



SCHOOL OF  
ECONOMICS AND  
MANAGEMENT

# The use of digital technology in decision-making processes

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A case study of Stopanska Banka AD's loan disbursement process

Master Thesis in Business Administration  
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# Abstract

Organisations increasingly adopt digital technologies in order to assist and improve the efficiency of their decision-making processes. Industries, including banking, need to increasingly adapt to the world of digitalization. The amount of data that has to be processed in the banking industry is increasing exponentially, and digital technology represents valuable solutions to processing this data both efficiently and rapidly, and to making better decisions. Some authors emphasize the importance of digitalization for businesses to compete, to optimise their productivity, and increase profit. This study seeks to investigate the use of digital technology in decision-making processes in the banking industry, and to assess its benefits and challenges. The purpose of this study is to explore how digital technology is used in the decision-making process for loan disbursements at Stopanska Banka AD Skopje.

The findings of the study reveal that while employees at Stopanska Banka do not utilize highly advanced digital systems in the decision-making process, digital technology still plays a significant role in the loan disbursement process. Digital tools (such as software and databases) are used in the decision-making process for various purposes such as gathering, summarizing, and analyzing data, as well as to save time and improve communication. These various operations have shown to improve overall decision-making processes. However, some challenges also arise in regards to digital technology in the decision-making process at Stopanska Banka as a result of its slow technological development, its dependency on human expertise, and inefficiency where there is data missing. The paper contributes to the field of research regarding digital technology and its use in decision-making in the banking industry. By providing a case study of Stopanska Banka, this research presents a real life example of how digital technology is used in a bank's decision-making process. This study also has practical implications, highlighting the benefits for businesses to implement such digital technology in their decision-making processes, and by presenting some challenges. It is hoped that this research will contribute to a deeper understanding of the topic and that it may serve as further guidance for future research.

**Key words: Digital Technology, Decision Making, Loan Process, Banking Industry**

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# Abbreviations

**AI** - Artificial Intelligence

**AM** - Account Manager

**CC** - Credit Committee

**CRM** - Customer Relationship Management

**EBITDA** - Earnings Before Interest, Taxes, Depreciation, and Amortization

**ICT** - Information and communication technology

**KPI** - Key Performance Indicators

**MKB** - Macedonian Kredit (Credit) Bureau

**NBRM** - National Bank of Macedonia

**NPA** - Non-Performing Assets

**NPL** - Non-Performing Loan

**RM** - Relationship Manager

**SBB** - Small Banking Business

# Table of Contents

1. Introduction .....	1
1.1. Problem .....	3
1.2. Purpose .....	4
1.3. Research Question.....	4
1.4 Outline of the Thesis .....	5
2. Literature review.....	7
2.1. Organizational Decision-Making .....	7
2.1.1. <i>Introduction to decision-making</i> .....	7
2.1.2. <i>Complexity of decision-making</i> .....	8
2.1.3. <i>The role of information in decision-making</i> .....	9
2.2. Digital Technology and Decision-Making Processes .....	10
2.2.1. <i>The use of digital technology in decision-making processes</i> .....	10
2.2.1. <i>Colson’s framework</i> .....	12
2.3. Digital Technology in the banking sector .....	14
2.3.1. <i>Digital technologies in decision making processes in banks</i> .....	14
2.3.2. <i>Digital technologies in decision making processes for loan approval</i> .....	15
3. Research Method .....	19
3.1. Main Methodology .....	19
3.2. Data Collection.....	21
3.2.1. <i>Conducting Interviews</i> .....	21
3.2.2. <i>Interview Guide</i> .....	21
3.3. Respondents Selection.....	22
3.4. Reliability and Ethics .....	24
3.4.1. <i>Reliability</i> .....	24
3.4.2. <i>Ethical concerns</i> .....	24
3.5. Methods Limitations .....	25
4. Settings .....	27
4.1. Case Description .....	27
4.2. The Loan Approval Process .....	29

4.3. The Loan Approval Process Stages.....	31
4.3.1 Loan submission .....	31
4.3.2 Loan analysis .....	33
4.3.3 Loan approval .....	35
4.3.4 Loan disbursement.....	36
4.3.5 Loan monitoring .....	37
5. Empirical Findings .....	39
5.1. Digital Technology in the Loan Process .....	39
5.1.1 Information and Communication Software .....	39
5.1.2 External Sources.....	41
5.1.3 Data Processing Software .....	42
5.1.4. Digital tools for customer services .....	43
5.2. Benefits of using digital systems in the loan disbursement process .....	45
5.2.1 Digital Technologies help saving time .....	45
5.2.2 Digital Technologies help analyzing data .....	46
5.2.3 Digital Technologies help retrieve information .....	48
5.2.4 Digital Technologies help summarising data .....	49
5.3. Challenges of using digital systems .....	49
5.3.1 Digital Technologies require human assistance .....	50
5.3.2 Lack of relevant data / information .....	51
5.3.3 Slow digital transformation .....	52
5.4. Limited use of digital technologies at Stopanska Banka.....	52
5.4.1 Reasons for not using more advanced technology .....	52
5.4.2 Implications of not using more digital technology .....	54
6. Discussion.....	56
6.1. The use of digital technology in the decision-making process .....	56
6.1.1. Data-driven decision making.....	56
6.1.2. Human judgement.....	56
6.2. Benefits of using digital technology in the decision-making process.....	58
6.2.1. Gathering information.....	58
6.2.2. Analysis of data using technology .....	59
6.2.3. Time saving.....	59

