Deepfake detection technologies

Business strategies for deepfake detection companies, within the Netherlands, to maintain or gain a competitive advantage.

W.C.J. Peeters

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March 26, 2024

Deepfake detection technologies

Business strategies for deepfake detection companies, within the Netherlands, to maintain or gain a competitive advantage.

by

W.C.J. Peeters

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Acknowledgements

Writing this master's thesis brings an end to years of school and study. Starting in school, where expectations about my ability to learn were not too high, and certainly not in the mathematical field (except for my maths teachers). From the idea of going to "Hotelschool", to yet choosing a beta direction. Only to go more alpha again by choosing a study in Applied Psychology in Leiden. But then soon to miss the numbers, and after getting my propaedeutic certificate, decided to study Mathematical Engineering in Delft. Who would have taught? At least not me, especially bearing in mind that during maths lessons, I was always right in front of the teacher, just watching series on my phone. "You get eights and nines anyway. Let us agree that you get a chocolate bar if you end up with at least an eight average for maths on your final list". And there stood my high school maths teacher at the graduation ceremony with not one, but two chocolate bars. He might still have thought it was possible for me to pursue a maths degree. Who else had thought this? Those are my parents, who have always given me, and my brother, every space and opportunity to study. My, sadly passed away, grandmothers saw me more at home in the hospitality industry anyway. Which is also not a very crazy thought considering I have had, and still have, a side job in the hospitality industry non-stop since I was 15 - I am 26 now -. Should I take a 36-hour job and still work every Friday night in the hospitality industry? Who knows.

After my bachelor's mathematics, I had already received several offers for jobs. "I am still so young, and I can work for the rest of my life, just stick another study behind it". This did require another pre-master's degree, because I went from "HBO" to university. That went quite smoothly, so to say. And then the beginning of the master's program; Management of Technology (MOT). From a very beta oriented bachelor mathematics, to a more alpha oriented master MOT. That was quite a switch, and gave me some flashbacks to Applied Psychology. It took some time to getting used to it, but eventually I had it under control. To get back to mathematics a bit, I chose the ICT specialisation, with "Technology Based Marketing and Sales" as elective. And that is where my interest in deepfake started. This course was taught by Dr. Tom Dolkens, and I thought "what is not done is always done wrong, let me ask Tom to be my thesis supervisor". And that is where my thesis research began. Writing this thesis did not go smoothly. I had some troubles with the start of the research. After which, with great sadness, we had to say goodbye to my boyfriend's father, my father-in-law. Eventually, with all the support of my parents, brother, boyfriend, and friends, I managed to pick up my thesis.

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Now it only remains for me to wish you much reading pleasure with my thesis.

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Summary

In today's climate of the increasing use of fake news for which deepfakes may be used, and their widespread distribution through social media, the challenge of distinguishing reality from manipulation is growing. The development of deepfake detection technologies (DFDTs) is therefore crucial. The number of deepfake detection companies (DFDCs) is growing rapidly, changing the competitive landscape. Literature review shows that little is known about strategic opportunities for DFDCs. Therefore, the aim of this research is to provide business strategies, for DFDCs in the emerging DFDT market, in order to maintain or gain a competitive advantage. The knowledge gap lies in the fact that research is done into business strategies for emerging technologies, however, not specifically for DFDTs. To generate concrete and valuable results, the focus is on the Netherlands. Hence, the main research question (MRQ) is: "What are potential strategies for deepfake detection companies in the Netherlands to maintain or gain a competitive advantage?".

The scientific relevance lies in contributing to the research field by providing a strong foundation for further research into emerging markets, by outlining a qualitative exploratory study for the DFDT market. Additionally, it serves as a foundation for further studies into DFDTs. Social risks are highlighted as well, which brings the research's social relevance. Lastly, the managerial relevance lies in offering insights into market analyses, strategy formulation, and strategic choices for DFDCs – or firms in other emerging markets -, in order to maintain or gain a competitive advantage.

Literature review shows that a strategic management process can be followed to provide a business strategy to maintain or gain a competitive advantage for firms in emerging markets. This strategic management process involves: conducting and merging internal and external analyses, deciding on strategic choices, and the strategic implementation. To fulfil the steps of the strategic management process, several analytical approaches are chosen. First, the analytical approach for the internal analysis. The Resource-Based View (RBV) provides insights into internal resources, which are evaluated with the so-called VRIO conditions; assessing the resource's Value, Rarity, ease of Imitation, and the way of Organising. The Effectuation Perspective (EP) further evaluates the resources by assessing their dynamism, adaptability, and responsiveness to market changes. Finally, RBV combined with VRIO and EP provide insights into the internal strengths & weaknesses for the DFDT market. Second, the analytical approach for the external analysis. The General Environment framework (GE) emphasises the demographic, cultural & technological trends, economic climate, legal & political conditions, and international events, of an emerging market. The Structure-Conduct-Performance (SCP) clarifies the relationship between the market structure, conduct – strategies -, and performance. Porter's Five Forces (P5F) examines micro environmental elements such as supplier & buyer power, and threat of new entrants, substitute goods & competitive rivalry. The PESTEL framework provides insights into macro environmental elements, analysing Political, Economic, Social, Technological, Environmental, and Legal elements. Finally, the results of GE, SCP, P5F, and PESTEL combined, provide insights into the external opportunities & threats for the DFDT market. Third, the analytical approach to merge the internal and external analyses. The SWOT analysis combines internal strengths & weaknesses with external opportunities & threats, which ultimately lead to the best potential strategies. A further elaboration of SWOT is done with the Confrontation Matrix (CM), which scores the interactions between strengths & weaknesses and opportunities & threats, ranging from a strong negative influence - -2 -, to a strong positive influence - +2 -. A total score is calculated for each strength, weakness, opportunity, and threat. The strength and opportunity with the highest score are those that offer the greatest potential for the DFDCs to maintain or gain a competitive advantage. The weakness with the lowest score needs to be monitored by the DFDC in order to improve it in the short term. The threat with the lowest score needs to be monitored closely so that the DFDC can respond to it. The strength and opportunity with the highest score and

the weakness and threat with the lowest score, are then proposed to be used to define a strategic choice.

Strategic choices, i.e. the firm's plan to maintain or gain a competitive advantage, are proposed, in literature on business strategies considering emerging technologies, to fall on business-level strategies. The business-level strategy of product differentiation is suggested to increase the perceived value to maintain or gain a competitive advantage. Within literature on strategies to maintain or gain a competitive advantage considering emerging technologies, it is proposed to incorporate an Innovation Management Technique (IMT). An IMT is a business-level strategy to manage innovation within a firm, to ultimately improve the productivity, and efficiency. The IMT identified in literature to support the business-level strategy of product differentiation is internal bench marking, which focuses on improving the quality of products, while improving internal processes. Product differentiation combined with internal bench marking leads to three "sub strategies"; (1) timing of product introduction, (2) use of customer-specific marketing, and (3) additional product features.

Eight interviews with experts from consulting, media, insurance, and law sectors are conducted to provide insights into the analytical approaches. The findings are presented for DFDCs in general and are based on the findings of the expert interviews considered in SWOT and CM. According to the interviews, the main strength for DFDCs is to have an up-to-date DFDT. The experts state that whenever a DFDC has an up-to-date DFDT, it has an advantage over other DFDCs without an up-to-date DFDT. A weakness was not directly considered by the experts, however, since media visibility will not provide a competitive advantage, stated by VRIO and EP, it is considered as weakness. Experts see the main opportunities for DFDTs in the dangers of deepfakes; experts consider the impact of deepfakes on fake news about wars and elections, and experts see potential for the use of deepfakes for CEO fraud. According to the experts, these dangers create opportunities for DFDCs to develop DFDTs as soon as such risks occur or increase. There is also, according to the experts, an opportunity for DFDCs to offer deepfake risk awareness programmes to DFDC's clients as an additional feature to the DFDTs. Finally, the experts identified the main threat to DFDCs as the fact that larger IT companies could also develop DFDTs. The main strength, weakness, opportunities, and threat identified in SWOT and CM, based on the findings of the expert interviews, can be used to answer the MRQ.
The MRQ focuses on potential strategies for DFDCs in the Netherlands to maintain or gain a competitive advantage. To this end, the literature review on business strategies for emerging technologies has shown that product differentiation, combined with internal bench marking, provide three sub strategies. First, the timing of the product launch. This is where the main opportunities identified by experts can be applied. Namely, the (potential for) manipulation with deepfakes during wars and elections, and the use of deepfakes for CEO fraud. This means that under certain circumstances, it is an ideal time to launch a DFDT. Next, consumer specific marketing, which involves tailoring the DFDT to the needs of the customer. During the expert interviews, participants identified "up-to-date DFDT" as main strength. Therefore, the DFDTs need to be up-to-date, which takes into account the tailoring of the DFDT to the needs of the customer. And the last strategy considers additional features to the product, for which the experts stated that providing deepfake risk awareness programmes for the DFDC client's employees as an opportunity. Differentiating the DFDT to the extent mentioned with the timing of product launch, consumer specific marketing, or additional features of the product, in which the main strength, and opportunities identified by the experts are taken into account, will ensure a competitive advantage for DFDCs. This allows DFDCs to stay ahead of even larger IT companies, which are seen as the main threat by the experts, and possibly other competitors, such as DFDCs. The main weakness can also be taken into account, which is making use of media visibility. DFDCs could use the media to familiarise their potential customers with them, however it will not provide a competitive advantage.

There are a number of limitations to this study, which lead to recommendations for further research. First, this research was carried out in the Netherlands in order to obtain concrete results. The current research provides a strong foundation to extend it to other countries. In addition, eight experts are interviewed over four industries. It is recommended to extend the research to other industries, such as the banking industry. Also, this research did not focus on DFDT companies/start-ups, or larger IT companies that are developing or planning to develop DFDTs. For further research, it is recommended to include such firms in the research, in order to gain insights into their perception of the DFDT market. Finally, the current research has built upon the knowledge gap in the literature, where little is known about business strategies for DFDCs, although there is knowledge for emerging markets. Therefore, this research gives an overview of the available knowledge for business strategies for emerging markets, which provides a foundation for further research.

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W.C.J. Peeters
March 26, 2024

Contents

List of Tables **IX**

List of Figures **XIII**

Abbreviations **XV**

1 Introduction **1**
1.1 Background . . . 2
1.2 Problem identification . . . 3
1.3 Scope of the research . . . 5
1.4 Research questions (RQs) . . . 5
1.5 Research approach . . . 5
1.6 Relevance of study . . . 7
1.7 Outline of the thesis . . . 7

2 Literature review **8**
2.1 Knowledge gap . . . 9
2.2 Search description . . . 11
2.3 Strategic management . . . 11
2.4 Keywords and selection criteria . . . 13
2.5 Internal analysis . . . 14
2.6 External analysis . . . 18
2.7 Matching internal analysis and external analysis . . . 23
2.8 Strategic choice and strategic implementation . . . 26
2.9 Conclusion of this chapter . . . 31

3 Research approach **32**
3.1 Retrospective of analytical approaches . . . 33
3.2 Internal analysis - analysis of internal organisations . . . 33
3.3 External analysis - analysis of external environment . . . 35
3.4 Matching internal analysis and external analysis . . . 36
3.5 Strategic choice and strategic implementation - business strategies . . . 37
3.6 Conclusion of this chapter . . . 38

4 Research methodology **40**
4.1 Data collection . . . 41
4.2 Data analysis . . . 44
4.3 Pilot interviews . . . 45
4.4 Expert interviews . . . 46
4.5 Conclusion of this chapter . . . 47

5 Results **48**
5.1 Coding schemes . . . 49

5.2 Interview codes to findings . . . 49
5.3 Internal analysis - analysis of internal organisations . . . 50
5.4 External analysis - analysis of external environment . . . 52
5.5 Conclusion of this chapter . . . 63

6 Discussion **64**
6.1 Introduction to discussion . . . 65
6.2 Internal analysis - analysis of internal organisations . . . 65
6.3 External analysis - analysis of external environment . . . 69
6.4 Matching internal analysis and external analysis . . . 70
6.5 Strategic choice and strategic implementation - business strategies . . . 73
6.6 Conclusion of this chapter . . . 74

7 Conclusion **75**
7.1 Extended abstract . . . 76
7.2 Research's conclusion . . . 77
7.3 Contributions . . . 80
7.4 Limitations and future recommendations . . . 80
7.5 Validity of the research . . . 81

References **II**

A Pilot interview questions **VII**

B Network for interviews **IX**

C Expert interview questions **X**

D Overview codes for coding scheme **XII**
D.1 Internal analysis - analysis of internal organisations . . . XII
D.2 External analysis - analysis of external environment . . . XII

E Excel spreadsheets for coding interviews **XIII**
E.1 Excel spreadsheet for all quotes . . . XIII
E.2 Excel spreadsheet for most frequently mentioned topics Dutch . . . XIV
E.3 Excel spreadsheet for most frequently mentioned topics English . . . XV

F List of opportunities & threats **XVI**
F.1 Opportunities . . . XVI
F.2 Threats . . . XVII

G Elaboration upon Confrontation Matrix (CM) **XVIII**

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TU Delft

W.C.J. Peeters
March 26, 2024

List of Tables

2.1 Keywords and synonyms of the keywords . . . 13
2.2 Overview of keywords, the corresponding number of articles, and topics . . . 14
2.3 Inclusion and exclusion criteria for literature review . . . 14
2.4 Differences between perspectives (Zahra, 2021; Garud & Karnoe, 2003; Baker & Nelson, 2005; Sarasvathy, 2001; Ries, 2017; Teece, Pisano, & Shuen, 1998) . . . 17
2.5 Differences between perspectives (Zahra, 2021; Garud & Karnoe, 2003; Baker & Nelson, 2005; Sarasvathy, 2001; Ries, 2017; Teece et al., 1998) . . . 18
2.6 Differences between market structures based on the characteristics (Fu, 2009; Jagpal & Spiegel, 2011; Gelos & Roldós, 2004) . . . 20
2.7 Six environments based on PESTEL framework with its corresponding assessment criteria, and the goal . . . 23
2.8 Cost advantages with an explanation . . . 28
2.9 Different manners of product differentiation . . . 29
2.10 Most effective Innovation Management Techniques (IMTs) (Hidalgo & Albors, 2008) . . . 30

3.1 Analysis with corresponding analytical approaches . . . 33

4.1 Advantages and disadvantages of a survey (Scheuren, 2004) . . . 41
4.2 Advantages and disadvantages of personal and telephone interviews (Holstein & Gubrium, 2003) 42
4.3 Advantages and disadvantages of direct and participant observations (Jorgenson & Pogrebin, 2003) . . . 42
4.4 Elaboration on different sampling categories (Acharya, Prakash, Saxena, & Nigam, 2013; Vehovar, Toepoel, & Steinmetz, 2016) . . . 43
4.5 Assessment criterion per analysis and analytical approach . . . 46

5.1 Example table showing which experts agree with the finding of the analytical approach . . . 50
5.2 Experts who agree with the finding "licence fee" for code "Resource-Based View (RBV) financial resource" . . . 50
5.3 Experts who agree with the finding "subsidies" for code "Resource-Based View (RBV) financial resource" . . . 51
5.4 Experts who agree with the finding "reliable data" for code "Resource-Based View (RBV) physical resource" . . . 51
5.5 Experts who agree with the findings "study and/or personal interest based knowledge" and ""learning-on-the-job" based experience" for code "Resource-Based View (RBV) individual resource" . . . 51
5.6 Experts who agree with the finding "media visibility" for code "Resource-Based View (RBV) organisational resource" . . . 52
5.7 Experts who agree with the finding "up-to-date deepfake detection technology/software (DFDT)" for code "Resource-Based View (RBV) organisational resource" . . . 52
5.8 Experts who agree with the finding "CEO fraud" for code "General Environment framework (GE) demographic trends" . . . 53
5.9 Experts who agree with the finding "widespread of news via social media" for code "General Environment framework (GE) demographic trends" . . . 53

5.10 Experts who agree with the finding "discriminatory Artificial Intelligence (AI) techniques" for code "General Environment framework (GE) cultural trends" . . . 53
5.11 Experts who agree with the finding "fake news disrupts society" for code "General Environment framework (GE) cultural trends" . . . 54
5.12 Experts who agree with the finding "companies will probably buy deepfake detection technology/software (DFDT)" for code "General Environment framework (GE) economic climate" . . . 54
5.13 Experts who agree with the finding "more different providers → price competition" for code "General Environment framework (GE) economic climate" . . . 55
5.14 Experts who agree with the finding "European Union (EU) guidelines" for code "General Environment framework (GE) legal & political conditions" . . . 55
5.15 Experts who agree with the finding "Artificial Intelligence (AI) act" for code "General Environment framework (GE) legal & political conditions" . . . 55
5.16 Experts who agree with the finding "deepfake's influence on wars" for code "General Environment framework (GE) specific international events" . . . 56
5.17 Experts who agree with the finding "deepfake's influence on elections" for code "General Environment framework (GE) specific international events" . . . 56
5.18 Experts who agree with the finding "fraud cases might rise while developing deepfakes becomes easier" for code "General Environment framework (GE) technological trends" . . . 56
5.19 Experts who agree with the finding "integration of DFDT into existing technologies" for code "General Environment framework (GE) technological trends" . . . 57
5.20 Experts who agree with the finding "tech-related issues team" for code "Structure-Conduct-Performance Model (SCP) structure" . . . 57
5.21 Experts who agree with the finding "competitors working on deepfake detection technology/softwares (DFDTs)" for code "Structure-Conduct-Performance Model (SCP) structure" . . . 57
5.22 Experts who agree with the findings "judgement explanation" and "discriminatory Artificial Intelligence (AI) techniques" for code "Structure-Conduct-Performance Model (SCP) structure" 58
5.23 Experts who agree with the finding "deepfake detection technology/software (DFDT) focus on niches" for code "Structure-Conduct-Performance Model (SCP) structure" . . . 58
5.24 Experts who agree with the finding "integration of DFDT into existing technologies" for code "Structure-Conduct-Performance Model (SCP) conduct" . . . 58
5.25 Experts who agree with the finding "developing awareness programmes" for code "Structure-Conduct-Performance Model (SCP) conduct" . . . 59
5.26 Experts who agree with the findings "licence fee" and "subsidies" for code "Structure-Conduct-Performance Model (SCP) performance" . . . 59
5.27 Experts who agree with the findings "reliable data" and "subsidies" for code "Porter's Five Forces (P5F) bargaining power of suppliers" . . . 60
5.28 Experts who agree with the findings "potential for deepfake detection technology/software (DFDT)" and "effective manual verification methods" for code "Porter's Five Forces (P5F) bargaining power of buyers" . . . 61
5.29 Experts who agree with the findings "start-ups might appear to develop deepfake detection technology/software (DFDT)" and "tech-related issues teams" for code "Porter's Five Forces (P5F) threat of new entrants" . . . 61
5.30 Experts who agree with the findings "effective manual verification methods" and "deepfake courses/e-learnings" for code "Porter's Five Forces (P5F) threat of substitute goods" . . . 62
5.31 Experts who agree with the findings "larger IT companies → deepfake detection technology/software (DFDT)" and "larger IT companies → proposal fake news" for code "Porter's Five Forces (P5F) threat of existing competitors/competitive rivalry" . . . 62
5.32 Experts who agree with the findings "media is not viewed critically enough", "a deepfake never disappears once published", and "negative and positive use cases of deepfake" for code "PESTEL social" . . . 63

6.1 Overview of resources found with Resource-Based View (RBV), based on expert interviews, whether it could achieve a competitive advantage . . . 68

A.1 Questions for semi-structured pilot interviews VIII

B.1 Researcher's network for interviews IX

C.1 Questions for semi-structured expert interviews XI

G.1 Strength "study and/or personal interest based knowledge" versus opportunities & threats . . . XVIII
G.2 Strength "up-to-date deepfake detection technology/software (DFDT)" versus opportunities & threats XIX
G.3 Strength ""learning-on-the-job" based experience" versus opportunities & threats XX
G.4 Weakness "media visibility" versus opportunities & threats XXI
G.5 Weakness "subsidies" versus opportunities & threats XXIII

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TU Delft

W.C.J. Peeters
March 26, 2024

List of Figures

1.1 Deepfake of the 13-year-old Sedar developed by the police department of Rotterdam 2
1.2 Roadmap for current research 6

2.1 Overview of research components - chapter 2 literature review 8
2.2 Strategic management process 12
2.3 VRIO framework for achieving sustained competitive advantage 16
2.4 General Environment framework (GE) for analysing the external environment of a firm 19
2.5 Structure-Conduct-Performance model (SCP) 19
2.6 Market structures classified by seller concentration 20
2.7 Two-by-two matrix for the SWOT analysis 24
2.8 Confrontation Matrix (CM) scoring system 24
2.9 Visualisation of the Confrontation Matrix (CM) 25
2.10 SWOT analysis and Confrontation Matrix (CM) combined 25
2.11 Gradient of economies of scale and diseconomies of scale 27

3.1 Overview of research components - chapter 3 research approach 32

4.1 Overview of research components - chapter 4 research methodology 40

5.1 Overview of research components - chapter 5 results 48

6.1 Overview of research components - chapter 6 discussion 64
6.2 Findings of research for the SWOT analysis 72
6.3 Findings of research for the Confrontation Matrix (CM) 72

7.1 Overview of research components - chapter 7 conclusion 75

E.1 Excel spreadsheet for all quotes XIII
E.2 Excel spreadsheet for most frequently mentioned topics Dutch XIV
E.3 Excel spreadsheet for most frequently mentioned topics English XV

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TU Delft

W.C.J. Peeters
March 26, 2024

Abbreviations

AI Artificial Intelligence

BP Bricolage Perspective

CM Confrontation Matrix

DCP Dynamic Capability Perspective

DFD deepfake detection

DFDC deepfake detection company/firm

DFDT deepfake detection technology/software

EP Effectuation Perspective

EU European Union

GE General Environment framework

IMT Innovation Management Technique

LEP Lean Entrepreneurship Perspective

ML Machine Learning

MRQ main research question

P5F Porter's Five Forces

QCA Qualitative Content Analysis

RBV Resource-Based View

RQ research question

SCP Structure-Conduct-Performance Model

SRQ sub research question

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1

Introduction

"The word deepfake has become a generic noun for the use of machine-learning algorithms and facial-mapping technology to digitally manipulate people's voices, bodies and faces. And the technology is increasingly so realistic that the deepfakes are almost impossible to detect."

- Ben Sasse

This chapter provides a background to gain a clear understanding of the topic of this research. It focuses on the identification of a problem from which a problem statement can be determined. The scope of the research is then determined to ensure that the research is not too broad and to provide concrete guidelines for understanding the research. The research questions (RQs), based on the problem statement and the scope of the research, are also discussed, including a main research question (MRQ) with supporting sub research questions (SRQ). The research approach is also discussed, explaining the nature of the research. Furthermore, the relevance of the study is specified. Finally, an overview of the thesis is given, briefly describing the topics covered in each chapter.

1.1 Background

In 2022, a law enforcement agency used a deepfake - see figure 1.1 - to appeal potential suspects and witnesses to come forward with information about the unsolved murder of the then 13-year-old Sedar in Rotterdam in 2003 (Politie, 2022).

Figure 1.1: Deepfake of the 13-year-old Sedar developed by the police department of Rotterdam

This remarkable use of a deepfake is being labelled in the media as a "world first", where a deepfake is used by law enforcement to solve a cold case. In order to provide a basic understanding of deepfake technology, it is explained below what exactly a deepfake is, what the potential risks of deepfakes are, and how deepfakes can be created.

Spreading fake news

First, the contemporary topic of "fake news", which has major consequences for humanity. Fake news is fictional and aims to mislead people. The extensive use of social media plays a major role in the propagation of fake news. Since news spread rapidly via social media, together with the fact that social media is a widely used news source worldwide (Ahmed, 2023). For example, research has shown that one in five internet users acquire their news via YouTube and Facebook (Westerlund, 2019).

Considering the growing availability of user-friendly techniques for manipulating photos and videos, it becomes increasingly effortless to spread incorrect information, i.e. fake news. In today's so-called "post-truth" era, which is characterised by digital disinformation and false information campaigns to manipulate public opinion, the issue of fake news is particularly pertinent (Westerlund, 2019).

However, what does fake news have to do with deepfake? First, there will be clarified what deepfake is, and then the connection between deepfake and fake news will be explored.

Manipulating photos and videos

Deepfakes can also be described as manipulated photos and videos, as previously mentioned in the context of spreading false information. The development of deepfakes is done by computers which generate photos and videos that appear lifelike, i.e. are highly realistic. People can therefore be manipulated and might for instance think that they hear or see a specific person say something (Fagni, Falchi, Gambini, Martella, & Tesconi, 2021; Yu, Xia, Fei, & Lu, 2021). This manipulation technique is not only a fascinating technological advancement but also a concerning element in the realm of fake news, i.e. spreading misinformation in which false photos and videos can be used (Westerlund, 2019).

Now that is provided what deepfake is, and its significance in the domain of fake news, the technology that drives this manipulation technique will be described.

Artificial Intelligence (AI)

The technology behind manipulating photos and videos - developing deepfakes - is also called Artificial Intelligence (AI). AI regarding deepfakes is also referred to as Machine Learning (ML). This brings the possibility for machines to learn - “train” - based on available data - “training data” -. In simpler terms, developing deepfakes is the skill of a computer in which it has seen photos and/or videos of faces several times, so that it teaches itself how a face is shaped and can move (Politie, 2022). Over time, increasing amounts of training data will continue to become available, which means that the technology for developing deepfakes will also improve. As time progresses, deepfake technology is advancing, making these manipulated videos increasingly realistic. This trend, makes it more challenging to distinguish deepfakes from reality (Fletcher, 2018; Guera & Delp, 2018).

Cat-and-mouse game

It is evident that deepfake carries substantial risks, for example, as mentioned before, for the use of developing fake news. This underscores the urgency of developing effective methods for detecting deepfake. Westerlund (2019) has shown that there are four different ways to combat the dangers of deepfake, including regulating legislation and regulations, teaching and training in recognising deepfakes, tightening policies from companies, and finally anti-deepfake technologies for deepfake detection (DFD), deepfake prevention, and content authentication (Westerlund, 2019).

DFD can also be labelled as a cat-and-mouse game. Techniques for detecting deepfakes cannot be perfected overnight; they require continuous refinement and adaptation to keep pace with the evolving landscape of deepfake technology. This creates a cyclical process in which the development of deepfake techniques spurs advancements in DFD, and, as mentioned earlier, the technologies for creating deepfakes will persistently advance. Consequently, a deepfake detection technology/software (DFDT) must undergo continuous improvement to stay current and effectively identify the latest deepfake iterations at all times (Greengard, 2020).

Having established the definition and significance of deepfakes, as well as the associated risks and discussions surrounding the development of DFDTs, the research problem will be further elucidated in the following section.

1.2 Problem identification

The overarching problem of this report is "dangers of deepfake". However, this is an incredibly broad topic and will therefore have to be narrowed down. In this section, the problem will be introduced, followed by a presentation of the associated problem statement, objective, and ultimately the expected deliverables.

1.2.1 Introducing the problem

In the background description, the cat-and-mouse game involving deepfake and DFD is discussed, where the enhancement of deepfake creation techniques interacts with advancements in DFDT. It appears that the number of companies developing DFDT - deepfake detection company/firm (DFDC) - have been increasing in recent years (Yu et al., 2021; Mahmud & Sharmin, 2021). With an increasing number of firms entering a specific market, the competitive landscape within the market is set to evolve. It is vital for DFDCs to position themselves effectively in the competitive market of DFDTs. To do this, DFDCs must adopt strategies to differentiate themselves from their competitors, and ultimately maintain or gain a competitive advantage.

Based on this problem introduction, a problem statement will be formulated, aligning it with an objective and a deliverable.

1.2.2 Problem statement

The following problem statement, objective, and deliverable can be stated accordingly to the problem's introduction.

Problem statement

"In the emerging market of DFDTs, the challenges lie in identifying effective ways to apply a DFDC's capabilities and resources to differentiate themselves from their competitors, and maintain or gain a competitive advantage."

This problem statement addresses the challenge in the emerging market of DFDT. It shows the difficulty of finding effective strategies for DFDC to utilise their capabilities and resources to maintain or gain a competitive advantage.

To provide an as clear as possible understanding of the problem, an objective and deliverable will be established concerning this problem statement, which allows specific outcomes and a clear direction of this research.

Objective

The resulting objective, according to the problem statement, is as follows:

"Identifying potential strategies for DFDCs to apply their capabilities and resources."

This objective signifies the aim to develop effective strategies for DFDCs while using their capabilities and resources.

Deliverable

The deliverable represents the final outcome of this research. Ultimately, the deliverable for this research is:

"An overview of the status quo in regard to the possible business strategies for DFDCs to differentiate themselves from competitors whilst keeping in mind their capabilities and resources."

The goal of this research, and therefore the deliverable, will provide an examination of the status quo in the field of DFDTs. It will explore possibilities and strategies that DFDCs can use to set themselves apart from their competitors. Further to this, the unique capabilities and resources will be taken into account.

1.2.3 Type of problem and knowledge gap

In the dynamic world of DFDT, a crucial knowledge problem arises that is the subject of this research, which is identified in the problem identification above. In-depth understanding of effective strategies to position as a DFDC, to eventually maintain or gain a competitive advantage remains a challenging issue to date. This knowledge problem includes the need to understand the complex issues, for DFDCs, in an emerging market.

