIEW OF THE THREE BUILDING BLOCKS FOR THE FOUR DIFFERENT TYPES OF OPPORTUNITY CAPTURING HEURISTICS

Table 9: Overview of the three building blocks for the four different types of opportunity capturing heuristics of BAM Wegen Zuidwest.

		Company confidential	

		Company confidential	

Table 10: Overview of the three building blocks for the four different types of opportunity capturing heuristics of BAM Infratechniek Telecom.

		Company confidential	

		Company confidential	

		Company confidential	

APPENDIX VII: FAST AND FRUGAL DECISION TREES BASED ON SEARCH-, STOPPING- AND DECISION RULES

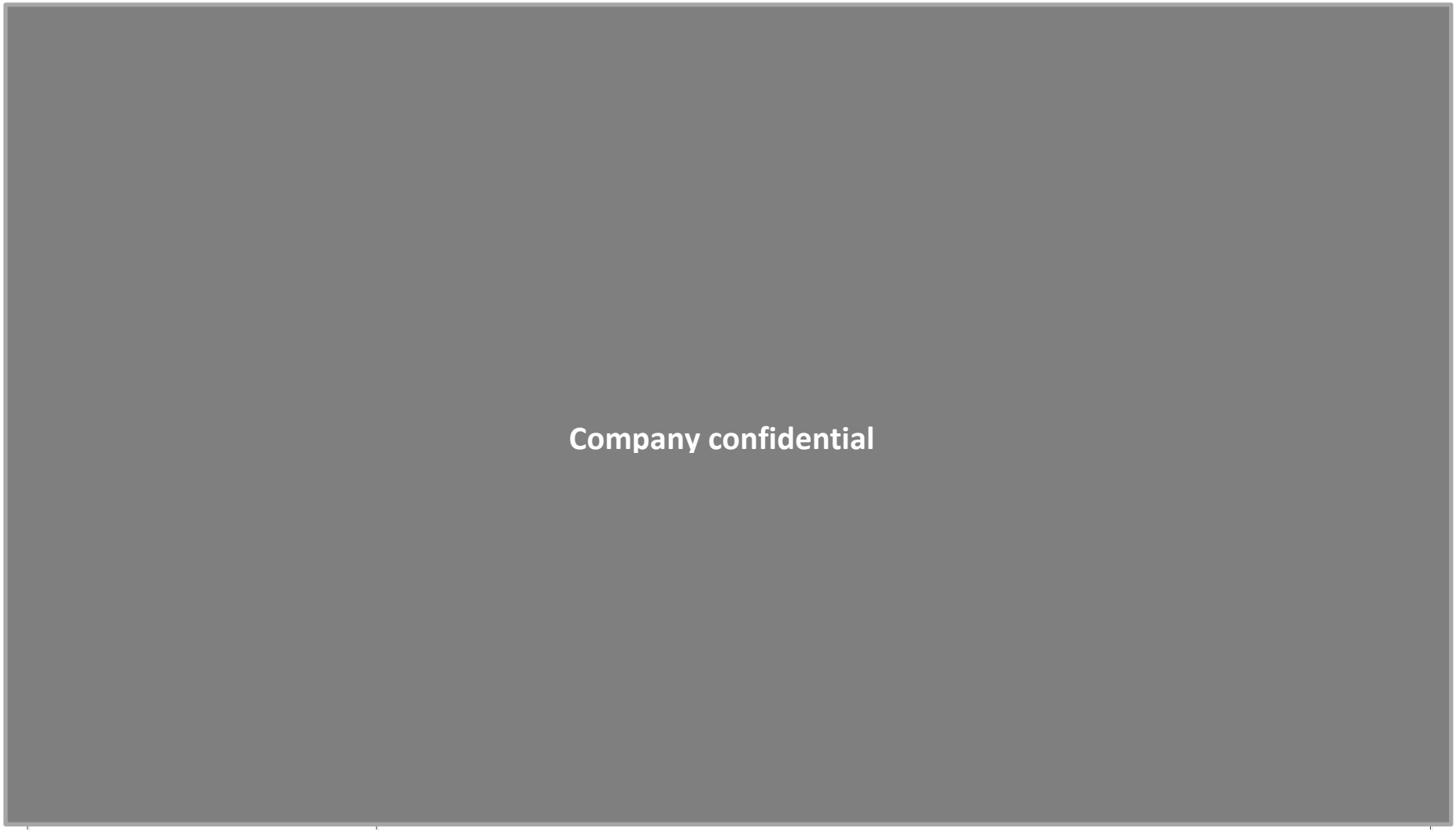


Figure 37: Overview of the fast and frugal decision trees for the selection- and procedural rules of BAM Wegen Zuidwest

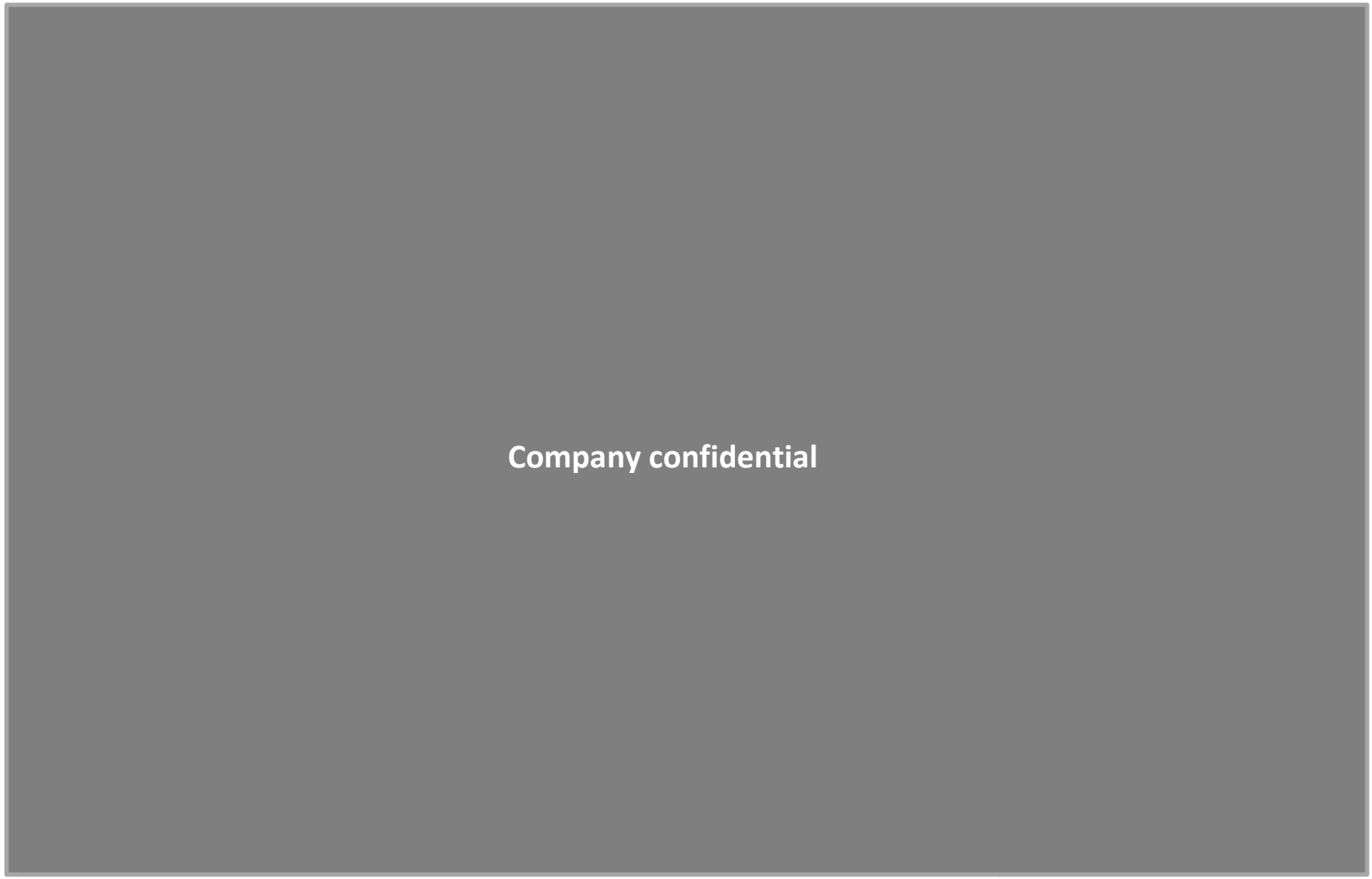


Figure 38: Overview of the fast and frugal decision trees for the priority- and timing rules of BAM Wegen Zuidwest

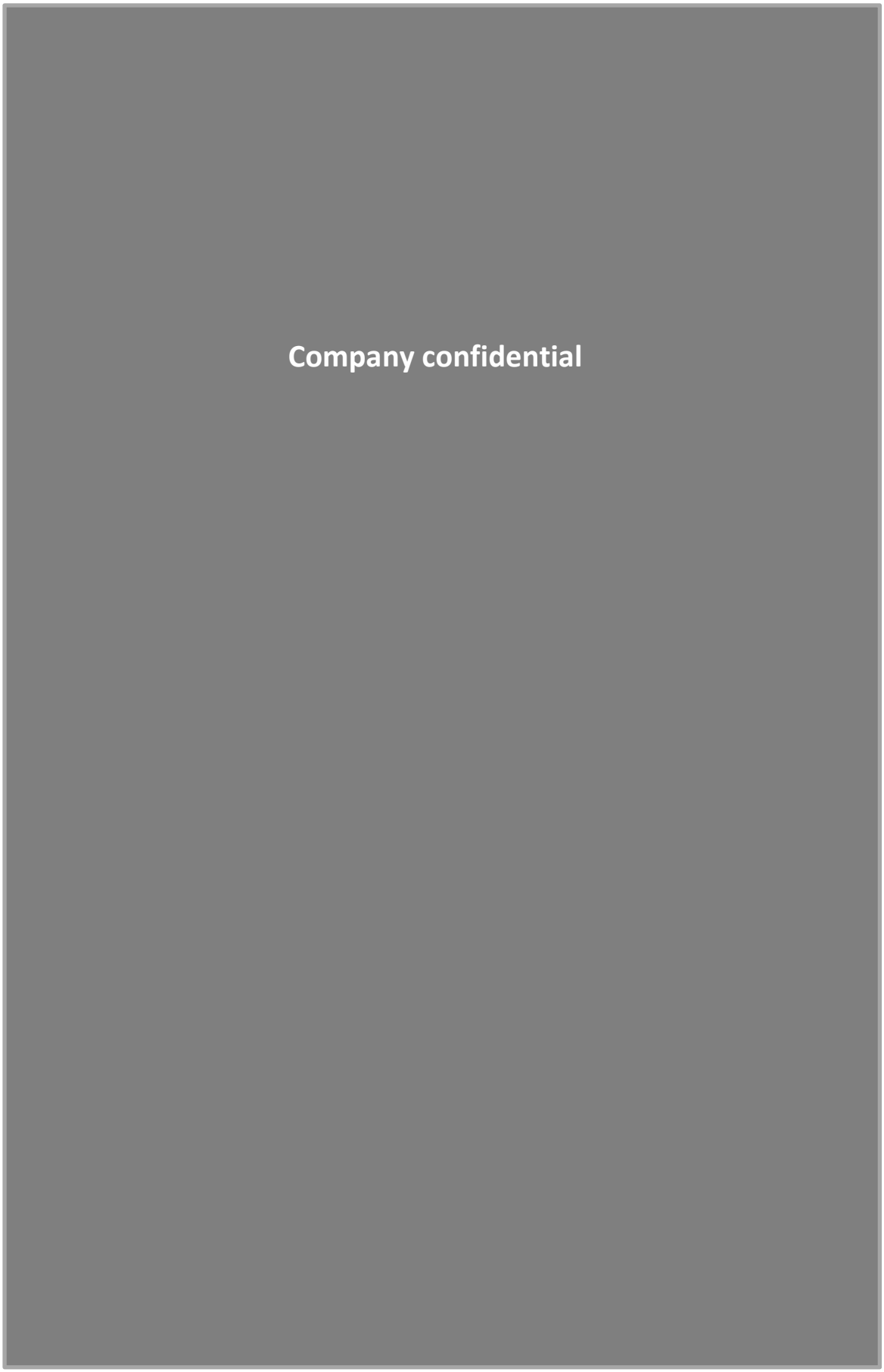


Figure 39: Overview of the fast and frugal decision trees for the selection-, priority- and timing rules of BAM Infratechniek Telecom.

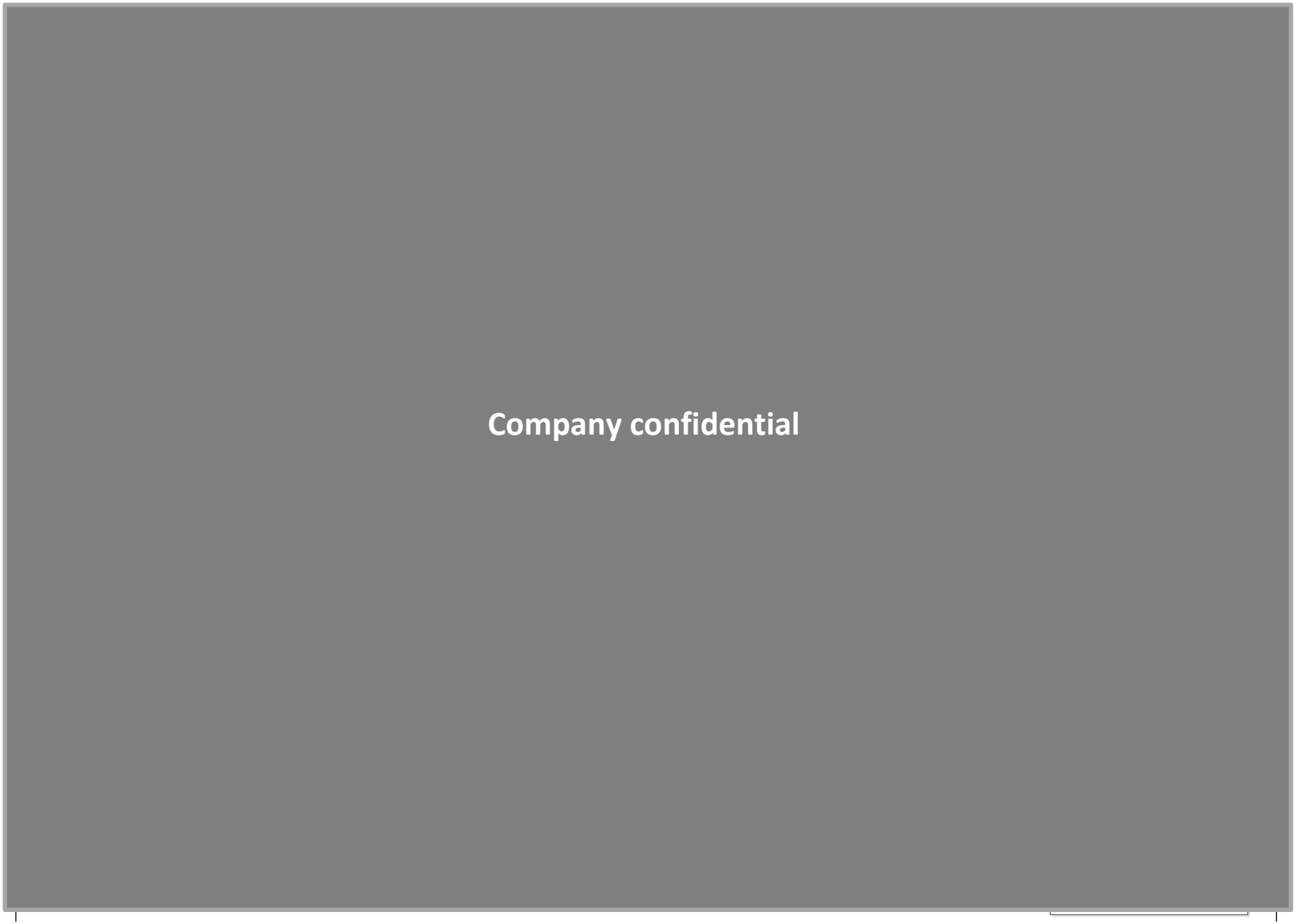


Figure 40: Overview of the fast and frugal decision trees for the procedural heuristics of BAM Infratechniek Telecom.