6.2.4. <i>Better communication</i> .....	60
6.3. Challenges of using digital technology in the decision-making process .....	60
6.3.1. <i>The need for human assistance</i> .....	60
6.3.2. <i>Some operations cannot be done by digital technologies</i> .....	61
6.4. The lack of use of digital technology in the decision making process.....	62
6.4.1. <i>Limitations of digital technology usage in the process</i> .....	62
6.4.2. <i>Why is more advanced digital technology not used in the process</i> .....	63
6.4.3 <i>Stopanska employees' view of the use of more advanced technology in the future</i> ....	64
7. Conclusion .....	65
References.....	67
Appendices.....	74
Appendix A - Interview Guide - Questions for the interviews .....	74

## Table of Figures

Figure 1. Decision models based on Colson's (2019) framework.....	13
Figure 2. Steps of the loan process .....	29
Figure 3. The Loan Disbursement Process .....	31

# List of Tables

Table 1. Participants, roles, and their relation to loan process.....	23
Table 2. Digital systems used in Stopanska Banka and description.....	43

# 1. Introduction

Decision-making is widely seen as one of the most important features of organisational activities. Indeed, a large number of authors have considered decision-making as being by far the primary function of management (Pusheljic et al, 2015). Managers and Chief Executive Officers constantly strive to produce the most optimal decisions and results for their companies (Mintzberg, 1973). However, making the right decision is not always an easy practice, often challenged by personal biases, lack of information, uncertainty, and many more external factors (Berger and Johnston, 2015). Many managers are faced with biases that can distort their rational decision-making, and need to search for solutions to try and eliminate or mitigate them (Kahneman, 2011). Furthermore, due to the increasing complexity of business decision-making, the need for information is becoming more and more important to ensure efficient decision-making (Hoßfeld, 2017). The increasing amount of available data, on the other hand, has made it more difficult for people to manage and process all information (Moin and Ahmed, 2012). In instance, Essen et al. (2021) have demonstrated how ignorance often arises in regard to information, which may have a significant impact on the outcome of corporate decision-making.

While the term ‘decision’ is often seen as a synonym of ‘choice’, Brunsson (2007) argues that it is more beneficial to look at decisions as an institution. According to the author, people within an organisation engage in what is called a ‘decision-making process’. These processes are guided by rules, and involve more than just one person, which is why they should be looked at as institutions (Brunsson, 2007). The decision-making process usually involves various actors within a company, not just the top management level (Brunsson, 2007). Business processes, on which operational activities are based, are designed by organisations to achieve particular business goals (Ghattas et al., 2014). These processes encompass a large variety of decisions, such as choosing between various alternatives, determining quantities, or allocating resources (Ghattas et al., 2014). Such decisions are of great importance as they influence the outcome of the process and how well its goal is achieved (Ghattas et al., 2014).

Digitalisation has become a key driver of organisational change, affecting all aspects of the business environment, from market structures to internal processes (Hoßfeld, 2017). In recent years, organisations have utilized new digital technologies to improve their overall decision-making processes. Digital technologies can be defined as “electronic tools, systems, devices and resources that generate, store or process data” (Victoria State Government, 2019). At the beginning of the 20th century, “computers” were typically employees that would, for example, calculate tables throughout the day (Hoßfeld, 2017). Today, digital technologies have taken over many tasks, and are designed and used to improve the quality and efficiency of overall business processes (Hoßfeld, 2017). According to many authors such as Hoßfeld (2017), digital technologies have and will increasingly change the way we make decisions, greatly affecting overall decision-making processes.

Since the 20th century, the banking industry has been greatly affected by digitalisation, adapting many of its business processes to the new digital era (Cuesta et al., 2015). New technology has become one of the most important factors affecting the business environment of contemporary banking organisations, fostering new abilities to support corporate activities and decision-making (Musa et al., 2019). Due to an improved access to large data sets and an increasing amount of data-processing power, there is an evolution in the banking sector towards more investment in R&D for technological improvements (EBF, 2019). Many authors have investigated the use of digital tools to assist in decision making capabilities in the banking industry (Marikar and Bandara, 2020). Some of these digital capabilities include data analytics, Business Intelligence, but also Artificial Intelligence (AI) (Marikar and Bandara, 2020; Mehrota, 2019). In the banking sector, new technologies are bringing down barriers to entry and opening up opportunities for new financial service providers (IBM, 2018). Competition from tech advanced companies, as well as increased regulations, are forcing banks to accelerate their digital reinvention (IBM, 2018). Banks will need to understand digital reinvention in order to compete within the new digital age. Their efforts will need to be strategic to reach desired business goals with the available capital and within an acceptable time frame (IBM, 2018).

We are seeing the global economy transform into a digital economy. AI and digitalization transformation are becoming new buzzwords among business scholars. The International Data Corporation (IDC, 2020) provides some interesting insights regarding the outlook and predictions

for AI and digitalization from 2021 onwards. According to IDC, 65% of the global GDP is supposed to be digitalized by 2022, 75% of all organizations will witness a comprehensive digital transformation by 2023 and 75% of businesses could leverage digital platforms and ecosystems by 2025 (IDC, 2020). This suggests that companies and businesses need to try to adapt to a more digitalized way of operation if they want to survive in the economy.