To specify this in terms of knowledge problems, this research focuses on the lack of detailed knowledge of strategic opportunities for DFDCs, for instance, how to exploit unique resources and capabilities to maintain or gain a competitive advantage. The knowledge gap can therefore be identified as follows. Knowledge is available that considers business strategies for companies working with emerging technologies. However, this knowledge is not specifically available for the emerging market of DFDTs. In chapter 2.1, there will be delved deeper into this knowledge gap.

This research aims to address this knowledge problem and the knowledge gap, by providing in-depth insights into DFDC's strategic positioning, focusing on identifying effective strategies that will enable them to differentiate in the emerging market of DFDT. The ultimate goal is not only to reveal the current status quo, yet providing strategies for DFDCs to eventually maintain or gain a competitive advantage in the emerging market of DFDTs.

1.3 Scope of the research

The scope of the research is an exploration within the emerging field of DFD. The market of DFDTs is an emerging market, and as a result, there is limited existing research on this topic. Therefore, it is decided to conduct the research within the Netherlands. This for the reason of creating the most concrete, and by this, the most valuable results for firms and organisations within the Netherlands. Although this research is conducted within the Netherlands, the findings and insights of this research can lay a strong foundation for further research in other countries.

1.4 Research questions (RQs)

In this section, the research questions (RQs) will be formulated. First, a main research question (MRQ), based on the problem statement, objective, deliverable, and the scope of the research. This MRQ will serve as the central focus of this research, and is stated as follows:

"What are potential strategies for deepfake detection companies in the Netherlands to maintain or gain a competitive advantage?"

To give an as clear as possible answer to the MRQ, several sub research questions (SRQs) are stated. These will delve into specific aspects, which are critical elements of the research problem. Together, these questions will give a structured and insightful examination for the MRQ. Thus, the SRQs sound as follows:

Sub research question 1 (SRQ1)

"What are the main resources and capabilities for deepfake detection companies in the Netherlands?"

Sub research question 2 (SRQ2)

"Which factors influence the environment of the market for deepfake detection companies in the Netherlands?"

Sub research question 3 (SRQ3)

"Which strategic alternatives do deepfake detection companies in the Netherlands have?"

Sub research question 4 (SRQ4)

"In what manner can the choices from SRQ3 be implemented by deepfake detection companies in the Netherlands, in order to maintain or gain a competitive advantage?"

1.5 Research approach

In the field of considering the research methodology, one of the central considerations lie in selecting the most appropriate approach to address the RQs effectively. Therefore, the distinction between quantitative and qualitative research must be made first.

Quantitative versus qualitative research

Both quantitative and qualitative research offers advantages and insights for different types of research objectives. The distinction between quantitative and qualitative research lies in the type of data which will be, or is, collected. Quantitative data is numerical data that is generally collected through structured questions. Qualitative data, on the other hand, is data in the form of words. This can be obtained in various ways, such as open questions during interviews or a questionnaire - primary data -, however also on the basis of already available information - secondary data - (Sekaran & Bougie, 2016). The MRQ raises the question of strategies to maintain or gain a competitive advantage. This underscores the requirement of qualitative data. Moreover, the DFDTs market is an emerging market, with limited research conducted so far. The necessity to gather qualitative data while considering an emerging market, steers the research towards a qualitative approach.

Exploratory versus descriptive questions

For qualitative research, two types of RQs can be stated, namely an exploratory or a descriptive question. An exploratory question is mainly used when not much is known about the topic, while concerning a complex industry with an emerging technology.
Descriptive questions are generally used to get a thorough understanding of the characteristics of objects, situations, and events (Sekaran & Bougie, 2016).

As mentioned in the scope of the research, chapter 1.3, there is stated that relatively little is known about the market of DFDT. For this reason, this research is referred to as qualitative, exploratory research. By which, insights can be drawn to collect useful information for companies involved in the development of DFDT (Sekaran & Bougie, 2016). In this scenario, the ultimate goal is to formulate a strategy that enables DFDCs to maintain or gain a competitive advantage.

Roadmap for current research

For the current study, different steps will be taken to find an answer to the MRQ, which is visualised in figure 1.2.

Figure 1.2: Roadmap for current research

First, a literature review is conducted. The aim of this review is to identify the knowledge gap in existing literature and, in doing so, pinpoint analytical approaches which are useful for the current research - "Literature review".

Once the knowledge gaps are identified, and suitable analytical approaches are determined, the next step involves figuring out how to implement these approaches with the current research - "Research approach".

Following the establishment of the research approach, the appropriate research methodology can be selected - "Research methodology". Within the research methodology, the intention is to determine the methodology that aligns with the chosen analytical approaches.

Once this is established, the analytical approaches can be completed based on the research's findings - "Results".

After presenting the results of the analytical approaches, the research's findings can be discussed - "Discussion".

Drawing from the discussion, the research's conclusion can be provided by addressing the MRQ - "Conclusion". The answer to the MRQ are derived from the collective answers to the SRQs. SRQ1 offers insights into the resources and capabilities of DFDCs. Subsequently, SRQ2 is tackled to provide insights into the environmental factors affecting DFDCs. To address SRQ3, the insights from both SRQ1 and SRQ2 are combined. Lastly, SRQ4 is addressed, building upon the findings from SRQ3, to propose strategies aimed at maintaining or gaining a competitive advantage for DFDCs. Also, the conclusion includes the research's contributions, limitations, and future recommendations.

1.6 Relevance of study

Now that the research problem, scope of the research, corresponding RQs, and the research approach is clear, the next element of this introduction is to note the relevance of the study. To elaborate upon this, the following dimensions will be discussed: the research's scientific, social, and managerial relevance.

Scientific relevance – what value does this research has for science?

The scientific relevance of this research is underscored by its contribution to the field through the introduction of a methodology suitable for a qualitative exploratory study within an emerging market. Additionally, developing a research approach which offers a deeper understanding of how companies, within emerging markets, can maintain or gain a competitive advantage.

It provides a strong foundation for further research into emerging markets, by outlining a qualitative exploratory study for the DFDT market. Moreover, it lays a foundation for further studies and research into the deepfake, DFD, DFDTs, and DFDCs.

Social relevance – what value does this research has for society?

The social relevance of this research is underscored by the fact that deepfake is a hot topic, given the increasing appearance of deepfakes in attempts to manipulate individuals. Consequently, the need for raising awareness is increasing more and more. The risks associated with deepfakes continue to escalate, as the deepfakes will become more realistic over time. Efforts should be made to help individuals in the detection of deepfakes, and this research contributes to that goal by analysing the market of DFDT, to generate a more fair and safe society.

Managerial relevance – what value does this research has for companies?

The managerial relevance lies in helping companies, especially in emerging markets, gain insight into methods to differentiate themselves from competitors, by providing business strategies for maintaining or gaining a competitive advantage. This research determines strategic choices and approaches that companies can use in the market of DFDT.

Also, this approach can be applied to respective markets, such as those focused on other AI techniques, in addition to emerging markets. Furthermore, an overview is provided of concrete guidelines for developing and implementing effective business strategies. And finally, practical insights and tools, with which business leaders can make informed decisions, to strengthen their competitive position in order to maintain or gain a competitive advantage.

1.7 Outline of the thesis

The outline of the thesis describes what topics will be discussed within this research, which follows the roadmap - figure 1.2 -.

First, a literature review will be conducted. This review is detailed in chapter 2, where relevant literature to this research is discussed. The literature review aims to pinpoint the knowledge gap and analyse previous research, thereby offering analytical approaches for the SRQs.
Subsequently, the research approaches, delineated in chapter 3, focuses on how these analytical approaches can be integrated into the current study.
Following this, chapter 4 outlines the research methodology, explaining how the research approach will be executed, including the completion of the analytical approaches. Based on the research methodology, the research is then conducted.
The research findings, fulfilling the analytical approaches, are presented in chapter 5.
These findings are discussed in chapter 6.
Lastly, chapter 7 concludes the research by providing conclusions, along with contributions, limitations, and future recommendations.

2

Literature review

"Research means that you do not know, but are willing to find out."

- Charles F. Kettering

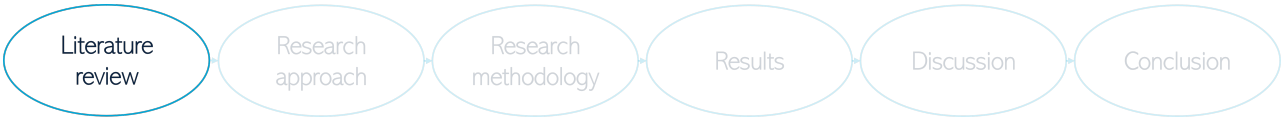

Figure 2.1: Overview of research components - chapter 2 literature review

This chapter outlines the literature review for the current research. Firstly, a literature review is performed to pinpoint the knowledge gap specific to the current research. As discussed in chapter 1, there is limited research available on business strategies for DFDCs. Therefore, first the existing knowledge, within the market of DFDTs, should be established, before delving into prior research, which will eventually serve as the foundation for the current research's analytical approaches.

Thus, the knowledge gap is identified first, followed by a description of the research process. Subsequently, in section 2.4, the keywords and selection criteria, employed for the literature review on business strategies for firms engaged in emerging technologies, are presented. The various analytical approaches identified in the literature review are then explored in sections 2.5 through 2.8.

The chapter concludes with section 2.9.

2.1 Knowledge gap

To start the literature review, in chapter 1.2.3 highlights that the DFD market is an emerging market, leading to limited existing research, will be expanded. Within this section, the knowledge gap will be further specified. The search will aim to identify what is already known, and what remains to be explored regarding the topic of business strategies for DFDCs.

2.1.1 Search description

The exploration of the knowledge gap was conducted using Google Scholar. The approach to addressing the knowledge gap was systematic, involving specific searches conducted in stages. First, studies related to DFD were sought. This was then refined to focus on studies concerning DFDCs. Subsequently, research on DFDT was examined. Following this, attention was turned to business strategies for DFDTs. Lastly, the search was further honed to investigate competitive advantages specific to DFDCs. The search terms utilised for each stage of the literature review on the knowledge gap are detailed in the subsequent search steps below.

2.1.2 Deepfake detection (DFD)

Google Scholar search term: "deepfake detection"

In Google Scholar, filtering research by publication year reveals an interesting trend in DFD studies. It shows that from 2018 onwards, there is a rise in research on DFD. Although this is only relatively small, with only four studies being published during this period. Notably, in 2019, the introduction of the "deepfake detection challenge" marked a pivotal moment. This challenge, jointly organised by the deepfake detection industry, academia, and civil society organisations, underscored a collaborative effort to emphasise and advance research in DFD (Dolhansky, Howes, Pflaum, Baram, & Ferrer, 2019; Dolhansky, Bitton, et al., 2019).

Dolhansky, Howes, et al. (2019) research articulates the significance of DFD by stating the following: "*detection of manipulated visual content is a research focus of intense interest in academia and industry, and a pressing topic of conversation in broader society. One type of manipulated visual content, high-quality videos containing facial manipulation (colloquially referred to as "deepfakes"), has become particularly salient over the last two years*". This observation highlights the escalating urgency in developing DFDTs due to the increasing prevalence of deepfakes since around 2017. The announcement of the deepfake detection challenge in September 2019 further states the notion that awareness and efforts towards DFD began gaining traction in 2019 (Dolhansky, Howes, et al., 2019; Dolhansky, Bitton, et al., 2019).

This literature review on DFD reveals that research in this area has been increasing since 2018. Thus, it demonstrates that there is existing knowledge about DFD. The subsequent phase in addressing the knowledge gap involves searching for information on DFDCs.

2.1.3 Deepfake detection companies/firms (DFDCs)

Google Scholar search terms:

- "deepfake detection company" or "deepfake detection companies"
- "deepfake detection firm" or "deepfake detection firms"
- "deepfake detection organisation" or "deepfake detection organisations"

When using the aforementioned search terms to look for studies on companies engaged in the development of DFD, no studies specifically focusing on DFDCs were found. This highlights a distinct knowledge gap.

2.1.4 Deepfake detection technologies (DFDTs)

Google Scholar search terms:

- "deepfake detection technology" or "deepfake detection technologies"
- "deepfake detection method" or "deepfake detection methods"

In line with the literature search conducted on DFD, a similar approach was adopted to filter research on DFDTs by year. The findings indicate that while some research on DFDTs was conducted in 2019, the field of DFDTs was still emerging during that time. Nonetheless, Engler (2019) asserts that the issue of deepfakes will escalate in the future and highlights that the dynamic between deepfakes and DFD will resemble a cat-and-mouse game.

From 2020 onwards, there is a modest increase in research on DFDTs. Gong, Goh, Kumar, Ye, and Chi (2020) underscores the risks associated with deepfakes and emphasises the importance of developing DFDTs. Both Gong et al. (2020) and Pishori, Rollins, Van Houten, Chatwani, and Uraimov (2020) outline methodologies for creating DFDTs. In contrast, Wu, Feng, Chang, and Yang (2020) assesses various existing DFDTs.

This literature review of DFDTs indicates that research in this area has been increasing since 2019. Especially as of 2021, more and more research is done into DFDTs. Thus, this literature review confirms that there is existing knowledge about DFDTs. The subsequent phase in addressing the knowledge gap involves searching for information about business strategies for DFDCs.

2.1.5 Business strategies for deepfake detection companies (DFDCs)

Google Scholar search terms:

- "business strategies" "deepfake detection"
- "business strategies" "deepfake detection technology" or "business strategies" "deepfake detection technologies"
- "business strategies" "deepfake detection method" or "business strategies" "deepfake detection methods"
- "business strategies" "deepfake detection company" or "business strategies" "deepfake detection companies"
- "business strategies" "deepfake detection firm" or "business strategies" "deepfake detection firms"
- "business strategies" "deepfake detection organisation" or "business strategies" "deepfake detection organisations"

When using the aforementioned search terms to look for studies on business strategies for DFDCs, no studies specifically focusing on DFDCs were found. This also highlights a distinct knowledge gap.

2.1.6 Competitive advantage for deepfake detection companies/firms (DFDCs)

Google Scholar search terms:

- "competitive advantage" "deepfake detection"
- "competitive advantage" "deepfake detection technology" or "competitive advantage" "deepfake detection technologies"
- "competitive advantage" "deepfake detection method" or "competitive advantage" "deepfake detection methods"
- "competitive advantage" "deepfake detection company" or "competitive advantage" "deepfake detection companies"
- "competitive advantage" "deepfake detection firm" or "competitive advantage" "deepfake detection firms"
- "competitive advantage" "deepfake detection organisation" or "competitive advantage" "deepfake detection organisations"

When using the aforementioned search terms to look for studies on competitive advantage for DFDCs, no studies specifically focusing on DFDCs were found. This also highlights a distinct knowledge gap.

2.1.7 Business strategies and/or competitive advantage for emerging markets

Google Scholar search terms:

- "business strategies" emerging
- "competitive advantage" emerging
- "business strategies" "competitive advantage" emerging

Using the aforementioned terms to search for studies on business strategies, or competitive advantage, for firms within emerging markets, provides numerous studies discussing "strategic management". Therefore, knowledge is available on business strategies for companies in emerging markets to either maintain or gain a competitive advantage. For the literature review into this, the search description is given in chapter 2.2.

2.1.8 Concluding knowledge gap

Thus far, research has been conducted on both DFD, and DFDTs. However, there is a lack of research on DFDCs, their business strategies, and how they can maintain or gain a competitive advantage. This identifies a knowledge gap regarding business strategies for DFDCs in the Netherlands to either maintain or gain a competitive advantage, as already discussed briefly in chapter 1.2.3. However, there is knowledge available for business strategies or competitive advantage for firms within emerging markets.

Having identified the knowledge gap, the subsequent section will outline the search criteria and methodology for identifying analytical approaches.

2.2 Search description

Having identified knowledge gaps in DFDCs, and business strategies and competitive advantage for DFDCs, the research can now focus on identifying appropriate analytical approaches. Given that no prior research exists on business strategies for DFDCs to maintain or gain a competitive advantage, the research will need to start from scratch.

To establish a foundation on what is already known about business strategies aimed at maintaining or gaining a competitive advantage for companies in emerging markets, an analysis of relevant literature is undertaken. As stated in chapter 2.1.7 the topic of "strategic management" is mentioned in numerous studies in business strategies or competitive advantage for firms in emerging markets. For this reason, a literature review on strategic management is conducted first, after which the keywords and selection criteria for the literature review on potential analytical approaches can be specified.

2.3 Strategic management

Barney and Hesterly (2015) show that a competitive advantage can ultimately be achieved by taking into account strategic management. In the field of strategic management, various components are essential, namely "strategy", "strategic management process", and "competitive advantage" (Ambrosini & Bowman, 2009; Dess, McNamara, Eisner, Lee, & Sauerwald, 2021; Ngui, 2015). Below, these components are discussed, beginning with "strategy".

Strategy

When thinking of a company's strategy, this is described as "*its theory about how to gain a competitive advantage*" (Barney & Hesterly, 2015; Ngui, 2015). A good strategy is therefore one that ensures that a competitive advantage is achieved. It is based on hypotheses and assumptions regarding how the industry is expected to evolve. To arrive at a good strategy, the so-called strategic management process are useful steps to proceed (Freeman & McVea, 2005; Dess et al., 2021; Ngui, 2015), on which is elaborated upon below.

Strategic management process

The strategic management process must be followed as carefully and systematically as possible. It is also described as "*a sequential set of analysis and choices that can increase the likelihood that a firm will choose a good strategy*" (Freeman & McVea, 2005; Dess et al., 2021). For this, a number of steps are taken, visualised in figure 2.2 (Barney & Hesterly, 2015).

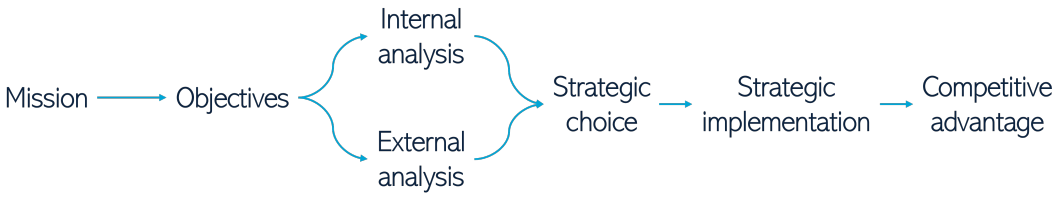

Figure 2.2: Strategic management process

Striking elements strategic management process

To further elaborate upon the different elements in the strategic management process – visualised in figure 2.2 - whilst taking the RQs into account, the components "internal analysis", "external analysis", "strategic choice", "strategic implementation", and "competitive advantage" are meaningful for the current research.

Internal analysis has everything to do with the internal strengths & weaknesses, while focusing on the analysis of the internal organisations. External analysis, on the other hand, concerns the external opportunities & threats. This focuses on the analysis of the external environment. Subsequently, the internal and external analyses will be matched to establish a strategic choice (Freeman & McVea, 2005; Ambrosini & Bowman, 2009; Dess et al., 2021; Ngui, 2015).

Barney and Hesterly (2015) describes a strategic choice as follows: "*a firm is ready to choose its theory of how to gain competitive advantage*". By assessing the company's internal strengths & weaknesses, as well as external opportunities & threats, strategic choices can be made to identify areas for improvement or change. This involves integrating the insights from both internal and external analyses (Freeman & McVea, 2005). Subsequently, strategic implementation is considered to either maintain or gain a competitive advantage (Dess et al., 2021). The concept of "competitive advantage" will be further elaborated upon below.

Competitive advantage

Christensen (2001) states a competitive advantage as "*a desire to imitate the strategies that make the most successful companies successful*". This is based on the economic value, which is the difference between what a company receives from customers for a product and the amount the company pays for the development of the product.

Competitive advantage can be both temporary - lasts for a short term - and sustained - lasts for a long time - (Ambrosini & Bowman, 2009; Ngui, 2015). Of course, competitive *dis*advantage can also be the case. Also, both of temporary and sustained nature. This means that a company creates a lower economic value than its rivals (Barney & Hesterly, 2015).

Besides competitive advantage and competitive disadvantage, there is also an intermediate path, namely competitive parity. This means that a firm creates the same economic value as its rivals (Powell, 2003).

With a clear understanding of what strategic management encompasses, and the various steps involved in the strategic management process, the next section will establish the keywords and selection criteria. These keywords and selection criteria will guide a literature review aimed at exploring potential analytical approaches for both internal and external analyses, matching these analyses, determining strategic choices, and implementing these strategies.

2.4 Keywords and selection criteria

Keywords	Synonyms
business strategies	strategic management, Innovation Management System
internal analysis	internal organisations, internal environment, strengths, weaknesses
external analysis	external environment, general environment, threats, opportunities, micro macro environment
external threats	external forces
combine internal external analyses	match internal external analyses/analysis, merge internal external analyses/analysis

Table 2.1: Keywords and synonyms of the keywords

Using the keywords and synonyms outlined in table 2.1, the literature review was conducted using Web of Science, encompassing materials available on the internet. Specifically, Google Scholar was employed for this purpose. Table 2.2 details the specific keywords searched, the corresponding number of articles, and the topics.

Keywords search	#	Topics
"internal analysis"	1	Internal analysis in general
"resource based view"	9	Internal organisations, Resource-Based View (RBV)
"resource based view" resources capabilities	6	Internal organisations, resources and capabilities explained considering the Resource-Based View (RBV)
"resource based view" knowledge	2	Types of knowledge considered with the Resource-Based View (RBV)
"resource based view" VRIO	8	VRIO conditions considered with the Resource-Based View (RBV)
"resource based view" "resource management" perspectives	6	Perspectives on Resource-Based View (RBV) - Bricolage Perspective (BP), Effectuation Perspective (EP), Lean Entrepreneurship Perspective (LEP), and Dynamic Capability Perspective (DCP)
"external analysis"	1	External analysis in general
"general environment" barney	2	External environment, General Environment framework (GE)
"structure-conduct-performance"	7	External environment, Structure-Conduct-Performance (SCP), market structures
"micro environment"	7	External environment, Porter's Five Forces (P5F)
"macro environment"	2	External environment, PESTEL
internal external analysis	3	Matching internal and external analysis, matching internal organisations with external environment, SWOT
SWOT	5	Matching internal and external analysis, matching internal organisations with external environment, Confrontation Matrix (CM)

"confrontation matrix"	2	Scoring confrontations between strengths, weaknesses, opportunities, and threats, SWOT
"strategic choice"	4	Strategic choice in general, business-level strategies, corporate-level strategies
"business-level strategy" "cost leadership"	6	Business-level strategy of cost leadership
"business-level strategy" "product differentiation	2	Business-level strategy of product differentiation
"business strategies"	9	Innovation Management Technique (IMT)

Table 2.2: Overview of keywords, the corresponding number of articles, and topics

It is worth noting that not all the literature identified proved to be relevant for the study. To address this, a set of inclusion and exclusion criteria was established. These criteria aim to ensure the selection of only pertinent literature. Table 2.3 outlines the specific inclusion and exclusion criteria employed.

Criteria	**Inclusion**	**Exclusion**
Period	From 2000 till now, also relevant literature from 1980's and 1990's of origin of analytical approaches.	Before 2000, except for literature from the 1980's and 1990's of origin of analytical approaches.
Business field	Management, business, emerging markets	Other business fields
Language	English and Dutch	All other languages
Research type	Academic journal articles, literature review articles, case study articles, empirical research, review articles	Others
Publication tool	Google Scholar	Other publication tools

Table 2.3: Inclusion and exclusion criteria for literature review

From the following section onwards, the literature review will be detailed, focusing on the keywords, and the established inclusion and exclusion criteria.

2.5 Internal analysis

Through internal analysis, the organisational strengths & weaknesses – i.e. resources and capabilities – can be identified. It helps to identify the areas within an organisation which can be changed and/or improved - weaknesses - or which do not – strengths - (Freeman & McVea, 2005). The internal analysis will also be referred to as "the analysis of the internal organisations".

Madhani (2010) discusses an analytical approach which can be used for doing internal analyses. Namely, the Resource-Based View (RBV), in which the VRIO framework is used as well (Ambrosini & Bowman, 2009; Dess et al., 2021). Below, a view on these analytical approaches - RBV and VRIO - will be presented. After which, some literature review is conducted to elaborate upon the resources found with RBV and VRIO.

2.5.1 Resource-Based View (RBV)

"The Resource-Based View (RBV) analyses and interprets internal resources of the organisations and emphasises resources and capabilities in formulating strategy to achieve sustainable competitive advantages."
- Madhani (2010)

RBV allows the resources and capabilities of a company to be mapped out, by which the link between performance of the firm and different internal factors - strengths & weaknesses - are examined (Barney, 1991). RBV states that an organisation can be seen as a bundle of resources, which are vital elements to achieve a competitive advantage as well as efficiency (Madhani, 2010; Barney, 1991; Bowman & Ambrosini, 2003; Asikhia, Osinowo, & Kassim, 2021; Lavie, 2006; Ngui, 2015).

Resources

Resources are assets that can be both tangible and intangible. Examples of tangible assets are a company's products or business premises. Intangible assets are "intangible things", such as the employee's knowledge and experience, or the reputation the firm has built up among customers. According to Halawi, Aronson, and McCarthy (2005), intangible resources have a greater chance of providing a competitive advantage than tangible assets. Especially "*intangible firm-specific resources*" such as knowledge (Halawi et al., 2005).

Knowledge

Knowledge can be divided into tacit knowledge and explicit knowledge. Tacit knowledge relates to the idea that "we know more than we can tell". An example, which is often used to explain tacit knowledge, is riding a bike. Once you know how to ride a bike, you will never forget. However, explaining how to ride a bike, is extremely challenging. Explicit knowledge, on the other hand, is "explainable" knowledge, in numbers, words, or other symbols. Take for example a maths problem, it is feasible to explain in words how to solve this maths problem (Halawi et al., 2005; Newell, Morton, Marabelli, & Galliers, 2020).

Resources subdivided

To further elaborate upon the resources, these are divided into four categories.

1. **Financial resources**: this includes money, equity holders, and self-invested money. Also, previously made profits and earnings fall under a company's financial resources;
2. **Physical resources**: consider, for example, the computers that the company has, or other hardware, and even software;
3. **Individual resources**: refers to the experience of employees, but also training provided by the company; and
4. **Organisational resources**: resources that are used for all forms of organising. For example, formal but also informal planning, controlling, and coordinating systems.

(Barney & Hesterly, 2015)

Assumptions about resources

There are two assumptions that need to be made about the resources.

1. **Resource heterogeneity**: different companies may use different resources even if they operate within the same industry. This ensures that one company will be more skilled than the other company (Ambrosini & Bowman, 2009); and
2. **Resource immobility**: the differences between companies can be maintained for a long time since it can be costly to develop resources and capabilities (Barney, 1991).

These two assumptions mean that one company will perform better than the other company. Even though the companies are working in the same market *and* with the same product (Barney, 1991).

Capabilities

Capabilities, on the other hand, are, as it were, a subset of the company's resources. Not much happens with capabilities themselves, however by combining the capabilities with the resources, strategies can be implemented in an improved manner. For example, consider the company's skills in terms of marketing (Freeman & McVea, 2005; Ngui, 2015).

2.5.2 VRIO framework

"VRIO framework means that human resources have the following characteristics: value, rarity, inimitability, and organisation. With successful realisation of resources by these conditions, sustainable competitive advantage will be achieved."
- Pesic, Milic, and Stankovic (2012)

The practical application of RBV necessitates the utilisation of VRIO for deciding whether the resource might help to achieve a competitive advantage. VRIO is an acronym, meaning Value, Rarity, Inimitability, and Organisation, and it serves as a guiding tool (Barney, 1991; Bowman & Ambrosini, 2003; Asikhia et al., 2021; Lavie, 2006). For each element of VRIO, an assessment criteria can be stated. These assessment criteria, sorted by VRIO's element, are:

- **Value:** the value of the resource;
- **Rarity:** the level of rarity of the resource;
- **Inimitability:** the extent to which the resource is inimitable; and
- **Organisation:** the extent to which the firm can be organised in such a way that this resource can be used.

(Pesic et al., 2012; Barney & Hesterly, 2015)

Using VRIO's criteria, it can be determined whether a resource has the potential to provide the firm with a competitive advantage. Figure 2.3 illustrates how the evaluation criteria for each VRIO condition can contribute to achieving a competitive advantage (Pesic et al., 2012).

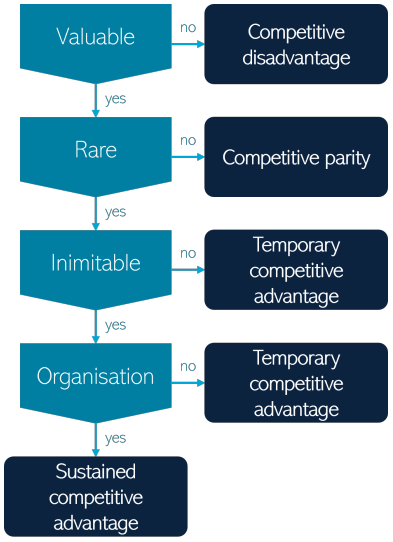

Figure 2.3: VRIO framework for achieving sustained competitive advantage

To elaborate upon figure 2.3: when all elements of VRIO are achieved, there is a *sustained* competitive advantage. When all elements are achieved except for organisation, companies have a *temporary* competitive advantage. When a resource is both valuable and rare, it is also referred to as a *temporary* competitive advantage. If a resource is only valuable, it is referred to as a competitive *parity*. And if a resource is not even valuable, competitive *dis*advantage applies (Barney & Hesterly, 2015).

Having clarified RBV and its associated VRIO evaluation of resources, the subsequent section delves into various perspectives on RBV.