APPENDIX VIII: OVERVIEW OF THE UNDERLYING CORE CAPACITIES FOR THE FOUR DIFFERENT TYPES OF OPPORTUNITY CAPTURING HEURISTICS

Table 11: Overview of the underlying core capacities for the four different types of opportunity capturing heuristics of BAM Wegen Zuidwest.

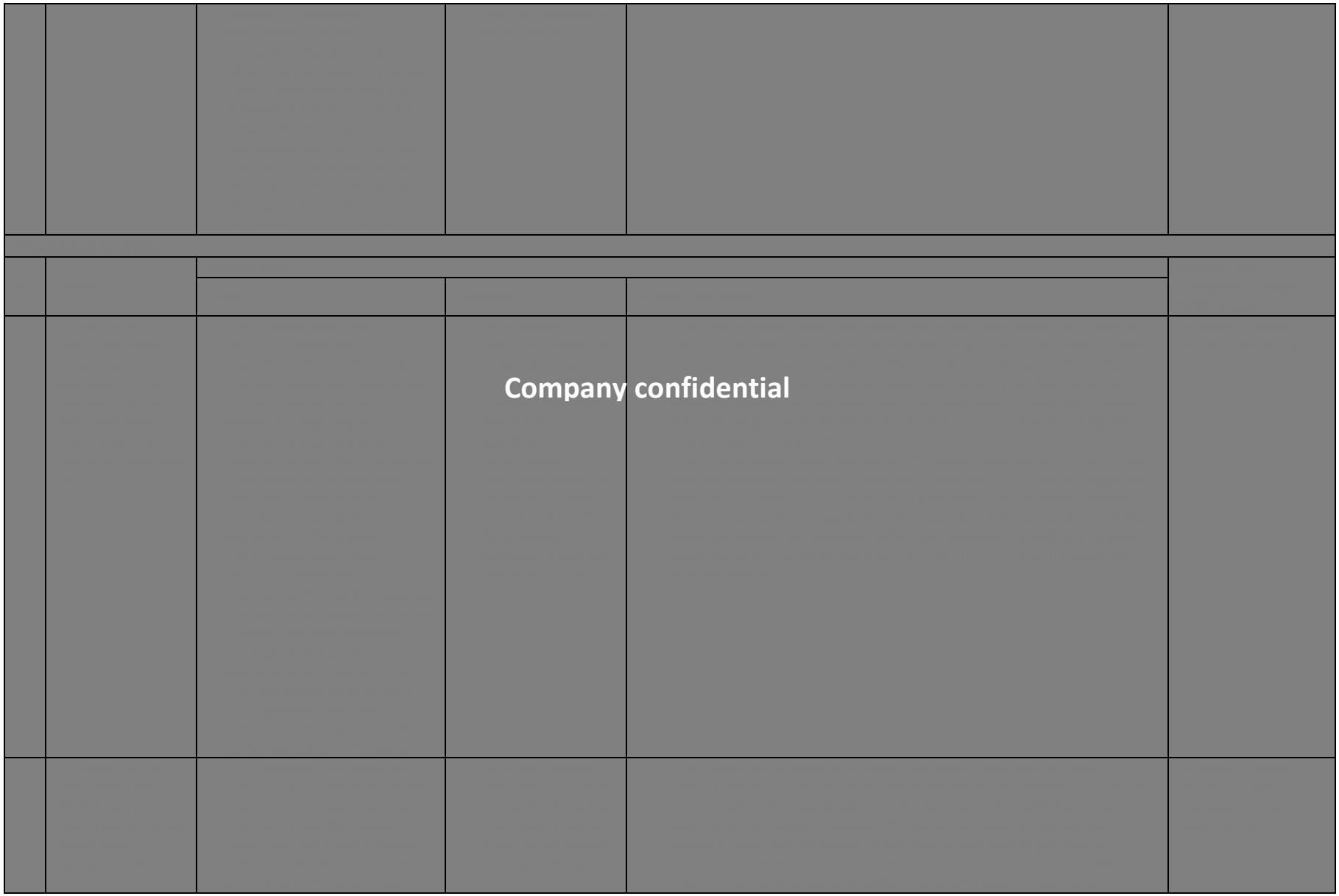
Company confidential

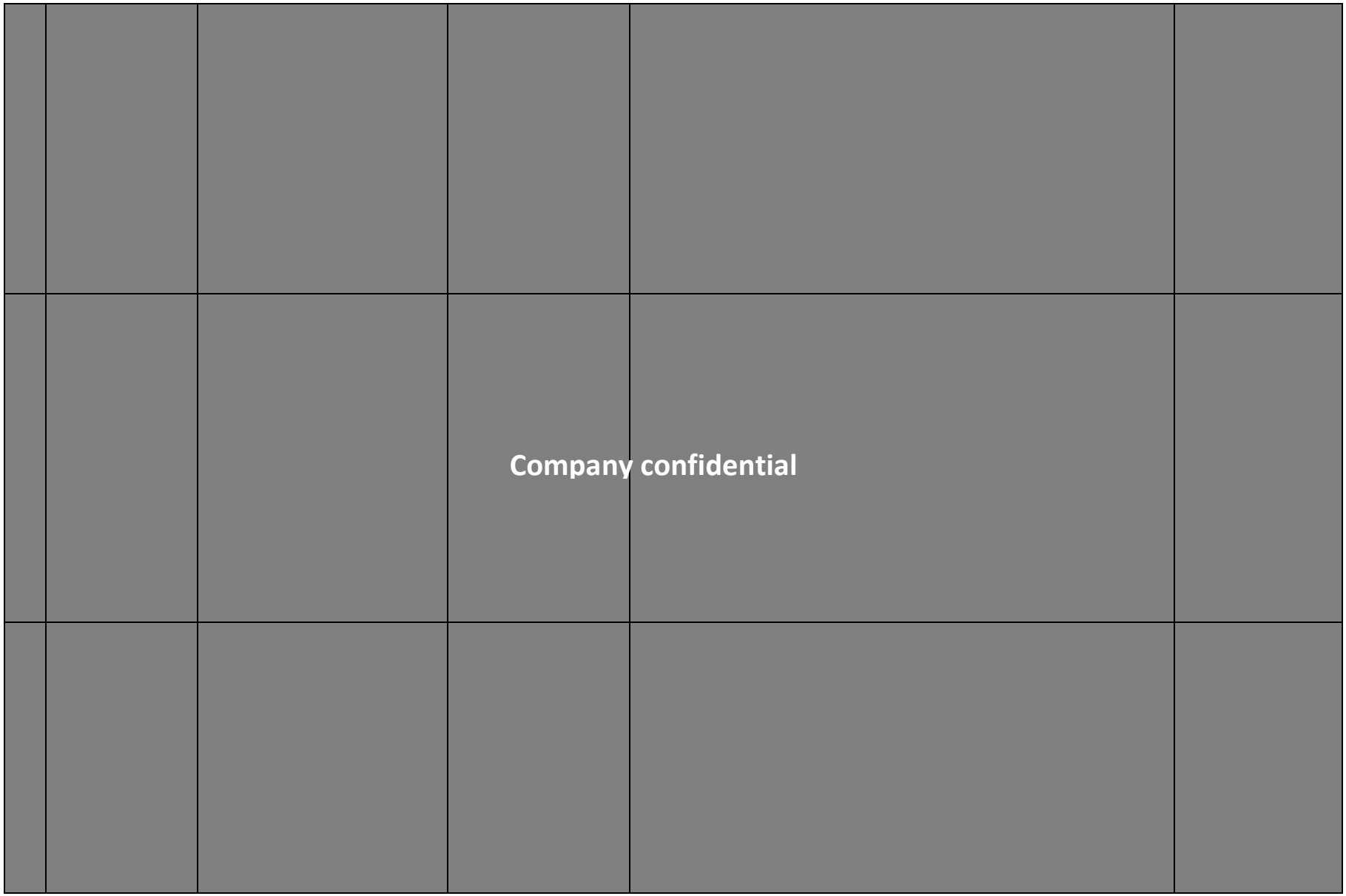
Table 12: Overview of the underlying core capacities for the four different types of opportunity capturing heuristics of BAM Infratechniek Telecom.

APPENDIX IX: OVERVIEW OF THE RISKS WHICH ARE RELATED TO THE HEURISTICS

Table 13: Overview of risks which are related to the four different types of opportunity capturing heuristics for BAM Wegen Zuidwest

			Company confidential		


Company confidential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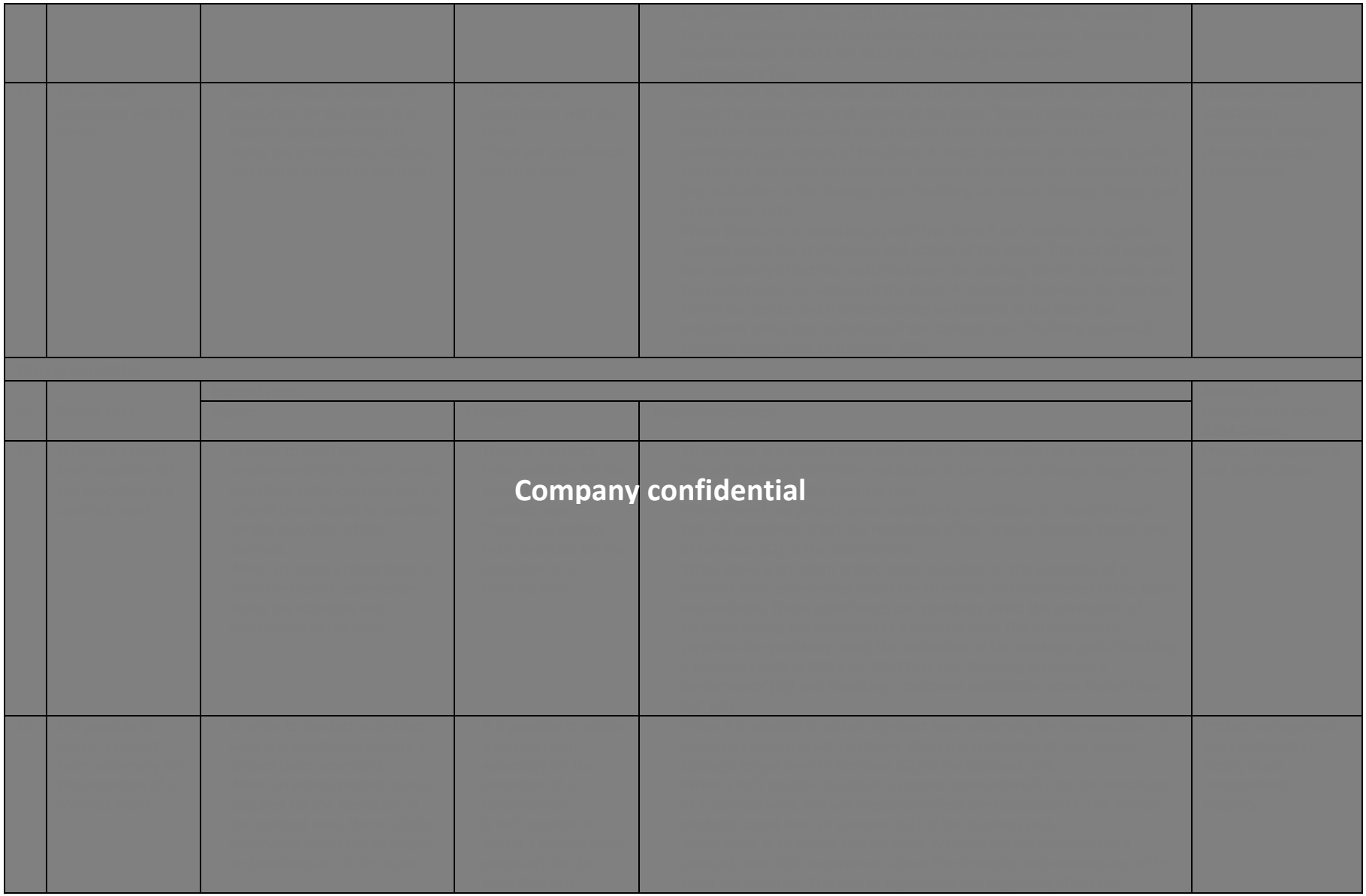
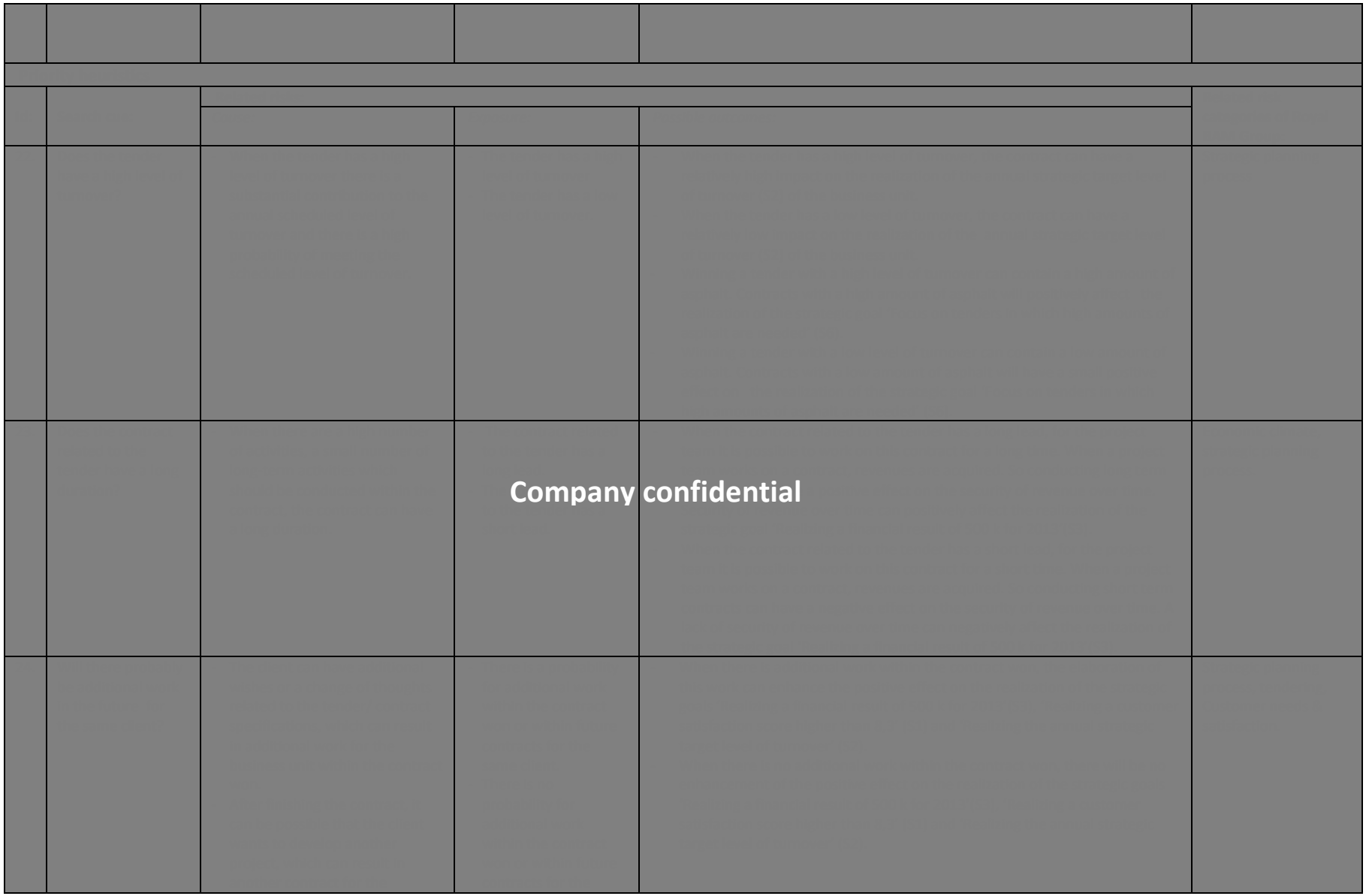