## **1.1. Problem**

Over the past few years, a number of authors have addressed the idea that banks have been disrupted by the new digital world (Hald, 2019; Swacha-Lech, 2019). Due to the changes in consumer habits and the emergence of a new competitive environment, some researchers have stated that banks will have to address their digitalisation process rapidly (Cuesta et al., 2015). Furthermore, more recent attention has focused on the development of advanced technology such as AI in the banking industry (Caron, 2019; Sastry, 2020). On the other hand, some studies have addressed that traditional organisations such as banks are less likely to change and utilize few of the available digital alternatives (Pusnik et al., 2019).

Moreover, a considerable amount of literature has looked into the impact of digital technology on decision-making processes. Operations in the banking industry are extensively data-driven, which is what often directs decision-making processes (Moin and Ahmed, 2012). According to Moin and Ahmed (2012), the amount of data has greatly increased in the past few years in the banking industry, and digital technology is valuable to process this data and therefore make better decisions. Efficient decision-making processes are fundamental in this industry due to the significant risks involved with financial activities.

While much study has been made regarding the use and impact of digital technologies on the banking industry, and some research has looked into the use of digital technologies in decision-making processes, little study has investigated how banks actually use various digital technologies to assist them throughout a whole decision-making process. Some studies - which are presented later in the literature review - have looked into either how distinct technologies (such as data mining) benefit decision-making processes, or how digital technology affects particular stages of

a decision-making process. Therefore, investigating a real case example of what digital technology is used, how it is used, and its impact throughout an entire decision-making process within a bank would provide some interesting insights on the topic.

## **1.2. Purpose**

The study was designed to investigate the use of digital technologies in a decision-making process within the banking sector. Due to the broadness of what decision-making processes can entail, our research focuses primarily on loan approval (or loan disbursement) processes. The loan disbursement process is interesting to use for our research as it is complex and involves a well structured decision-making process.

In order to do this, we are focusing our research on the decision-making process in regards to loan approvals at Stopanska Banka AD. Our paper aims to explore how digital technology is used throughout each stage of the decision-making process and how technologically advanced these digital systems are. Additionally, this study will look at the level at which digital technology contributes to the decision-making process, assessing whether it fully overtakes decision-making or partially assists in the process. The aim is also to see how much banks use and rely on digital technologies in their operations and in what way is this used in their daily responsibilities. Furthermore, we will investigate the various benefits, as well as any particular drawbacks in the decision-making process linked to either the application or the lack of use of digital technology.

## **1.3. Research Question**

The objectives of this thesis are as follows. Firstly, this thesis aims to contribute to the scarce literature in regard to the link between decision-making and digital technologies in the banking industry. Secondly, this study seeks to provide practical insights for decision-makers in the banking industry by providing a better understanding of the way digital technologies can be used to enhance or challenge decisions made in loan approval processes. Furthermore, this paper may

allow managers and associates on all levels to get some understanding of the benefits and challenges technology may bring to their every day operations.

Therefore, the objective of this study is to present the use and impact of digital technology on a particular decision-making process. Our research paper aims to answer the following research question:

*How is digital technology used in decision-making processes for loan approval operations in Stopanska Banka AD Skopje?*

## **1.4 Outline of the Thesis**

This paper continues by presenting a literature review which introduces the topics of organisational decision-making, the use of digital technology in decision-making, and the use of digital technology in loan disbursement processes. In this section, Colson's (2019) framework regarding the various levels of usage of digital technology in decision-making will be presented.

Following this, the third chapter is concerned with the methodology used for this study. In this section, the paper's research method and data collection strategy are addressed. Additionally, the limitations in regard to the methodology and overall research are discussed in this chapter.

In the 'Settings' section (Chapter 4), some background information regarding the company used in the case study is introduced. In this chapter, a detailed overview of the loan approval process and each of its stages are also presented, as well as what type of decision-making is involved in all levels of the process.

The fifth section presents the empirical findings of the research, focusing on the key themes that emanated from the interviews. Firstly, it provides an overview of the digital technologies used throughout the loan disbursement process. It then states the various benefits and challenges (perceived by the interviewees) that arise from using these digital technologies in the decision-making process for loan disbursements.

Finally, Chapter 6 aims to discuss the meaning, importance and relevance of our findings in more depth. It also seeks to answer our research question and relate our findings to previous research and theories found in the field of research.

## **2. Literature review**

The purpose of this chapter is to provide an overview of the existing literature regarding the topics related to our area of focus. By doing so, the aim is to present an extensive, analytical, and accurate understanding of the current state of scientific knowledge regarding our research topic. This chapter will also uncover current gaps in the literature.

First of all, literature regarding organisational decision-making will be presented. This part will introduce the concept of organisational decision-making, present its complexities, and demonstrate the importance of information. Secondly, past research in regard to the use of digital technology in decision-making processes will be introduced and examined. This section will also introduce Colson's (2019) framework which will be used later on to support our findings. Finally, more specific literature related to the use of digital technology in decision-making processes for loan approvals will be discussed.

### **2.1. Organizational Decision-Making**

#### *2.1.1. Introduction to decision-making*

Social science theories have greatly supported the idea that a vast majority of all human actions are a result of decision-making (Brunsson, 2007). Cyert et al. (1956) defined decision-making as being the process of “choosing one course of action rather than another, finding an appropriate solution to a new problem posed by a changing world”. This cognitive process is often claimed to be “the heart of executive activity” in business (Cyert et al., 1956). In the past century, a large number of studies have laid the foundation for managerial decision making (eg. Harrison and March, 1984; Simon, 1990; Mintzberg, 1989). Mintzberg (1973) presented three modes of decision-making made in business organisations which are: entrepreneurial, adaptive, and planning.