2.5.3 Perspectives on Resource-Based View (RBV)

Zahra (2021) examined different perspectives that provide distinctive aspects on the use of RBV, namely:

1. Dynamic Capability Perspective (DCP);
2. Effectuation Perspective (EP);
3. Bricolage Perspective (BP); and
4. Lean Entrepreneurship Perspective (LEP).

Each of these four perspectives offers further understanding regarding a resource's potential to confer a competitive advantage, including how the resource can be leveraged to enhance its market adaptability. To clarify the distinctions between these perspectives, Zahra (2021) employs various processes or activities related to resource management/strategic management, which include:

1. **Conceptualisation:** forming resources - (1) in table 2.4;
2. **Evaluation:** determining quality, value, and performance of resources - (2) in table 2.4;
3. **Assembly:** combine different elements to create a resource - (3) in table 2.4;
4. **Orchestration:** coordination of resources - (4) in table 2.4 -; and
5. **Deployment:** making resource accessible - (5) in table 2.4 -.

Based on these processes, the distinction between the four perspectives mentioned, will be further substantiated in tables 2.4 and 2.5.

Perspective	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
RBV	✓	✓			✓
DCP				✓	✓
EP	✓		✓		✓
BP			✓	✓	✓
LEP	✓		✓	✓	✓

Table 2.4: Differences between perspectives (Zahra, 2021; Garud & Karnoe, 2003; Baker & Nelson, 2005; Sarasvathy, 2001; Ries, 2017; Teece et al., 1998)

Perspective	**About resources**	**Type of firm**	**Relevant for new markets**
DCP	• Resources are dynamic and adaptable. • Respond to market changes. • Invest in resource development.	• Organisations operating in turbulent and rapidly changing markets. • Startups.	Yes, particularly crucial for success in a new market environment.
EP	• Resources are dynamic and adaptable. • Respond to market changes. • Invest in resource development is less important.	• Organisations operating in dynamic, uncertain, and entrepreneurial environments. • Startups - especially entrepreneurs.	Yes, particularly when dealing with uncertainty, resource constraints, and rapidly changing market conditions.

BP	• Resources are dynamic and adaptable. • Respond to market changes. • Invest in resource development is important. However, organisations should focus more on considering a mix of resource leveraging, resource investment, and bricolage.	• Organisations for which resource constraints, uncertainty, or dynamic environments can be the case. • Startups.	Yes, particularly for new and emerging markets.
LEP	• Resources are dynamic and adaptable. • Respond to market changes. • Invest in resource development.	• Especially startups.	Yes, helps organisations to navigate the uncertainties and challenges associated with entering unfamiliar markets.

Table 2.5: Differences between perspectives (Zahra, 2021; Garud & Karnoe, 2003; Baker & Nelson, 2005; Sarasvathy, 2001; Ries, 2017; Teece et al., 1998)

Among the various perspectives, EP aligns most closely with emerging markets. Consequently, EP will be employed to delve deeper into RBV.

Having covered the literature relevant to analysis into the internal organisations, the subsequent phase in the strategic management process involves examining the external environment. The following section will provide a detailed literature review on external analysis.

2.6 External analysis

With an external analysis, the environmental opportunities & threats - factors which influence the market - can be identified. It helps identifying the areas within the organisation's environment which can be changed and/or improved – opportunities - or which might threat the firm's environment – threats - (Ambrosini & Bowman, 2009). The external analysis will also be referred to as "the analysis of the external environment".

Barney and Hesterly (2015) recommends utilising the General Environment framework (GE) for assessing the external environment. Additionally, the Structure-Conduct-Performance Model (SCP) serves as a valuable analytical approach for this purpose. According to Rhew and McKinney (2023), the external environment can be segmented into micro and macro environmental factors during external analyses. The micro environment encompasses opportunities & threats stemming from customers, competitors, and suppliers (Buye, 2021). Conversely, the macro environment includes opportunities & threats that originate from the broader societal context but still impact the immediate environment (Buye, 2021). For analysing micro environmental factors, the Porter's Five Forces (P5F) approach proves useful, while the PESTEL framework is beneficial for macro environmental factors (Rhew & McKinney, 2023).

Below, there will be delved into GE and SCP first, followed by P5F and PESTEL.

2.6.1 General Environment framework (GE)

"The General Environment consists of a broad trend in the context within which a firm operates that can have an impact on a firm's strategic choices."
- Barney and Hesterly (2015)

The first analytical approach, discussed by Barney and Hesterly (2015), regarding the external analysis, is GE. GE contains of six different elements, as shown in figure 2.4 (Dess et al., 2021).

Six elements of the General Environment framework (GE)

To elaborate upon the six elements of GE visualised in figure 2.4:

1. **Demographic trends**: demographic trends within the market;
2. **Cultural trends**: norms & values, and beliefs that influence the behaviour of society;
3. **Economic climate**: the "health" of the economic system in which the company operates;
4. **Legal & political conditions**: the legal system and laws that influence the company, in combination with the general relationship between the government and the company;
5. **Specific international events**: indicate the events such as terrorism, wars between countries, and civil wars, which might affect the company; and
6. **Technological trends**: opportunities and threats in technology development.

(Barney & Hesterly, 2015)

Figure 2.4: General Environment framework (GE) for analysing the external environment of a firm

2.6.2 Structure-Conduct-Performance Model (SCP)

"The basic tenet of the SCP paradigm is that the economic performance of an industry is a function of the conduct of buyers and sellers which, in turn, is a function of the industry's structure."
- McWilliams and Smart (1993)

was developed back in the 1930s by a group of economists to understand the relationship between the firm's environment, behaviour, and performance (McWilliams & Smart, 1993). In figure 2.5, the model is visualised, after which some elaboration upon the three components is given - industry structure, firm conduct, and performance (Barney & Hesterly, 2015).

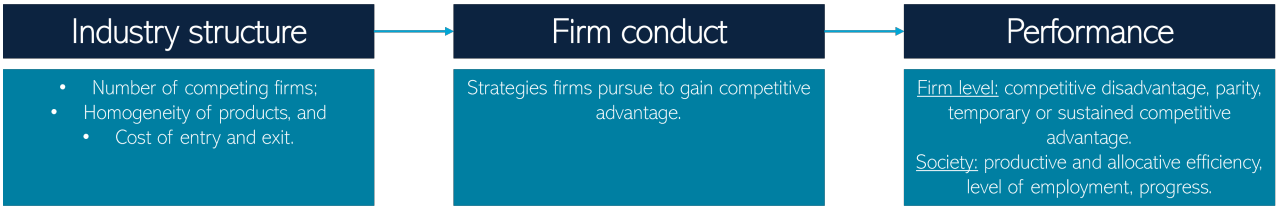

Figure 2.5: Structure-Conduct-Performance model (SCP)

Structure

The structure in SCP refers to the construction of the market in which the company operates. Economists argue that the market structure lies somewhere between monopoly and pure competition. This is divided into four different market structures, namely:

1. Perfect competition, i.e. pure competition - (1) in table 2.6;
2. Monopolistic competition - (2) in table 2.6;
3. Oligopoly - (3) in table 2.6; and
4. Monopoly - (4) in table 2.6.

The difference between these four structures are based on a number of market characteristics, which are:

1. Number of sellers/firms;
2. Type of product: varying from identical products - homogeneous -, similar products with variances – differentiated -, & completely distinct products – heterogeneous -; and
3. Barriers to enter the market - which can also be described as “ease of entry”.

(Fu, 2009; Jagpal & Spiegel, 2011; Gelos & Roldós, 2004)

Based on the three defined characteristics, the table below presents and differentiates the various market structures.

Market structure	**(1)**	**(2)**	**(3)**	**(4)**
Number of firms	Many	Many	Few	One
Type of product	Homogeneous	Differentiated	Homogeneous or differentiated	Heterogeneous
Ease of entry	High	High	Low	No entry possible
Examples	Several farmers have businesses that grow, for example, potatoes.	Several supermarket chains, such as Albert Heijn and Plus.	Various telecom companies, such as KPN and Ziggo.	ProRail- Dutch Railway management company.

Table 2.6: Differences between market structures based on the characteristics (Fu, 2009; Jagpal & Spiegel, 2011; Gelos & Roldós, 2004)

Number of firms

To further elaborate upon characteristics which influence the market structure, the “number of firms” – also known as “seller concentration” - is discussed first. The higher the seller concentration, the more the market tends towards the structure of a monopoly. Therefore, the higher the concentration, the fewer companies are active in the market. This fact is shown visually in figure, in which the previously mentioned market structures are provided 2.6. The lower the seller concentration, the weaker the market power, indicating a larger number of companies that must "divide their strength" (Fu, 2009; Jagpal & Spiegel, 2011; Gelos & Roldós, 2004).

Figure 2.6: Market structures classified by seller concentration

Type of product, and ease of entry

The next characteristic of markets discussed is the products. As mentioned before, products can be homogeneous, differentiated, or heterogeneous. The differentiation can influence the company’s position and profits in the market. In addition, it can also work as an entry barrier (Fu, 2009; Jagpal & Spiegel, 2011; Gelos & Roldós, 2004).

For instance[1], consider a customer named Ethan, Ethan is loyal to the potatoes of farmer Henry, who sells his potatoes each Tuesday on the weekly farmer’s market in Ethan’s neighbourhood. One day farmer Sarah decides to sell her potatoes on this market as well. Ethan is loyal to Henry to which he goes every week for already three years since he is living in this neighbourhood. Customers, such as Ethan, make it hard for Sarah to enter the market for selling her potatoes.

[1] Self-constructed illustration.

It can also be stated from table 2.6, and the example of Ethan and his potatoes, that when it comes to a homogeneous product, there are many "barriers of entry", which are discussed below (Fu, 2009; Jagpal & Spiegel, 2011; Gelos & Roldós, 2004).

Barriers of entry

Barriers of entry are mainly focused on new competition, and can be divided into three types:

1. **Economies of scale**: the more products are developed, the lower the cost to develop additional products, due to the fact that the fixed costs can be divided over a higher number of products. And vice versa; if less products are developed, it is relatively more costly to develop additional products;
2. **Product differentiation**: involving brand identification and customer loyalty, acts as an entry barrier for new competitors. Incumbent firms' advantages in this regard create additional costs for newcomers. If these costs outweigh potential returns, entry into the industry is discouraged, even if existing firms are profitable; and
3. **Cost advantages**: this entry barrier differs from the previously mentioned entry barriers in the following way. For example, existing companies may already have patents on their products, which ensures that new companies are not allowed to use these technologies in their products. Additional costs will therefore have to be paid to develop similar technologies. These are called *proprietary technologies*. In addition, existing companies have, in all likelihood, already built up long-term experience, which new companies have not yet developed. Acquiring this knowledge will take time for a new company, and is therefore also allocated as *managerial know-how* costs. It could also be the case that existing companies have access to raw materials that are low-priced. To ensure that new companies can also receive this, costs must be incurred, which apply as *favourable access to raw materials*.

(Buye, 2021)

Conduct

Having delved into the structural aspect of conduct will now be explored. This refers to the strategies that the company uses to maintain or gain a competitive advantage. It is the pattern of the behaviour of the firm, to adapt to the current market, or how they behave towards themselves and others in the market.

Consider, for example, pricing techniques. In such manner, the conduct determines *how* the performance of a company in a market occurs. Conduct in is exercised by the company through, among others, innovation, product strategies, and advertising (Fu, 2009).

Performance

The last element of is performance. The performance can be divided into:

1. The performance of the *individual companies*; and
2. The performance of the economy of the *market as a whole*.

(Fu, 2009; Lelissa & Kuhil, 2018)

However, the strategic management process, of the current research, mainly concerns the performance of the individual companies, and therefore the performance of the economy as a whole will not play a further role. The performance of individual companies can also be described as the level of economic efficiency which can be achieved, and it will be determined based on the economic results of a firm (Fu, 2009; Lelissa & Kuhil, 2018).

2.6.3 Porter's Five Forces (P5F)

"Porter's Five Forces framework is based on the perception that an organisational strategy should encounter the opportunities and threats in the organisation's external setting."
- Bruijl (2018)

As discussed before, P5F is used for analysing the *micro* environmental factors. P5F has been drawn up on the basis of five different factors that influence competition, namely:

1. **Bargaining power of suppliers**: assesses the power suppliers have on the industry while taking into account the number of suppliers in the market, and the product's homogeneity;
2. **Bargaining power of buyers**: assesses the power buyers have on the industry while taking into account the number of buyers in the market;
3. **Threat of new entrants**: determines the ease of entering the market while taking into account the entry barriers;
4. **Threat of substitute goods**: examines the presence of substitute goods; and
5. **Threat of existing competitors/competitive rivalry**: analyses the intensity of competition in the market.

(Buye, 2021; Indiatsy, Mwangi, Mandere, Bichanga, & Geroge, 2014; Freeman & McVea, 2005; Ambrosini & Bowman, 2009; Dess et al., 2021)

With P5F, a strategy can be determined to stay ahead of the influences of the aforementioned forces, by identifying micro environmental factors which might have an influence on the market.

2.6.4 PESTEL framework

"The PESTEL framework is used for analysing the macro-business environmental external to a firm."
- Pan, Chen, and Zhan (2019)

As discussed before, PESTEL analyses the *macro* environmental factors. PESTEL is an abbreviation for the following dimensions of the external environment:

1. Political;
2. Economic;
3. Social;
4. Technological;
5. Environmental; and
6. Legal.

(Pan et al., 2019)

Using PESTEL, the current environment can be assessed. A hypothesis associated with this analytical approach suggests that organisations maintaining continuous surveillance of the external environment enjoy a competitive advantage (Buye, 2021).

To delve deeper into the applicability of PESTEL, table 2.7 outlines the evaluation criteria for an external analysis using PESTEL, ultimately defining the overarching objective (Buye, 2021).

Environment	Assessment criteria	Goal
Political	Impact of political environment on market.	The situations within politics are clarified, which shows whether there is a form of stability in politics that is positive for the company. There may also be negative influences, for example when there are wars.
Economic	Economic condition of the market.	Consider data regarding economic growth, inflation, interest rates, taxes, and so on.

Social	Social beliefs related to the market.	This includes: norms & values, opinions, beliefs, and lifestyle of stakeholders. Demographic data regarding the population influences this, such as age, education level, income distribution, population size, and geographical division.
Technological	Technological advancements related to the market.	By gaining more insight into technological developments, which can be useful, productivity will increase and costs will decrease. Although purchasing new technologies can be costly, overall costs will decrease due to the lower production costs.
Environmental	Environmental elements within the market.	Consider natural and physical environment which are used by the company.
Legal	Laws and regulations applicable to the market.	Finding out how laws and regulations may have a significant influence on the development of the product.

Table 2.7: Six environments based on PESTEL framework with its corresponding assessment criteria, and the goal

Having examined analytical approaches for conducting external analysis, the subsequent step involves matching the analysis of the internal organisations, with the analysis of the external environment. The methods to achieve this alignment, will be discussed in the following section.

2.7 Matching internal analysis and external analysis

Several researchers have recommended SWOT as an analytical approach to match the analysis of internal organisations with the external environment (Pickton & Wright, 1998; Leigh, 2010; Ghani, Nayan, Ghazali, Shafie, & Nayan, 2010). The internal analysis uncovers strengths & weaknesses, while the external analysis identifies opportunities & threats. Consequently, SWOT was chosen as the analytical method to bridge the internal organisational analysis with the external environment (Pickton & Wright, 1998; Jenco & Cernak, 2019; Leigh, 2010; Ghani et al., 2010).

An analytical method that extends the concept of SWOT is the Confrontation Matrix (CM). CM serves as a valuable tool for strategic analysis (Jenco & Cernak, 2019). To delve deeper into the insights gained from SWOT, further investigation into the applicability of CM was deemed necessary.

In the following sections, SWOT will be discussed in greater detail, followed by an exploration of CM.

2.7.1 SWOT analysis

"A SWOT analysis evaluates the internal strengths & weaknesses, and the external opportunities & threats in an organisation's environment."
- Sammut-Bonnici and Galea (2017)

Buye (2021), Pickton and Wright (1998), and Leigh (2010) state that SWOT searches through the following elements: the strengths & weaknesses *of* an organisation, and the opportunities & threats *for* an organisation. The analysis of the internal organisations reveals its strengths & weaknesses, while the analysis of the external environment identifies opportunities & threats. SWOT allows a company to determine in which areas it is doing well and in which areas there is room for improvement (Buye, 2021).

The following quote gives a clear overview of the meaning of SWOT:

"The SWOT analysis is a list of an organisation's strengths & weaknesses as indicated by an analysis of its resources and capabilities, plus a list of the opportunities & threats that an analysis of its environment identifies. Strategic logic obviously requires that the future pattern of actions to be taken should match strengths with opportunities, ward off threats, and seek to overcome weaknesses."
- Pickton and Wright (1998)

SWOT is often presented as a two-by-two matrix, and is nothing more, or less, than a list of internal and external factors that can be divided into strengths, weaknesses, opportunities, and threats, which is shown in figure 2.7 (Pickton & Wright, 1998; Leigh, 2010; Jenco & Cernak, 2019).

Figure 2.7: Two-by-two matrix for the SWOT analysis

To go into more detail about what the strengths, weaknesses, opportunities, and threats are:

- **Strengths**: positive characteristics of a firm which ensure that the performance of a company improves;
- **Weaknesses**: factors of a company that interfere with positive organisational performance;
- **Opportunities**: factors in the external environment that serve as stepping stones for the organisation to achieve its strategic goals; and
- **Threats**: factors that have a negative effect, or negative influence, on the company's goals (Buye, 2021; Pickton & Wright, 1998; Leigh, 2010; Jenco & Cernak, 2019).

With this explanation of SWOT, CM will be examined, providing further insights into the SWOT's findings.

2.7.2 Confrontation Matrix (CM)

"A proper tool for system's strategies analysis and synthesis is the confrontation matrix. It is often used as an extended part of the SWOT method."
- Jenco and Cernak (2019)

As mentioned, CM is used to further build upon SWOT. Utilising the CM provides clarity on the interaction between the internal strengths & weaknesses with the external opportunities & threats (Jenco & Cernak, 2019; Van Wijngaarden, Scholten, & Van Wijk, 2012)

Jenco and Cernak (2019) provides a systematic plan detailing the process. Initially, both internal and external factors are identified. These factors are then integrated into SWOT, followed scoring the confrontations with CM. The ultimate step involves calculating total scores for each strength, weakness, opportunity, and threat. The scoring mechanism for this is illustrated in figure 2.8.

Elaborating upon figure 2.8, confrontations can range from a strong negative influence - – -2 - to a strong positive influence - ++ +2-. Each strength, weakness, opportunity, and threat requires an assigned total score. As depicted on the right side of figure 2.8, a numerical score is provided. Both Jenco and Cernak (2019) and Van Wijngaarden et al. (2012) affirm that this scoring system is suitable for manual evaluation.

- -	Strong negative influence	-2
-	Some negative influence	-1
	No influence	0
+	Some positive influence	+1
+ +	Strong positive influence	+2

Figure 2.8: Confrontation Matrix (CM) scoring system

Figure 2.9 provides a visualisation of CM (Jenco & Cernak, 2019).

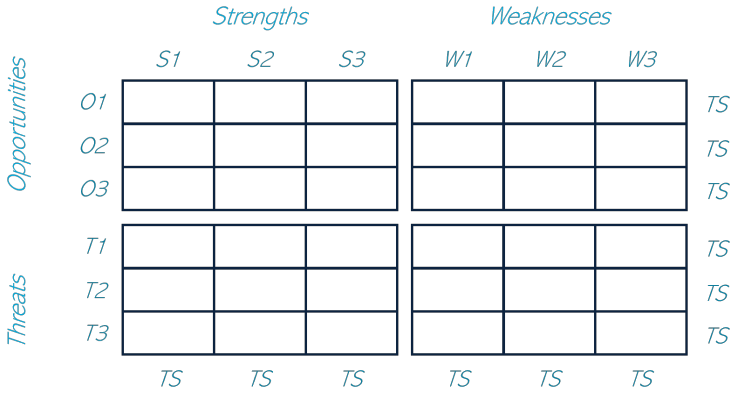

Figure 2.9: Visualisation of the Confrontation Matrix (CM)

To elaborate upon figure 2.9:

- All different strengths, weaknesses, opportunities, and threats are filled in the cells with the numbers S1, …, S4 & W1, …, W4 & O1, …, O4 & T1, …, T4;
- For each possible confrontation - strengths & weaknesses with opportunities & threats -, a score is given which ranges from - - to + + - as discussed before;
- The total score - TS - of each column - strength & weakness - and row - opportunity & threat - is calculated by aggregating the scores. Take for example a score of - -, 0, +, and -, this gives a total score of -2 (-2 plus 0 plus 1 plus -1);
- The strength and opportunity with the maximum score are the factors with the maximum internal strength or opportunity – i.e. a factor on which the firm can maximally rely on, and which has the greatest opportunity to maintain or gain a competitive advantage; and
- The weakness with the minimum score is the main weakness – i.e. something which must be improved as soon as possible -, and the threat with the minimum score is the biggest threat – i.e. the factor which must be removed preferentially. The main weakness and threat need to be monitored closely in order to improve them whenever market shifts occur.

(Jenco & Cernak, 2019; Van Wijngaarden et al., 2012)

Figure 2.10 visualises an example of how SWOT and CM can be integrated.

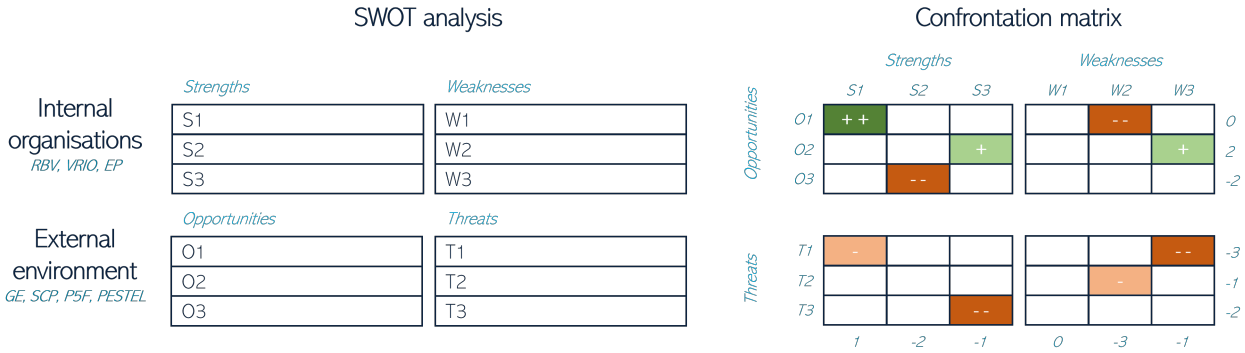

Figure 2.10: SWOT analysis and Confrontation Matrix (CM) combined

In figure 2.10, an example demonstrates how the scores in the CM are represented using the previously mentioned scoring system in figure 2.8. Additionally, the total scores are computed.

The example presented in figure 2.10 provides the following main weakness, strength, opportunity, and threat:

- Factor with maximum internal strength - strength with the highest score - in the example, it is strength S1, with a total score of 1;
- Factor with minimum internal weakness - weakness with the lowest score - in the example, it is weakness W2, with a total score of -3;
- Factor with maximum external opportunity - opportunity with the highest score - in the example, it is opportunity O2, with a total score of 2; and
- Factor with minimum external threat - threat with the lowest score - in the example, it is threat T1, with a total score of -3.

After employing an analytical approach to align the analyses of the internal organisation with the external environment, the subsequent step involves determining the strategic choice. This will be elaborated upon in the following section.

2.8 Strategic choice and strategic implementation

Having explored the internal analysis, external analysis, and the matching of these two analyses, the next phase in the strategic management process is strategic choice, which incorporates strategic implementation. The strategic choice utilises the insights gained from aligning the internal and external analyses. As previously discussed, strategic choice represents a company's approach to potentially achieving a competitive advantage.

Strategic choice can be categorised into two main types: business-level strategies and corporate-level strategies (Barney & Hesterly, 2015). These will be further elaborated upon below.

2.8.1 Business-level strategies versus corporate-level strategies

Business-level strategies are strategies that apply to a single industry or market. Cost leadership and product differentiation are the most common business-level strategies (Barney & Hesterly, 2015). On the other hand, corporate-level strategies, are strategies that apply whenever a firm wants to operate in multiple industries and markets simultaneously (Dess et al., 2021). This research focusses on the single market of DFDT. Therefore, business-level strategies are applicable to this research.

Below, the process of selecting a strategy will be discussed, followed by a description of the aforementioned business-level strategies: cost leadership and product differentiation.

Choosing strategy

The strategic management process states that a strategic choice consists of the following characteristics:

- The strategic choice supports the mission of the firm;
- The strategic choice keeps the objective of the firm as consistent as possible;
- The strategic choice takes the firm's strengths into account to exploit opportunities; and
- The strategic choice avoids the weaknesses of the firms to neutralise its threats.

(Barney & Hesterly, 2015)

2.8.2 Business-level strategies

As mentioned before, the most common business-level strategies are cost leadership and product differentiation. Because of the wide use of these strategies, those are commonly called "generic business strategies" (Datta, 2010). Below, the cost leadership is discussed first, after which the product differentiation is described.

Cost leadership

The ultimate goal of cost leadership is to reduce Firm A's costs to a point in which the costs are lower than the costs of Firm A's competitor. By this, firm A gains an advantage over its competitor - i.e. firm A has a cost advantage over its competitor. However, in what context is a firm able to have a cost advantage over its competitors? First, it can be stated that it is indeed possible to have cost advantages when competitors produce similar goods. Secondly, there are different sources of cost advantages. For these sources, the terms "economies of scale" and "*dis*economies of scale" play a role.

The concept of economies of scale is already introduced in chapter 2.6.2, however, there will be elaborated upon this some further below. The term economies of scale mean that whenever the production volume of a firm increases, the costs decrease. *Dis*economies of scale, on the other hand, mean that whenever the production volume of a firm is increasing to a certain point, the costs increase as well, instead of decrease (Christensen, 2001; Datta, 2010; Eaton & Lipsey, 1989). In figure 2.11 the gradient of (dis)economies of scale is visualised, in which "X" is the optimal level (Barney & Hesterly, 2015).

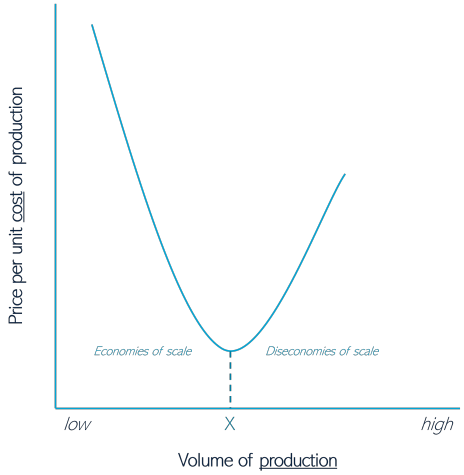

Figure 2.11: Gradient of economies of scale and diseconomies of scale

Reasons economies of scale exist

- The firm can make use of specialised machines;
- The firm can invest in employee specialisation;
- The firm can construct larger plants; or
- The firm can divide the costs over a larger number of produced units.

Considering these reasons, the average costs per unit will decrease, by which economies of scale are achieved (Barney & Hesterly, 2015).

Reasons *dis*economies of scale exist

The reason that diseconomies of scale exist, is due to the fact that the product volume is too large and by this, negative side effects might rise. The negative side effects which might occur are:

- Physical limits might occur for efficient size - for example, a warehouse can keep a maximum of 100 units, whenever there are 101 units to keep, a larger warehouse is required;
- Diseconomies according to management might arise;
- The firm's coworkers might be demotivated; or
- The distance between the market and its suppliers might enlarge.

(Barney & Hesterly, 2015)

With cost leadership, there are also cost advantages. Table 2.8, elaborates upon the different sources of cost advantages (Josee, Gongera, & Anyika, 2020; Barney, 2008).

Cost advantage	Explanation
Size differences and economies of scale	Companies of a larger size have commonly a cost advantage over smaller ones. When the product volume increases, the average price per unit decreases, up until the optimal level is reached, as stated in figure 2.11.
Size differences and diseconomies of scale	Whenever the optimal level is reached, as is depicted in figure 2.11, there might be a change in which the per unit costs increases.

Experience differences and learning-curve economies	Experience could be a firm's advantage in the sense of lowering the costs due to efficiency. This can be stated as the learning curve. The more products developed, the better the coworkers know how to produce it, the faster and more efficient the products can be made.
Differential low-cost access to productive inputs	A firm might have access to productive inputs, such as capital, labour, raw materials, and land, by which means products can be developed in a more efficient way.
Technological advantages independent of scale	Both technological hardware and software which help with the efficiency of producing products.
Policy choices	Firms need to make choices between what kind of products they are going to develop, and which services they are going to sell. All this, has influence on the cost position of the firm.

Table 2.8: Cost advantages with an explanation

Product differentiation

With product differentiation, firms try to increase the product's perceived value, compared to their rivals or substitute goods, with the goal to maintain or gain a competitive advantage. Whenever the perceived value of the firm's product rises, the price can be stated higher and by this, the revenues of the firm will increase which will generate a competitive advantage in the end (Eaton & Lipsey, 1989). For example, think about Mercedes' cars, they can differentiate themselves from their rivals, by using sophisticated engineering and a high car performance. For product differentiation, firms can either focus on the products and services directly, the relationships between the firm and its customers, or linkages between or within firms.

Table 2.9 shows the different ways for firms to differentiate their products (Barney & Hesterly, 2015).