Company confidential

			Company confidential		


Company confidential

			Company confidential		

			Company confidential		

Table 14: Overview of risks which are related to the four different types of opportunity capturing heuristics for BAM Infratechniek Telecom.

			Company confidential		

APPENDIX X: OVERVIEW OF THRESHOLDS FOR THE DECISION RULES

Table 15: Overview of thresholds for the decision rules of 'BAM Wegen Zuidwest'

	Company confidential			

	Company confidential			

	Company confidential			

	Company confidential			

Table 16: Overview of thresholds for the decision rules of 'BAM Infratechniek Telecom'

	Company confidential			

	Company confidential			

	Company confidential			

APPENDIX XI: OVERVIEW OF RISK APPETITES OR RISK ATTITUDES WHICH ARE RELATED TO THE TOLERANCES/THRESHOLDS

Table 17: Overview of risk appetites or risk attitudes which are related to the tolerances/ thresholds of BAM Wegen Zuidwest.

			Company confidential		

			Company confidential		

			Company confidential		

			Company confidential		

			Company confidential		

			Company confidential		

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			Company confidential		

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			Company confidential		

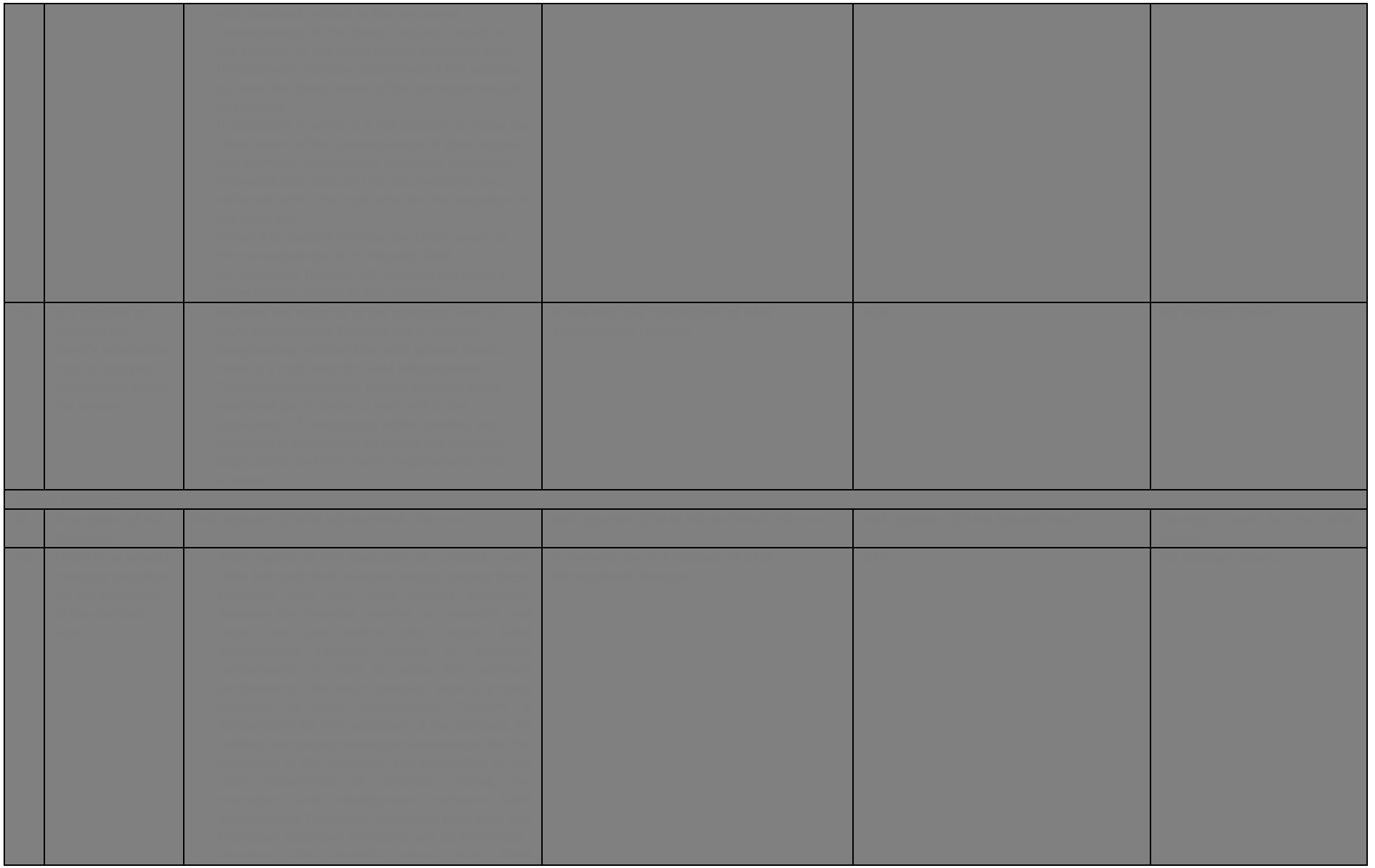
Table 18: Overview of risk appetites or risk attitudes which are related to the tolerances/ thresholds of BAM Infratechniek Telecom

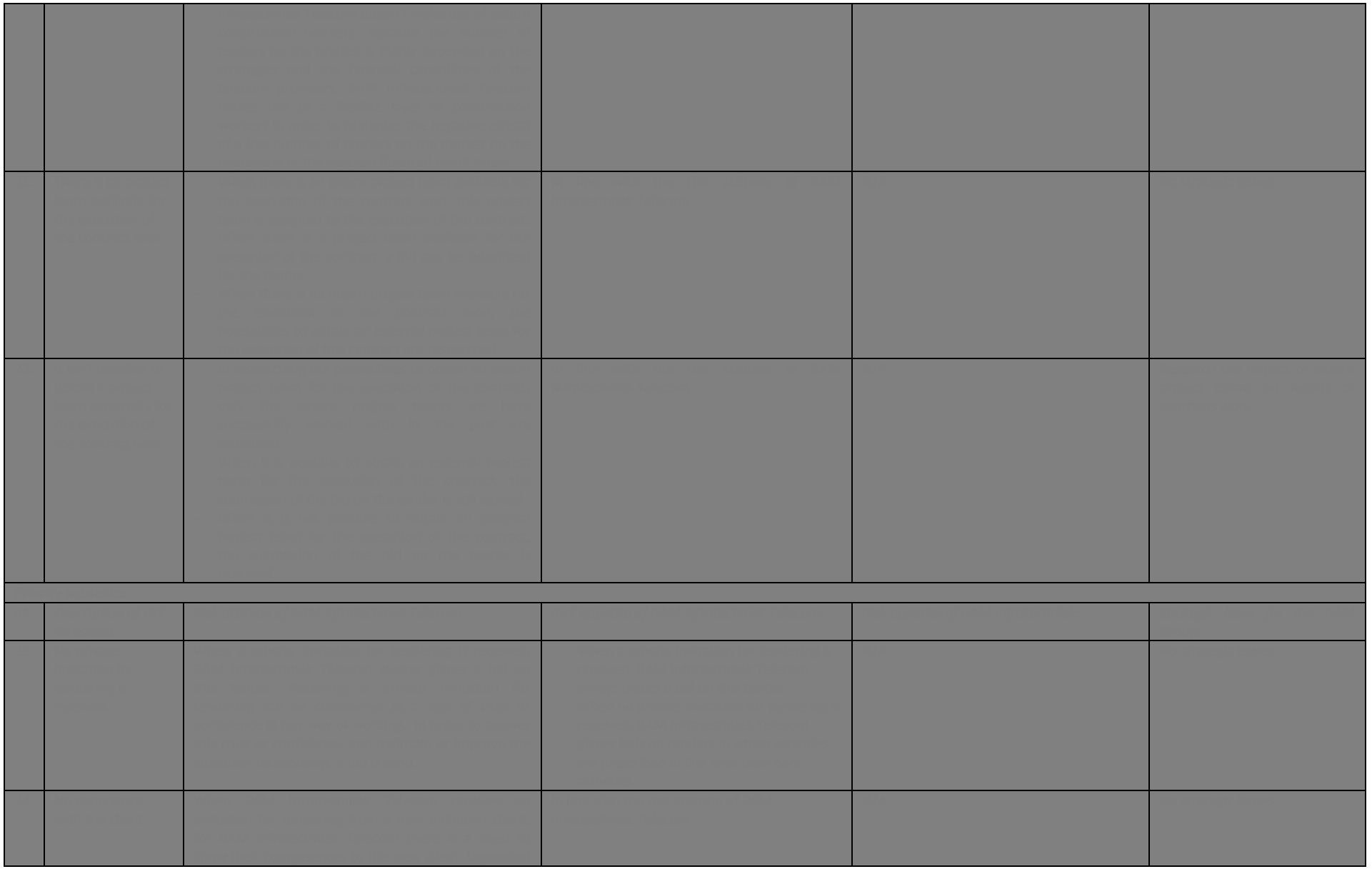
			Company confidential		

			Company confidential		

			Company confidential		

			Company confidential		





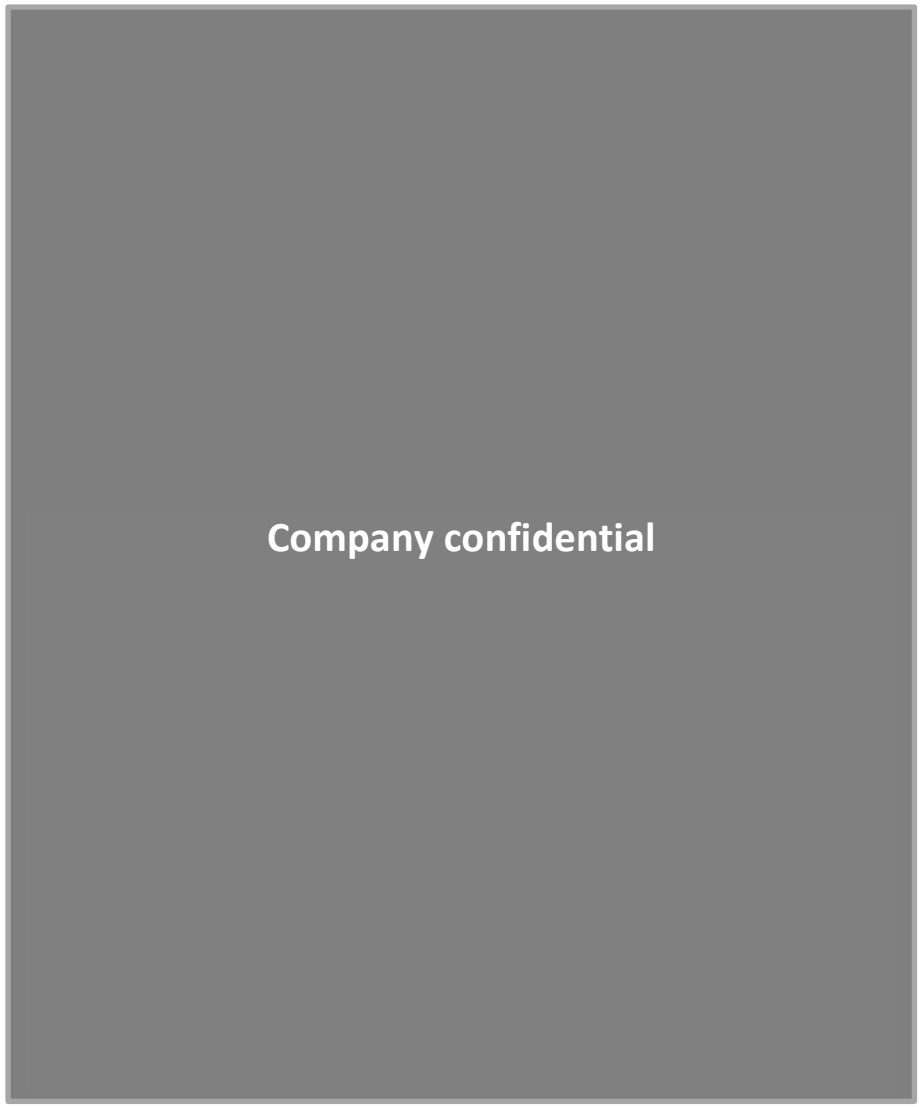


Figure 41: Extended priority scheme for tenders with positive experiences with clients