Organisational decisions greatly vary on the ways in which decision-making processes (or procedures) are implemented (Cyert et al., 1956). Grünig & Kühn (2013) define decision-making procedure as ‘a system of intersubjectively comprehensible rules for obtaining and analyzing information, which can be applied to resolve a certain type of decision problem’. Organisations often neglect the importance of implementing an efficient decision-making process, despite it having the potential of highly benefiting productivity and profit (Schank et al., 2010). Cyert et al. (1956) throughout their research, described the various types of decision-making processes that occur in business contexts. The authors find that search processes (or information seeking processes) and information-gathering processes represent significant elements of decision-making.

### *2.1.2. Complexity of decision-making*

In order to understand why digital technologies can help to improve decision making, it is essential to understand the complexity for humans to make decisions. The decision-making perspective looks at organisations as being systems that foster rational decision making, however, individuals as decision makers are often limited by their cognitive abilities (Choo, 1981). Simon (1990) introduced his theory of “bounded rationality” which discusses the ways in which decisions are made, and addresses the impact of limitations of the human cognitive ability to achieve rational decision-making. Simon (1990) argued that complex circumstances, insufficient mental capabilities, and limited time result in decision makers facing “bounded rationality”.

Moreover, an important contribution to the decision-making field was made by Kahneman (2011). The psychologist and economist theorized the concept that people often make decisions that are more emotional than rational. The author explains that people activate different systems in their mind depending on the situation they are facing. ‘System 1’ is the automatic, intuitive, and unconscious thinking mode, while ‘System 2’ is more of the slow, controlled, and analytical thinking mode (Kahneman, 2011). Additionally, Kahneman (2011) notes that executives are constantly faced with different types of biases that can distort their reasoning in business decisions. Confirmation bias, anchoring, loss aversion and other types of biases are a constant challenge to

managers when making decisions (Kahneman, 2011). The author explains that in order to avoid these biases, decision makers should aim to use their 'System 2' thinking.

### *2.1.3. The role of information in decision-making*

Previous studies have established the importance of information in decision making. Mintzberg (1989, p.19) described information as “the basic input to decision making”. Moreover, Saaty (2008) stated that information is important to understand occurrences, to develop adequate judgement, and be able to make rational decisions regarding particular situations. The author mentions that it is easy to believe that all information is valuable, and that the more information we gather, the better it is to make good decisions. However, organisations need a formulated way of making decisions, and collect information that is relevant to their purpose (Saaty, 2008). Galbraith (1974) indicates that the more uncertainty there is, the greater the amount of information needs to be gathered in order to achieve the highest level of performance.

Several studies have suggested that if people could collect enough information, they would make economically rational decisions (e.g. Simon, 1990; Saaty, 2008). However, Kahneman and Tversky (2013) argue that people tend to often discard certain components that are shared with them, leading to non-rational decision making. This argument follows Essen et al. (2021)'s idea that people often tend to ignore information. These various arguments present multiple rationales for why digital technology can play an important role in the decision-making process.

In the field of decision-making, understanding that the world is becoming increasingly complex and that more and more elements need to be considered is essential. Berger and Johnston (2015) explained how the world has become more complex, and that it is changing more rapidly than ever. The authors stated that decision making is no longer a linear cause-and-effect process, which has major implications on the ability for executives to make the right decisions. In their book, Berger and Johnston (2015) emphasise the importance of gathering as much information as possible.

Furthermore, Adeosun et al. (2008) did some research on the importance of information and communication technology in the banking industry for effective service delivery. The authors state

that information is not only needed but plays a vital role in decision making. Moreover, Adeosun et al. (2008) explain that banks are more and more dependent on information and that it is needed in every stage of their decision-making processes.

## **2.2. Digital Technology and Decision-Making Processes**

### *2.2.1. The use of digital technology in decision-making processes*

A great deal of previous studies has looked into the topic of digitalisation and its relation to the business environment. According to Carlsson (2018), digitalisation, which is also sometimes described as “the digital revolution”, is a key component in understanding today’s business and industrial trends. The author states that digitalisation will have a considerable effect on the overall business world: changing organisational structures, business models, how companies cope with competition, and affecting productivity and profit. Carlsson (2018) also describes that digitalisation might become a solution to greater requirements in terms of efficient planning, problem-solving and decision-making. Colson (2019) mentions in his article that decision-making models have changed a lot throughout the years. Fifty to seventy years ago, the main decision-maker was human judgement (Colson, 2019). The author describes a shift from fully “human” driven decision making, to an increased use of data and digital technologies to improve decision making.

In more recent years, there has been a large volume of published studies describing more specifically the role of digital technology in decision-making processes. Hoßfeld (2017) aimed to assess the implications of digitalization on decision making in organisational contexts. The author found that digital technology (more specifically automated systems) will ameliorate results emerging from decision making, due to a decrease of non-accurate human judgment.

Previous research has also explored the potential of digital technology to solve the issue of complexity surrounding decision making. Qudrat-Ullah et al. (2008) studied complexity in the field of decision-making and stated that decision makers now face issues that are more and more

complex, interrelated, and are within an environment that continuously changes. According to the authors, acquisition of new managerial capabilities (human expertise) to cope with continuously changing and complex issues is a common move made by firms, but presents many barriers. Qudrat-Ullah et al. (2008) mention that new advances in computer technology and the development of new simulations tools may become a solution to this managerial problem, being the increased complexity of decision making.