Product differentiation directly on product	**Product differentiation by relationship between firm and its customers**	**Product differentiation by linkages between or within firms**
Timing of product introduction: for instance, introducing a product before competitors can do so. Timing of introducing the product is crucial.	*Consumer marketing:* advertising a product by marketing efforts.	*Linkages with other firms:* linkages between firm A's products, and firm B's services.
Product features: altering features on products to differentiate them.	*Product customisation:* for instance, customising the product especially to the needs of the customer.	*Distribution channels:* make a firm's specific distribution channel in which the supplier has exclusive rights to only distribute to a particular company.
Location: the physical location of the company.	*Product reputation:* a complex relationship between the customer and the firm.	*Linkages among other functions within a firm:* link employees of different functions to combine forces.

Product complexity: altering the product in a complex manner so that the product cannot be imitated easily.		*Product mix:* outcome of linkages with other firms, and linkages among other functions within a firm. The goal of with the product mix is that products or services are linked in a technological manner, and secondly, whenever a customer buys a number of products or services of a firm.
		Service and support: service and support for customers is quite important. This can be outsourced to other countries. For example, lots of customer services are based in India, simply because it less expensive.

Table 2.9: Different manners of product differentiation

2.8.3 Innovation Management Techniques (IMTs)

For the strategic choice, the strategies of cost leadership and product differentiation are discussed (Datta, 2010; Christensen, 2001; Eaton & Lipsey, 1989; Barney & Hesterly, 2015).

Igartua, Garrigos, and Hervas-Oliver (2010) and Hidalgo and Albors (2008) distinguishes so-called "Innovation Management Techniques (IMTs)", which refers to business-level strategies, processes, and tools that organisations use to promote and manage innovation within their company. Whenever the company makes use of an IMT, such as an improvement in the productivity, also the efficiency & the flexibility of the employees, and the knowledge, available within the firm, will be managed effectively (Igartua et al., 2010; Hidalgo & Albors, 2008).

Parameters for Innovation Management Techniques (IMTs)

For the IMTs, three parameters are determined, which specify the characteristics and the requirements of the IMTs:

1. The IMT is both developed and standardised. This means that the IMT must be both unique and being generally accepted;
2. The IMT must have a positive effect on the competitiveness of the firms, in which knowledge is an important element; and
3. The IMT are accessible for every firm in the market.

(Hidalgo & Albors, 2008)

Most effective Innovation Management Techniques (IMTs)

Hidalgo and Albors (2008) conducted a study among 15 states of the European Union (EU), for which 4,000 questionnaires were used. From this study it is shown that project management, business plan, firm's intranet, and bench marking are the most effective IMTs, respectively 82, 67, 66, and 60 percent of the cases. Yet, what do these IMTs entail? In table 2.10, the values are mentioned, and how these values can be achieved (Hidalgo & Albors, 2008).

Project management	Business plan	Firm's intranet	Bench marking
What are the values?			
Clarity	Clarity Thoughtfulness	Accessibility Sharing information	Quality preservation Quality improvement
How to achieve the values?			
Realistic and achievable schedule.	Making a proposal in which the plans are explained in detail. Making a proposal, so the entrepreneurs think the innovation completely through.	Intranet is available for every employee of the firm, in which they can ask questions, give some clarifications to others, and share their knowledge.	Making a proposal in which the quality can be preserved or improved.

Table 2.10: Most effective Innovation Management Techniques (IMTs) (Hidalgo & Albors, 2008)

Below, there will be briefly elaborated upon each IMT.

Project management

Project management deals with different steps for managing and also organising the projects. First, it starts with making a schedule, which must be determined in a realistic and achievable manner. During the project, project management takes care of achieving goals in the time which is states in the planning. In the end, the goal is achieving a successful project. However, it could be the case that the project fails. Whenever this is the case, project management deals with failure (Heerkens, 2002).

Business plan

A business plan is becoming more important in innovative studies. There are different factors why a business plan is getting increasingly important. These are: (1) the business model allows entrepreneurs and managers to associate the innovative product with the market, and (2) a business plan gives the manager, or entrepreneur, the opportunity to really think about the innovation, and accordingly changing the dimension of the innovation in such a way it can be applied in the perfect manner for the market (Massa & Tucci, 2013).

Firm's intranet

Corporate intranet is a manner to both manage and create a so-called "internal web" for an organisation. It can be used to exchange information through the organisation. And therefore, can be used for knowledge exploration. Which means exploring through the organisation which knowledge is available (Newell et al., 2020). Besides this, it creates networks about certain subjects for employees with which they can reach out to others (Bernard, 1996).

Bench marking

By the use of bench marking, the quality of the innovation will constantly be improved (Dattakumar & Jagadeesh, 2003). There are several definitions for bench marking, nonetheless they all have in common the measuring of the innovation, and looking into how competitors are working. In the end, with bench marking, as mentioned before, the quality of the innovation will always be kept in mind while innovating (further) (Stapenhurst, 2009).

There are several techniques for bench marking, according to Mertins, Kempf, and Siebert (1995). Bench marking can be divided into internal, and external bench marking. With internal bench marking, it is more focused on the internal processes of the firm, and with external bench marking, it is more focused on comparing several firms (Mertins et al., 1995).

Now that the business strategies of cost leadership and product differentiation are explored, along with the most effective IMTs such as project management, business plan, firm's intranet, and bench marking, the research approach can be determined. First, a brief summary of the current chapter will be provided in the next section, followed by a discussion on the research approach in chapter 3.

2.9 Conclusion of this chapter

This chapter beings by addressing the existing knowledge gap in DFDCs, their business strategies, and competitive advantage. For this knowledge gap, a research description is given which provides a literature review for strategies for firms in emerging markets to maintain or gain a competitive advantage. Numerous studies are found that discusses "strategic management". From the literature review on strategic management, it is found that the so-called "strategic management process" can be used to decide on a business strategy in order to maintain or gain a competitive advantage. Within this strategic management process, several steps are considered. Namely, some internal analysis, external analysis, matching the internal and external analyses, deciding on a strategic choice and implementing it to finally decide about a business strategy to maintain or gain a competitive advantage. Several keywords and selection criteria have been drawn up for the literature review into analytical approaches. For the internal analysis, RBV, VRIO, and EP are found to be sufficient analytical approaches, and finally provide the internal strengths & weaknesses. For the external analysis, GE, SCP, P5F, and PESTEL are found as sufficient analytical approaches, and finally provide the external opportunities & threats. SWOT and CM can be used to match the internal and external analysis. Whilst combining SWOT and CM, a strong foundation can be laid to match the internal strengths & weaknesses, and the external opportunities & threats.

Having matched the internal and external analyses, the next step in the current research is to decide about a strategic choice and how to implement this. To determine the strategic choice and its implementation, the insights gained from the internal and external analyses, as well as their alignment, will be utilised. Strategic choice can be divided into business-level strategies and corporate-level strategies. The difference can be stated quite simply in the sense that business-level strategies focus on a single industry or market, and corporate-level industries focus on a company that operates in several industries simultaneously. It may be clear for the current research that a strategy is being sought for firms within DFD's single market, so business-level strategies apply. The business-level strategies can be divided into cost leadership and product differentiation. The IMTs are then discussed, and are divided into project management, business plan, firm's intranet, and - internal or external - bench marking. How the business-level strategies and the IMTs can then be applied to the current research, is explained later in this study.

The following chapter explains in detail how these analytical approaches and findings can be applied in practice, providing a solid basis for further analysis and conclusions in this research.

3

Research approach

"Research is creating new knowledge."

- Neil Armstrong

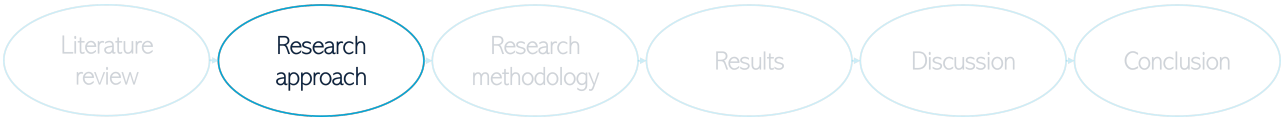

Figure 3.1: Overview of research components - chapter 3 research approach

After an in-depth analysis of the knowledge gap and the applicable analytical approaches, it can be determined how these analytical approaches can be applied to the current research.

In summary, chapter 2 delved into various analytical approaches useful for analysing the internal organisations and the external environment, as well as for matching the internal and external analyses. For the analysis of internal organisations, RBV, VRIO, and EP are considered as convenient analytical approaches. And for the analysis of external environment, GE, SCP, P5F, and PESTEL are considered as suitable analytical approaches. Both SWOT and CM serve as valuable tools to integrate the analyses of internal organisations with the external environment. Additionally, theories on strategic choice and implementation are explored, focusing on business-level strategies like cost leadership and product differentiation, which can be complemented by IMTs.

To ensure clarity and a thorough understanding of how these analytical approaches and theories can be applied to the current research, this chapter provides a detailed examination of each approach, outlining its application and relevance to the current research.

The chapter concludes with section 3.6.

3.1 Retrospective of analytical approaches

Chapter 2 provides a literature review of the knowledge gap. The knowledge gap is identified in the areas of DFDCs, business strategies for DFDCs and competitive advantage for DFDCs, where no research has been done. It is therefore decided to develop a research approach based on the knowledge available on business strategies for companies in an emerging market. The strategic management process outlines that to determine a business strategy aimed at maintaining or gaining a competitive advantage, several sequential steps must be followed. First, an internal analysis is conducted, followed by an external analysis. Subsequently, the results of these analyses are matched. Chapter 2 offers various analytical approaches for the internal analysis, external analysis, and matching the internal and external analyses. Drawing from these analytical insights and the business strategies identified in the literature, a strategic choice is made, paving the way for strategic implementation.

As previously highlighted, this chapter focuses on the application of the analytical approaches to the current research. Following the structured strategic management process, this study proceeds through its defined steps in sequence. First, an internal analysis of the DFDT market, which examines the internal organisations, will be conducted. Subsequently, an external analysis, which explores the external environment of the DFDT market, is carried out. The internal and external analyses are then matched. Finally, leveraging the findings from the matched analyses, and the business strategies identified in the literature, strategic choices and implementations for DFDCs are proposed.

For each step - i.e. (1) internal analysis, (2) external analysis, (3) matching internal and external analyses, and (4) strategic choice and strategic implementation - of this research, several analytical approaches are found in the literature review, which is discussed in chapter 2. Table 3.1 provides an overview of these analytical approaches.

Analysis	**Analysis of...**	**Analytical approach**
Internal analysis	*Internal organisations*	RBV VRIO One of Zahra (2021)'s perspectives
External analysis	*External environment*	GE SCP Micro environment: P5F Macro environment: PESTEL
Matching internal organisations and external environment		SWOT CM
Business-level strategies		Cost leadership and product differentiation complemented with IMTs.

Table 3.1: Analysis with corresponding analytical approaches

The following sections discuss in more detail how these analytical approaches, set out in table 3.1, can be applied to the current study.

3.2 Internal analysis - analysis of internal organisations

First, the internal analysis - i.e. the analysis of internal organisations. In this section, the analytical approaches to the internal analysis are explained briefly, after which is discussed how these analytical approaches can be applied to the current research.

3.2.1 Resource-Based View (RBV) and VRIO

RBV can be used to understand the resources that are applicable to the firm. The resources can be categorised into four categories, namely (1) financial, (2) physical, (3) individual and (4) organisational. Subsequently, VRIO is employed to evaluate these resources based on specific criteria: the Value they offer, their Rarity, the extent to which they are Inimitable, and how they can be Organised (Madhani, 2010; Ambrosini & Bowman, 2009; Dess et al., 2021; Barney, 1991; Bowman & Ambrosini, 2003; Asikhia et al., 2021; Lavie, 2006; Ngui, 2015). The application of these analytical approaches to the current research is elaborated upon in the subsequent sections.

Applying the Resource-Based View (RBV) and VRIO

The initial stage of employing RBV involves identifying a statement for each resource category. Specifically, one financial, one physical, one individual, and one organisational resource are sought after (Barney & Hesterly, 2015). Subsequently, these resources are evaluated using VRIO, which assesses them based on the following criteria:

- **Value:** the value of the resource;
- **Rarity:** the level of rarity of the resource;
- **Inimitability:** the extent to which the resource is inimitable; and
- **Organisation:** the extent to which the firm can be organised in such a way that this resource can be used.

(Pesic et al., 2012; Barney & Hesterly, 2015)

These assessment criteria can be used to determine whether this resource can potentially provide a competitive advantage (Barney, 1991; Bowman & Ambrosini, 2003; Asikhia et al., 2021; Lavie, 2006) - see figure 2.3. The resources are subsequently examined using a perspective of Zahra (2021).

3.2.2 Perspectives of Zahra (2021)

Zahra (2021) identified different perspectives to further elaborate upon RBV's resources assessed with VRIO. After evaluating the characteristics of various perspectives, it was determined that EP is most suitable for the current research, given its relevance to an emerging market. Zahra (2021) proposed that the resources identified by VRIO as capable of yielding a competitive advantage should also be assessed based on EP's criteria (Garud & Karnoe, 2003; Baker & Nelson, 2005; Sarasvathy, 2001; Ries, 2017; Teece et al., 1998). The assessment of resources using EP will be elaborated upon below.

Applying Effectuation Perspective (EP)

In order to apply this perspective to the current research, several steps are required. Building upon RBV and VRIO, there is identified which resources have the potential to offer either a sustained or temporary competitive advantage for the DFDC. These resources are further examined using EP, evaluating them against the following three criteria:

1. Are the resources dynamic?
2. Are the resources adaptable?
3. How do the resources respond to market changes?

(Zahra, 2021)

Meeting the criteria outlined above suggests that these resources are most likely to facilitate the attainment of a competitive advantage (Zahra, 2021).

3.2.3 Conclusion for the approach for internal analysis

In summary, the following steps are applicable to the analysis of the internal organisations:

1. Identify various resources, ensuring representation from each resource type: financial, physical, individual, and organisational. At least one resource from each category should be pinpointed;

2. Using VRIO's conditions, determine which resource could enable the DFDC to maintain or gain a competitive advantage. Resources are assessed based on their value, rarity, inimitability, and how they might be organised; and
3. Resources identified as potential contributors to maintaining or gaining a competitive advantage, as per VRIO, are then evaluated using EP. These resources are assessed against the criteria outlined by Zahra (2021) with EP, which are: (1) is the resource dynamic?, (2) is the resource adaptable?, and (3) how does the resource respond to market changes? Meeting these criteria indicates that the resources have the potential to assist DFDCs in maintaining or gaining a competitive advantage.

By analysing the internal organisations, the internal strengths & weaknesses are stated. The resources that ultimately satisfy both VRIO and EP criteria are the ones that can be identified as the internal strengths & weaknesses of DFDCs (Barney, 1991).

With the analytical approaches for analysing internal organisations elucidated, the use of analytical approaches for assessing the external environment can be discussed.

3.3 External analysis - analysis of external environment

Secondly, the external analysis, also known as the analysis of the external environment. In this section, the analytical approaches for the analysis of the external environment are discussed briefly. Following this, there is described how these analytical approaches can be applied to the current research.

3.3.1 General Environment framework (GE)

The analysis of the external environment employing GE is structured around six dimensions. Market trends relevant to each of these elements are researched and examined. For each dimension, specific evaluation criteria are established to complete GE. The six dimensions and their corresponding elements to be investigated are:

1. **Demographic trends:** demographic trends within the market;
2. **Cultural trends:** cultural trends within the market;
3. **Economic climate:** the economic system of the market;
4. **Legal & political conditions:** legal systems and laws applicable to the market;
5. **Specific international events:** specific international events, such as wars, which could have an influence on the market; and
6. **Technological trends:** technological advancements within the market.

(Barney & Hesterly, 2015)

3.3.2 Structure-Conduct-Performance Model (SCP)

Besides GE, SCP also provides an in-depth analysis of the external environment. SCP consists of three elements; (1) structure, (2) conduct, and (3) performance (McWilliams & Smart, 1993). To make this analytical approach applicable to the current research, each component is described briefly as follows:

1. **Structure:** this segment of SCP examines the number of competitors in the market, the diversity of products available, and the costs associated with entering or exiting the market. Fu (2009) has demonstrated that this is related to the market type, which can be categorised as perfect competition, monopolistic competition, oligopoly, or monopoly. To determine which of these four types of markets apply, three characteristics are examined. First, the number of companies in the market - many – few – one -. Then the type of product - homogeneous – differentiated – heterogeneous -. Finally, the ease of entering the market - barriers of entry - (Fu, 2009; Jagpal & Spiegel, 2011; Gelos & Roldós, 2004);
2. **Conduct:** this refers to the strategies the company uses to maintain or gain a competitive advantage. For example, consider pricing techniques used by a company (Fu, 2009); and
3. **Performance:** the performance is assessed based on the economic outcomes (Fu, 2009; Lelissa & Kuhil, 2018).

3.3.3 Porter's Five Forces (P5F)

Another analytical approach for the analysis of the external environment is P5F, in which an analysis is done into the micro environment (Rhew & McKinney, 2023). An assessment criterion can be stated for analysing each Porter's force. The five forces constructed by Porter, including its assessment criterion:

1. **Bargaining power of suppliers**: assesses the power suppliers have on the industry while taking into account the number of suppliers in the market, and the product's homogeneity;
2. **Bargaining power of buyers**: assesses the power buyers have on the industry while taking into account the number of buyers in the market;
3. **Threat of new entrants**: determines the ease of entering the market while taking into account the entry barriers;
4. **Threat of substitute goods**: examines the presence of substitute goods; and
5. **Threat of existing competitors/competitive rivalry**: analyses the intensity of competition in the market.

(Buye, 2021; Indiatsy et al., 2014; Freeman & McVea, 2005; Ambrosini & Bowman, 2009; Dess et al., 2021)

3.3.4 PESTEL

In addition to P5F, PESTEL is stated to be useful for analysing the external macro environment of a market, by providing clarity about the external environment of the market. A number of assessment criteria are stated, considering information given in table 2.7:

- **Political:** political influences on the market;
- **Economic:** the economic condition of the market;
- **Social:** social beliefs which are related to the market;
- **Technological:** technological advancements related to the market;
- **Environmental:** environmental influences on the market; and
- **Legal:** laws and regulations considered within the market.

(Rhew & McKinney, 2023)

3.3.5 Conclusion for the analysis of external environment

In conclusion, the following steps apply to the analysis of external environment:

1. Consider the environmental dimensions of GE;
2. Investigate the type of the market, firm's strategies, and firm's performances within the market, using SCP;
3. Assess different micro environmental influences with P5F; and
4. Assess different macro environmental influences with PESTEL.

By analysing the external environment with the use of GE, SCP, P5F, and PESTEL, the external opportunities & threats are stated (Ambrosini & Bowman, 2009).

With the analytical approaches for analysing the external environment elucidated, the use of the matching of the internal and external analyses can be described.

3.4 Matching internal analysis and external analysis

The subsequent phase in the strategic management process, pertinent to this research, involves aligning the analyses of internal organisations with the external environment. In this section, the analytical approaches for matching the internal and external analysis are discussed briefly, followed by an explanation of how these analytical approaches can be applied to the current research.

3.4.1 SWOT analysis

Pickton and Wright (1998), Jenco and Cernak (2019), Leigh (2010), and Ghani et al. (2010) propose integrating the internal and external analyses using SWOT. SWOT combines internal strengths & weaknesses with external opportunities & threats. The internal strengths & weaknesses are found with the analysis of the internal organisations - as discussed in chapter 3.2. The external opportunities & threats are found with the analysis of the external environment - as discussed in chapter 3.3. SWOT provides an overview of the internal strengths & weaknesses, and the external opportunities & threats, in a two-by-two matrix - see figure 2.7.

3.4.2 Confrontation Matrix (CM)

Jenco and Cernak (2019) suggests elaborating upon SWOT with CM. The strengths, weaknesses, opportunities, and threats are entered in the CM, accordingly to how it is visualised in figure 2.9. The extent to which the strengths confront the opportunities & threats is then scored, and the same applies to the weaknesses with the opportunities & threats. This is done using the score system mentioned in chapter 2.7 - figure 2.8.

The conclusions from the CM are determined as follows:

1. The strength and the opportunity with the maximum score is the factor with the maximum internal strength or opportunity – i.e. a factor on which the firm can maximally rely, and which has the greatest potential for the DFDCs to maintain or gain a competitive advantage; and
2. The weakness with the minimum score is the main weakness, and the threat with the minimum score is the biggest threat. These factors need to be monitored closely in order to improve them whenever market shifts occur.

3.4.3 Conclusion for matching the internal and external analysis

In conclusion, the following steps apply to matching the internal and external analysis:

1. Incorporate the internal strengths & weaknesses to SWOT's matrix;
2. Incorporate the external opportunities & threats to SWOT's matrix;
3. Consider the influences of the strengths to the opportunities & threats with the CM - with scores ranging from a strong negative influence - – -2 - to strong positive influence - ++ +2 -;
4. Consider the influences of the weaknesses to the opportunities & threats with the CM - with scores ranging from a strong negative influence - – -2 - to strong positive influence - ++ +2 -;
5. Calculate the total scores for each strength, weakness, opportunity, and threat; and
6. Consider:
   - The maximum internal strength - i.e. strength with the highest score, the best strength a DFDC can have -;
   - The minimum internal weakness - i.e. weakness with the lowest score, the main weakness of the DFDC -;
   - The maximum external opportunity - i.e. opportunity with the highest score, the best opportunity a DFDC can have -; and
   - The minimum external threat is - i.e. threat with the lowest score, the main threat for DFDC -.

Now that there is explored how the analytical approaches for matching the analyses of the internal organisations and external environment, can be combined using SWOT and CM, there will be delved into the business strategies identified in the literature review, in chapter 2.8. This will be discussed in the following section.

3.5 Strategic choice and strategic implementation - business strategies

The subsequent phase of the strategic management process, and consequently of this research, involves determining a strategic choice and its implementation. In this section, the literature considering the strategic choice and its implementation is considered and how they are relevant to the current research.

3.5.1 Business-level strategies

Barney and Hesterly (2015) considered business-level strategies as well as corporate-level strategies. Business-level strategies are applicable to a single industry or market, for which cost leadership and product differentiation are common techniques. On the other hand, corporate-level strategies are strategies applicable to firms which are working simultaneously in multiple markets (Dess et al., 2021). As already stated in chapter 2.8.1, the current research is focused on the single market of DFDTs, and therefore business-level strategies apply.

Business-level strategies can be divided into cost leadership and product differentiation. The goal of cost leadership is to reduce the costs to a certain point in which the firm's costs are lower than its competitors (Christensen, 2001; Datta, 2010; Eaton & Lipsey, 1989). Product differentiation, on the other hand, is focused on differentiating the product in such a way a firm gets advantage over its competitor (Eaton & Lipsey, 1989).

3.5.2 Innovation Management Techniques (IMTs)

Igartua et al. (2010) and Hidalgo and Albors (2008) distinguishes IMTs, which refers to business-level strategies, processes, and tools that organisations use to promote and manage innovation within their company. The IMTs are (1) project management, (2) business plan, (3) firm's intranet, and (4) (internal or external) bench marking. Each IMT has its own characteristics, focused on the value it achieves (Hidalgo & Albors, 2008).
Project management is focused on providing clarity by dealing with steps for managing and organising projects (Heerkens, 2002).
Business plans focus on providing clarity and thoughtfulness by stating a proposal in which the business' plan is discussed in detail (Massa & Tucci, 2013).
Firm's intranet focus on providing accessibility and sharing information, by providing an easy-accessible platform in which each employee can ask its questions (Newell et al., 2020; Bernard, 1996).
And, (internal or external) bench marking focus on providing quality preservation and quality improvement, by stating how to preserve and improve the quality of the product. Bench marking can be either focused on internal or external processes (Dattakumar & Jagadeesh, 2003; Stapenhurst, 2009; Mertins et al., 1995).

Considering the differences between the IMTs, internal bench marking most closely matches the business-level strategies of cost leadership and product differentiation for DFDCs, since it is focused on improving internal processes to preserve and improve the quality of the product (Stapenhurst, 2009; Mertins et al., 1995).

3.5.3 Conclusion for strategic choice and implementation

In conclusion, to formulate a strategic choice and its implementation, the insights from matching the internal and external analyses can be integrated with the IMT of internal bench marking. This can be achieved by leveraging the business-level strategies of cost leadership and product differentiation.

3.6 Conclusion of this chapter

After reviewing the literature to identify applicable analytical approaches for the current research, the next step involves determining how to apply these approaches. This is discussed within this chapter, and is summarised in this section.

Internal analysis - analysis of internal organisations

For analysing the internal organisations, RBV, VRIO, and EP are considered. These analytical approaches focus on how firms can leverage their internal capabilities and resources to maintain or gain a competitive advantage. RBV identifies resources across four categories. For each category, at least one resource is identified and subsequently evaluated using VRIO and EP. Eventually, the internal strengths & weaknesses will be provided.

External analysis - analysis of external environment

For the external analysis, GE, SCP, P5F, and PESTEL are employed. Each of these analytical approaches is accompanied by specific assessment criteria, forming the basis for analysing the external environment. Eventually, the external opportunities & threats will be provided.

Matching internal and external analysis

To match the internal and external analyses, SWOT and CM are used. SWOT combines the internal strengths & weaknesses with external opportunities & threats, utilising a two-by-two matrix. The interactions between strengths with opportunities & threats and weaknesses with opportunities & threats are then evaluated using CM. This method assigns scores to these interactions, ranging from a strong negative influence - – -2 - to a strong positive influence - ++ +2 -. A total score is determined for each strength, weakness, opportunity, and threat. Eventually, the most significant strength, weakness, opportunity, and threat will be provided.

Strategic choice and strategic implementation - business strategies

Based on the outcomes from matching the internal and external analyses, the strategic choices and implementation strategies are determined. Business-level strategies, cost leadership and product differentiation, are considered. To refine these strategies, the IMT of internal bench marking is employed, emphasising product quality maintenance and enhancement.

Research approach summary

The research approach for the current study is structured as follows:

- Initiate with an internal analysis using RBV, VRIO, and EP to evaluate the internal organisations;
- Conduct an external analysis using GE, SCP, P5F, and PESTEL to assess the external environment;
- Match the internal and external analyses using SWOT and CM;
- Utilise CM to identify the main internal strength, external opportunity, internal weakness, and external threat, which inform the strategic choice and its subsequent implementation; and
- Conclude with internal bench marking, incorporating product differentiation and cost leadership to finalise the strategic choice and implementation.

Having outlined the application of various analytical approaches in the current research, the subsequent chapter will delve into the methodology detailing how the research will be conducted.

4

Research methodology

"No research without action, no action without research."

- Kurt Lewin

Figure 4.1: Overview of research components - chapter 4 research methodology

After outlining the research approach derived from the literature review, the subsequent step involves defining the research methodology. Central to this is determining the appropriate methodology that aligns with the chosen analytical approaches for conducting the research. This chapter delves into this aspect in detail.

First, a literature review into data collection methods is provided. This section discusses different data types, and explores the methodologies commonly employed to gather such data. Then, the exploration into data analysis methods is given. This section delves into the various techniques and tools available for analysing the collected data. Then, the proposed research methodology for the current research is given.

This chapter concludes with section 4.5.

4.1 Data collection

Before delving into the specifics of the research methodology chosen for the current research, it is essential to first identify the type of data collection that best suits the research objectives. This section will explore various data collection methods, aiming to provide the most suitable research methodology for the research.

4.1.1 Primary data versus secondary data

Firstly, when discussing data collection, two different types of data can be collected; primary and secondary data - which is already discussed briefly in chapter 1.5 -. Primary data is data collected by the researchers themselves. This can be done through surveys, interviews, or even observations. Secondary data, on the other hand, is data from others, such as company archives, websites, other research that can be found on Google Scholar, news articles, and so on (Hox & Boeije, 2005).

As reviewed with the literature, chapter 2.1, there is a knowledge gap in research on DFDCs, business strategies for DFDCs, and competitive advantage for DFDCs. Therefore, data will be collected directly by the researcher, thus primary data will be collected.

Various methods exist for collecting primary data, which will be explored in the subsequent section.

4.1.2 Collecting primary data

Hox and Boeije (2005) suggests collecting primary data through surveys, interviews, and/or observations. Further explanation of these different primary data collection methods is provided below.

Surveys

Surveys use a structured questionnaire to explore a wide range of opinions, beliefs, attitudes, and norms & values. This method facilitates the collection of information from a sample. A sample is a representative part of the whole population. Table 4.1 gives an overview of the advantages and disadvantages of surveys (Scheuren, 2004).

Advantages	Disadvantages
Not that time-consuming.	The way a question is asked might influence the answer to it.
Costs can be quite low.	Survey non-response might lead to bias due to less representative sample of the whole population.

Table 4.1: Advantages and disadvantages of a survey (Scheuren, 2004)

Interviews

Another way of gathering primary data is through interviews. An interview can be described as a conversation between the interviewer and the respondent in which questions are asked to obtain information, opinions, or insights. The intention is to gather in-depth information on the subject of the interview. Interviews may be conducted in person or by telephone. Table 4.2 shows the advantages and disadvantages of both types of interview (Holstein & Gubrium, 2003).

Interview type	Advantage	Disadvantage
Personal interviews	Clarify doubts	High costs/time
	Non-verbal clues - e.g. body language	Geographical limits
	High response	Response bias
	Special visual aids/scoring devices	Confidentiality difficult
Telephone interviews	Less discomfort than face-to-face	Limited interview length
	More efficient	Low response rate
	Lower costs	Only verbal clues

Table 4.2: Advantages and disadvantages of personal and telephone interviews (Holstein & Gubrium, 2003)

In addition to interviews conducted in person or over the telephone, interviews can also be categorised based on different structures.