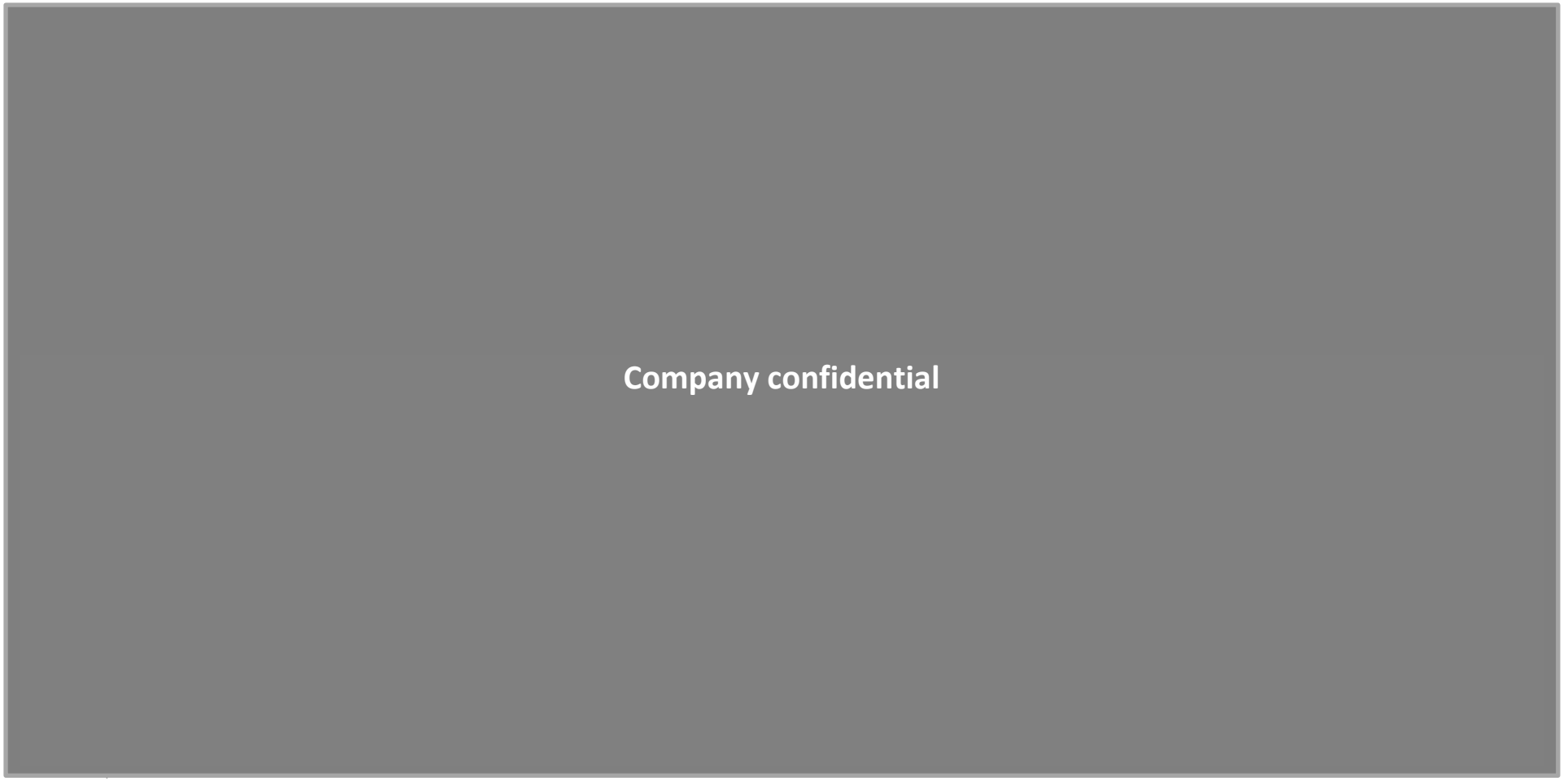


Figure 42: Extended priority scheme for tenders with negative experiences with clients

APPENDIX XIII: EFFECTIVENESS OF THE FOUR DIFFERENT TYPES OF OPPORTUNITY CAPTURING HEURISTICS

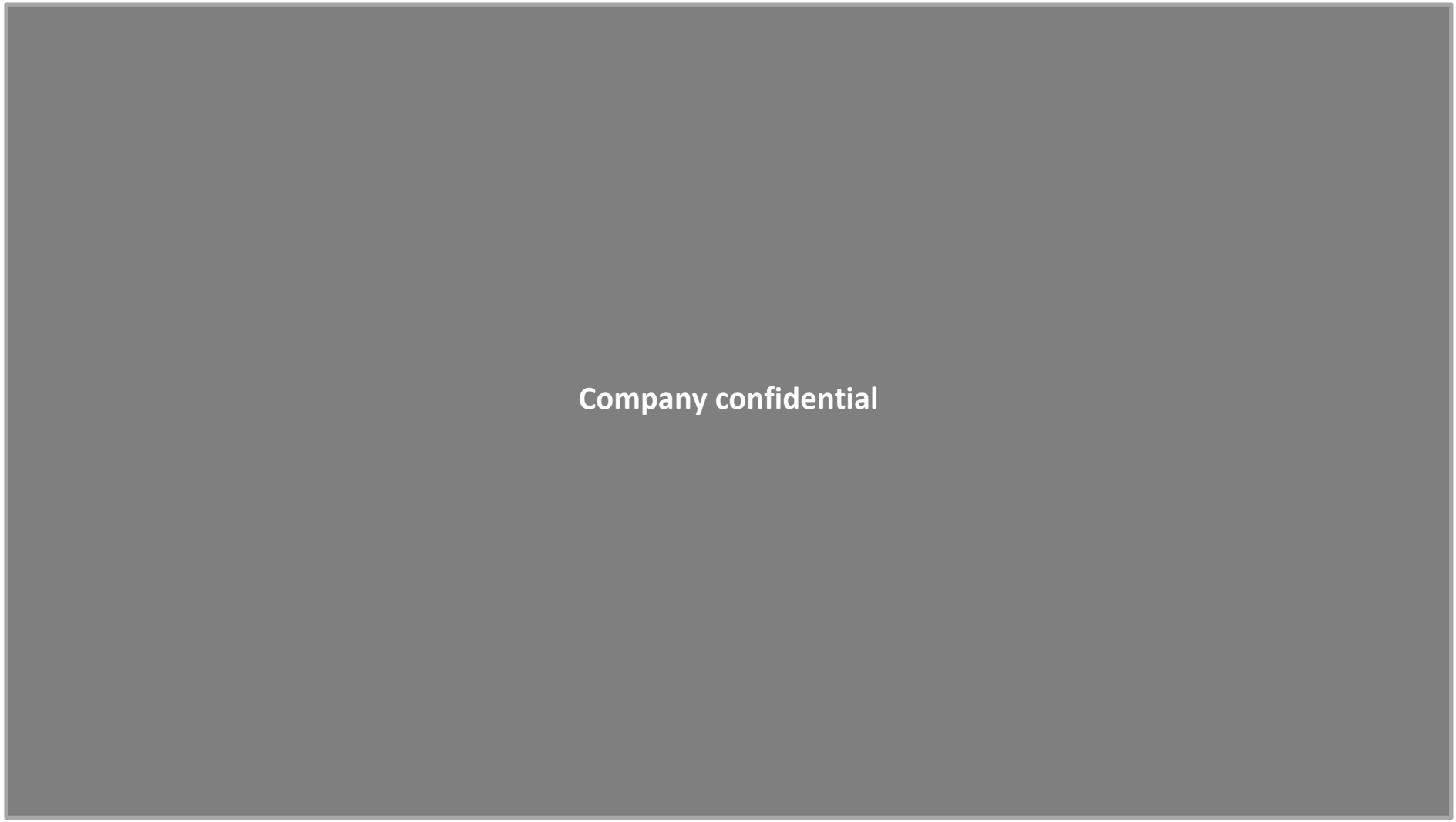


Figure 43: Overview of cumulative turnover of bids placed on tenders and cumulative turnover of contracts won for different business segments of BAM Wegen Zuidwest

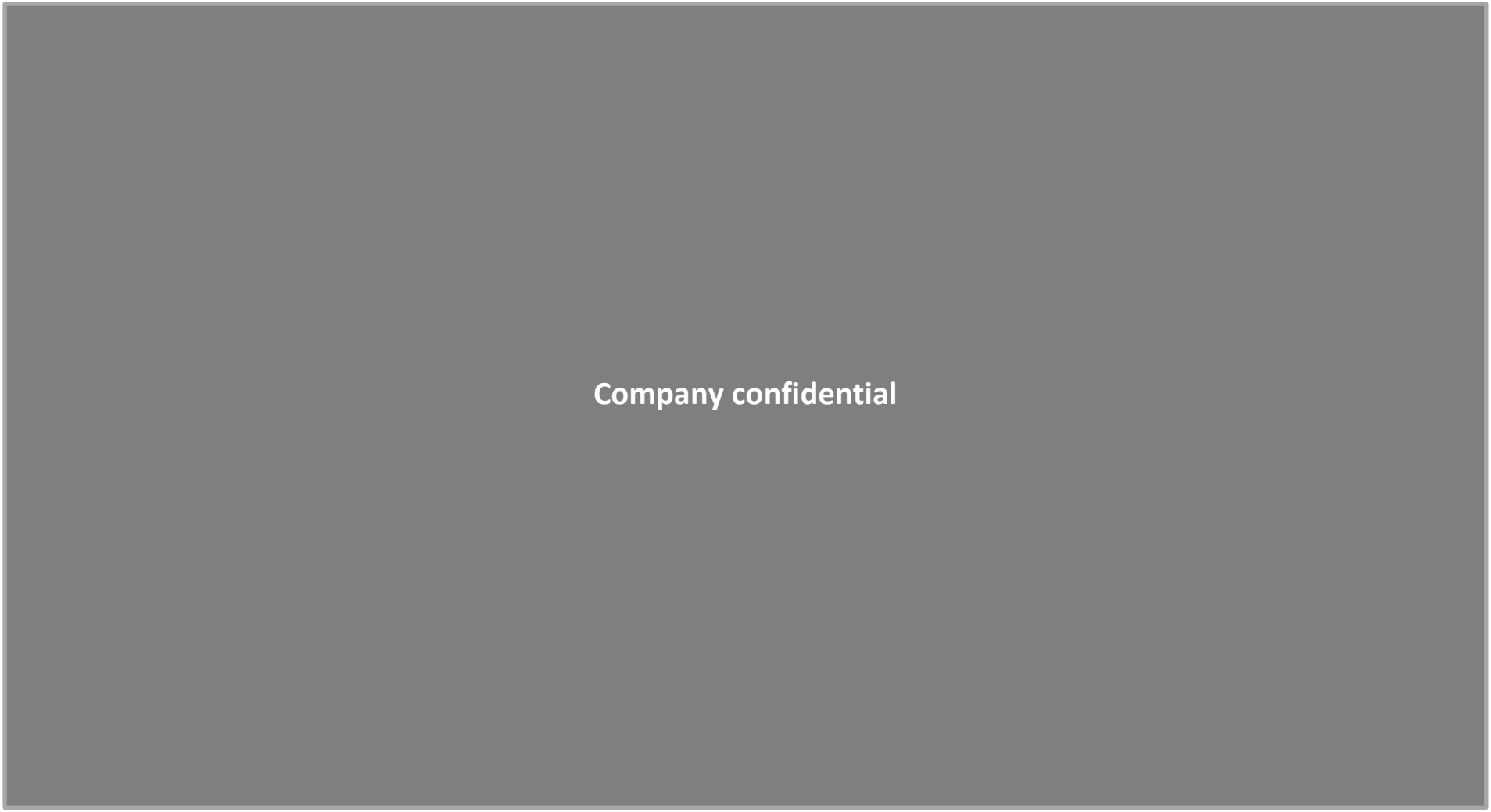


Figure 44: Overview of percentages of tenders lost and percentages of contracts won for different business segments of BAM Wegen Zuidwest

OVERVIEW OF WIN RATIOS FOR TENDERS WITH DIFFERENT LEVELS OF TURNOVER FOR BAM WEGEN ZUIDWEST

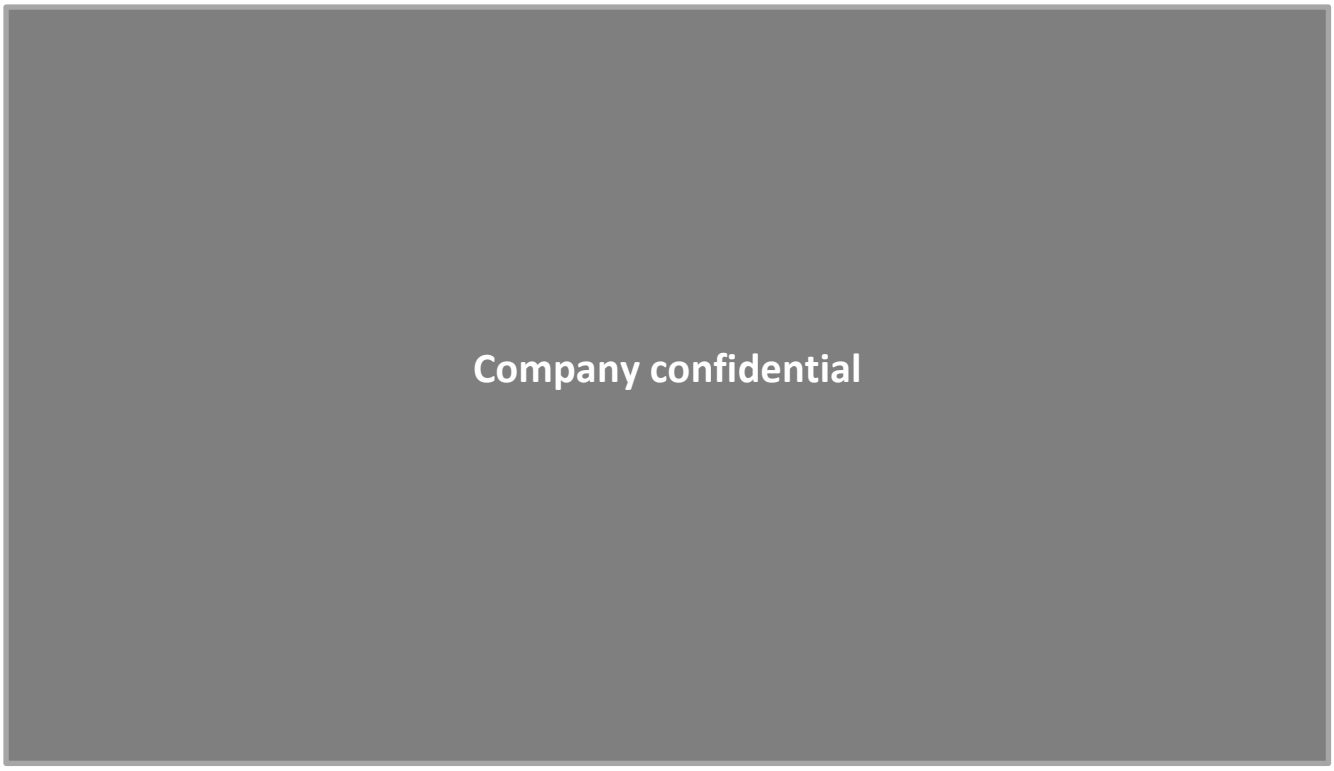


Figure 45: Overview of number of tenders won and lost for the different levels of turnover of the tenders of BAM Wegen Zuidwest