A number of other studies have assessed the benefits of using digital technology to assist people in their decision making. Turpin and Marais (2004) did some research on decision-making styles and how decision support technology is used by managers. According to the authors, considering a few aspects such as understanding the business environment, recognizing the decision-making context, knowing how to package the huge amount of information, and using help from analytical decision support tools, might be beneficial when making decisions (Turpin and Marais, 2004). Furthermore, Cherviakov et al. (2020) undertook research regarding the digitalization of strategic decision-making processes. The authors state that the use of digitalisation creates the foundation for a rapid analysis of a current situation, and decreases the possibilities of errors, which overall improves the quality of decisions. The authors also add that while the use of intelligent analyzers helps to reduce processing time, the presence of human expertise is still required to verify the collected results.

While much study has looked at the benefits of using digital technology in decision making, it is important to understand what influences firms to invest in new digital systems. Corrigan (2008) talks about the factors that influence the use of digital technologies in decision-making processes. The author states that organizations are dominated by one factor, which is money. Therefore, firms generally perform what is called a 'cost-benefit analysis', in which they assess how much implementing new technologies will cost, and how much these technologies will make them save money (Corrigan, 2008).

### *2.2.1. Colson's framework*

A recent article, written by Colson (2019) looks at the different ways in which organisations use digital technology towards their decision making. The author describes the various levels of digitalisation that organisations go through regarding their data manipulation and technology implementation in their decision-making processes. Colson (2019) touches upon different models of decision making and provides different levels of human, data and AI assistance in the process. The models are depicted in Figure 1.

The first stage is a decision-making model based on human judgement. According to Colson (2019), human judgement was seen, around five to seven decades ago, as the main processor for decision making in businesses. Experts turned towards their professional experience, knowledge, and intuition to direct their decision making (Colson, 2019). However, the author believes that human judgement alone is not ideal, that cognitive biases can impair human judgement, and that making quick decisions is not optimal.

The next type of decision making presented by Colson (2019) is the data supported (or data-driven) model. In this form, the central decision-maker remains the human, but decisions are supported by using data as an input. This data is generally processed by humans using the help of external tools (Colson, 2019).

The final decision-making model, presented by Colson (2019) in two different variations, is AI infused. The first variation involves implementing AI as the sole decision-maker, assuming that this technology is less prone to cognitive biases (Colson, 2019). However, the second model includes AI in the workflow as an assistance to human judgement. According to Colson (2019), businesses sometimes depend on more than just pure structured data. Some aspects such as vision statements or corporate values only remain in people's minds and are conveyed through culture or other means of 'non-digital communication'. In addition, Colson (2019) notes that "AI can be used to generate possibilities from which humans can pick the best alternative given the additional information they have access to".

*Stage 1. Decision making based on human judgement.*



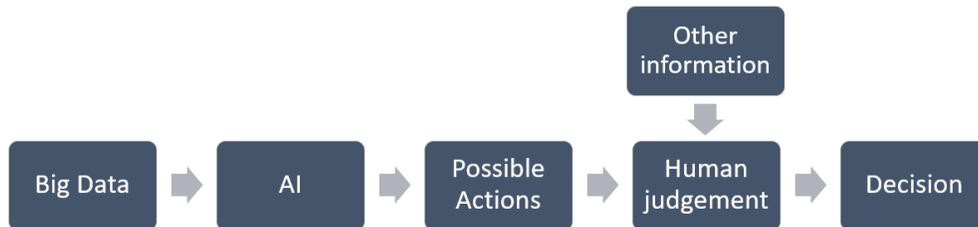
*Stage 2. Decision making utilizing data.*



*Stage 3. Decision making utilizing AI.*



*Stage 4. Decision making with a combination of data and AI as helping tools to human judgement.*



*Figure 1. Decision models based on Colson's (2019) framework*

The author believes that in order to fully take advantage of the value of data, organisations must aim to bring Artificial Intelligence into their workflows. While our paper does not necessarily focus on AI specifically, this framework is useful to assess the level at which an organisation utilises digital technology in its decision-making process.

## **2.3. Digital Technology in the banking sector**

### *2.3.1. Digital technologies in decision making processes in banks*

A large number of studies have been conducted as regards to the use of digital technologies in business processes within the banking industry. This section aims to provide an overview of the various empirical studies that examined the use of various digital technologies, from information and communication technologies, data mining, to Artificial Intelligence, in internal organisational operations within the banking sector.

Firstly, a number of studies have investigated the application of information and communication technologies (ICT) in internal processes within the banking industry. Adeosun et al. (2008) focused their research on the advantages and disadvantages of using ICTs in the banking sector for effective service delivery. The authors investigated the use of these technologies in strategic management, communication and collaboration, managerial decision making, data management, and knowledge management. The authors state the importance of information in decision making, and underline the advantages of using ICTs in decision making processes.

Moreover, a growing body of literature has emerged regarding digital technology and its use towards data manipulation in the financial industry. Jayasree and Balan (2013) undertook some research regarding the importance of data mining technologies and its benefits in the banking industry. Another study by Musa et al. (2019) examined the role of applying data mining technology in decision-making processes in the Jordanian banking sector. The researchers used a descriptive analytical approach based on a questionnaire sent to 366 employees from 14 different banks. Musa et al. (2019) find that the use of data mining tools leads to the creation of new ideas in a structured manner, and helps to provide useful information, which in turn leads to sound decision making.