Interview structures

Interview structuring types can be divided into unstructured, structured and semi-structured. Unstructured interviews are interviews that do not have a predetermined format. Structured interviews, on the other hand, have a pre-defined, strict format and are also ordered in a certain way. Semi-structured interviews are a mixture of unstructured and structured interview formats. In semi-structured interviews there are some pre-defined questions, nevertheless there are still some possibilities to ask any follow-up questions (Brinkmann, 2014).

Observations

Observations are used to control the quality of fieldwork by observing behaviour, events, or phenomena in a given context. The researcher uses direct observations to gain insight into naturally occurring situations without influencing them. This type of data collection is often used to study behaviour and processes in their natural habitat. Observations can be divided into direct observations and participant observations. The advantages and disadvantages of both types of observation are shown table 4.3 (Jorgenson & Pogrebin, 2003).

Observation type	Advantage	Disadvantage
Direct observations	Covers events in real time	Time-consuming
	Covers event context	Might miss facts
		Observer's presence might cause change
Participant observations	Same as ***direct observations***	Same as ***direct observations***
	Insightful into interpersonal behaviour	Bias due to investigator's actions

Table 4.3: Advantages and disadvantages of direct and participant observations (Jorgenson & Pogrebin, 2003)

4.1.3 Sampling type

Having discussed various methods of primary data collection, the approaches to sampling a subset from a larger population are discussed within this section. This so-called subset is a "sample". As described in chapter 4.1.2; a sample is a representative component of the whole population (Scheuren, 2004).

Sampling can be divided into non-probability and probability sampling. In non-probability sampling, members of the population *do not* have an equal chance of being selected for the sample. In probability sampling, the main aim is to select a sample from the population in which members of the population *do have* an equal chance of being selected (Acharya et al., 2013; Vehovar et al., 2016).

Both probability and non-probability sampling can be divided into several categories. These categories are stated and elaborated upon in table 4.4.

Sampling type	Category	Elaboration
Non-probability	*Purposive*	Elements of the population are selected for the sample based on convenience.
	Quota	A specific number of participants is determined based on a particular characteristic of a population element. Once this number is achieved, attention shifts to another characteristic of a population element, and a similar number of participants with this characteristic are then selected, and so forth.
	Network	Snowball sampling is a commonly used technique that makes use of the researcher's network.
Probability	*Simple random*	Each element of the population is assigned a number. Subsequently, a random number generator is utilised, and participants corresponding to the numbers generated by the random number generator are included in the sample.
	Systematic random	The initial participant for the sample is selected randomly from the population. Subsequent participants are then chosen to use a periodic process, specifically every nth participant following the initially selected participant.
	Stratified random	Random sampling is conducted from each segment or stratum of the population. These strata could be categorised by factors such as race, age, gender, income, ethnicity, or education. A specific number of individuals are then randomly chosen from each of these strata.
	Cluster random	The population is segmented into various groups and clusters. Subsequently, a random sample of these clusters is selected, and data is then collected from all individuals within the chosen clusters.

Table 4.4: Elaboration on different sampling categories (Acharya et al., 2013; Vehovar et al., 2016)

4.1.4 Proposed data collection method

Different data collection methods are discussed. From this, a data collection method is suggested.

As indicated in 4.1.1, primary data will be collected in this study, due to the knowledge gap in the research field of DFDCs, business strategies for DFDCs, and competitive advantage for DFDCs. Primary data can be collected in several ways, namely surveys, interviews, and observations. Observations are irrelevant to this research, as there is no need to observe any particular phenomena. Interviews have been chosen, mainly because, compared to surveys, interviews can address ambiguities. Interviews can be unstructured, semi-structured, and structured. Given the knowledge gap, there is still little research on business strategies for DFDCs, which precludes the use of structured interview questions. For this reason, unstructured interviews are used.

As for the type of sampling, it is important to first define the population. There is decided to collect data from experts in the field of (cyber) security, IT risk, DFD, AI, and other related topics. Therefore, the population can be stated as follows:

"Experts in (cyber) security, IT risk, deepfake detection, Artificial Intelligence, and other related fields, working within companies and organisations in the Netherlands."

It is impossible to know all population elements, so probability sampling is quickly ruled out, and thus non-probability sampling will be used. To be more specific, network sampling will be used.

Thus, interviews will be conducted. The next section discusses in more detail how the interview findings can be analysed from which insights emerge.

4.2 Data analysis

As mentioned in chapter 1.5, the current research is of a qualitative exploratory nature. In this type of research, it is common to use a systematic approach for data analysis.

Qualitative Content Analysis (QCA) is a useful tool for interviews used in researches of qualitative exploratory nature, in which several methods for categorising the interview's text are proposed (Mayring, 2000; Kuckartz, 2019). One of them is "thematic coding". Thematic coding can be explained literally as coding text based on themes. For this, a coding scheme with codes are provided. These codes are of thematic nature and are literally the themes discussed during the interviews (Mayring, 2000; Kuckartz, 2019). Thus, QCA categorises collected data from interviews by creating thematic coding schemes.

For QCA, it is necessary to transcribe the interviews. Recording the interviews could be beneficial for transcription purposes. Once transcribed, the interviews are coded. This involves assigning labels to specific segments based on predefined codes from the coding scheme, indicating the discussed topics. While specialised software like AtlasTI is available for this purpose, it can also be done using standard text processing tools like Word, utilising the "Insert Comment" feature (Mayring, 2000; Kuckartz, 2019; Monaro, Gullick, & West, 2022).

After coding the transcribed interviews, the codes are organised into a coding scheme. This scheme typically consists of rows for participant codes and columns for codings. The participant's spoken text corresponding to each code is entered in the intersecting cells. The coding scheme can be conveniently visualised using Excel. Analysing this scheme provides insights into the various perspectives of participants on the topics covered during the interview (Mayring, 2000; Kuckartz, 2019).

4.2.1 Proposed data analysis method

In conclusion, the findings of the literature on data analysis are as follows. As a data analysis method that is qualitative in nature, QCA is a relevant methodology. For QCA, recording the interviews is essential, followed by transcription. Subsequently, the interviews are coded based on predetermined themes, a process referred to as "thematic coding". These coded findings are then organised within a coding scheme. Analysis is conducted on various segments in relation to the codes. Finally, the results from different interviews are compared to draw results.

4.3 Pilot interviews

Due to the knowledge gap, it is decided to conduct pilot interviews to find out which markets can be considered as potential markets to be further investigated within this research. These pilot interviews will be semi-structured, with predefined questions listed in appendix A. The objective of these pilot interviews is to understand perspectives on deepfakes across various industries. Insights from these pilot interviews will inform the development of a strategy for the subsequent expert interviews.

4.3.1 Target audience

Utilising snowball sampling, the researcher will contact several experts from various fields, as identified in the population and listed in Appendix B, through the researcher's professional network across different markets. Eventually, eight different pilot interviews within five different fields are conducted, namely health care, consultancy, media, insurance, and law.

4.3.2 Findings

Due to these interviews being the pilot ones, there is no need to code these interviews. It is decided to focus on two crucial elements. First, the fact whether there is awareness of deepfakes. And secondly, if the experts see potential to warrant the use of DFDT.

Firm A - Health care institution

Deepfake does not currently seem to bring serious issues within this health care institution. While there is awareness of the potential of deepfake's misuses in telemedicine, the dangers are not considered significant enough to warrant the institution's investment in DFDT.

Firm B - Consultancy firm

This consultancy firm considers deepfakes to be a relevant cyber security threat. Despite awareness and recognition of the challenges surrounding detection, the business justification for investing in DFDT remains unclear. The complexity of DFD remains a stumbling block.

Firm C - Media organisation

Deepfake is considered a prominent topic within this media business. There is not only awareness of the possible dangers, also of the positive applications of deepfake and AI. This company seriously considers purchasing DFDT, having quickly moved it up their priority list.

Firm D - Insurance company

This insurance company recognises the emerging risks of deepfake, especially in relation to claims fraud. Awareness is there, and while collaboration with partners for DFD is not yet in place, future investments are being considered depending on the availability of effective solutions within the market.

Firm E - Law firm

Deepfake is taken seriously within this law firm, with an emphasis on cyber security risks and possible cases of fraud. Awareness and interest in purchasing a DFDT are there.

4.3.3 Overall finding of pilot interviews

Overall, these insights suggest that while organisations are aware of deepfake fraud, the willingness to invest in DFDT depends on each company's specific risk perception and context. While some sectors consider it a high priority, for others the business justification for investing in DFDT still remains a consideration. This underlines the complexity and variability of responding to deepfake risks across different business environments.

4.4 Expert interviews

Having discussed the pilot interviews, the next step is to outline the expert interviews. As previously mentioned, semi-structured interviews will be employed, with a set of predetermined questions being developed. Snowball sampling will be utilised to identify suitable participants, leveraging the researcher's professional network as detailed in appendix B. Ultimately, the objective of the expert interviews is to provide insights that will inform the evaluation criteria of the various analytical approaches.

4.4.1 Assessment criteria

Based on the research approach, as described in chapter 3, different assessment criteria are determined for each analytical approach, except for VRIO and EP, because these analytical approaches will discuss the findings of the expert interviews for RBV in chapter 6.

Table 4.5 states the assessment criterion per analytical approach, which help to arrive at semi-structured interview questions. The questions for the semi-structured interviews are provided in appendix C.

Analysis of	**Analytical approach**	**Assessment criterion**
Internal organisations	*RBV*	Financial, physical, individual, and organisational resources in DFDT development.
External environment	*GE*	Demographic trends: demographic trends within the market. Cultural trends: norms & values, and beliefs of potential customers. Economic climate: economic system of market of DFD. Legal & political conditions: laws, and regulations of DFD. Specific international events. Technological trends.
External environment	*SCP*	Structure: number of competitors, heterogeneity of products, and costs of entering or exiting the market. Conduct: strategies of DFDC. Performance: economic results of DFDC.
External environment	*P5F*	Bargaining power of suppliers and buyers, and threat of new entrants, substitute goods and existing competitors/competitive rivalry.
External environment	*PESTEL*	Political: impact of political environment on market of DFDT. Economic: economic condition of market of DFDT. Social: social beliefs of market of DFDT. Technological: technological advancements related to market of DFDT. Environmental: environmental elements necessary for product development. Legal: laws and regulations related to market of DFDT.

Table 4.5: Assessment criterion per analysis and analytical approach

4.4.2 Target audience

Appendix B shows an overview of the researcher's network. It has been decided to re-approach the experts from the pilot interviews for the expert interviews. However, it is chosen to not contact the health care institution again, due to the findings of the pilot interviews. Thus, there is decided to focus the expert interviews on the following industries: consultancy, media, insurance, and law.

Within these firms, experts are contacted in the fields of (cyber) security, IT Risk, DFD, AI, and related fields. From each firm, two experts are interviewed, to gather diverse insights from that particular firm. Also, appendix B shows which experts from the researcher's network are contacted for the pilot interviews.

4.4.3 Analysis method

In order to gain insights from the interviews, the expert interviews will be analysed. As mentioned before, it is suggested to do this through QCA with thematic coding. An outline of the codes that needed to be collected in order to eventually come up with findings for the current research is provided in appendix D. These codes are based on the assessment criteria shown in table 4.5.

Then, the transcribed interviews will be coded. This can be done via Word, with the "Insert Comment" function. After coding each transcribed interview, the codes and quotes were added to an Excel spreadsheet. How the expert interviews are coded in the Excel spreadsheets, will be discussed in chapter 5.1.

4.5 Conclusion of this chapter

This chapter delves into the research methodology, focusing on the chosen data collection method. Given the identified knowledge gap, the decision has been made to gather primary data. This primary data will be obtained through semi-structured interviews. In these interviews, participants will be presented with some predetermined questions, yet they will also have the opportunity to elaborate upon their answers.

In preparing for the interviews, a sampling method needs to be determined. Sampling can be categorised as either non-probability or probability. The key distinction lies in the equal - probability sampling - or unequal - non-probability sampling - chances each element of the population has of being selected for the sample. When opting for probability sampling, the researcher must have comprehensive knowledge of the entire population. For the purposes of this research, the population is defined as follows:

"Experts in (cyber) security, IT risk, deepfake detection, Artificial Intelligence, and other related fields, working within companies and organisations in the Netherlands."

Given that it is impractical to know all the elements of the population, a non-probability sampling approach will be adopted, leveraging the researcher's network for data collection.

In order to analyse the collected data, QCA will be used, since the qualitative exploratory nature of the current research. With QCA thematic coding could be used, for which a list of codes should be predefined. The interviews should be recorded for transcription and subsequent coding. This will be accomplished using Word and its "Insert Comment" function.

Due to the knowledge gap, it was decided to conduct some pilot interviews first. Eight pilot interviews were conducted in five different sectors - health care, consulting, media, insurance and law. The aim of these pilot interviews was to get an idea of how people in different industries think about deepfakes. And based on the results, a strategy was chosen for the expert interviews. It was decided to exclude the health sector in the expert interviews, the consulting, media, insurance and legal sectors are included, given the potential seen in DFDTs by the experts. For the expert interviews, eight interviews were conducted within the four industries mentioned above; two experts from each sector were interviewed. For the expert interviews, evaluation criteria were provided on which the semi-structured interview questions are based.

Now that the methodological framework has been established and the semi-structured interviews have been crafted, the subsequent step involves conducting the actual research. The following chapter will delve into the results of the study.

5

Results

"Research is seeing what everybody else has seen and thinking what nobody else has thought."

- Albert Szent-Györgyi

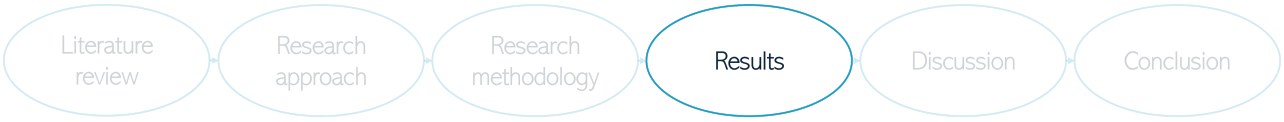

Figure 5.1: Overview of research components - chapter 5 results

This chapter provides the outcomes of the interviews. First, the coding process of the expert interviews is outlined. Subsequently, there is a concise explanation of how the interview codes were transformed into results. The findings are then analysed and discussed. Firstly, the insights from the analysis of the internal organisations are presented, grounded in the analytical approach RBV. Following the internal analysis, the results from the analysis of the external environment are elaborated upon, utilising the analytical methods GE, SCP, P5F, and PESTEL.

This chapter concludes with section 5.5.

5.1 Coding schemes

As previously discussed in chapter 4.4.3, the expert interviews were coded using Word's "Insert Comment" function. Subsequently, these codes, along with their corresponding quotations, were incorporated into a coding scheme within an Excel spreadsheet. To enhance clarity, the coding schemes were presented in multiple phases, which are described below.

Phase 1: Excel spreadsheet for all quotes

First, an Excel spreadsheet was created which shows all different statements of the participants belonging to that code. Appendix E.1 shows a small part of the Excel spreadsheet listing all the statements.

The analytical approaches - RBV, VRIO, EP, GE, SCP, P5F, and PESTEL - are listed in the first row of the coding scheme. The second row specifies the evaluation criteria, which represent the latter part of the code. For instance, for the code "RBV financial resource," the second row indicates "financial resource". A brief explanation of each code is provided in the subsequent row. Lastly, the fourth row, calculates the number of filled cells - with Excel's function "=COUNTA" - corresponding to each code, offering an overview of the number of quotes associated with that particular code.

The first column of the Excel spreadsheet contains the participant codes. The cell at the intersection of the code and the participant's code displays the respective participant's quote.

All quotes in this Excel spreadsheet are presented in Dutch, reflecting the language used during the interviews.

Phase 2: Excel spreadsheet for most frequently mentioned topics

The subsequent step involved creating an Excel spreadsheet to highlight the most frequently discussed topics. Appendix E.2 shows a small part of the Excel spreadsheet listing all the statements. The objective was to identify two topics for each code, although this was not achievable for every code.

In this sheet, the first column features the codes as detailed in appendix D. The second column provides a brief description of the topic, while the third column indicates the number of quotes associated with each code - calculated by the Excel function "=COUNTA" -. The quotes selected for the most frequently discussed topics were sourced from the Excel spreadsheet discussed in "Phase 1: Excel spreadsheet for all quotes".

The participant codes are listed in the first row, and the cell where the code and participant code intersect displays the respective participant's quote.

Similarly to sheet of "Phase 1: Excel spreadsheet for all quotes", all quotes within this Excel spreadsheet are presented in Dutch.

Phase 3: Translate most frequently mentioned topics to English

Given that the interviews were conducted in Dutch, the subsequent step involved translating the quotes into English. The sheet has the same structure as the previously discussed Excel spreadsheet - "Phase 2: Excel spreadsheet for most frequently mentioned topics". Appendix E.3 shows a small part of the Excel spreadsheet listing the most frequently mentioned topics with the participant's quotes in English.

5.2 Interview codes to findings

Before the interview codes can be translated into findings, a brief introduction is given. As described earlier, a number of quotations emerged from the interviews that correspond to the formulated code list, as shown in appendix D. The quotes and insights from the experts will serve as findings for the analytical approaches. For each finding that corresponds to a code, an overview is given to identify which participant provided a statement reflecting the same insight. This is demonstrated using an example in accordance with table 5.1.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
A	B	✓			✓	✓	✓		✓

Table 5.1: Example table showing which experts agree with the finding of the analytical approach

Thus, such tables show which participant provided a statement that brings the same insight. The first column shows the code. The second column shows the finding, i.e. the insight given by the expert(s). The other columns show whether the expert gave a statement that brings the same insight. This is done by using "✓". If there is a "✓" in the cell, it means that the expert made a statement which provides the same insight. For the current example can be stated that for code "A", participants B1, C2, D1, D2, and E2 mentioned the finding "B".

5.3 Internal analysis - analysis of internal organisations

For analysing the internal organisations, three distinct analytical approaches are outlined, each building upon the previous one in sequence. These are RBV, VRIO, and EP. The analytical approach RBV will be elaborated upon the insights from the expert interviews. Chapter 6 will delve into the findings of RBV in conjunction with the criteria of VRIO and EP.

As discussed, for RBV, there are four different types of resources, namely (1) financial, (2) physical, (3) individual, and (4) organisational. For each type, it is decided to collect at least one resource. Below, there will be elaborated upon each type of resource using the findings of the expert interviews.

Financial resources

After analysing the interviews, only two financial resources were found.

"If you are going to use a DFDT, you want a tool from a party that actually keeps up as much as those who can develop deepfakes. More on a licensing basis, at least software that continues to be developed."
- Participant C1, 10-01-2024

This statement shows the potential in DFDT being offered to customers on licence basis, with the aim of ensuring that the DFDT continues to evolve and is therefore up-to-date at all times. A financial resource is therefore "**licence fee**" from which a revenue stream is provided for the DFDC.

Whether other experts provided a statement that brings the same insight, is stated in table 5.2.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
RBV financial resource	Licence fee			✓					

Table 5.2: Experts who agree with the finding "licence fee" for code "RBV financial resource"

"What I have also read several articles about is that subsidies are offered from, among others, the Dutch government for AI-related innovations. So companies, including start-ups, can thus fund the development of their technology to recognise deepfakes."
- Participant B2, 26-01-2024

From this statement it can be extracted that opportunities are offered from governmental institutions in the Netherlands to receive, as a company, a grant to work on AI innovations. Participant B2 states that DFDTs are considered as an AI innovation. A financial resource is therefore "**subsidies**" that DFDC might receive from governmental institutions in the Netherlands.

Whether other experts provided a statement that brings the same insight, is stated in table 5.3.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
RBV financial resource	Subsidies		✓						

Table 5.3: Experts who agree with the finding "subsidies" for code "RBV financial resource"

Physical resource

For the physical resource, only one resource emerged from the expert interviews.

""Garbage in, garbage out", if the data you throw in is incorrect, or incomplete, then what comes out will not be useful or will only be useful in parts."
- Participant B1, 10-01-2024

What this statement indicates is the fact that data should be complete and reliable. If incorrect data is used, incorrect results will also be provided by the technique. The physical resource is therefore "**reliable data**".

Whether other experts provided a statement that brings the same insight, is stated in table 5.4.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
RBV physical resource	Reliable data	✓							

Table 5.4: Experts who agree with the finding "reliable data" for code "RBV physical resource"

Individual resources

For the individual resource, knowledge and experience are particularly central, based on the findings of the expert interviews. The expert interviews showed that knowledge and experience regarding deepfake and DFDT, mainly originated from their educational background, personal interest, and "learning-on-the-job" - meaning that knowledge and experience was gained in the work field -. Thus, the individual resources are **study and/or personal interest based knowledge**, and **"learning-on-the-job" based experience**.

Whether other experts agree to these findings, is stated in table 5.5.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
RBV individual resource	Study and/or personal interest based knowledge		✓	✓	✓	✓			✓
	"Learning-on-the-job" based experience		✓		✓	✓			✓

Table 5.5: Experts who agree with the findings "study and/or personal interest based knowledge" and ""learning-on-the-job" based experience" for code "RBV individual resource"

Organisational resources

With organisational resources, planning and coordinating during the development of, in this case, DFDT are central.

"I became familiar with DFDCs because they expressed themselves in the media."
- Participant B1, 10-01-2024

From this statement in connection with the organisational resources, it can be inferred that it is useful for DFDCs to communicate about their technology in media - **media visibility** - in order to get familiarity with their potential customers.

Whether other experts provided a statement that brings the same insight, is stated in table 5.6.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
RBV organisational resource	Media visibility	✓	✓		✓	✓	✓		

Table 5.6: Experts who agree with the finding "media visibility" for code "RBV organisational resource"

Also, the experts state that the development of DFDTs can be seen as a "rat race" or a "cat-and-mouse game". This means that DFDT should continue to be developed, just like the technologies for deepfakes will improve. The development of DFDT and software for deepfakes should therefore proceed in parallel. Some interesting statements regarding this finding are:

"That will be a rat race of detection software versus deepfake software. AIs fighting AIs. The DFDT must be up-to-date at all times."
- Participant C2, 17-01-2024

"Towards the future, we are presumably entering a cat-and-mouse game, where detection will no longer provide a hundred percent certainty. And so, that does pose a problem that is starting to emerge."
- Participant E2, 29-01-2024

Thus, the second organisational resource is **up-to-date DFDT**.

Whether other experts provided a statement that brings the same insight, is stated in table 5.7.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
RBV organisational resource	Up-to-date DFDT		✓	✓	✓			✓	✓

Table 5.7: Experts who agree with the finding "up-to-date DFDT" for code "RBV organisational resource"

All resources are defined based on the findings of the expert interviews. In chapter 6.2, the resources are scored based on VRIO and EP.

The following section discusses the findings of the analysis of the external environment.

5.4 External analysis - analysis of external environment

For analysing the external environment, there are four different analytical approaches stated. Namely, GE, SCP, P5F, and PESTEL. Below, each analytical approach is elaborated upon based on the findings of the expert interviews.

5.4.1 General Environment framework (GE)

As discussed, for GE, there are six different trends which are analysed, namely: (1) demographic trends, (2) cultural trends, (3) economic climate, (4) legal & political conditions, (5) specific international events, and (6) technological trends. Below, there will be elaborated upon each trend using the findings of the expert interviews.

Demographic trends

"You have CEO fraud, naivety; so that someone of a certain height within an organisation gives an order "transfer this amount of money to that account". These risks are already there, but there is yet another means to committing this kind of fraud."
- Participant D1, 10-01-2024

This statement of participant D1 argues that **CEO fraud** is already there, but the "means" are changing, i.e. deepfakes can be used for committing CEO fraud.

Whether other experts provided a statement that brings the same insight, is stated in table 5.8.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
GE demographic trends	CEO fraud	✓	✓	✓	✓	✓		✓	✓

Table 5.8: Experts who agree with the finding "CEO fraud" for code "GE demographic trends"

Additionally, the **rapidness of the spread of news via social media platforms** is discussed by several participants, which also seems to be a demographic trend.

"People post something on social media faster, and before you know it, it has spread."
- Participant C1, 10-01-2024

Whether other experts provided a statement that brings the same insight, is stated in table 5.9.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
GE demographic trends	Widespread of news via social media	✓		✓	✓	✓			

Table 5.9: Experts who agree with the finding "widespread of news via social media" for code "GE demographic trends"

Cultural trends

"It is relevant that programmes are reproducible, and that such programmes are fair. So the programme should not discriminate."
- Participant B1, 10-01-2024

This quote suggests the first cultural trend, for GE, which is the fact that it has occurred that **AI techniques can be discriminatory**. Participant B1 considers the example of the algorithm of Amazon which had been developed for selecting job applicants, to strengthen his statement. Initially, all data of the applicants was entered into the AI system, although it soon became apparent that the AI system had taught itself that "being a woman" was a "negative trait". By this, women were more quickly removed from the application process. It was then decided that gender should be extracted from the data. However, the AI system had already taught itself to figure out based on which attributes it could "know" whether the applicant was a woman (Dastin, 2018).

Whether other experts provided a statement that brings the same insight, is stated in table 5.10.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
GE cultural trends	Discriminatory AI techniques	✓							

Table 5.10: Experts who agree with the finding "discriminatory AI techniques" for code "GE cultural trends"

"The use of AI to spread fake news, though, is huge. In which deepfake is AI related."
- Participant E1, 12-01-2024

This quote suggests another cultural trend, namely that **fake news disrupts society**.

Participants B2 and E2 highlight the topic of fake news in a slightly varied manner, namely:

"In my opinion, the impact of deepfakes on international events can be very significant. They can spread misinformation, undermine the credibility of news sources and cause social unrest."
- Participant B2, 26-01-2024

"It is both "it could be deepfake" where you should not just assume something is true and that someone actually said it. But also the other side, that if people say something that is true, people are also more likely to question that because they cannot be sure whether someone has said something or not. I think it is an illusion to think it does not play a bigger role."
- Participant E2, 29-01-2024

These statements highlights the use of fake news, or spreading misinformation, differently than the statement of participant E1. However, it also brings the urge that the spread of fake news will disrupt society.

Whether other experts provided a statement that brings the same insight, is stated in table 5.11.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
GE cultural trends	Fake news disrupts society		✓	✓	✓			✓	✓

Table 5.11: Experts who agree with the finding "fake news disrupts society" for code "GE cultural trends"

Economic climate

The economic climate was not discussed too much in the interviews, simply because this was not where the participants' expertise lay. On the other hand, still two interesting insights did emerge from them.

"I think very few companies are going to develop deepfake detection software themselves. I think you are going to buy that."
- Participant E1, 12-01-2024

Participants B1 and C2 suggest that there might be possibilities to develop such software within IT specialised teams within their firms, even though these teams are not currently AI focused. Alternatively, they view DFDT as such a specialised field that it might be more efficient to buy a DFDT. Thus, **chances are that companies will buy it, rather than develop their own**.

Whether other experts provided a statement that brings the same insight, is stated in table 5.12.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
GE economic climate	Companies will probably buy DFDT	✓	✓		✓			✓	✓

Table 5.12: Experts who agree with the finding "companies will probably buy DFDT" for code "GE economic climate"

A second statement corresponding to the economic climate is given by participant D2, which reads:

"If there are more DFDT providers, you can compete on price."
- Participant D2, 10-01-2024

Thus, expert D2 suggests that whenever there are **more different DFDT providers, price competition will occur**.

Whether other experts provided a statement that brings the same insight, is stated in table 5.13.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
GE economic climate	More different providers → price competition						✓		

Table 5.13: Experts who agree with the finding "more different providers → price competition" for code "GE economic climate"

Legal & political conditions

"A whole package is being drawn up from the EU in terms of guidelines for the use of deepfakes. I do not think this will go into effect until 2025. For deepfake particularly, it means that it must be clear that it is a deepfake."
- Participant C2, 17-01-2024

This statement, of expert C2, suggests the first legal & political condition, which is the fact that the **EU is working on guidelines considering the use of deepfakes**.

Whether other experts provided a statement that brings the same insight, is stated in table 5.14.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
GE legal & political conditions	EU guidelines	✓	✓		✓				

Table 5.14: Experts who agree with the finding "EU guidelines" for code "GE legal & political conditions"

"The use of deepfakes will not be in line with the AI act, which has already been made. Especially since deepfakes are so used to deceive people. The threshold will be slightly higher to develop and spread deepfakes because of this AI act."
- Participant E1, 12-01-2024

Expert E1 suggests the **AI act**, considered by the EU, which requires developers of deepfakes to report that it is a deepfake by using a watermark or notification.

Whether other experts provided a statement that brings the same insight, is stated in table 5.15.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
GE legal & political conditions	AI act				✓			✓	

Table 5.15: Experts who agree with the finding "AI act" for code "GE legal & political conditions"

Specific international events

"I already see an increase in cyber wars with hacking and flattening, deepfake can be used as a tool in that too. In wars, this could also be used just like that, for example, a deepfake is developed in which a high-ranking person surrenders."
- Participant D2, 10-01-2024

Expert D2's statement highlights a significant international event related to the **current wars**. It states that deepfakes can be used to mislead people with false information during wars. Participant C1 also has an interesting view on considering the use of deepfakes during wars, namely:

"Deepfakes certainly play a big role in the current wars. Especially when you look at areas where few media outlets are allowed to be present, it is difficult to find out whether sent images and clips are real or fake news."
- Participant C1, 10-01-2024

Whether other experts provided a statement that brings the same insight, is stated in table 5.16.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
GE specific international events	Deepfake's influence on wars	✓	✓	✓	✓	✓	✓	✓	✓

Table 5.16: Experts who agree with the finding "deepfake's influence on wars" for code "GE specific international events"

"A deepfake is easiest to spread in countries with a very dictatorial regime, where few journalists can get in, especially during elections. Countries/people where you can do little adversarial reporting, where you can get a little of your own information, are also often the countries with the highest risk of being manipulated. It can go so far that real images or videos appear manipulated because we are so alert to manipulation."
- Participant C1, 10-01-2024

"I think it already plays a very big role. We saw it four years ago with the elections in America. It is obviously going to play a role again this year. And I think it is an illusion if we think it will not be so that case in the Netherlands."
- Participant E2, 29-01-2024

These quotes of experts C1 and E2 suggests the impact of **deepfake on elections**.