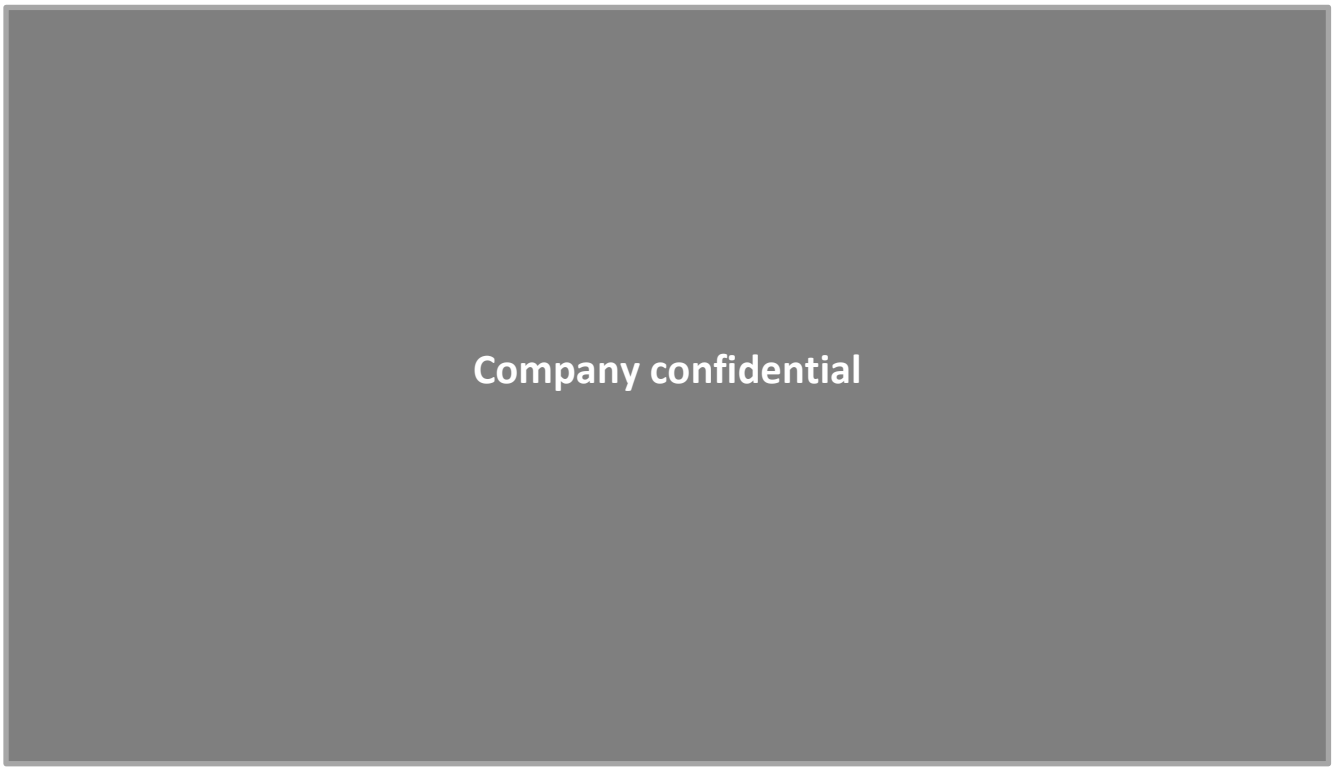


Figure 46: Overview of win- and loss percentages for tenders with different levels of turnover of BAM Wegen Zuidwest

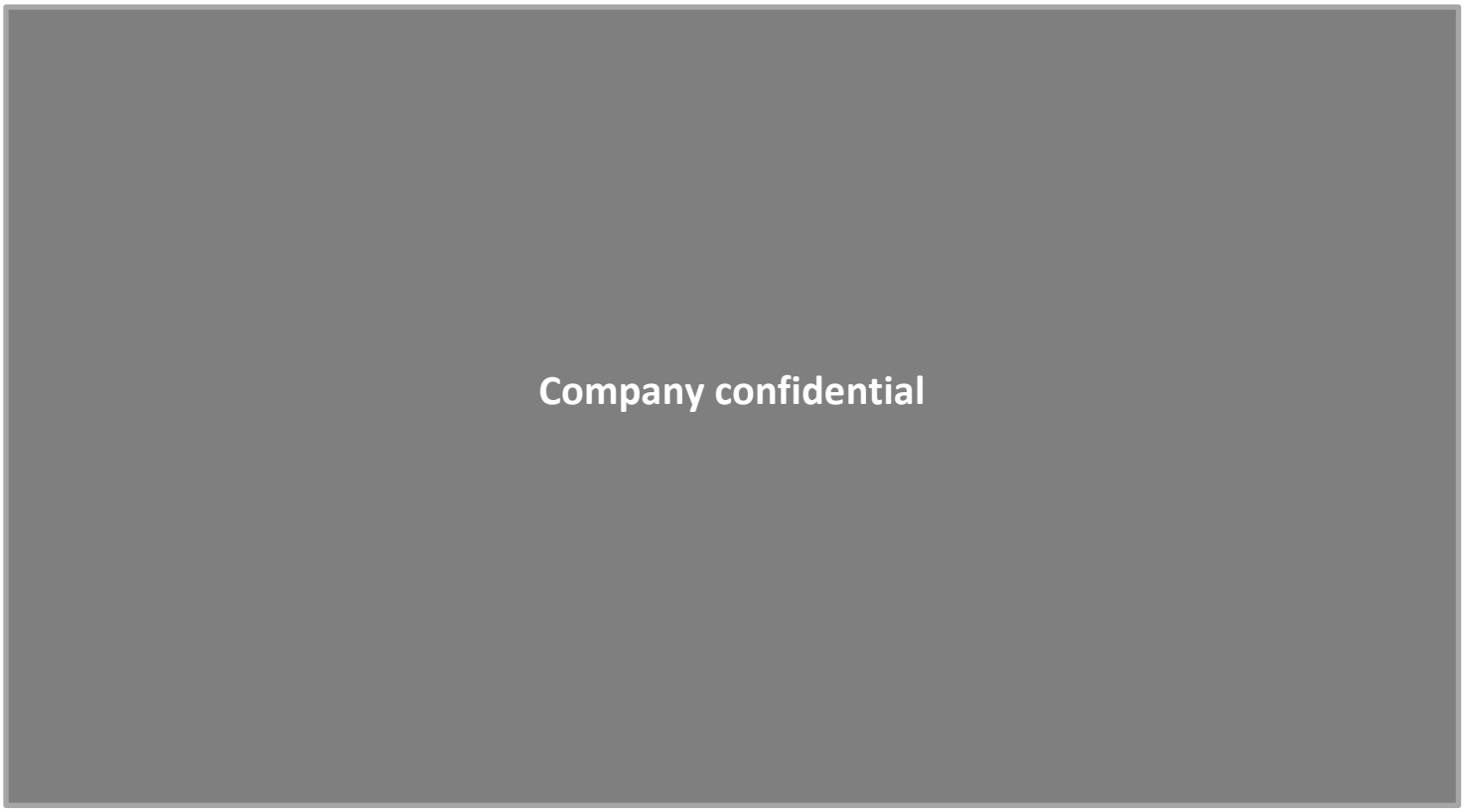


Figure 47: Overview of cumulative turnover level of tenders lost and won for tenders with different levels of turnover for BAM Wegen Zuidwest

FINANCIAL RESULTS OF CONTRACTS WON FOR BAM WEGEN ZUIDWEST

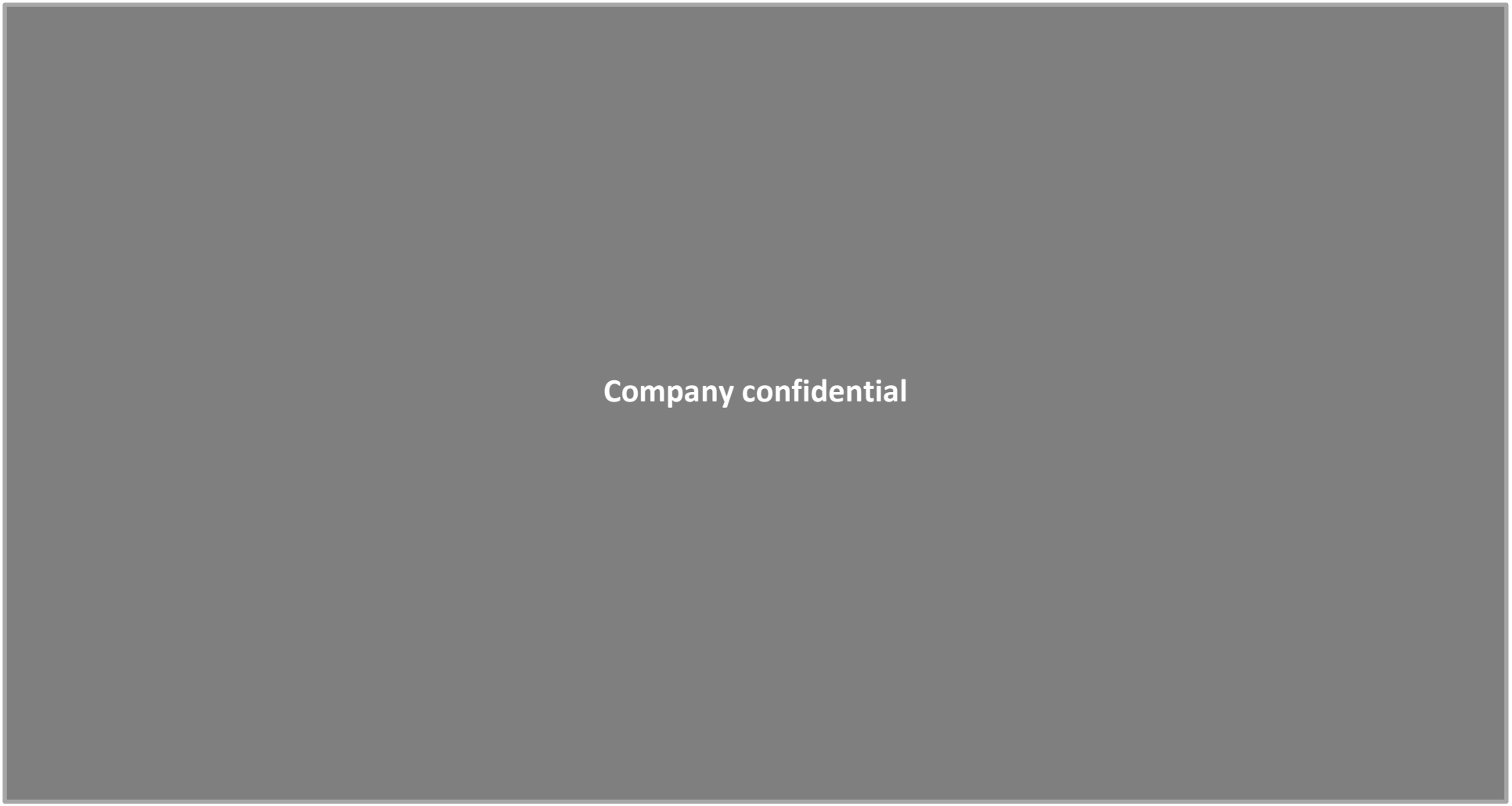


Figure 48: Overview of percentages of discount on costs and percentages of financial result with regard to the turnover level for tenders won with different degrees of performance

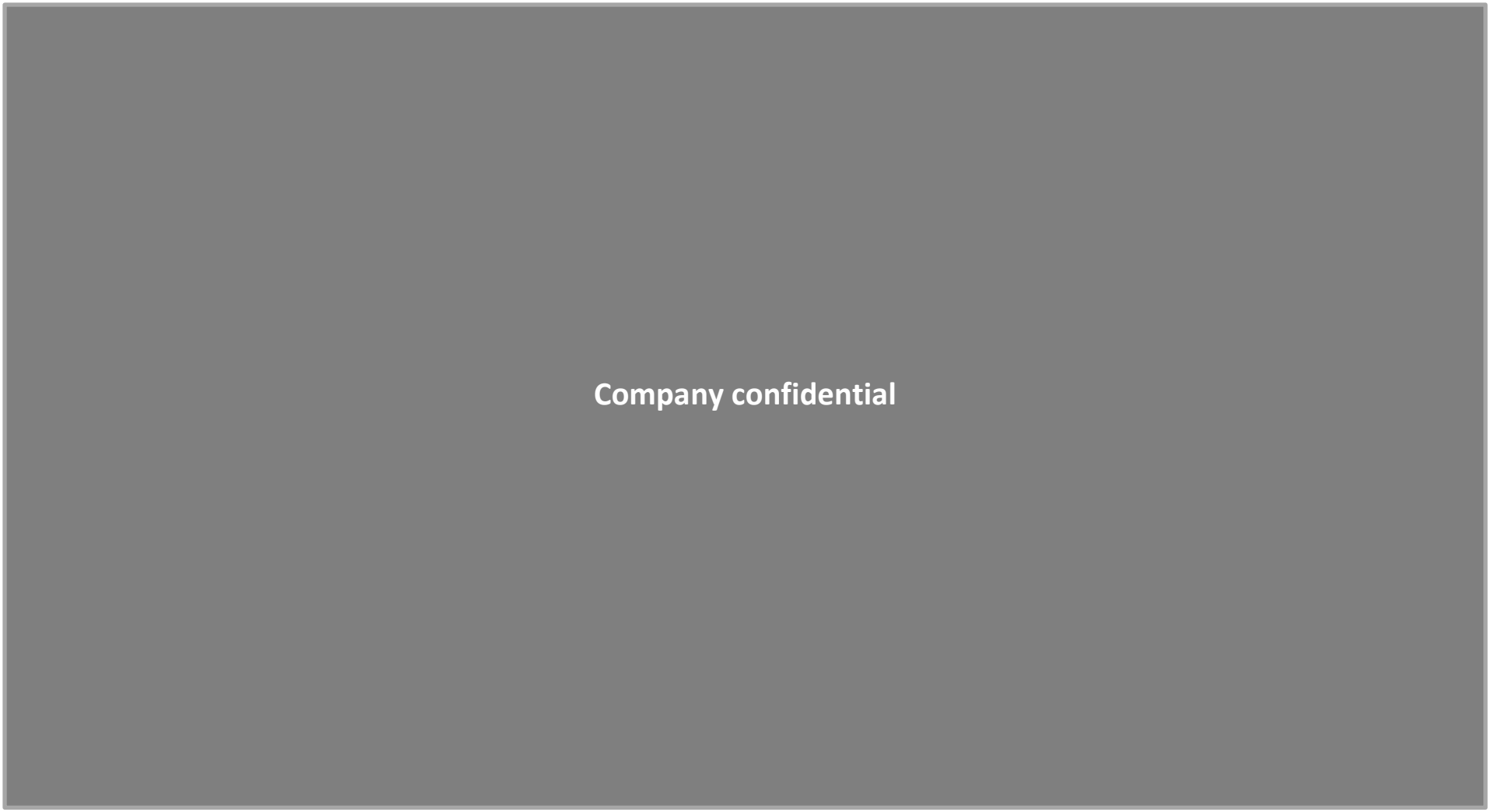


Figure 49: Overview of the number of tenders won with different degrees of performance