Furthermore, there has been a growing amount of literature regarding the use of Artificial Intelligence in the banking industry. Methrota (2019) provided an overview of how AI is increasingly being used in banking and examines the benefits and challenges of implementing this

‘disruptive’ technology. The author stated that AI has the potential to reduce operating costs by 20 to 25 percent, having a significant potential to change the ways in which banks operate. While this study shows how AI can create innovative products and services, and could improve customer experience, it does not specifically investigate its impact on decision making processes.

Moreover, Daks (2018) investigated the benefits that spring from the use of AI by examining the case study of the acquisition of the artificial intelligence firm Layer 6 Inc. by the TD Bank Group. The author cites further examples of financial organizations that use some type of artificial intelligence technology. Daks (2018) points out that AI can help optimize the use of information and improve customer interaction, however highlighting the fact that AI does not solve everything and that it only remains a tool.

### *2.3.2. Digital technologies in decision making processes for loan approval*

There is a relatively small body of literature that is concerned with the topic of digital technology in loan approval processes. A collection of various studies related to this field of research is presented below. This will introduce some findings made in this field of research and reveal the literature gap.

First of all, several studies have emerged introducing new digital technology improvement initiatives to optimize loan approval processes. Manikandan et al. (2015) present how document imaging techniques, such as their proposed ‘E-LAP’ web-based application, can enable an improved overall processing of loan approvals in terms of rapidity. This type of system can also reduce complexities related to large amounts of information and limit inefficiencies related to paper document manipulation (Manikandan et al., 2015). The authors suggest that it is essential for banks to consider applications such as the proposed one and their study shows how digital technologies can potentially improve loan approval processes. However, this paper does not present real-life applications of such technology, which makes it challenging to assess its use and effectiveness.

Moreover, researchers have looked into the impact of distinct digital technologies on loan disbursement processes. For example, Ray et al. (2018) did research in the Indian microfinance sector and touched upon the use of digital technologies such as mobile technology for loan disbursements. Another study conducted by Mocetti et al. (2017) attempted to examine the impact of information and communication technologies (ICT) on the internal organisations of banks. The authors empirically examined the relationship between the use of such technology and the degree of delegation in lending operations to ‘local branch managers’. Their findings indicate that banks using more ICT assets delegate more decision-making power to ‘local branch managers’ regarding loan disbursement activities. While these studies are interesting in understanding the digital developments in the banking sector, and how specific technologies can improve certain aspects of the loan approval process, they do not focus on how digital technologies are used throughout an entire decision-making process.

A few studies have been conducted, looking at how digital technology can help to manage particular stages of loan disbursement processes. For example, Vijayarangan (2020) has studied the impact of using digital technology for managing non-performing assets (NPA). This paper is useful in understanding how digital technologies can assist and mitigate risks related to loan disbursements. However, this study does not look at the use of digital technologies in loan disbursement process in its whole. Another study, presented by Sheikh et al. (2020), shows how machine learning algorithms can help make predictions for loan approval in order to reduce ‘Non-Performing Assets’. Through this quantitative paper, the authors tested out a model by taking customer data from various banks. According to the authors, banks often fail to consider certain client attributes during loan granting processes. Their study states that using logistic regression models (which is used for predictions) can be valuable, as these take into account a larger number of variables, which are essential to consider when granting loans. While this research shows the potential of such technology to predict loan approval outcomes, it does not present any real-life applications of this type of machine learning development.

Furthermore, some research has been done regarding the use or potential of machine learning and AI in loan disbursement processes. Arun et al. (2016) wrote a paper in regards to loan approval predictions based on machine learning techniques. The authors used 6 different models based on

11 different variables to conduct loan approval predictions. The results suggest that ‘machine learning’ based software is ‘working properly and meeting all Banker requirements’ (Arun et al., 2016, p. 20). The authors however mention that some errors still occur but that some adjustments can be made over time to make the software more accurate and reliable. This study provides a promising view of how advanced digital technologies can help in decision-making processes for loan approval.

Carvallo et al. (2017) aimed to find out how to improve overall loan approval processes, through analyzing a real-life process of over 30,000 applications. The authors find out that clients rather than employees are responsible for longer loan approval process times, which suggests that ‘process mining’ in the loan approval process is efficient. Carvallo et al. (2017, p.1) defines ‘process mining’ as a “bridge between data science and process science, where knowledge could be extracted from the records of events associated with a process”. The authors explain that in order to improve loan disbursement processes, banks would need to create better communication strategies between bank employees and clients. This paper is interesting regarding how digital technologies help improve processes in loan disbursement, whether that is through data gathering or communication tools.

In addition, Pusnik et al. (2019) undertook some research regarding the use of information solution support in loan approval processes in a more general manner. The authors undertook an analysis of the quality of processes related to general IT solutions in loan disbursement and presented an encompassing process optimization proposal. The study was undertaken through interviewing two employees from one bank and based on a literature review. Additionally, a survey was conducted with employees from IT companies in order to evaluate various optimization possibilities. Results from this study indicate that while some of the process utilises computerized activities, not all of it is fully automated and a large amount of the process requires human effort. Furthermore, their findings suggest that using advanced digital technology can optimise the loan disbursement process to a certain extent. However, Pusnik et al. (2019) state that traditional systems such as banks are less likely to change, and adopt few of the new technological possibilities. This study presents a strong insight into the loan approval process and how banks can optimise their IT support systems to improve the loan disbursement process. However, the authors received little

information from the banks themselves, leading to a limited understanding of the use of digital technology in a particular loan approval process.

### **3. Research Method**

The purpose of this study is to answer the question of ‘How digital technology is used in the decision-making process for loan disbursements in Stopanska Banka AD Skopje’. In order to do this, we have focused on presenting the perception employees from Stopanska Banka have on the use of digital technologies in decision making processes.