Whether other experts provided a statement that brings the same insight, is stated in table 5.17.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
GE specific international events	Deepfake's influence on elections	✓	✓	✓	✓	✓		✓	✓

Table 5.17: Experts who agree with the finding "deepfake's influence on elections" for code "GE specific international events"

Technological trends

"The idea and the risk is not new, just the means is getting easier. And it is becoming more accessible. It can be used en masse to spread disinformation, among other things."
- Participant D2, 10-01-2024

This quote of expert D2 suggests that **the number of fraud cases will rise, as developing deepfakes becomes easier**.

Whether other experts provided a statement that brings the same insight, is stated in table 5.18.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
GE technological trends	Fraud cases might rise while deepfake technologies become easier				✓	✓	✓	✓	

Table 5.18: Experts who agree with the finding "fraud cases might rise while developing deepfakes becomes easier" for code "GE technological trends"

"The nicest thing would be if there was an integration in, say, Teams, which would provide a notification indicating when it might be a deepfake. I find it harder to believe that it is going to be effective that someone has to start an application every time with a call. I think that integration has to become "seamless" within a company, otherwise its impact is likely to be very low."
- Participant E1, 12-01-2024

The second technological trend concerns the integration approach of DFDT. Expert E1 proposes that integrating "*seamless*" DFDTs into existing programmes would be highly beneficial.

Whether other experts provided a statement that brings the same insight, is stated in table 5.19.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
GE technological trends	Integration of DFDT into existing technologies							✓	

Table 5.19: Experts who agree with the finding "integration of DFDT into existing technologies" for code "GE technological trends"

5.4.2 Structure-Conduct-Performance model (SCP)

For SCP three different elements are analysed, namely: (1) structure, (2) conduct, and (3) performance. Below, there will be elaborated upon each element, based on the findings of the expert interviews.

Structure

For structure, three components are considered - see chapter 3.3. These components are (1) number of competitors, (2) heterogeneity of products, and (3) entering/exiting the market.

Number of competitors

"We have a team dedicated to tech-solutions who could be able to develop a DFDT by themselves."
- Participant B1, 10-01-2024

Expert B1 mentions the presence of a **tech-related issues team** within the company capable of developing a DFDT. Meanwhile, expert C2 recognises the high specialisation of this technique, suggesting that procuring it would be more efficient.

Whether other experts provided a statement that brings the same insight, is stated in table 5.20.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
SCP structure	Tech-related issues team	✓		✓	✓		✓		✓

Table 5.20: Experts who agree with the finding "tech-related issues team" for code "SCP structure"

"Big tech giants like Intel and Microsoft are investing in tooling for DFD. For example, Intel recently introduced FakeCatcher and Microsoft is focusing on tooling that can recognise the authenticity of digital content."
- Participant B2, 26-01-2024

Expert B2 suggests several potential **competitors which are working on DFDTs**. Thus, there is suggested that there are already competitors for DFDCs in the market.

Whether other experts provided a statement that brings the same insight, is stated in table 5.21.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
SCP structure	Multiple DFDCs	✓	✓			✓			✓

Table 5.21: Experts who agree with the finding "competitors working on DFDTs" for code "SCP structure"

Heterogeneity of products

Then, heterogeneity of products. Participant B1, states the following:

"There is often a very large part of trade-offs involved, and makes it all the more interesting to say "this is why I come to this judgement"."
- Participant B1, 10-01-2024

Expert B1 suggests that it could be interesting whenever a DFDT can provide **clarity on where judgements come from**. Also, as already mentioned in GE - cultural trends, by participant B1, a tool can differentiate itself from others when it is a **non-discriminatory tool**.

Whether other experts agree to these findings, is stated in table 5.22.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
SCP structure	Judgement explanation	✓							
	Discriminatory AI techniques	✓							

Table 5.22: Experts who agree with the findings "judgement explanation" and "discriminatory AI techniques" for code "SCP structure"

Entering/exiting the market

Next, the approach to enter and/or exit the DFDT market is discussed. Participants D1 and D2 suggest that DFDT will **specifically target niches**. By concentrating on a niche, the company can adopt a more strategic approach tailored to particular requirements. However, this focus may result in a limited market reach for the DFDC, which could be less advantageous.

Whether other experts provided a statement that brings the same insight, is stated in table 5.23.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
SCP structure	DFDT focuses on niches					✓	✓		

Table 5.23: Experts who agree with the finding "DFDT focus on niches" for code "SCP structure"

Conduct

Conduct means the strategy a company can adopt. Expert E1 suggests a **"seamless" integration of DFDT into existing software**, which is also discussed as GE - technological trends.

Whether other experts provided a statement that brings the same insight, is stated in table 5.24.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
SCP conduct	Integration of DFDT into existing technologies							✓	

Table 5.24: Experts who agree with the finding "integration of DFDT into existing technologies" for code "SCP conduct"

Secondly, experts B1 and B2 state the following:

"It is important for almost every company, especially some larger ones, to create awareness of deepfake, so too for this firm, to create awareness among their clients and possibly help implement DFDTs."
- Participant B1, 10-01-2024

"It is important to raise awareness and improve DFDT to reduce the impact on international events."
- Participant B2, 26-01-2024

Experts suggest that it could be considered to develop **awareness programmes** as additional feature to the DFDT.

Whether other experts provided a statement that brings the same insight, is stated in table 5.25.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
SCP conduct	Developing awareness programmes	✓	✓		✓			✓	✓

Table 5.25: Experts who agree with the finding "developing awareness programmes" for code "SCP conduct"

Performance

In terms of performance, the economic dimension is taken into account. The financial resources highlighted in RBV pertain to a firm's performance. Performance indicators such as "**licence fee**" and "**subsidies**" are emphasised in SCP. The licence fee aids DFDCs in generating revenue, while subsidies assist new DFDCs in penetrating the market.

Whether other experts agree to these findings, is stated in table 5.26.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
SCP performance	Licence fee			✓					
	Subsidies		✓						

Table 5.26: Experts who agree with the findings "licence fee" and "subsidies" for code "SCP performance"

5.4.3 Micro environment: Porter's Five Forces (P5F)

For P5F, there are five different forces which could influence the micro environment of the market, namely:

1. Bargaining power of suppliers;
2. Bargaining power of buyers;
3. Threat of new entrants;
4. Threat of substitute goods; and
5. Threat of existing competitors/competitive rivalry.

Beneath, there will be elaborated upon each force, in which the findings of the expert interviews are discussed.

Bargaining power of suppliers

Suppliers could be different kind of stakeholders, as long as they provide something for the party which is developing something. As previously discussed in chapter 5.3, experts emphasise the importance for DFDCs to have access to reliable data. Reliable data is crucial for the accuracy and efficiency of the DFDT. Often, reliable data is sourced from suppliers, or external entities. Therefore, reliable data is identified not only as a physical resource but also as a form of supplier bargaining power.

Another supplier bargaining power highlighted by experts in chapter 5.3, pertains to financial resources, specifically "subsidies". In this context, governmental institutions act as suppliers by providing funds to aid in the development of DFDTs.

The findings regarding the bargaining power of suppliers, as suggested by experts, can be summarised as follows:

1. For DFDC, obtaining reliable data from suppliers is essential; and
2. For DFDC, receiving subsidies can be beneficial.

Whether other experts agree to these findings, is stated in table 5.27.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
P5F Bargaining power of suppliers	Reliable data	✓							
	Subsidies		✓						

Table 5.27: Experts who agree with the findings "reliable data" and "subsidies" for code "P5F bargaining power of suppliers"

Bargaining power of buyers

The bargaining power of buyers; what power do the (potential) buyers of DFDTs have?

"I think it is incredibly important for almost every company, especially for companies that are a bit larger, where you cannot knock on everyone's door, to know whether something is correct or not."
- Participant B1, 10-01-2024

This quote highlights the significance of DFDT for businesses, emphasising its importance for information verification.

"There is habituation to pooling sources as much as possible to find out if something is real. But, those will also increasingly use technology to make it a logical puzzle."
- Participant C1, 10-01-2024

This statement underscores the growing reliance on technology, such as a DFDT, while also highlighting the current practice of verifying information through pooled sources.

"I think it is good that it is there, then you can see what is real, and what is fake. I do doubt to what extent deepfakes will come into play - in the short term - and to what extent deepfake detection technologies should be deployed - in the short term -."
- Participant D1, 10-01-2024

Participant D1's perspective acknowledges the value of DFDT in discerning genuine content from manipulated content. However, the expert expresses reservations about the imminent prominence of deepfakes and the immediate necessity of DFDTs.

Another aspect of buyer power concerns the effectiveness of post-purchase services, as highlighted by participants C1 and C2:

"Even more important than before is checking, actually often just going to call "is it true that you made this video?". Thus, currently checking manually is crucial."
- Participant C1, 10-01-2024

"For journalists, it is also super important not to let speed take precedence, but to check, now "manually", what we release."
- Participant C2, 17-01-2024

Thus, the bargaining power of buyers encompasses:

1. Concerns about the potential risks and consequently the demand for DFDT; and
2. The effectiveness of current manual verification methods.

Whether other experts agree to these findings, is stated in table 5.28.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
P5F bargaining power of buyers	Potential for DFDT	✓		✓	✓	✓	✓		
	Effective manual verification methods			✓	✓		✓		

Table 5.28: Experts who agree with the findings "potential for DFDT" and "effective manual verification methods" for code "P5F bargaining power of buyers"

Threat of new entrants

Regarding the threat of new entrants, attention is given to potential challenges from companies either entering the market or existing firms pivoting towards developing DFDT. Participants B1 and B2 highlight the emergence of start-ups specialising in DFDT. Furthermore, as discussed in chapter 5.4.2 under "Structure," tech-related teams within existing organisations could potentially develop DFDTs.

Thus, the threat of new entrants encompasses:

1. Start-ups which appear to be developing DFDT; and
2. Team within companies dealing with tech-related problems.

Whether other experts agree to these findings, is stated in table 5.29.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
P5F threat of new entrants	Start-ups might appear to develop DFDT	✓	✓						
	Tech-related issues teams	✓		✓	✓		✓		✓

Table 5.29: Experts who agree with the findings "start-ups might appear to develop DFDT" and "tech-related issues teams" for code "P5F threat of new entrants"

Threat of substitute goods

When discussing substitute goods, there is referred to products or methods that function differently but ultimately serve the same purpose.

First, as previously noted in the "bargaining power of buyers" section, experts suggest that manual verification methods are currently effective. Additionally, experts indicate that courses and e-learning programmes designed to educate people on detecting deepfakes could also be considered as substitute goods. The availability of these courses and e-learnings is emphasised by several experts, underscoring the importance of raising awareness about deepfakes. As a result, people become more aware of what constitutes a deepfake, potentially leading to reduced demand for DFDTs.

Therefore, the threat of substitute goods can be characterised by:

1. The continued effectiveness of manual verification methods; and
2. The availability of courses and e-learnings aimed at increasing awareness of how to recognise a deepfake.

Whether other experts agree to these findings, is stated in table 5.30.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
P5F threat of substitute goods	Effective manual verification methods			✓	✓		✓		
	Deepfake courses/e-learnings		✓	✓	✓		✓	✓	✓

Table 5.30: Experts who agree with the findings "effective manual verification methods" and "deepfake courses/e-learnings" for code "P5F threat of substitute goods"

Threat of existing competitors/competitive rivalry

The threat from existing competitors or competitive rivalry is centred on established IT companies that are either currently developing or appear to be developing DFDT. Several experts mention their awareness of large IT firms working on DFDT development. These include notable companies like Intel, OpenAI - a part of Microsoft -, Sentinel, and McAfee. Additionally, potential competitors in this space are companies offering tools to combat fake news, where deepfakes are a subset off.

Thus, the threat of existing competitors or competitive rivalry encompasses:

1. Large IT companies that are or could potentially be involved in DFDT development; and
2. Companies offering solutions for fake news, which include DFD.

Whether other experts agree to these findings, is stated in table 5.31.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
P5F threat of existing competitors/competitive rivalry	Larger IT companies → DFDT	✓	✓		✓	✓	✓	✓	✓
	Larger IT companies → proposal fake news				✓				

Table 5.31: Experts who agree with the findings "larger IT companies → DFDT" and "larger IT companies → proposal fake news" for code "P5F threat of existing competitors/competitive rivalry"

5.4.4 Macro environment: PESTEL

For PESTEL, there are six different components that could influence the macro environment of the market, namely: (1) Political, (2) Economic, (3) Social, (4) Technological, (5) Environmental, and (6) Legal.

While analysing the expert interviews, and coding different topics, it seems that PESTEL and GE are quite overlapping. Only the cultural trends of GE and the social component of PESTEL differ. The following applies for the corresponding topics:

- PESTEL's "Political" → GE's "Specific international events";
- PESTEL's "Economic" → GE's "Economic climate";
- PESTEL's "Social" → non of GE;
- PESTEL's "Technological" → GE's "Technological trends";
- PESTEL's "Environmental" → GE's "Demographic trends";
- PESTEL's "Legal" → GE's "Legal & political conditions"; and
- Non of PESTEL → GE's "Cultural trends";

Thus, for PESTEL, only the component "social" is elaborated upon. This component encompasses three distinct elements. Firstly, society's **lack of critical scrutiny** towards the media stands out as a significant concern.

Another noteworthy observation comes from expert C1, stating:

"People are, I think, particularly afraid of deepfakes because it does persist. You can get your right in court, and the deepfake can be removed, but that does not change the fact that the deepfake does continue to float around the internet."
- Participant C1, 10-01-2024

This suggests a concern that once a deepfake is published, **it may never be completely disappeared**.

Also, deepfakes has its negative applications, however, there are also some **positive uses**, which is particularly stated by participants B1 and B2:

"If you look at the possibilities that deepfakes offer, at least, if you look at the theory behind it, that it can, for example, make the internet a lot more personal."
- Participant B1, 10-01-2024

"In particular, the focus at our company is on looking at opportunities to use generative AI to optimise our day-to-day operations, as well as commercialising generative AI."
- Participant B2, 26-01-2024

Whether other experts agree to these findings, is stated in table 5.32.

Analytical approach - code	Finding	B1	B2	C1	C2	D1	D2	E1	E2
PESTEL social	Media is not viewed critically enough	✓			✓			✓	✓
	A deepfake never disappears once published			✓					
	Negative and positive use cases of deepfake	✓	✓	✓			✓		

Table 5.32: Experts who agree with the findings "media is not viewed critically enough", "a deepfake never disappears once published", and "negative and positive use cases of deepfake" for code "PESTEL social"

5.5 Conclusion of this chapter

This chapter presents the findings of the expert interviews. The resources for the internal analysis were determined based on the insights provided by the experts. Subsequently, the analytical approaches for assessing the external environment were derived from the experts' statements. In the following chapter, these results will be elaborated upon and thoroughly discussed. The identified resources will be evaluated using VRIO and EP to provide internal strengths & weaknesses. The external analysis will pinpoint the perceived opportunities & threats. To consolidate these insights, SWOT is used, followed by an evaluation using CM.

6

Discussion

"The best vision is insight."

- Malcolm Forbes

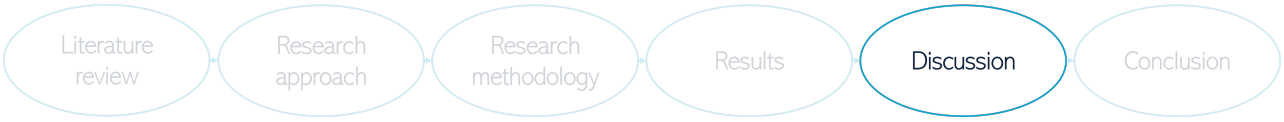

Figure 6.1: Overview of research components - chapter 6 discussion

This chapter discusses the outcomes of the expert interviews, described in chapter 5. First, the findings related to the internal analysis are examined in depth, focusing on the resources identified through RBV based on the experts' insights. These resources will be discussed, within this chapter, using VRIO and EP. Consequently, the internal strengths & weaknesses are pinpointed. Subsequently, the results of the external environment analysis are discussed to distinguish between opportunities & threats. The internal and external analyses are matched using SWOT and CM. Based on the outcomes of SWOT and CM, strategic choices and their subsequent implementations are determined. In this context, the earlier discussed business-level strategies of cost leadership and product differentiation are revisited, along with the IMT of internal bench marking. Integrating the business-level strategies, with internal bench marking, SWOT, and CM, will provide potential strategies to maintain or gain a competitive advantage.

This chapter concludes with section 6.6.

6.1 Introduction to discussion

Before starting the discussion, a more detailed introduction to this chapter is provided.

In summary, the chapter encompasses both internal and external analyses, which are subsequently aligned. These aligned results are then integrated with business-level strategies to determine both a strategic choice and its implementation.

To elaborate further:
The internal analysis is conducted using RBV, VRIO, and EP. As detailed in chapter 5, resources are identified based on expert insights for RBV. In the current chapter, the resources undergo assessment using VRIO and EP. Through this evaluation, the resources are categorised into internal strengths & weaknesses.
The external analysis employs GE, SCP, P5F, and PESTEL. As explored in chapter 5, these analytical frameworks are completed using the findings from expert interviews. Within this chapter, these insights are segmented into external opportunities & threats.
Subsequently, the internal and external analyses are matched. Matching the internal and external analyses, involves integrating the internal strengths & weaknesses with the external opportunities & threats. As highlighted, SWOT and CM serve this purpose. SWOT merges the internal strengths & weaknesses with the external opportunities & threats in a two-by-two matrix. CM evaluates the interactions between strengths with opportunities & threats, as well as weaknesses with opportunities & threats. The interactions are scored on a scale ranging from a strong negative influence - – 2 - to a strong positive influence - ++ +2 -. A cumulative score is computed for each strength, weakness, opportunity, and threat, which aids in pinpointing the primary factors in each category. These pivotal factors subsequently inform the strategic choice and its implementation.

For determining the strategic choice and implementation, these identified key factors are melded with the business-level strategies of cost leadership and product differentiation, supplemented by the IMT of internal bench marking.

With this comprehensive overview of the components in place, the subsequent sections will delve into the discussion of the findings and analytical approaches, commencing with the internal analysis.

6.2 Internal analysis - analysis of internal organisations

Based on the expert interviews, different resources are stated for RBV. Below, there is described for each resource whether it meets VRIO - Valuable Rare Inimitable Organisation - and EP - being adaptable, dynamic, and could easily respond to market changes - conditions, after which it can be determined whether competitive advantage might be maintained or gained with the use of this resource.

Financial resource 1: Licence fee

VRIO conditions

This resource is **valuable**, since it generates a revenue stream for the company. Currently, it does not seem, according to the experts, like there are any DFDCs in the Netherlands offering DFDTs on a licence basis, which also makes this resource **rare**. This resource is easy to imitate, as other DFDCs may decide to offer their DFDT on a licensing basis as well. Thus, the financial resource of licence fee is not ***in*imitable**. Assuming that DFDCs are capable of organising this resource, this resource meets the condition **organised**.

Effectuation Perspective (EP)

It is essential that the licencing model can be easily **adapted** to changing circumstances, and can therefore respond easily to **market changes**. Consider, for example, different market demands, or competitive pressures. If the licencing model is too "rigid", and thus difficult to change, it could be considered less dynamic. Thus, the licencing model must be rigid to be **dynamic**.

To conclude

Based on assessing the financial resource "licence fee" on VRIO and EP, it is found that this resource might provide a **temporary competitive advantage**, since the resource is valuable and rare, yet not inimitable, and it is adaptable, dynamic, and could respond easily to market changes.

Financial resource 2: Subsidies

VRIO conditions

Subsidies are **valuable**, because they provide financial support for DFDCs. While this resource is **rare** due to the limited availability of such subsidies, it is possible for competitors to imitate it. However, given the limited availability, imitation is not straightforward, making this resource not entirely ***in*imitable**. As long as the DFDC is well-organised to make use of subsidies, it meets the condition of **organisation**.

Effectuation Perspective (EP)

Subsidies are **adaptable**. However, not that **dynamic** and could not easily respond to **market changes**.

To conclude

Based on assessing the financial resource "subsidies" on VRIO, it is found that this resource could provide a temporary competitive advantage. However, since the resource is not dynamic and could not easily respond to market changes, it is decided that it could be hard to achieve a competitive advantage based on this resource, thus **competitive disadvantage** applies to this resource.

Physical resource 1: Reliable data

VRIO conditions

Reliable data is definitely a **valuable** resource, to develop accurate and effective DFDTs. Having reliable data can be **rare** and **inimitable**, especially when it comes specifically to training data for DFDT. Chances are that not all DFDCs have easy access to this kind of data. A DFDC does need to be well-organised to possess over reliable data, however, assuming that experienced individuals are working on it, it can be said that this resource meets the condition of being **organised**.

Effectuation Perspective (EP)

If new patterns emerge in deepfake techniques - **market changes** - then it is essential for the DFDC to respond to these changes as soon as possible. However, it could be hard to possess over new reliable data in such short notice. Therefore, this resource is not **dynamic**. However, the resource is easy **adaptable**, considering that DFDTs are developed by professionals, with experience in using data.

To conclude

Based on assessing the physical resource "reliable data" on VRIO, it is found that this resource could provide a sustained competitive advantage. However, since the resource is not that dynamic and could have some troubles with responding to market changes on short notice, this resource could eventually provide a **temporary competitive advantage**.

Individual resource 1: Study and/or personal interest based knowledge

VRIO conditions

Study and/or personal interest based knowledge can be scaled as **valuable**. Without this knowledge, there is no possibility for developing DFDTs. Possessing over knowledge for developing DFDTs is not obvious and highly specialised, making this resource **rare** and **inimitable**. The ability to organise and leverage this resource, depends on how well the DFDC is organised to effectively integrate the knowledge. Assuming that this is the case, makes this resource well **organised**.

Effectuation Perspective (EP)

Whenever new knowledge, considering the changes within the market, can be easily acquired, then this resource is **dynamic**, **adaptable**, and responds easily to **market changes**.

To conclude

Based on assessing the individual resource "study and/or personal interest based knowledge" on VRIO and EP, it is found that this resource could provide a **sustained competitive advantage**.

Individual resource 2: "Learning-on-the-job" based experience

VRIO conditions

Getting experience through "learning-on-the-job" is a **valuable** resource, and relevant to the development of DFDTs. It is not yet obvious to have experience on such topics, which makes this resource **rare**. Time and practical exposure is needed in the unique challenges for the development of DFDTs, which also makes this resource **inimitable**. As long as the company can properly integrate this resource, the condition **organised** will also be achieved.

Effectuation Perspective (EP)

The **dynamic** of this resource lies mainly in the ability of individuals to continuously learn and gain new experiences. If individuals can quickly absorb new experiences, especially when **market changes** are involved, this resource is **adaptable**.

To conclude

Based on assessing the individual resource ""learning-on-the-job" based experience" on VRIO and EP, it is found that this resource could provide a **sustained competitive advantage**.

Organisational resource 1: Media visibility

VRIO conditions

Media visibility is a **valuable** resource because it gives greater brand awareness and attention to the DFDC. This resource is not that **rare**, since other DFDCs could easily decide to make use of media visibility. From which can also be stated that this resource is not ***in*imitable**. When it is properly organised, this resource does meet the **organisation** condition.

Effectuation Perspective (EP)

This resource is **dynamic** and **adaptable** when there is the ability to respond flexibly to **market changes**. This can be done by changing strategies quickly, such as trying new media channels, and thereby responding effectively to changes in the market.

To conclude

Although, this resource scores on all conditions of EP, it is not a rare and an inimitable resource. Therefore, this resource is eventually scored to provide a **competitive parity**.

Organisational resource 2: Up-to-date DFDT

VRIO conditions

Making sure the DFDT stays up-to-date is **valuable**. This allows a high level of accuracy and reliability to be achieved. It is considered to be difficult to react quickly to new deepfake techniques, while improving the DFDT according to these changes, therefore this resource is stated to be **rare**. As specific knowledge, and expertise is needed to ensure this, this resource can be considered **inimitable**. As long as there is a well-structured development and maintenance process, this resource can be said to be **organised**.

Effectuation Perspective (EP)

This resource is obviously **dynamic**, **adaptable**, and responds well to **market changes**. Given the necessity for this resource to adapt to market changes continuously.

To conclude

Based on assessing the organisational resource "up-to-date DFDT" on VRIO and EP, it is found that this resource might provide a **sustained competitive advantage**, since the resource is valuable, rare, inimitable, and it is adaptable, dynamic, and could respond easily to market changes.

6.2.1 Conclusion of internal analysis - analysis of internal organisations

Thus, to conclude the analysis of internal organisations, table 6.1 gives an overview of the resources, and whether the resources might achieve a competitive advantage.

Resource	Competitive advantage conclusion
RBV financial resource: *Licence fee*	Temporary competitive advantage
RBV financial resource: *Subsidies*	Competitive disadvantage
RBV physical resource: *Reliable data*	Temporary competitive advantage
RBV individual resource: *Study and/or personal interest based knowledge*	Sustained competitive advantage
RBV individual resource: *"Learning-on-the-job" based experience*	Sustained competitive advantage
RBV organisational resource: *Media visibility*	Competitive parity
RBV organisational resource: *Up-to-date DFDT*	Sustained competitive advantage

Table 6.1: Overview of resources found with Resource-Based View (RBV), based on expert interviews, whether it could achieve a competitive advantage

Next, determine which resources are strengths and which are weaknesses. Using VRIO and EP criteria, the assessment of various resources indicates whether a resource could lead to a competitive disadvantage, competitive parity, a temporary competitive advantage, or a sustainable competitive advantage. Resources capable of achieving a competitive advantage, whether temporary or sustainable, are considered internal strengths. Conversely, resources that may result in competitive disadvantage or competitive parity are categorised as weaknesses for DFDCs.

Internal strengths

- **RBV financial resource - licence fee:** an expert suggests that the licence fee is a financial resource for DFDCs, as it provides a source of income for the company. Whenever the DFDC has a source of income through a licence fee, it is a strength for the company;
- **RBV physical resource - reliable data:** an expert suggests that having overly reliable data will help in providing correct results as stated by the DFDT. Whenever the firm possess over reliable data, it is a strength for the firm;
- **RBV individual resource - study and/or personal interest based knowledge:** experts suggest that knowledge is acquired through study and/or personal interest. Whenever the firm has employees with study and/or personal interest based knowledge, it is a strength for the firm;
- **RBV individual resource - "learning-on-the-job" based experience:** experts also suggest that knowledge is acquired through experience gained within the work field. Whenever employees gain experience within the work field, it is a strength for the firm; and
- **RBV organisational resource - up-to-date DFDT:** experts suggest the importance of having an up-to-date DFDT to give the most accurate results. Whenever a DFDC can provide an up-to-date DFDT, it will be a strength for the firm.

Internal weaknesses

- **RBV financial resource - subsidies:** an expert suggests that subsidies are a financial resource. However, this resource does not comply to the conditions of VRIO and EP. Subsidies will provide a competitive disadvantage, and is therefore classified as weakness; and
- **RBV organisational resource - media visibility:** experts suggest that media visibility is an organisational resource. However, this resource does not comply to the conditions of VRIO. Media visibility will provide a competitive parity, and is therefore classified as weakness.

Having discussed the findings of the internal analysis, the subsequent section will delve into the discussion of the external analysis' findings.

6.3 External analysis - analysis of external environment

From the analysis of the external environment, seventeen opportunities and thirteen threats are listed by the experts, detailed in appendix F. Given the high number of opportunities & threats identified, the subsequent discussion will focus on the three most frequently mentioned opportunities & threats.

External opportunities

- **Deepfakes danger for wars and elections:** this external factor is stated as an opportunity by the experts, due to the rise of the use of deepfakes during wars and elections to spread misinformation, which brings opportunities for DFDCs to develop their DFDT accordingly to these risks;
- **CEO fraud:** this external factor is stated as an opportunity by the experts, due to the rise of the use of deepfakes to commit CEO fraud. This brings opportunities for DFDCs to develop their DFDT accordingly to these risks; and
- **Develop awareness programmes for the DFDC's client:** experts consider that awareness must be created about the dangers of deepfake, and therefore the development of awareness programmes as additional feature to the DFDT is considered to be an opportunity for the DFDCs.

External threats

- **Larger IT companies are working on DFDT:** this external factor is stated as a threat by the experts, due to the fact that larger IT companies seem to develop their own DFDT, which could be a threat to DFDCs;
- **Deepfake courses/e-learnings:** this external factor is stated as a threat by the experts, due to the fact that deepfake courses/e-learnings will provide more awareness, and this provides guidance to recognise a deepfake. Therefore, the fact that deepfake courses/e-learnings exists is considered to be a threat by the experts due to the fact that it could make DFDTs less likely to be needed since people will possibly be quicker to recognise whether something is a deepfake; and
- **Tech-related issues team:** this external factor is stated as a threat by the experts, due to the fact that there are possibilities within some firms of the experts to develop a DFDT by a tech-related issues team internally.