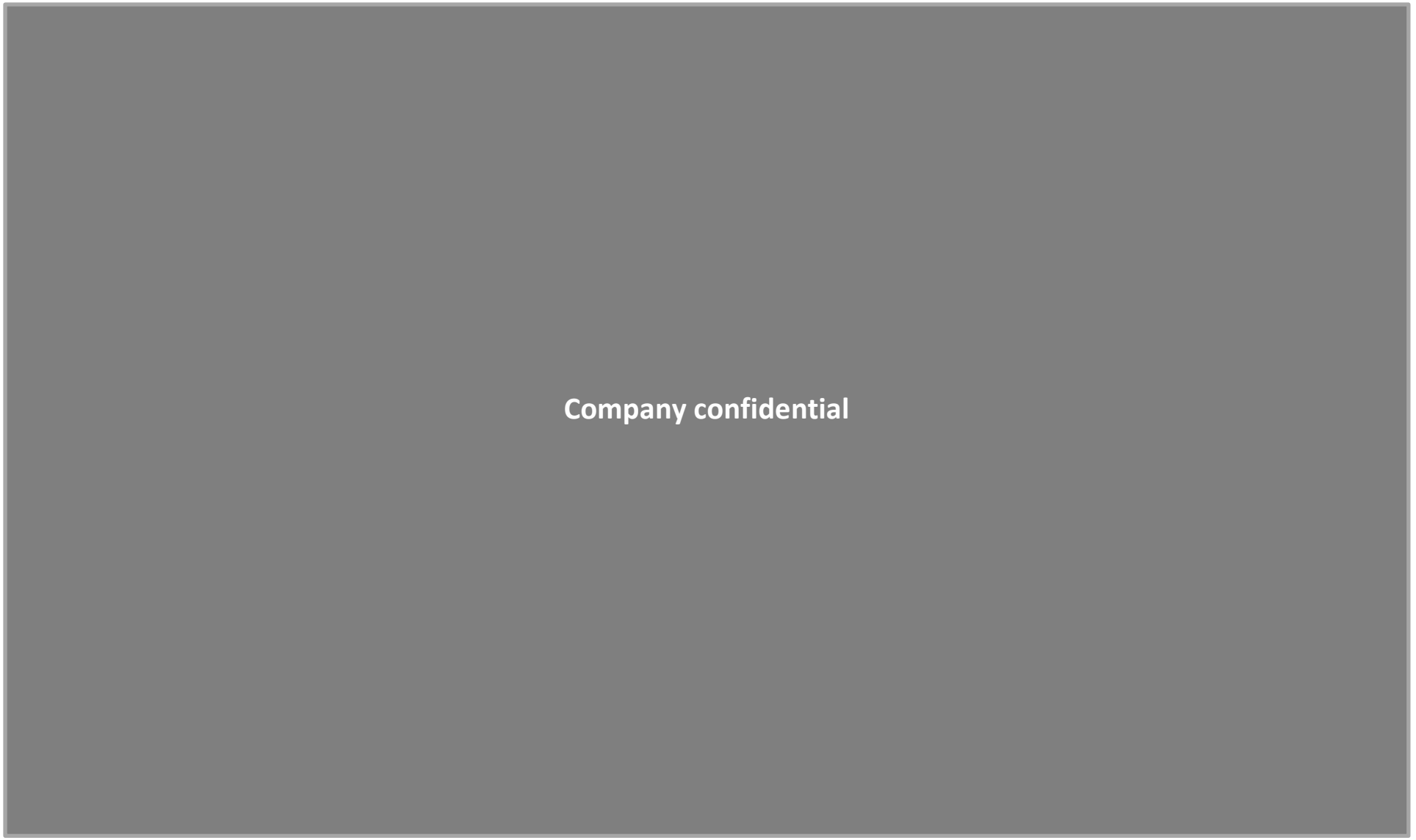


Figure 50: Overview of initial- and final turnover levels for tenders won with different degrees of performance

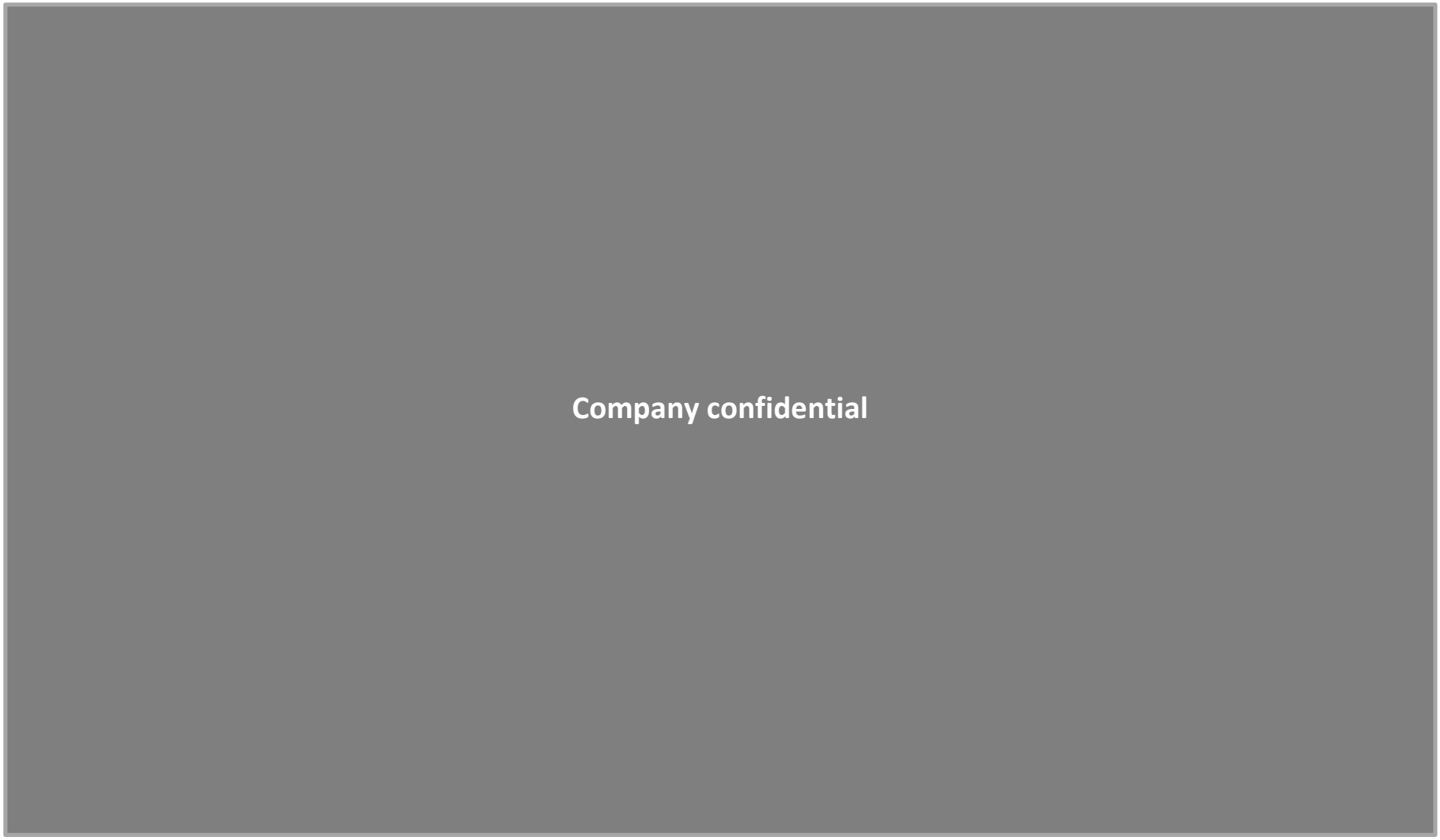


Figure 51: Overview of the total- and cumulative levels of financial result for tenders won with different degrees of performances

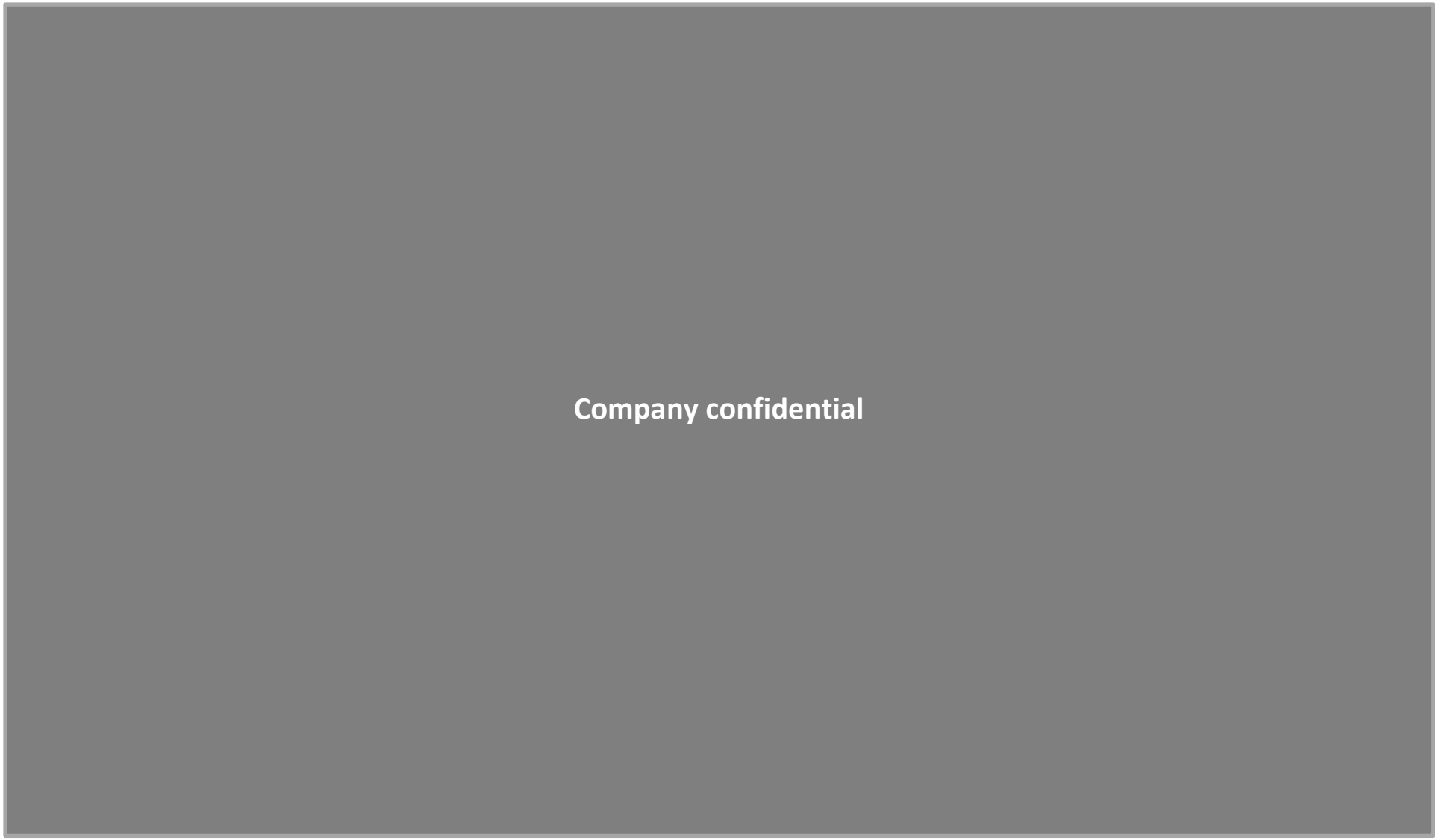


Figure 52: Overview of absolute number and average number of tons of asphalt for tenders won with different degrees of performances