Decision-making is a very wide topic with vast implications. Therefore, we have decided to focus on decision-making specific to the loan approval process. Our aim is to gain a more comprehensive understanding of the decision-making process in regards to loan disbursements in Stopanska Banka AD Skopje, and to assess the involvement of digital technologies throughout this process. Our research can be considered as descriptive as Bhattacharjee (2012, p.6) describes descriptive research as being “directed at making careful observations and detailed documentation of a phenomenon of interest.”

#### **3.1. Main Methodology**

This paper will seek to apply a qualitative research method. Choosing a qualitative approach has several benefits. According to Rahman (2017), a qualitative approach can produce a detailed, in-depth description of participants’ opinions and experiences, and achieve deeper insights into specific issues. This type of study can also help with data gathering, as researchers directly interact with participants when data is collected through interviews. Finally, qualitative research is considered to be flexible to a certain extent, as the design can be continuously reconstructed throughout the research process (Rahman, 2017).

In order to undertake this qualitative method, the chosen research strategy for our paper is a single case study. Creswell (2013) defined the case study as a method that “explores a real-life, contemporary bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection involving multiple sources of information [...] and reports a case

description and case themes”. An additional definition provided by Gustafsson (2017) presents the case study as “an intensive study about a person, a group of people or a unit, which is aimed to generalize over several units”.

Initially, the intention of the authors was to produce a multiple case study by interviewing a set of participants from three different banks in Macedonia. However, after further reflection regarding the most optimal method to use for our research, a single case study appeared to be more appropriate. According to Baxter and Jack (2008), it can become significantly time consuming and expensive to implement multiple case studies. Gustafsson (2017) also notes that single case studies are not as expensive and time consuming as multiple case studies. Furthermore, Dyer and Wilkins (1991) argue that single case studies are more efficient than multiple case studies in regards to producing more advanced and higher quality theories. A single case study makes the authors have a deeper understanding of the subjects they are exploring, and can contribute towards describing the existence of a phenomenon or an occurrence in a richer manner (Gustafsson, 2017). Single case studies also show better performance when the authors create a high-quality theory. Finally, Gustafsson (2017) states that because a more careful study can be undertaken with this type of method, writers can comfortably question old theoretical relationships and explore new ones. In order to analyze the use of digital technology in a loan disbursement decision-making process, it is essential to have a good understanding of its use at each step of the process. Thus, a single case study approach was adopted to provide rounded, detailed illustrations of the use of digital technology in a particular decision-making process for loan approval.

For this research, the authors also decided to adopt an inductive approach. This is done by collecting data, finding patterns within this data, and developing some theory which will be supported by or contradicting published literature. As presented in the literature section, some research has already been undertaken regarding the use and impact of specific technology in decision-making, as well as regarding its use in certain parts of the loan approval processes. Even though our research aims to look at digital technology in a more general manner and the loan approval process in its entirety, the aim of this paper is to relate and test these theories. This will be developed in the analysis section. Furthermore, the study will be based on a derived version of

Colson's (2019) framework described above in order to evaluate the level of digitalization of the bank in the loan process.

## **3.2. Data Collection**

### *3.2.1. Conducting Interviews*

For this research paper, data was collected by conducting seven semi-structured interviews with employees from Stopanska Banka AD Skopje. These employees work in different departments of the bank, but are all involved in the loan process. Interviewing is the most common format of data collection in qualitative studies (Jamshed, 2014). In a qualitative study, the aim of interviewing is to understand other people's perspectives (Patton, 2002). This practice assumes that the respondents' perspectives are meaningful, comprehensible, and have been able to be made explicit (Patton, 2002).

### *3.2.2. Interview Guide*

The seven interviews were conducted in a semi-structured manner. By doing so, the authors ensured a clear direction was followed throughout our investigation, while remaining flexible. This enabled the authors to gain a deeper understanding of relevant topics that were specific to each interviewee. Therefore, the interviews were based on predetermined open-ended questions, with additional further questions that arose from the discussions between us and the respondents. Furthermore, the questions were designed to be neutral and non-judgmental to ensure the interviewees were comfortable and gave honest answers. The interview question structure base is presented in Appendix A.

For a qualitative analysis, the semi-structured interviews, as a type of data collection, makes the perfect choice to gather the right information. Gill et al (2008) state that semi-structured interviews consist of "several key questions that help to define the areas to be explored, but also allows the interviewer or interviewee to diverge in order to pursue an idea or response in more detail". This

method allows for higher flexibility, as it allows the information to be discovered that is important to participants but may not have been previously thought of before the interview (Gill et al, 2008). This also contributes towards exploring the views, experiences, motivations and opinions of individuals on specific matters (Gill et al, 2008). A very important part when designing interviews is to focus on questions that are likely to yield as much information as possible about the study phenomenon, as well as the questions to be neutral, sensitive and understandable (Gill et al, 2008).

According to Bhattacharjee (2012), to collect qualitative data, most case studies are undertaken using face-to-face interviews. While face-to-face interaction with the respondents would have been preferable, interviews had to be performed via online platforms, due to the ongoing Covid-19 pandemic. That being said, qualitative interviews that are conducted through online video or telephone are seen as valid and reliable alternatives to conventional in-person interviews (Saarijärvi and Bratt, 2021).