6.4 Matching internal analysis and external analysis

For matching the analyses of the internal organisations with the external environment, SWOT is used. SWOT merges the internal strengths & weaknesses, and external opportunities & threats into a two-by-two matrix. Strengths & weaknesses are determined based on the analysis of the internal organisations, which eventually are the resources which could provide a competitive advantage. Opportunities & threats are determined based on the analysis of the external environment. These strengths, weaknesses, opportunities, and threats are merged using SWOT. After which, CM scores the interactions between the components.

6.4.1 SWOT analysis

Section 6.2.1 gives an overview of all strengths & weaknesses. In total, there are five strengths and two weaknesses.

Section 6.3 states that there are seventeen opportunities and thirteen threats given. It is decided to use the three most frequently mentioned opportunities & threats, which are discussed in chapter 6.3. Therefore, it is decided to use the three most frequently mentioned strengths as well. Only two weaknesses are provided based on the findings of the expert interviews.

Strengths

The strengths are internal elements which could be used by a firm to create an advantage over its competitors. The three most frequently mentioned strengths are:

- **Study and/or personal interest based knowledge:** highlighted by five out of eight participants. This is a strength for a DFDC due to knowledge being one of the most important resources. Without knowledge, there are no opportunities of developing DFDT;
- **Up-to-date DFDT:** highlighted by five out of eight participants. Experts state the importance of providing an up-to-date DFDT. If a DFDC can address this, customer satisfaction will likely increase; and
- **"Learning-on-the-job" based experience:** highlighted by four out of eight participants. This is a strength for a DFDC due to experience being one of the most important resources. Without experience, there are no opportunities for developing DFDTs.

Weaknesses

The weaknesses are internal elements which could cause a disadvantage over a firm's competitors.

- **Media visibility:** although media visibility brings more awareness of the DFDC's DFDT to potential customers, it is a resource that could bring competitive parity, as the resource is not rare and can be easily imitated by other DFDCs. Therefore, this resource is identified as a weakness; and
- **Subsidies:** although subsidies could potentially help the DFDC to develop and launch the product, the resource could be at a competitive disadvantage as it is not dynamic and could not easily respond to market changes.

Opportunities

The opportunities are external elements which could be beneficial for the company. Those are positive elements which could be used to achieve a goal. The opportunities for DFDT are:

- The first opportunity merges the opportunities of "**deepfakes could influence wars**" - highlighted by eight out of eight participants - and "**deepfakes could influence elections**" - highlighted by seven out of eight participants. Since these topics both relate to the overarching theme of specific international events, i.e. the political environment, these are combined into one opportunity. The potential negative impact of deepfakes on wars and elections presents an opportunity for DFDC, because the DFDT could be used to identify a deepfake used towards influencing wars or elections;
- **Deepfakes could be used for CEO fraud:** highlighted by seven out of eight participants. The potential negative impact of deepfakes on CEO fraud presents an opportunity for DFDCs. This lies in the prospect of developing DFDT capable of identifying whether a deepfake is used to conduct CEO fraud; and
- **There is seen potential for DFDT and for developing awareness programmes:** highlighted by five out of eight participants. Experts agree that there is indeed potential for the use of DFDT within their firm. This is an opportunity for DFDCs, with the prospect of developing DFDT for different types of firms. Also, participants do see potential whenever DFDCs offer deepfake awareness programmes. Thus, developing deepfake awareness programmes as additional feature to the DFDT, is an opportunity for DFDCs.

Threats

The threats are external elements that may pose challenges or risks to the DFDC. Those are negative elements which could hinder achieving a certain goal. The threats for DFDCs are:

- **Larger IT companies are working on DFDT**: highlighted by seven out of eight participants. The fact that larger IT companies are working on DFDT could be a threat for DFDCs. Larger IT companies often benefit from brand awareness. This means that individuals, within organisations, familiar with a company's products or services, and who have had positive experiences, are more inclined to choose that company's system again over competitors;
- **Courses and e-learnings available for the dangers of deepfake:** highlighted by six out of eight participants. The fact that courses and e-learnings are available within some companies to create awareness about deepfakes and to provide their employees handles how to recognise deepfakes, can be seen as a threat to DFDC. This could potentially decrease the demand for DFDTs as the risk is mitigated by employees who are better equipped to identify deepfakes; and
- **Within some firms, to which is spoken during the expert interviews, there are tech-related issues teams which could develop DFDT by themselves:** highlighted by five out of eight participants. The fact that some firms could potentially develop DFDT by themselves, is a threat for DFDCs. Simply because if a company develops it themselves, they no longer need the software from DFDC.

The three most frequently mentioned strengths, opportunities, and threats, and the two weaknesses, are combined in SWOT, as shown in figure 6.2.

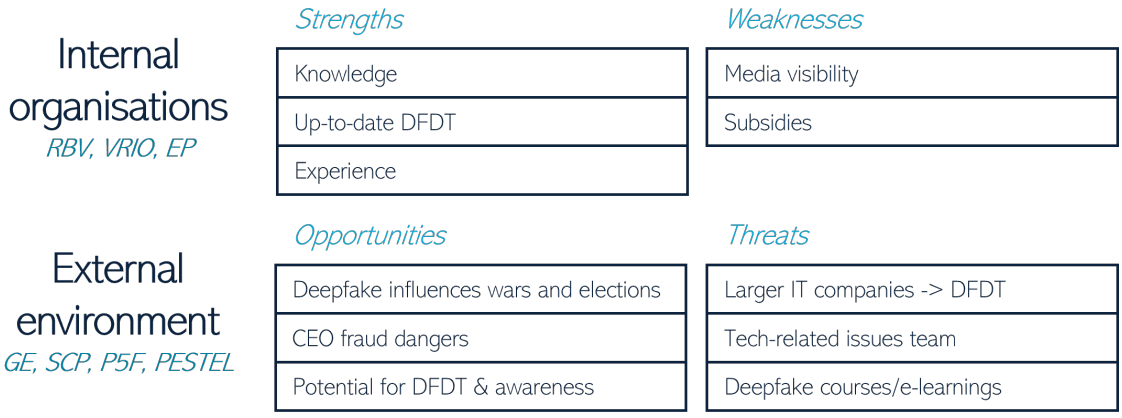

Figure 6.2: Findings of research for the SWOT analysis

6.4.2 Confrontation Matrix (CM)

Within CM, there is focused on the confrontations between strengths with opportunities & threats, and weaknesses with opportunities & threats. With CM, the confrontations between the different elements, i.e. strengths, weaknesses, opportunities, and threats, are shown. In appendix G the substantiation of each confrontation is described. All confrontations are shown in CM in figure 6.3

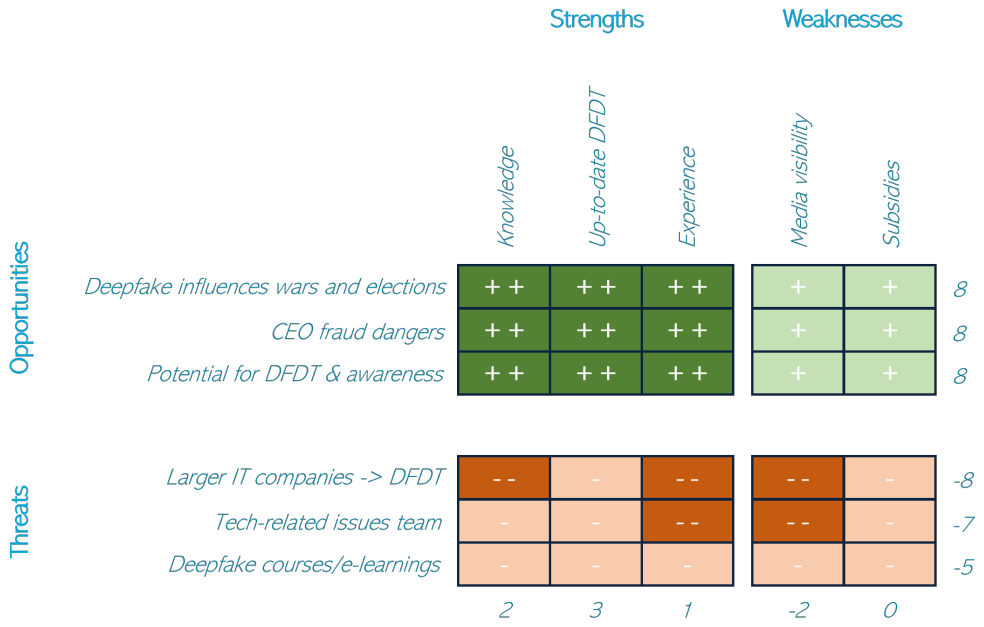

Figure 6.3: Findings of research for the Confrontation Matrix (CM)

Beneath, some prominent findings are discussed in more detail.

- **Strength with maximum score - i.e. maximum internal strength:** "up-to-date DFDT" with a score of three points. This means that the maximum internal strength is having an up-to-date DFDT;
- **Weakness with minimum score - i.e. minimum internal weakness:** "media visibility" with a score of minus two. The score is not particularly low, as media visibility is not particularly a weakness. However, since it does not confer a competitive advantage, it is categorised as a weakness. Utilising media visibility is deemed to offer the least advantage for the DFDC;
- **Opportunity with maximum score - i.e. maximum external opportunity:** "deepfakes might influence wars and elections", "deepfakes might be used for CEO fraud", and "different firms see potential in DFDT *and* awareness programmes", i.e. all opportunities share an equal rating of eight. Consequently, these opportunities can be leveraged for the development of DFDTs; and

- **Threat with minimum score - i.e. minimum external threat:** "larger IT companies seem to, or might, develop DFDTs". Which is a threat, since these are potential competitors for DFDCs.

The main strength and opportunities offer the greatest potential for the DFDC to maintain or gain a competitive advantage. The main weakness and threat needs to be monitored so that the DFDC can respond to it whenever market shifts occur.

6.5 Strategic choice and strategic implementation - business strategies

Chapter 2.8 discussed the strategic choice with the strategic implementation in more detail. It showed that there are business-level strategies and corporate-level strategies. These differ in that business-level strategies focus on companies operating in one single market, and corporate-level strategies focus on companies working in several markets simultaneously. Previously, in chapter 2.8.1, it was pointed out that the current study focuses on business-level strategies, since it deals with companies that focus only on the market of DFDTs, i.e. DFDCs. For business-level strategies, it refers to cost leadership and product differentiation. In particular, cost leadership focuses on keeping costs lower than competitors. Product differentiation focuses on differentiating the product in a way that gives a company an advantage over its competitors. Cost leadership and product differentiation are supported by the IMT of internal bench marking, which focuses on improving the quality of products while improving internal processes.

However, how can these techniques be combined with the results of SWOT and CM?

- The strength with the maximum score, i.e. the maximum internal strength for DFDCs, is having an up-to-date DFDT. Experts argue that if a DFDC has an up-to-date DFDT, it has an advantage over other DFDCs, without an up-to-date DFDT.
  This strength points to the business-level strategy of product differentiation, by differing the product compared to competitors, combined with the IMT of internal bench marking, which focuses on internal processes to improve product quality;
- The biggest weakness, i.e. the minimum internal weakness for DFDCs, is seen in the fact that media visibility will not provide a competitive advantage. Media visibility in itself will create more awareness of the DFDC, among potential customers, however this is a resource that other DFDCs can easily use, which reduces the chance of maintaining or gaining a competitive advantage by this resource.
  This weakness points to the business-level strategy of product differentiation combined with the IMT of internal bench marking, which focuses on internal processes to improve product quality;
- The opportunity with the highest score, i.e. the maximum external opportunity, is not one, but all three opportunities, which are further analysed using SWOT and CM. The experts see potential in the use of DFDTs as the use of deepfakes to mislead public opinion in wars and elections is on the rise. They also see potential in DFDT as deepfakes could potentially be used to commit CEO fraud. According to the experts, these dangers create opportunities for DFDCs to develop DFDTs as soon as such risks arise. The experts also see an opportunity to develop awareness programmes as an additional feature to the DFDT.
  These opportunities point to the business-level strategy of product differentiation combined with the IMT of internal bench marking, which focuses on internal processes to improve quality; and
- The threat with the lowest score, i.e. the lowest external threat, is the fact that larger IT companies also appear to be working on DFDTs, according to the experts.
  This threat points to the business-level strategy of product differentiation combined with the IMT of internal bench marking, which focuses on internal processes to improve quality.

The outcomes from SWOT and CM, integrated with insights from strategic choice literature, suggest a business-level strategy of product differentiation, complemented by the IMT of internal bench marking. The strategy of cost leadership is not included in this approach due to the absence of pertinent findings from the expert interviews that would emphasise the cost leadership strategy.

Consequently, product differentiation combined with internal bench marking yielded three "sub strategies", namely:

1. Timing of product introduction;
2. Use of customer-specific marketing; and
3. Additional product features.

These sub strategies will eventually provide a business strategy for DFDCs in the Netherlands to maintain or gain a competitive advantage.

6.6 Conclusion of this chapter

Within this chapter, the findings of the research are discussed.

First of all, the resources of RBV found with the expert interviews are described. In total, seven resources were found. The resources are discussed using VRIO and EP. The resources with which the DFDC could maintain or gain a *sustained competitive advantage* are: study and/or personal based knowledge, "learning-on-the-job" based experience, and up-to-date DFDT. The resources with which the DFDC could achieve a *temporary competitive advantage* are: offering their products on a licence basis, and having reliable data on which to develop the DFDT. The resource that could provide *competitive parity* is the use of media, because this resource could be easily used by competitors. The resource that will provide a *competitive disadvantage* is subsidies. This is simply because this resource is not dynamic and therefore cannot easily respond to changes in the market. From this, it was determined which resources could be classified as internal strengths & weaknesses. Since the experts did not specifically mention weaknesses, it was decided to classify as internal weaknesses those resources that could not provide a competitive advantage, i.e. media visibility and subsidies. The other resources are internal strengths, i.e. study and/or personal interest based knowledge, up-to-date DFDT, and "learning-on-the-job" based experience.

The analysis of the external environment identified seventeen opportunities and thirteen threats. Due to the high number, it is decided to use the three most frequently mentioned opportunities & threats for SWOT and CM. The external opportunities are the fact that deepfakes could influence wars and elections, deepfakes could be used to commit CEO fraud, and there is seen potential for developing awareness programmes as additional feature to DFDT. And the external threats are larger IT companies working on DFDT, courses and e-learnings available for recognising deepfakes, and within some firms, there are tech-related issues teams which could develop DFDTs by themselves.

The internal and external analyses can then be matched, in which the strengths, weaknesses, opportunities, and threats are merged into SWOT. With CM, the influences between the strengths with opportunities & threats, and weaknesses with opportunities & threats, are scored from strong negative influence - – -2 - to strong positive influence - ++ +2 -. Finally, the total scores are calculated, from which the main strengths, weaknesses, opportunities, and threats emerged. These are then discussed in the light of the business-level strategy of product differentiation, which can be combined with the IMT of internal bench marking, which focuses on improving internal processes to maintain, or improve, product quality. From this, three "sub strategies" are formed, namely: (1) timing of product introduction, (2) use of customer-specific marketing, and (3) additional product features.

These findings will provide the conclusion of this research in the next chapter.

7

Conclusion

"The best vision is insight."

- Malcolm Forbes

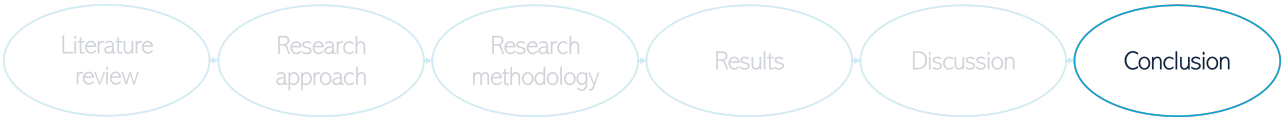

Figure 7.1: Overview of research components - chapter 7 conclusion

This chapter begins with a brief summary of the current research. Subsequently, the MRQ is addressed. The contributions of the research are then elaborated upon. Lastly, the research's limitations are identified, followed by suggestions for future research.

7.1 Extended abstract

First, a brief review of the current research is given. An in-depth understanding of effective strategies for positioning as a DFDC to maintain or gain a competitive advantage remains a challenging issue to date. This research focuses on the lack of detailed knowledge of strategic opportunities for DFDCs. Knowledge is available that considers business strategies for companies working with emerging technologies. However, this knowledge is not specific to the emerging market of DFDTs. As the market for DFDTs is an emerging market, the research focuses on companies and organisations in the Netherlands in order to produce the most concrete and therefore most valuable results. On this basis, the following MRQ is stated:

"*What are potential strategies for deepfake detection companies in the Netherlands to maintain or gain a competitive advantage?*"

In order to give as clear an answer as possible to the MRQ, four SRQs are stated, which discuss in turn the internal analysis, the external analysis, the matching of the internal and external analyses, and finally a strategic choice with a strategic implementation. The findings to these SRQs will be combined to answer the MRQ.

Several analytical approaches are considered to answer the RQs. The findings to the analytical approaches are provided by semi-structured interviews were conducted with eight different experts in four industries, namely consulting, media, insurance, and law. The analytical approaches for the analysis of the internal organisations are RBV, VRIO, and EP. For which the findings to RBV are based on the expert interviews. These findings were then discussed with VRIO and EP. Based on discussing these resources, internal strengths & weaknesses were emerged. GE, SCP, P5F, and PESTEL are used to analyse the external environment. For which, the findings to these analytical approaches are based on the expert interviews. These findings are then discussed, to eventually provide the external opportunities & threats.

SWOT and CM combine the internal and external analyses. SWOT is a two-by-two matrix which combines the internal strengths & weaknesses, and the external opportunities & threats. CM then assesses the interactions between the strengths with the opportunities & threats, and the weaknesses with the opportunities & threats. The interactions are scored from a strong negative influence - – -2 - to a strong positive influence - ++ +2 -. Total scores are determined to eventually provide the main strength, weakness, opportunity, and threat. The strategic choice and its strategic implementation can then be decided.

In conducting the literature review on strategic choice, it is found that there are strategies that can be used at the business-level. These business-level strategies are cost leadership and product differentiation. The difference between the two is that cost leadership focuses more on reducing costs, and product differentiation focuses more on improving the product in such a way that the company can differentiate itself from its competitors.

Also, there are different IMTs found, while considering the characteristics of each IMT, it is found that the IMT of internal bench marking matches the business-level strategies of cost leadership and product differentiation. Internal bench marking focuses on improving internal processes to advance the product's quality. Finally, the business-level strategies, combined with the IMT of internal bench marking, and the results of CM, will provide a strategic choice and strategic implementation for DFDCs in the Netherlands to maintain or gain a competitive advantage.

The strategy of cost leadership is not included in the approach due to the absence of pertinent findings from the expert interviews that would emphasise the cost leadership strategy. The strategic choice and strategic implementation will therefore be based on three sub strategies which emerge from combining the business-level strategy of product differentiation, the IMT of internal bench marking, and the findings of CM. The "sub strategies" are: (1) timing of product introduction, (2) use of customer-specific marketing, and (3) additional product features. Based on these sub strategies, a business strategy for DFDCs in the Netherlands to maintain or gain a competitive advantage, will be provided.

Having provided this brief overview of the research, the MRQ will now be addressed based on the findings and discussion presented in this research. The answer to the MRQ is presented in the subsequent section.

7.2 Research's conclusion

The conclusion of the research is provided by answering the MRQ, which sounds:

"What are potential strategies for deepfake detection companies in the Netherlands to maintain or gain a competitive advantage?"

To conclude the MRQ, the strategic management process is considered. This involves several steps: internal analysis, external analysis, matching the internal and external analyses, and finally a strategic choice and strategic implementation. These topics are discussed sequentially with the SRQs. The findings to the SRQs are described below in order to provide an answer to the MRQ, i.e. a conclusion for this research.

7.2.1 Internal analysis - analysis of internal organisations

Considering SRQ1:

"What are the main resources and capabilities for deepfake detection companies in the Netherlands?"

With the findings of the expert interviews to the analytical approach of RBV, seven resources are found, which are:

- Financial resource: offering the DFDT on a licence fee basis;
- Financial resource: collecting subsidies from governmental institutions in the Netherlands;
- Physical resource: possessing over reliable data to train the DFDT on;
- Individual resource: employees within the DFDC with study and/or personal interest based knowledge;
- Individual resource: "learning-on-the-job" based experience by employees of the DFDC;
- Organisational resource: DFDCs which use media visibility to make their potential customers familiar with them; and
- Organisational resource: keeping the DFDT up-to-date at all times.

These findings of the expert interviews are discussed with VRIO and EP. From which is found that the following resources will provide a **sustained competitive advantage**, based on conditions of VRIO and EP:

- Individual resource: employees within the DFDC with study and/or personal interest based knowledge;
- Individual resource: "learning-on-the-job" based experience by employees within the DFDC; and
- Organisational resource: keeping the DFDT up-to-date at all times.

The following resources will provide a **temporary competitive advantage**, based on the conditions of VRIO and EP:

- Financial resource: offering the DFDT on a licence fee basis; and
- Physical resource: possessing over reliable data to train the DFDT on.

The resource of using media visibility to make the DFDC's potential customers familiar with them, will achieve a **competitive parity**, based on conditions of VRIO and EP. And the resource of making use of governmental subsidies will achieve a **competitive disadvantage**, based on the conditions of VRIO and EP, since this resource is not dynamic and by this, could not easily respond to market changes. Based on these resources, internal strengths & weaknesses are considered. Internal strengths are the resources that could provide a temporary or sustained competitive advantage. Since there are no real weaknesses mentioned by the experts, it is decided to consider as weaknesses those resources that might not provide a competitive advantage.

Thus, the internal strengths are:

1. Employees within the DFDC with study and/or personal interest based knowledge;
2. "Learning-on-the-job" based experience by employees within the DFDC;
3. An up-to-date DFDT;
4. Offering the DFDT on a licence fee basis; and
5. Possessing over reliable data to train the DFDT on.

The internal weaknesses are:

1. Using subsidies from governmental institutions; and
2. Using media visibility to make the DFDC's potential customers familiar with them.

7.2.2 External analysis - analysis of the external environment

Considering SRQ2:

"Which factors influence the environment of the market for deepfake detection companies in the Netherlands?"

Based on GE, SCP, P5F, and PESTEL, seventeen opportunities and thirteen threats are considered by the experts. Due to the high number of both, it is decided to discuss the three most frequently mentioned opportunities & threats.

Thus, the external opportunities are:

1. Experts see opportunities in the development of DFDTs, due to the rise of the use of deepfakes during wars and elections to spread misinformation;
2. Experts see opportunities in the development of DFDTs, due to the rise of the use of deepfakes to commit CEO fraud; and
3. Experts see opportunities in the development of DFDTs in combination with the development of awareness programmes for deepfake's risks, which can be used by the customers for their employees.

The external threats are:

1. Experts see a threat for DFDCs in the fact that larger IT companies are developing DFDTs as well;
2. Experts see a threat for DFDCs in the fact that there are deepfake courses/e-learnings available. Since deepfake courses/e-learnings will provide more awareness, which eventually provides guidance to recognise a deepfake. It will make DFDTs less likely to be needed as people will be quicker to recognise for themselves whether something is a deepfake; and
3. Experts see a threat for DFDCs in the fact that within some firms there are tech-related issues teams available which are able to develop a DFDT by themselves.

7.2.3 Matching internal analysis and external analysis

Considering SRQ3:

"Which strategic alternatives do deepfake detection companies in the Netherlands have?"

As there are three opportunities and three threats, it is decided to use the three most frequently mentioned strengths. Only two weaknesses are found, so these are used. The two weaknesses and three opportunities & threats have already been discussed. The three most frequently mentioned strengths, by the experts, are:

1. Employees within the DFDC with study and/or personal interest based knowledge;
2. "Learning-on-the-job" based experience by employees within the DFDC; and
3. An up-to-date DFDT.

These strengths, weaknesses, opportunities, and threats are combined with SWOT as a two-by-two matrix. The interactions between strengths with opportunities & threats, and weaknesses with opportunities & threats are then scored using CM. A total score is given for each strength, weakness, opportunity, and threat. Based on the expert interviews, the following is determined.

- The strength with the maximum score, i.e. the maximum internal strength: having an up-to-date DFDT. The experts state that whenever a DFDC has an up-to-date DFDT, it has an advantage over other DFDCs without an up-to-date DFDT;
- The weakness with the minimum score, i.e. the minimum internal weakness: the use of media visibility. Media visibility is not a weakness in itself, however, since it does not provide a competitive advantage, it is considered a weakness. This means that the use of media visibility will gain the least advantage for the DFDC;

- The opportunity with the maximum score, i.e. the maximum external opportunity: these are all three most frequently mentioned opportunities. Experts consider the impact of deepfakes on fake news about wars and elections, and experts see potential in the use of deepfakes for CEO fraud. These dangers create opportunities for DFDCs to develop DFDTs when such risks arise or increase. Experts also see an opportunity to offer deepfake risk awareness programmes as an additional feature of DFDTs; and
- The threat with the minimum score, i.e. the minimum external threat: experts identified the main threat to DFDCs as the fact that larger IT companies could also develop DFDTs.

The main strength, weakness, opportunities, and threat, as stated above, identified with SWOT and CM, based on the findings of the expert interviews, can then be used to decide about a strategic choice and strategic implementation.

7.2.4 Strategic choice and strategic implementation - business strategies

Considering SRQ4:

"In what manner can the choices from SRQ3 be implemented by deepfake detection companies in the Netherlands, in order to maintain or gain a competitive advantage?"

To this end, the literature review and discussion on business strategies for emerging technologies has shown that product differentiation combined with internal bench marking provide three sub strategies.

First, the timing of the product launch. This is where the main opportunities identified by experts can be applied. Namely, the (potential for) manipulation with deepfakes during wars and elections, and the use of deepfakes for CEO fraud. This means that under certain circumstances, it is the right time to launch a DFDT.

Next, consumer specific marketing, which involves tailoring the DFDT to the needs of the customer. During the expert interviews, participants identified "up-to-date DFDT" as the main strength, which is a need of the potential customers of DFDCs.

The last strategy considers additional features to the product, for which the experts stated providing deepfake risk awareness programmes for the DFDC client's employees as opportunity.

Differentiating the DFDT to the extent mentioned with the timing of product launch, consumer specific marketing, or additional features of the product, in which the main strength, and opportunities identified by the experts are taken into account, will ensure a competitive advantage for DFDCs. This allows DFDCs to stay ahead of even larger IT companies, which are seen as the main threat by the experts, and possibly other competitors, such as DFDCs, by monitoring market shifts. The main weakness can also be taken into account, which is making use of media visibility. This resource is not specifically a weakness, however since it eventually will not provide a competitive advantage, it is considered as a weakness. DFDCs may utilise media visibility to introduce themselves to potential customers; however, this alone will not provide them with a competitive advantage over their competitors, and thus needs to be monitored by the DFDCs.

7.2.5 To conclude

Business strategies for DFDCs in the Netherlands to maintain or gain a competitive advantage can be seen as three sub strategies. Namely, the timing of product introduction, which can be considered whenever there is an increase in the use of deepfakes to mislead public opinion during wars and elections. The DFDCs could consider such times as the right time to launch their product.

Next, the use of customer-specific marketing, where the DFDT is tailored to the needs of the customer. Experts suggested that the most important need for the DFDT is, to be up-to-date at all times.

And finally, additional product features. Experts see potential in providing deepfake risk awareness programmes as an additional feature to DFDTs, to be offered to their employees to raise awareness about how the dangers of deepfakes.

7.3 Contributions

The scientific contribution lies in contributing to the research field by providing a strong foundation for research into emerging markets, by outlining a qualitative exploratory study for the DFDT market. This research has built upon the knowledge gap in the literature, where little is known about business strategies for DFDCs, although there is knowledge considering business strategies to maintain or gain a competitive advantage for emerging markets. Therefore, this research gives an overview of the available knowledge for business strategies for emerging markets, which provides a foundation for further research, for which recommendations are provided in chapter 7.4.

The social risks consider the use of deepfakes to mislead individuals, and the use of deepfakes for fake news. This brings the research's social relevance. This research emphasises the need for raising awareness, since the deepfakes will become more realistic over time. Thus, efforts should be made to help individuals in the detection of deepfakes, which is suggested by experts by providing deepfake awareness programmes as additional feature to the DFDTs.

The managerial contribution lies in offering insights into market analyses, strategy formulation, and strategic choices for DFDCs, in order to maintain or gain a competitive advantage, on which the policymaking within DFDCs can be based. These insights are not only pertinent for DFDCs, but can also benefit for firms operating in other emerging markets.

7.4 Limitations and future recommendations

Limitations and future recommendations can be sought in a number of areas.
First, the current research is carried out in only the Netherlands in order to obtain concrete research and results. By this, a strong foundation is provided to extend the research to other countries, which is the first future recommendation.

Also, during the current research, the findings to the analytical approaches are based on eight interviews, with experts from four different industries, namely consultancy, media, insurance, and law. This is where the second future recommendation lies, namely in considering interviewing experts from different industries, such as the banking industry. Also, it can be considered to interview more experts within the same industry. This can provide even stronger insights into potential business strategies for DFDCs.

Although great care was taken to ensure that the semi-structured interview questions were as open-ended and non-focused as possible, the interview bias could still have been occurred. There are two reasons for this:

- Deepfake is generally perceived as something quite negative. As a result, participants felt strongly that it is important to develop DFDTs. This is in itself a great result for the current study, as it obviously focused on business strategies for DFDCs. However, it underestimates the positive aspect of deepfakes. Which view point could also influence the opinion towards DFDTs; and
- The expert interviews were conducted with many of the same participants as the pilot interviews. At first, this did not seem like a problem, as it allowed for a deeper exploration of the questions. However, looking at the study as a whole, it also means that people already had a certain idea about deepfakes and DFD, simply because it was already discussed during the pilot interviews.