WIN RATIOS FOR BAM INFRATECHNIEK TELECOM

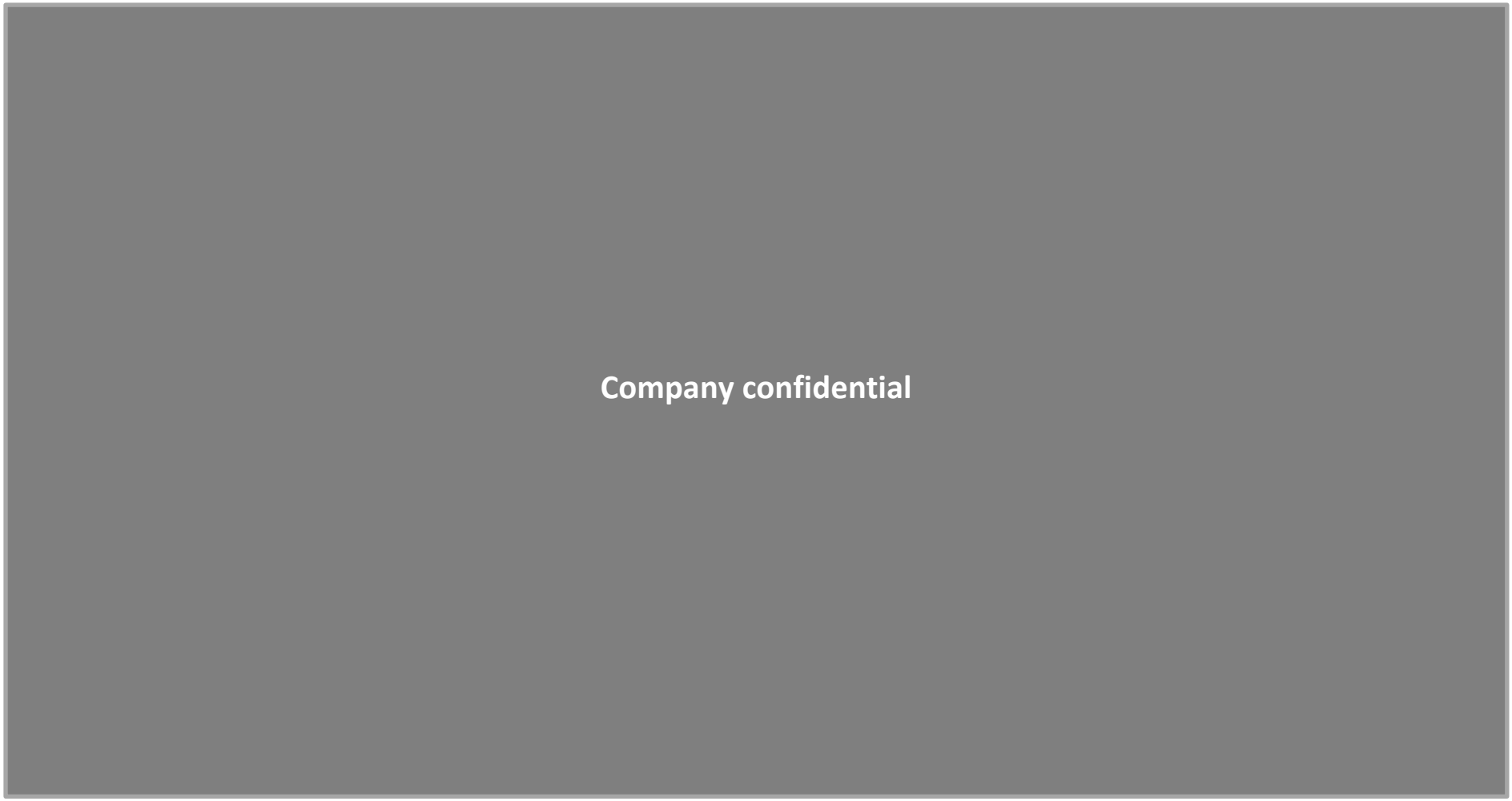


Figure 53: Overview of cumulative turnover level of tenders lost and won for tenders with different levels of turnover for BAM Infratechniek Telecom

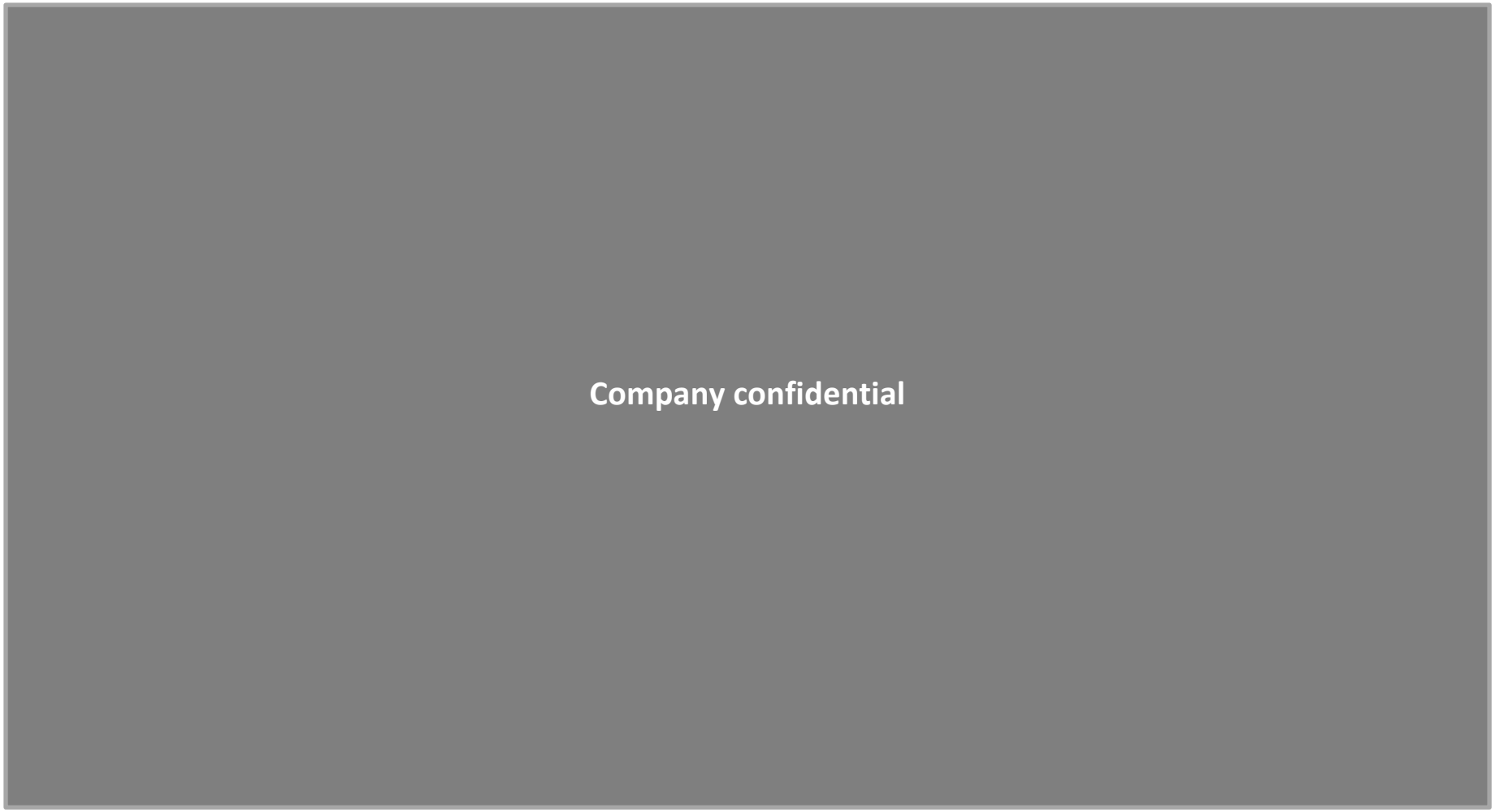


Figure 54: Overview of win- and loss percentages for tenders with different levels of turnover of BAM Infratechniek Telecom

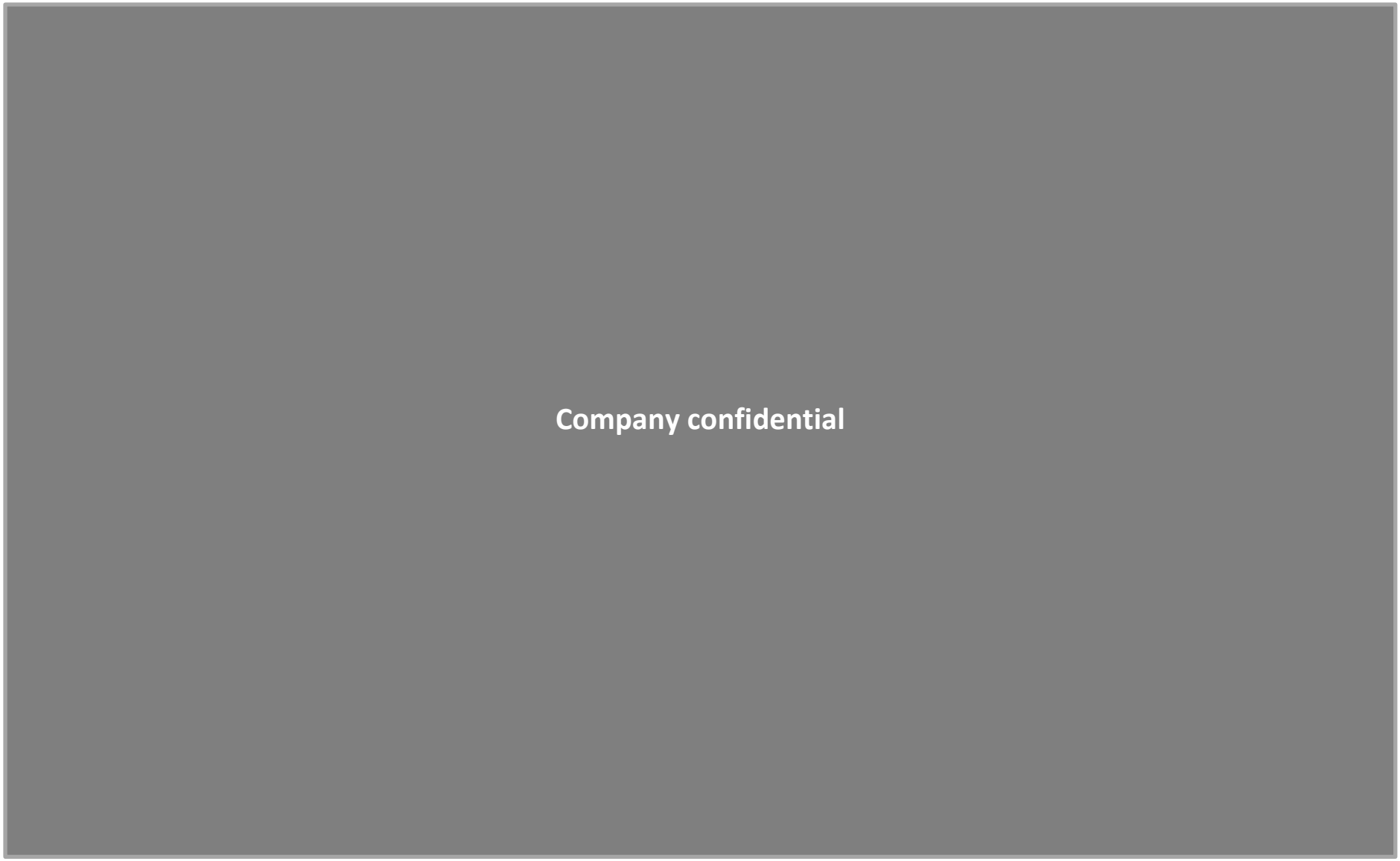


Figure 55: Overview of cumulative turnover of tenders for which a bid is placed and number of tenders won for the business segment 'Fiber to the X'

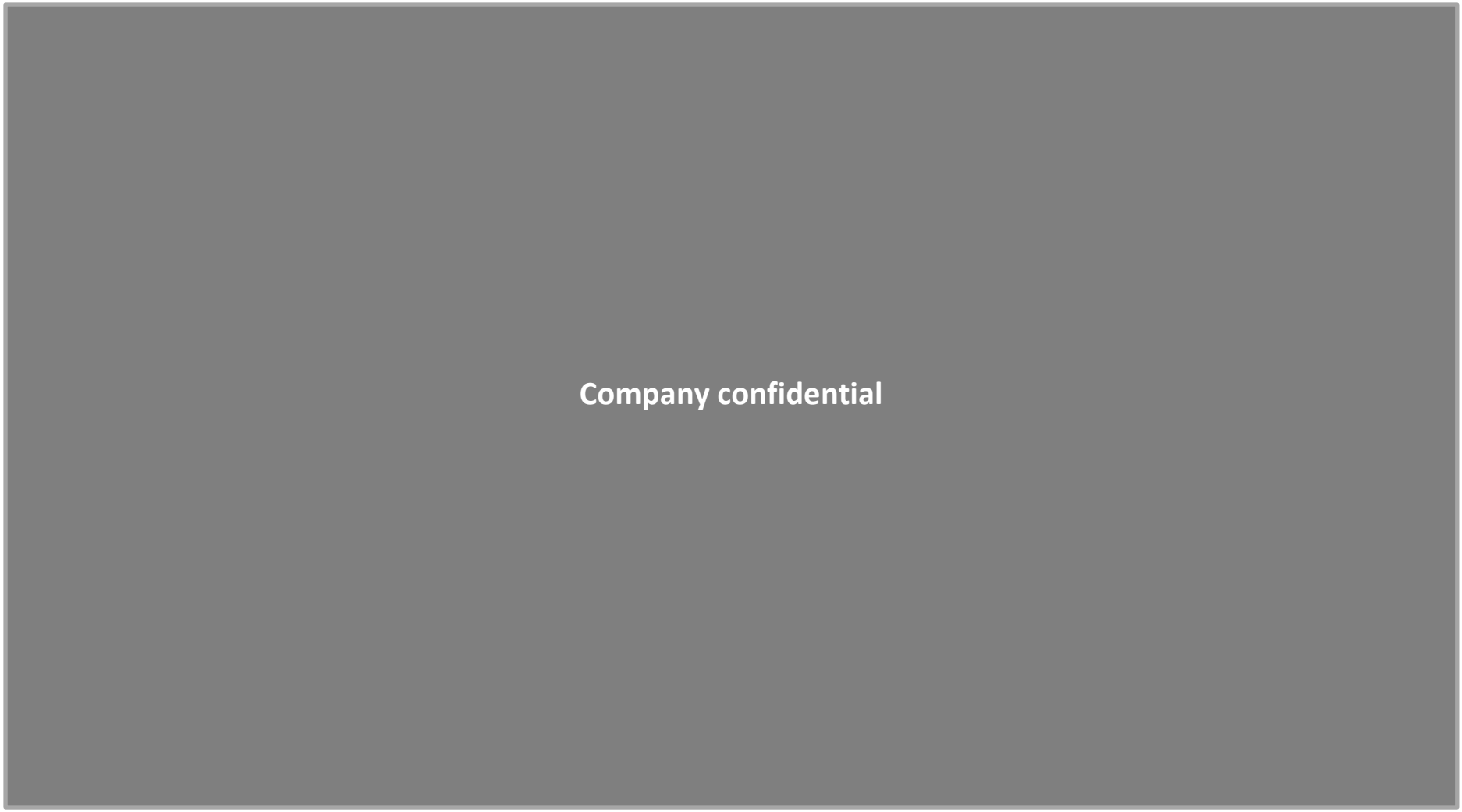


Figure 56: Overview of win- and loss percentages for 'FttX' tenders with different levels of turnover of BAM Infratechniek Telecom

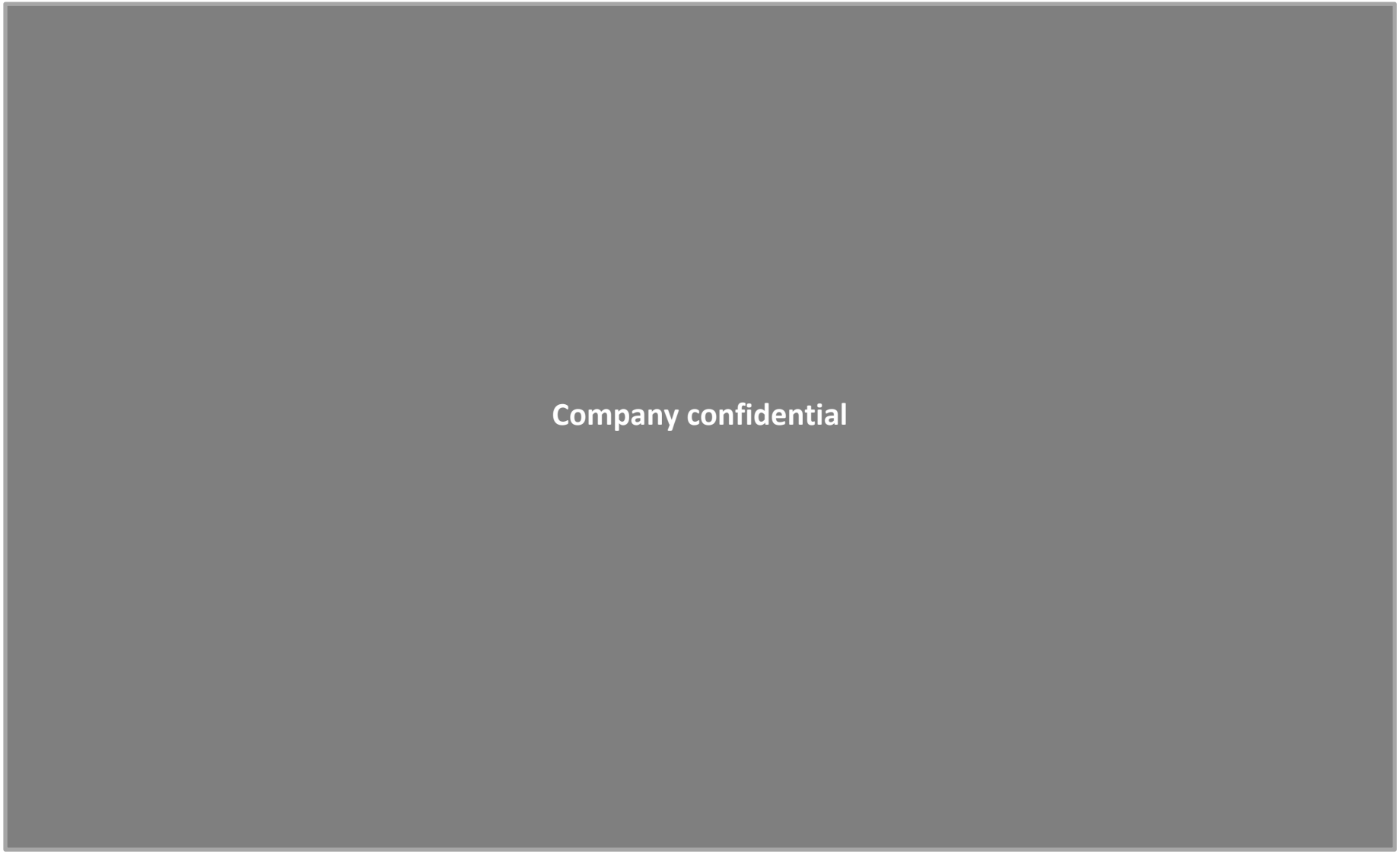


Figure 57: Overview of cumulative turnover of tenders for which a bid is placed and number of tenders won for the business segment 'Datanetworks including civil engineering structures'

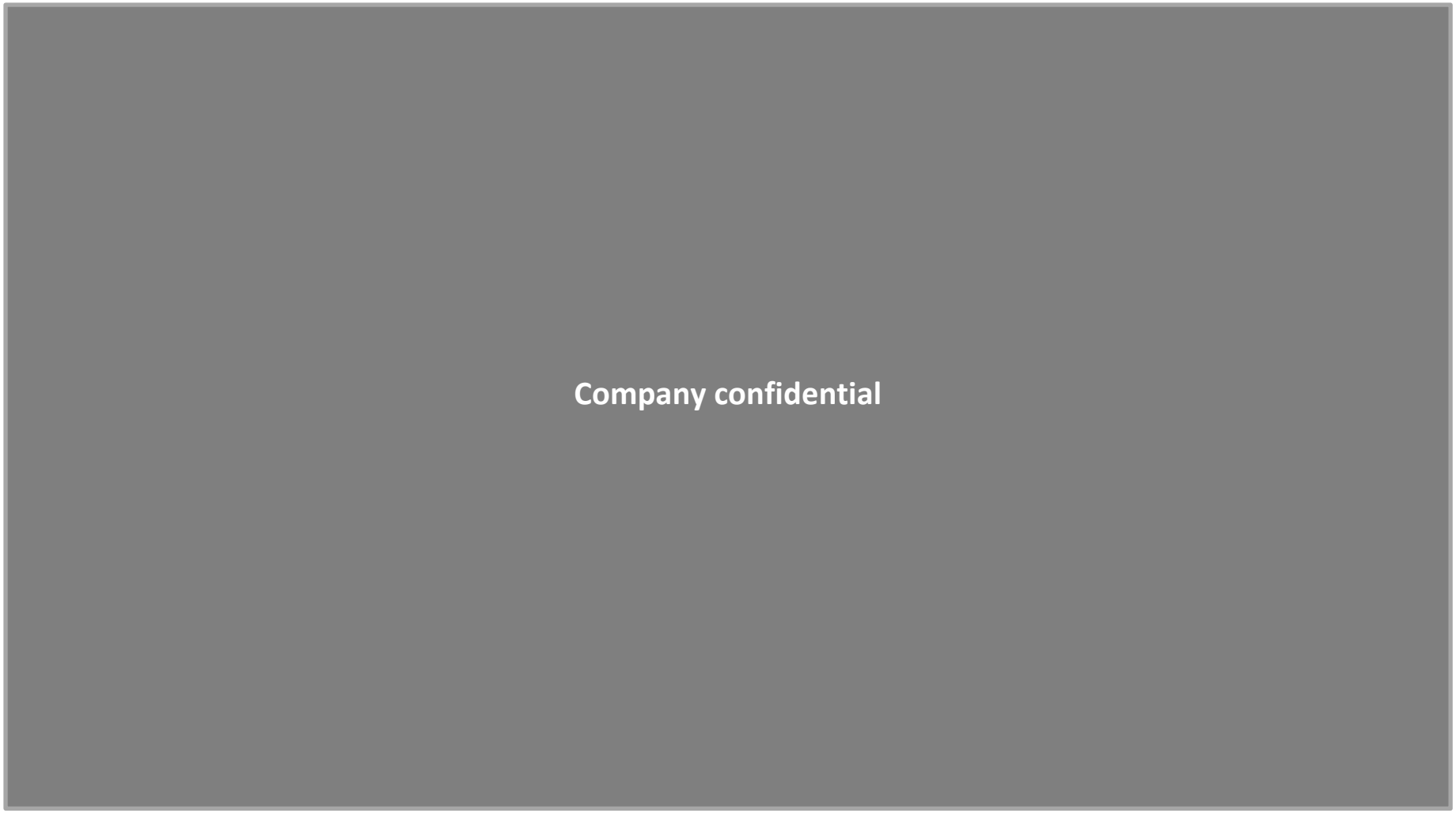


Figure 58: Overview of win- and loss percentages for 'Datanetworks including civil engineering structures' tenders with different levels of turnover of BAM Infratechniek Telecom

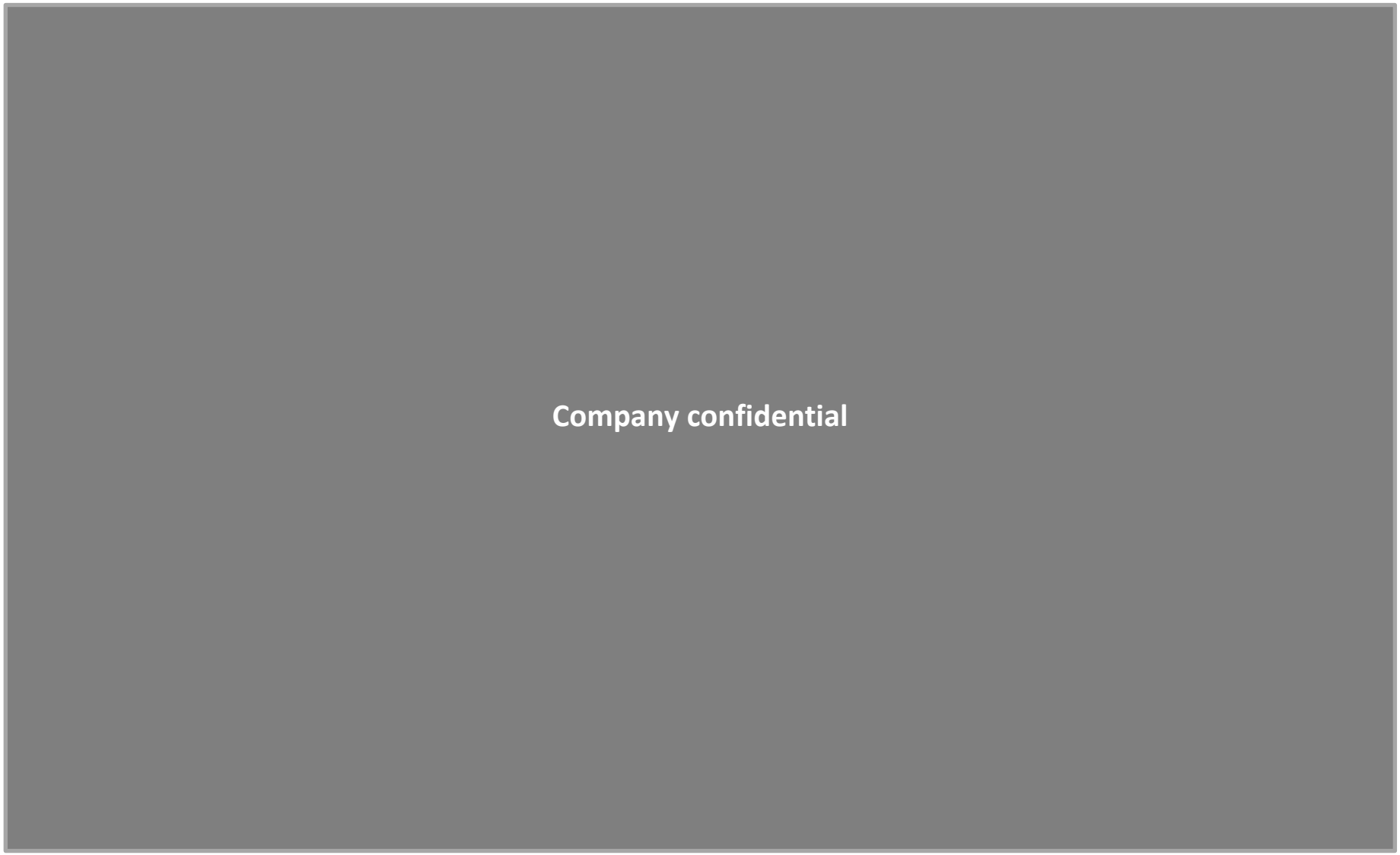


Figure 59: Overview of cumulative turnover of tenders for which a bid is placed and number of tenders won for the business segment 'Public lighting networks, low and medium voltages'

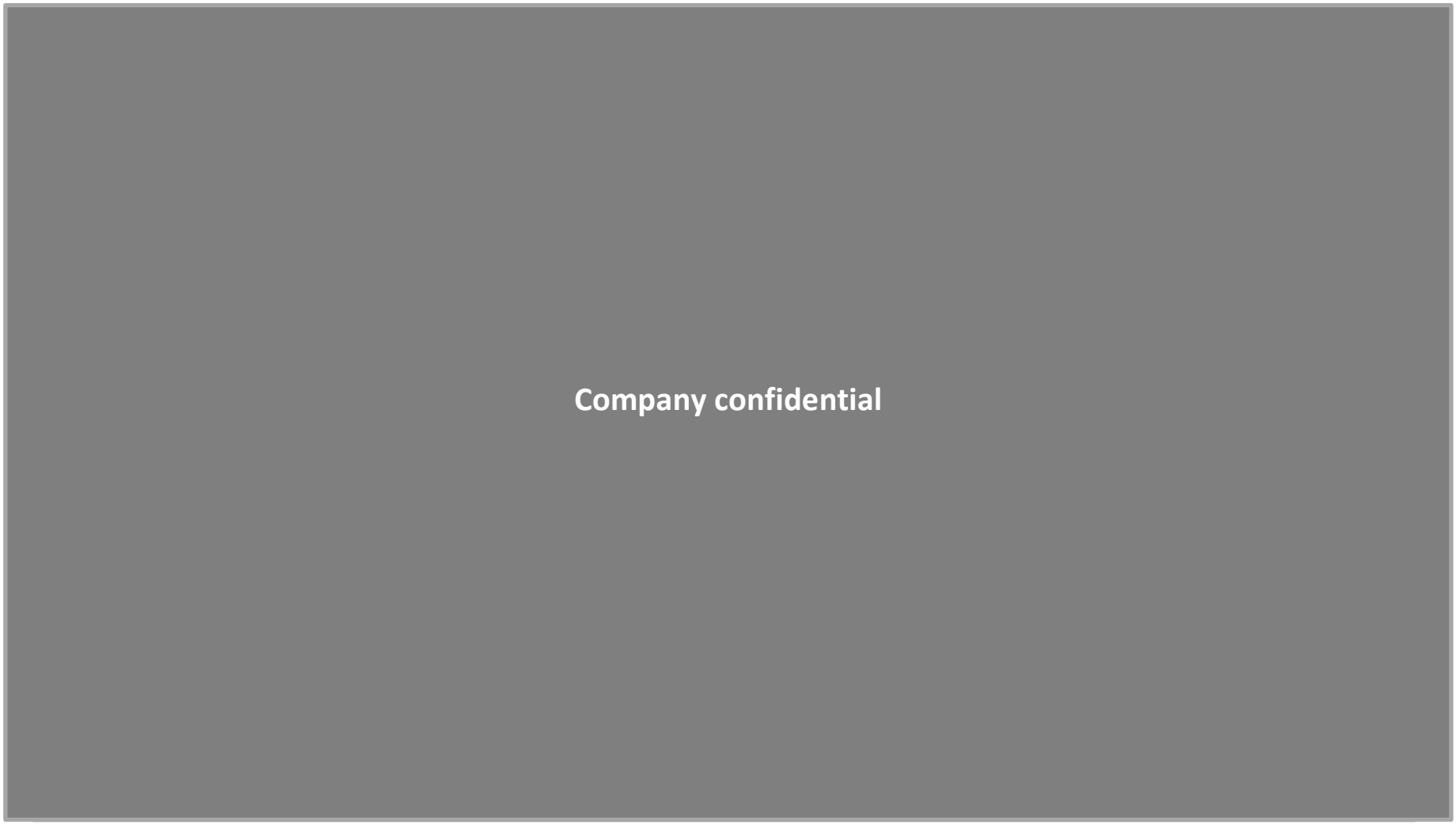


Figure 60: Overview of win- and loss percentages for 'Public lighting networks, low and medium voltages' tenders with different levels of turnover of BAM Infratechniek Telecom