It is recommended, by considering the positive use of deepfakes, to modify the semi-structured interview questions to include scenarios or questions that prompt participants to consider the positive applications of deepfakes. However, transparency should be kept in mind.
Considering the fact that experts were interviewed twice, brings the recommendation for future research to avoid using participants more than once to prevent pre-existing biases and opinions from influencing the results. Recruiting new participants can provide a fresh perspective.

Another limitation of this research lies in the fact that there is not focused on firms developing DFDT. Such as start-ups, or larger IT companies. This brings another future recommendation, namely to include such firms in the research as well, in order to gain insights into their perception of the DFDT market.

7.5 Validity of the research

Since a qualitative approach was used, deploying semi-structured interviews is the primary data collection tool. This was an acceptable choice, since it allowed for a deeper exploration of issues than, for example, using surveys. To translate these interview into useful insights, the data was coded using QCA. This analytical method was chosen to categorise the interviews based on themes, ensuring that the findings were certainly based on the views of the experts. This ensures that it can be easily reproduced and thus validated in further research.

Some literature review in analytical approaches, which are eventually used for internal and external analysis, and merging these two analyses, was also used. Frequently cited literature, and literature which shows the analytical approaches' origin, is used. This means that these are valid studies from which relevant theories can be extracted. This is mainly since it draws on existing theoretical frameworks and literature. Which means that it has a solid theoretical foundation and is in line with existing scientific concepts, which then increases the credibility of the findings.

The next element to discuss, regarding the validity of the study, is whether the findings are relevant for, in this case, the market for DFDTs. The data found is useful and easy to interpret for DFDCs. However, the research is obviously focused on the Netherlands, which may bring some limitations, as stated in chapter 7.4. Nevertheless, the current research could be a foundation for conducting similar research in other parts of the world and within other emerging markets, as already considered with future recommendations.

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March 26, 2024

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A

Pilot interview questions

#[1]	Vraag	Question
1	Wat is uw algemene perceptie van deepfake-technologie?	What is your overall perception of deepfake technology?
2	Hoe bent u bekend geraakt met het concept van deepfake?	How did you get familiair with the concept of deepfake?
3	Bent u bekend met de diverse toepassingen van deepfake, zowel negatief als positief? Zo ja, zou u deze nader kunnen toelichten?	Are you aware of different applications of deepfake, both negative and positive? If so, could you please elaborate?
4	In hoeverre denkt u dat BEDRIJF kwetsbaar kan zijn voor deepfake? En wat zouden mogelijke gevolgen hiervan kunnen zijn?	To what extent do you think FIRM is funerable for deepfake? What possible consequences could occur?
5	In hoeverre denkt u dat BEDRIJF positief gebruik kan maken van deepfake?	To what extent do you think FIRM could make positive use of deepfake?
6	Wat zijn volgens u de belangrijkste uitdagingen en beperkingen bij het detecteren van deepfakes in de context van bedrijven zoals BEDRIJF?	What are the most important challenges and limitations with detecting deepfake in the context of firms such as FIRM?
7	Bent u op de hoogte van specifieke incidenten of gevallen waarin BEDRIJF mogelijk is blootgesteld aan deepfake? Zo ja, kunt u dit nader toelichten?	Are you aware of specific incidents in which FIRM has been exposed to deepfake? If so, could you please elaborate?
8	Neemt BEDRIJF maatregelen om zich te beschermen tegen deepfake? Zo ja, welke maatregelen heeft BEDRIJF genomen?	Does FIRM take measures to protect themselves against deepfake? If so, which measures did FIRM take?
9	Zijn er, naar uw idee, bepaalde afdelingen of functies binnen BEDRIJF die een hoger risico lopen op deepfake aanvallen? Zo ja, waarom specifiek die afdelingen of functies?	Are there, in your opinion, certain departments or functions within FIRM which has a higher risk for deepfake attacks? If so, why specifically those departments and functions?
10	Heeft BEDRIJF richtlijnen of protocollen opgesteld met betrekking tot het identificeren en reageren op mogelijk deepfake fraude? Zo ja, zou u deze nader kunnen toelichten?	Does FIRM has protocols with regards to identifying and reacting to potential deepfake fraud? If so, could you please elaborate?

[1] Pilot interview question number.

11	Heeft BEDRIJF richtlijnen of protocollen opgesteld met betrekking tot het gebruik van deepfake als ondersteunende techniek voor werknemers en klanten? Zo ja, zou u deze nader kunnen toelichten?	Does FIRM has protocols with regards to using deepfake as supportive technique for employees or clients? If so, could you please elaborate?
12	Zijn er samenwerkingsverbanden met externe partners, organisaties, of instanties om BEDRIJF te ondersteunen bij het omgaan van deepfake? Denk aan bijvoorbeeld technologische oplossingen/tools voor het detecteren van deepfake. Zo ja, met welke externe experts, organisaties, of instanties is dit? Zo nee, denkt u dat dit in de toekomst wellicht wel het geval zal zijn? Zo nee, zijn er mogelijkheden en middelen om dit vanuit BEDRIJF zelf te organiseren? Of zou dit in de toekomst wellicht het geval kunnen zijn?	Are there partnerships with external partners, organisations, or agencies to support FIRM in dealing with deepfake? Consider, for example, technological solutions/tools for detecting deepfake. If so, which external experts, organisations, or bodies does this involve? If not, do you think this might be the case in the future? If not, are there options and resources to organise this by the FIRM itself? Or could this possibly be the case in the future?

Table A.1: Questions for semi-structured pilot interviews

B

Network for interviews

Industry firm	Firm code	Function title contact person	PI[1]	EI[2]	#[3]
Health care institution	A	CISO	✓	✗	✗
Consultancy firm	B	Head of Quality & Security	✓	✓	B2
		Manager Cyber Security	✓	✗	✗
		Consultant IT Advisory	✗	✓	B1
Media organisation	C	Chief editor	✓	✓	C1
		Technology Reporter	✗	✓	C2
Insurance company	D	IT Risk Manager	✓	✓	D1
		IT Risk Officer	✓	✓	D2
Law firm	E	ICT Director	✓	✓	E1
		CISO	✓	✗	✗
		Manager ICT	✗	✓	E2

Table B.1: Researcher's network for interviews

[1] Whether or not there is spoken to this person with a pilot interview.
[2] Whether or not there is spoken to this person with an expert interview.
[3] Participant codes used for the elaboration upon the expert interviews.

C

Expert interview questions

#[1]	Vraag	Question
1	Zou u zichzelf kort kunnen introduceren?	Could you please introduce yourself.
1a	Wat is uw functie binnen BEDRIJF?	What is your function within FIRM?
1b	Heeft u al eerdere ervaring in IT security in het algemeen of specifiek deepfakes? Indien ja, wat is uw ervaring?	Do you have previous experience in IT security in general or in deepfakes in particular? If so, what is your previous experience?
1c	Wa t is uw studie-achtergrond?	What is your study background?
1d	Heeft u op een formele of informele manier kennis opgedaan over IT security in het algemeen of specifiek deepfakes?	Do you have any formal or informal education in IT security in general or in deepfakes in particular?
2	Wat weet u van deepfakes en deepfake detectie?	What do you know about deepfakes and deepfake detection?
3	Wat is uw mening over deepfakes en deepfake detectie?	What is your opinion about deepfakes and deepfake detection?
4	Wat is uw professionele ervaring met deepfakes en deepfake detectie?	What is your professional experience with deepfakes and deepfake detection?
5	Op welke manier heeft u de kennis betreft deepfakes en deepfake detectie opgedaan?	Where did you get your information about deepfakes and deepfake detection from?
6	Heeft u (andere) ervaren collega's binnen uw team of BEDRIJF die zich focussen op het onderwerp deepfake?	Do you have (other) educated or experienced colleagues within your team or FIRM focusing on the topic of deepfakes?
7	Wat denkt u van deepfake detectie binnen BEDRIJF?	What do you think of deepfake detection for FIRM?
8	Zijn er mogelijkheden binnen BEDRIJF om een technologie (software dan wel plug-ins in andere programma's) voor deepfake detectie te ontwikkelen?	Are there opportunities for FIRM to develop a technique (software or plug-ins in other programmes) for deepfake detection?

[1] Expert interview question number.

9	Bent u op de hoogte van een of meerdere bedrijven die deepfake detectie technologieën ontwikkelen, of die additionele functies, om deepfakes te achterhalen, ontwikkelen? Zo ja, hoe bent u bekend geworden met dit bedrijf of deze bedrijven?	Are you aware of one or more firms which are developing deepfake detection technologies, or which offers additional features, to detect deepfakes, within their software? If so, how did you get familiar with this company or these companies?
10	Bent u op de hoogte van standaarden, wetten, en regelgevingen voor deepfakes in het algemeen of binnen BEDRIJF?	Are you aware of standards, laws, and regulations corresponding deepfakes in general and within FIRM?
11	Wat is volgens u de impact op deepfakes in internationale gebeurtenissen? Denk aan bijvoorbeeld gebeurtenissen zoals de oorlog tussen Rusland & Ukraine, Israel & Hamas, of de verkiezingen van de Tweede Kamer?	What do you think is the impact of deepfakes in international events? Think about events such as the war between Russia & Ukraine, Israel & Hamas, or the elections for the "Tweede Kamer" in the Netherlands?
12	Wat is uw mening over deepfake als individu/in uw privé leven?	What is your opinion about deepfake as individual or in your private life?
13	Heeft u het idee dat er nog belangrijke vragen missen of is er nog iets dat u denkt dat belangrijk is te vermelden over deepfake of deepfake detectie?	Do you feel I missed out some important questions or do you think there is something important left to say in this context?

Table C.1: Questions for semi-structured expert interviews

D

Overview codes for coding scheme

D.1 Internal analysis - analysis of internal organisations

- RBV financial resource
- RBV physical resource
- RBV individual resource
- RBV organisational resource

D.2 External analysis - analysis of external environment

General Environment framework

- GE demographic trends
- GE cultural trends
- GE economic climate
- GE legal & political conditions
- GE specific international events
- GE technological trends

Structure-Conduct-Performance Model

- SCP structure
- SCP performance
- SCP conduct

Porter's Five Forces (P5F)

- P5F bargaining power of suppliers
- P5F bargaining power of buyers
- P5F threat of new entrants
- P5F threat of substitute goods
- P5F threat of existing competitors/competitive rivalry

PESTEL

- PESTEL political
- PESTEL economic
- PESTEL social
- PESTEL technological
- PESTEL environmental
- PESTEL legal

E

Excel spreadsheets for coding interviews

E.1 Excel spreadsheet for all quotes

Framework	RBV					GE	
Assessment criteria	*Financial resource*	*Physical resource*	*Individual resource*	*Organisational resource*		*Demographic trends*	*Cultural trends*
Explanation	*Money*	*Soft- and hardware*	*Experience, knowledge*	*Planning, controlling*		*Wereldwijde trends*	*Trends op basis van cultuur*
Number of quotations	*4*	*3*	*19*	*16*		*22*	*5*
B1		Beschikken over goede data: 'Garbage in, garbage out'. Als je data erin gooit, die niet klopt of onvolledig is, dan is hetgeen dat eruit komt ook niet kloppend.	Studie.	Doormiddel van artikelen in de media ben ik bekend geworden met verschillende bedrijven die zich bezig houden met de ontwikkeling van deepfake detectie technologieën.	**B1**	CEO-fraude is nu al heel erg groot. Als dat dan ook nog eens op een veel overtuigendere manier kan plaatsvinden, dan kan je als bedrijf natuurlijk gigantisch grote risico's lopen.	
B1			Persoonlijke interesse.		**B1**	Deepfake detectie kan ook een nuttige check zijn voor het auditen.	
B1					**B1**	Door de opkomst van onder andere sociale media, wordt nieuws sneller verspreid.	
B1					**B1**		
B1					**B1**		
D1			'Learning-on-the-job'.		**D1**	Ik denk dat het goed is dat het er is, dan kan je zien wat echt is, en wat nep is. Maar	

Figure E.1: Excel spreadsheet for all quotes

E.2 Excel spreadsheet for most frequently mentioned topics Dutch

Assessment criteria		#	B1	B2	C1
RBV: Financial resource	*Op contractbasis technologie aanbieden aan klanten - licenstie, zodat de software ontwikkeld blijft worden.*	1			Als je iets gaat gebruiken, dan wil je iets van een partij die eigenlijk net zo bijblijft als degene die deepfake video's kunnen maken. Meer op licentiebasis, inieder geval software die ontwikkeld blijft worden.
RBV: Financial resource	*Er worden subsidies vrijgegeven vanuit de overheid om te werken aan AI technieken.*	1		Waar ik ook verschillende artikelen over heb gelezen is dat er vanuit, onder andere, de Nederlandse overheid subsidies worden aangeboden voor AI gerelateerde innovaties. Dus bedrijven, waaronder ook start-ups, kunnen op deze manier de ontwikkeling van hun technologie om deepfakes te herkennen	
RBV: Physical resource	*Beschikken over juiste data*	1	Garbage in, garbage out', als de data die je erin gooit, niet klopt of onvolledig is, dan is hetgeen dat eruit komt, niet of slechts in delen		
RBV: Individual resource		5		Studie & persoonlijke	Studie & persoonlijke
RBV: Individual resource		4		'Learning-on-the-job'	
RBV: Organisational resource	*In de media spreken*	5	Ik ben bekend geworden met DFDC doordat zij zich in de media hebben geuit.	Via online middelen heb ik verschillende artikelen voorbij zien komen.	
RBV: Organisational resource	*Rat race voor deepfake en deepfake detectie (gelijke ontwikkeling)*	5		Omdat de ontwikkeling van deepfakes ontzettend snel gaan, moet de ontwikkeling van deepfake detectie software ook zo snel gaan.	Zo snel deepfake gaat, zo snel zal ook de technologie steeds moeten gaan.
GE: Demographic trends	*CEO-fraude*	7	Als je kijkt naar CEO-fraude	Als je kijkt naar CEO fraude,	Je kunt nu natuurlijk al op

Figure E.2: Excel spreadsheet for most frequently mentioned topics Dutch

E.3 Excel spreadsheet for most frequently mentioned topics English

Assessment criteria		#	B1	B2	C1
RBV: Financial resource	***Licence fee***	1			If you are going to use something, you want something from a party that actually keeps up as much as those who can develop deepfakes. More on licensing basis, at least software that continues to
RBV: Financial resource	***Subsidies***	1		What I have also read several articles about is that subsidies are offered from, among others, the Dutch government for AI-related innovations. So companies, including start-ups, can thus fund the development of their technology to recognise	
RBV: Physical resource	***Reliable data***	1	Garbage in, garbage out', if the data you throw in is incorrect, or incomplete, then what comes out will not be useful or will only be useful		
RBV: Individual resource	***Study and/or personal interest based knowledge***	5		Study & personal interest	Study & personal interest
RBV: Individual resource	***Learning-on-the-job' based experience***	4		'Learning-on-the-job'	
RBV: Organisational resource	***Media visibility***	5	I became familiair with DFDC because they expressed themselves in the media	Through online resources, I have seen several articles pass by.	
RBV: Organisational resource	***Up-to-date DFDT***	5		Because the development of deepfakes is incredibly fast, the development of deepfake detection software must also be so fast.	As fast as deepfake goes, as fast DFDT will also have to go all the time.
GE: Demographic trends	***CEO fraud***	7	If you look at CEO fraud now, how big that already is. If that can then also be done in a much more convincing manner, then of course, as a company, you can be at huge risk, with all legal	If you look at CEO fraud, you hear that a lot. To my knowledge, we haven't had to deal with that yet using deepfakes, but of course this is a matter of waiting if you work at a large, international	Of course, you can already supposedly have your CEO 'on screen' in this way. And be enticed to transfer sums of money. With deepfakes, this risk only increases.

Figure E.3: Excel spreadsheet for most frequently mentioned topics English

F

List of opportunities & threats

F.1 Opportunities

1. CEO fraud: opportunities are seen for developing DFDTs to detect deepfakes used for committing CEO fraud;
2. News spread faster due to the rise of social media: fake news is spread fast by social media. Deepfakes can be used for fake news, and therefore, opportunities are seen in developing DFDTs to detect deepfakes spread via social media;
3. Fake news might disrupt society: since deepfakes are used for fake news, opportunities are seen in developing DFDTs to detect deepfakes used for spreading fake news;
4. Companies will probably buy DFDT: opportunities are seen in developing DFDTs since companies will probably invest in DFDTs, rather than developing it by themselves;
5. Deepfakes might influence current wars: since deepfakes might influence current wars, opportunities are seen in developing DFDTs to detect deepfakes used for spreading misinformation during wars;
6. Deepfakes might influence elections: since deepfakes might influence elections, opportunities are seen in developing DFDTs to detect deepfakes used for spreading misinformation during elections;
7. As developing deepfakes becomes easier, the number of fraud cases will rise: since the techniques for developing deepfakes become more user-friendly, opportunity is seen in developing DFDTs;
8. Integration of DFDT into existing technologies: opportunities are seen in developing "seamless" DFDTs within existing technologies;
9. Judgement explanation of decisions DFDT: opportunities are seen into judgement explanation of the decisions made by the DFDT;
10. DFDT will possibly focus on niches: opportunities are seen in customer-specific marketing focusing on niches;
11. Possibility to develop awareness programmes: opportunities are seen by experts in developing awareness programmes as additional features to the DFDT;
12. Possibly receiving licence fee of customers: opportunities are seen by an expert to consider a licence fee as pricing scheme for DFDTs;
13. Receiving reliable data from suppliers: opportunities are seen in receiving reliable data from suppliers to train the DFDT on, to make the technology as accurate as possible;
14. Receiving subsidies from governmental institutions: opportunities are seen by an expert in receiving subsidies as foundation to develop the DFDT;
15. Potential for DFDT: potential is seen by experts for the development of DFDTs, which brings opportunities for DFDCs;
16. Media is not viewed critically enough by society: opportunities for DFDTs are seen in the fact that media is not viewed critically enough by society, and therefore it could be of importance to develop a DFDT; and
17. Fear that a deepfake will never disappear after once published: opportunities are seen by an expert in the development of DFDTs since deepfakes are hard to fully disappear once published online.

F.2 Threats

1. AI techniques can be discriminatory: threats are seen for DFDTs, by an expert, that there are AI systems which seem to discriminate;
2. More DFDC will bring price competition: threats are seen by an expert at the moment more DFDCs are entering the market, a price competition will occur;
3. EU is working on some guidelines for the use of deepfakes: threats are seen by the fact that the EU is working on guidelines for the use of deepfakes, as this may reduce the prevalence and subsequently decrease the demand for DFDTs;
4. AI act: threats are seen by the fact that the EU is working on guidelines for the use of deepfakes, as this may reduce the prevalence and subsequently decrease the demand for DFDTs;
5. Tech-related issues teams within several firms: threats are seen by the fact that within some firms, tech-related issues teams could develop a DFDT by themselves;
6. Multiple DFDCs within the Netherlands: threats are seen by the experts due to the fact that multiple DFDCs seem to enter the market of DFDTs;
7. Doubts about the size of the problem requiring DFDT: threats are seen by an expert due to the fact that the expert has doubts about the size of the problem requiring DFDT - in the short term -;
8. Manual verification methods: threats are seen by the fact that manual verification methods work well;
9. Start-ups might appear to be developing DFDT: threats are seen by the experts since it seems like start-ups are entering the market of DFDTs;
10. Courses and e-learnings are offered to develop knowledge: threats are seen in courses and e-learnings since it will provide more awareness, and this provides guidance to recognise a deepfake;
11. Larger IT companies seem to be/could potentially be working on the development of DFDTs: threats are seen by the experts since larger IT companies seem to be/could potentially be working on the development of DFDTs;
12. Larger IT companies offering solutions for fake news: threats are perceived by experts due to the efforts of larger IT companies working on solutions for fake news, where deepfakes could potentially be employed to spread misinformation; and
13. Negative applications of deepfakes, however, also positive use cases: threats are identified in the perception that individuals might view deepfakes as a beneficial technology.

G

Elaboration upon Confrontation Matrix (CM)

S/W	O/T	Score	Explanation
S: Study and/or personal interest based knowledge	O: Deepfake influences wars and elections	+2	Employees with study and/or personal interest based knowledge have a positive influence on developing more effective DFDTs, and therefore on the opportunity of developing DFDT to detect deepfakes used for wars and elections.
S: Study and/or personal interest based knowledge	O: CEO Fraud	+2	Employees with study and/or personal interest based knowledge have a positive influence on developing more effective DFDTs, and therefore on the opportunity of developing DFDT to detect deepfakes used for committing CEO fraud.
S: Study and/or personal interest based knowledge	O: Potential for DFDT and awareness	+2	Employees with study and/or personal interest based knowledge have a positive influence on developing more effective DFDTs. With the knowledge, the employees are able to develop more effective DFDTs and awareness programmes.
S: Study and/or personal interest based knowledge	T: Larger IT companies → DFDT	-2	The fact that larger IT companies (might) develop DFDT themselves, might have a negative impact on the possibilities for development/sales of DFDT by DFDC, although they have study and/or personal interest based knowledge.
S: Study and/or personal interest based knowledge	T: Tech-related issues team	-1	The fact that different firms have tech-related issues teams, might have a negative impact on the possibilities for development/sales of DFDT by DFDC, although they have study and/or personal interest based knowledge.
S: Study and/or personal interest based knowledge	T: Deepfake courses/e-learnings	-1	The fact that there are courses and e-learnings available to provide awareness and handles to know how deepfakes can be recognised, might have a negative impact on the possibilities for development/sales of DFDT by DFDC, although they have study and/or personal interest based knowledge.

Table G.1: Strength "study and/or personal interest based knowledge" versus opportunities & threats

S/W	O/T	Score	Explanation
S: Up-to-date DFDT	O: Deepfake influences wars and elections	+2	Having up-to-date DFDT could have a positive influence on the development of DFDTs for it to be more accurate. Whenever the DFDT is up-to-date it could mean that harmful effects of the risks and impact could be minimalised.
S: Up-to-date DFDT	O: CEO Fraud	+2	Having up-to-date DFDT could have a positive influence on the development of DFDTs for it to be more accurate. Whenever the DFDT is up-to-date it could mean that harmful effects of the risks and impact could be minimalised.
S: Up-to-date DFDT	O: Potential for DFDT and awareness	+2	Having up-to-date DFDT could have a positive influence on the potential people from different firms see in DFDT and awareness programmes. It is often mentioned, by experts, that software must be up-to-date, thus more potential will be seen in up-to-date DFDTs and awareness programmes.
S: Up-to-date DFDT	T: Larger IT companies → DFDT	-1	Even tough having up-to-date DFDT means a lot of good, the fact that larger IT companies (might) develop DFDT as well, might have a negative influence. Simply by the fact that they have already created brand awareness.
S: Up-to-date DFDT	T: Tech-related issues team	-1	Even tough having up-to-date DFDT means a lot of good, the fact that within different firms possibilities are there to develop DFDT by themselves by intern tech-related issues teams, might have a negative influence. Simply because those firms might not need the DFDC's DFDT.
S: Up-to-date DFDT	T: Deepfake courses/e-learnings	-1	Even tough having up-to-date DFDT means a lot of good, the fact that courses and e-learnings are available to create awareness and handles to know how deepfakes can be recognised, might have a negative influence. Simply because the need for DFDT may be less.

Table G.2: Strength "up-to-date DFDT" versus opportunities & threats

S/W	O/T	Score	Explanation
S: "Learning-on-the-job" based experience	O: Deepfake influences wars and elections	+2	Employees with "learning-on-the-job" based experience have a positive influence on developing more effective DFDTs, and therefore on the opportunity of developing DFDT to detect deepfakes used for wars and elections.
S: "Learning-on-the-job" based experience	O: CEO Fraud	+2	Employees with "learning-on-the-job" based experience have a positive influence on developing more effective DFDTs, and therefore on the opportunity of developing DFDT to detect deepfakes used for committing CEO fraud.
S: "Learning-on-the-job" based experience	O: Potential for DFDT and awareness	+2	Employees with "learning-on-the-job" based experience have a positive influence on developing more effective DFDTs. With the experience, the employees are able to develop more effective DFDTs and know how to develop the awareness programmes.
S: "Learning-on-the-job" based experience	T: Larger IT companies → DFDT	-2	The fact that larger IT companies (might) develop DFDT themselves, might have a negative impact on the possibilities for development/sales of DFDT by DFDC, although they have employees with "learning-on-the-job" based experience, within larger IT companies, there is more experience over all.
S: "Learning-on-the-job" based experience	T: Tech-related issues team	-2	The fact that different firms have tech-related issues teams, might have a negative impact on the possibilities for development/sales of DFDT by DFDC, although they have study and/or personal interest based knowledge.
S: "Learning-on-the-job" based experience	T: Deepfake courses/e-learnings	-1	The fact that there are courses and e-learnings available to provide awareness and handles to know how deepfakes can be recognised, might have a negative impact on the possibilities for development/sales of DFDT by DFDC. However, by "learning-on-the-job" based experience, there is the possibility that the employees know how the courses/e-learnings are developed, and therefore this experience can be used to develop the awareness programmes differently so that they add value in another manner than courses/e-learnings. Still, this strength and threat has a slightly negative influence.

Table G.3: Strength ""learning-on-the-job" based experience" versus opportunities & threats

S/W	O/T	Score	Explanation
W: Media visibility	O: Deepfake influences wars and elections	+1	Media visibility, although a weakness in terms of competitive advantage, may well have a positive effect on the visibility of DFDCs, and thus on the speed with which deepfakes used to spread disinformation for wars and elections can be eliminated. Since other DFDCs can easily make use of media visibility as well, the positive impact considering one DFDC, is minimal.
W: Media visibility	O: CEO fraud	+1	Media visibility, although a weakness in terms of competitive advantage, may well have a positive effect on the visibility of DFDCs, and thus on the speed with which deepfakes used to commit CEO fraud. Since other DFDCs can easily make use of media visibility as well, the positive impact considering one DFDC, is minimal.
W: Media visibility	O: Potential for DFDT and awareness	+1	Media visibility, although a weakness in terms of competitive advantage, may well have a positive effect on potential seen for DFDTs and awareness programmes. Since other DFDCs can easily make use of media visibility as well, the positive impact considering one DFDC, is minimal.
W: Media visibility	T: Larger IT companies → DFDT	-2	Media visibility is seen as a weakness in that it does not provide a competitive advantage, as other DFDCs can easily make use of media visibility as well. This, combined with the fact that there are already larger IT companies working on DFDTs, will have a negative impact on a DFDC.
W: Media visibility	T: Tech-related issues team	-2	Media visibility is seen as a weakness in that it does not provide a competitive advantage, as other DFDCs can easily make use of media visibility as well. This, combined with the fact that there are tech-related issues teams within different firms, will have a negative impact on a DFDC.
W: Media visibility	T: Deepfake courses/e-learnings	-1	Media visibility is seen as a weakness in that it does not provide a competitive advantage, as other DFDCs can easily make use of media visibility as well. This, combined with the fact that there are deepfake courses/e-learnings available, will have negative impact on a DFDC.

Table G.4: Weakness "media visibility" versus opportunities & threats

S/W	O/T	Score	Explanation
W: Subsidies	O: Deepfake influences wars and elections	+1	Subsidies are seen as a weakness because they do not provide a competitive advantage, because subsidies are not dynamic and therefore cannot easily respond to changes in the market. Subsidies can, however, help to launch and develop DFDTs based on the use of deepfakes in wars and elections. As subsidies do not directly create a competitive advantage, this is seen as a small positive influence.
W: Subsidies	O: CEO Fraud	+1	Subsidies are seen as a weakness because they do not provide a competitive advantage, because subsidies are not dynamic and therefore cannot easily respond to changes in the market. Subsidies can, however, help to launch and develop DFDTs based on the use of deepfakes for committing CEO fraud. As subsidies do not directly create a competitive advantage, this is seen as a small positive influence.
W: Subsidies	O: Potential for DFDT and awareness	+1	Subsidies are seen as a weakness because they do not provide a competitive advantage, because subsidies are not dynamic and therefore cannot easily respond to changes in the market. Subsidies can, however, help to launch and develop DFDTs with corresponding awareness programmes, since potential is seen in this technology in combination with an awareness program. As subsidies do not directly create a competitive advantage, this is seen as a small positive influence.
W: Subsidies	T: Larger IT companies → DFDT	-1	While subsidies can help fund development efforts, they may not be able to match the technological advances and resources of larger IT companies. Subsidies as stated to be weaknesses as it does not provide a competitive advantage directly. Coupled with the fact that subsidies do not directly provide a competitive advantage. This can increase the threat these larger IT companies pose to the DFDCs and reduce its effectiveness in dealing with the development of DFDTs. Since the larger IT companies are probably not directly competitors for the subsidies, the impact between the weakness and threat has been assess as a minimal negative impact.
W: Subsidies	T: Tech-related issues team	-1	While subsidies can help fund development efforts, they may not outweigh the ability of companies themselves to develop DFDTs. Subsidies as stated to be weaknesses as it does not provide a competitive advantage directly. As these companies are unlikely to be direct competitors for the subsidies themselves, the impact between this weakness and the threat has been assessed as minimal negative impact.

W: Subsidies	T: Deepfake courses/e-learnings	-1	Subsidies can be useful for funding technology development, but the presence of deepfake courses/e-learnings for employees can reduce the effectiveness of deepfakes as a deception tool. Subsidies are considered as weakness as they do not provide a direct competitive advantage. This can reduce the threat that deepfakes pose to the organisation, potentially reducing the need for advanced DFDTs.

Table G.5: Weakness "subsidies" versus opportunities & threats