The interviews were conducted in the language that the respondent felt the most comfortable with, either in English or Macedonian, to ensure the interviewees provided the best possible answers and good quality data was drawn. Following the interviews, transcriptions of the conversations were created in order to have access to all the information provided by the respondents in written format. This was done to subsequently facilitate the analysis of the data.

### **3.3. Respondents Selection**

In order to get a comprehensive picture of how digital technology plays a role in the decision-making process, the participants were selected so that the authors could gain an insight into each step of the loan disbursement process. The respondents were therefore chosen in accordance to their position and role in the loan disbursement process. The participants and their role in the process are presented in Table 1.

As mentioned previously, a total of seven interviews were conducted. According to Dworkin (2012), there is no strict or right number of interviews that are needed in order to promote sufficient results. However, researchers should aim to reach the goal of data saturation and redundancy regarding the studied characteristics and concepts (Dworkin, 2012).

Table 1. Participants, roles, and their relation to loan process

<b>Participant's Role</b>	<b>Responsibilities in the loan disbursement process</b>
<p><b>Participant 1</b> Loan Administration Officer</p>	<ul style="list-style-type: none"> <li>• Responsible for disbursement of the loan.</li> <li>• Decides whether or not the case is enough to disburse the loan.</li> <li>• Possibility to generate data and reports to be used in the framework of loan analysis by other departments.</li> </ul>
<p><b>Participant 2</b> Customer Care Agent</p>	<ul style="list-style-type: none"> <li>• Responsible for assisting clients with credit services.</li> <li>• Able to receive loan applications directly through the call and analyze and approve them.</li> <li>• Have access to quick tools for loan assessment (MKB, Globus, CRM).</li> </ul>
<p><b>Participant 3</b> Head of Corporate Loan Department</p>	<ul style="list-style-type: none"> <li>• Directly involved in the analysis and approval of the loan.</li> <li>• Use different tools for loan assessment and decision making.</li> <li>• High decision-making authority for loan approval.</li> <li>• Faced with different decision complexity.</li> <li>• Have access to quick tools for loan assessment.</li> </ul>
<p><b>Participant 4</b> Head of Work-Out Department</p>	<ul style="list-style-type: none"> <li>• Involved in the monitoring of the loan.</li> <li>• High decision-making authority for loan approval.</li> <li>• Faced with different decision complexity.</li> </ul>
<p><b>Participant 5</b></p>	<ul style="list-style-type: none"> <li>• Receives loan applications.</li> <li>• Involved in loan analysis, assessment and approval.</li> <li>• Have access to quick tools for loan assessment.</li> </ul>

Bank Advisor for Legal Entities	
<b>Participant 6</b> SBB Loan Associate	<ul style="list-style-type: none"> <li>• Receives loan applications.</li> <li>• Involved in loan analysis, assessment and approval.</li> <li>• Have access to quick tools for loan assessment.</li> </ul>
<b>Participant 7</b> Branch Associate	<ul style="list-style-type: none"> <li>• Receives loan applications.</li> <li>• Involved in loan analysis, assessment and approval.</li> </ul>

### 3.4. Reliability and Ethics

#### 3.4.1. Reliability

Once the authors had made an initial contact with the respondents, each of them was sent a brief description of the research subject and explanation of the study methodology. Additionally, the participants were sent a selection of some of the main questions. This enables the respondents to have a better understanding of the purpose of the interview, and to provide them with an opportunity to think about the subject beforehand. All participants received the same identical information prior to the interviews in order to foster consistency.

#### 3.4.2. Ethical concerns

When it comes to qualitative studies, researchers face many ethical challenges throughout the various stages of the research process. These include issues of confidentiality, anonymity, informed consent, or even the influence of researchers on the participants and vice versa (Bahramnezhad et al., 2014). Therefore, the following elements were taken into consideration to promote reliable and trustworthy outcomes.

First of all, it was made clear to the participants that each interview was voluntary, indicating that it was up to our respondents to decide whether or not they were willing to participate. Additionally, each interviewee was asked whether they wanted to remain anonymous or not. For the purpose of this study, we shall keep the interviewees anonymous, but disclose their position and role in the bank, as well as their connection to the loan process.

In addition to this, the participants were asked for their permission to be recorded prior to each interview. Having a recording of the interview enables the transcription to be more accurate and to make sure no relevant details are omitted. Furthermore, this enables the authors to accurately analyse the information provided by respondents and to limit potential biases or distortions regarding the input data. The interview transcriptions were then sent to the respondents to make sure the information was efficiently delivered by the interviewees and accurately understood by the researchers.

### **3.5. Methods Limitations**

Whilst the selected methodology is the most appropriate for this research, there are certain drawbacks associated with this single case study. Firstly, some interviews were conducted in the native language of the respondent, which only one author can speak. Therefore, the second researcher could not make sure the translations were accurate or that the information provided by the respondents was correctly understood. However, recording the interviews and creating transcriptions aimed to mitigate any risks related to misunderstanding the interviewees.

Another limitation of the research method is regarding the choice of the participants. The loan process is extensive and many participants are involved throughout the process. Although the aim was to get participants that worked in different stages of the process in order to get a full picture, choosing the right participants is always open to discussion. A similar debate could be considered when it comes to choosing the right number of respondents and which level of participant feedback

is enough to saturate the topic. Due to time constraints, the authors were unable to interview more than seven employees, which means that relevant data might have been omitted.

Finally, as this is a single case study which aims to analyze the loan approval process in Stopanska Banka. The results identified for this bank can not be generalised to the entire industry or whole region. Although the research may show trends and patterns that are similar in other banks, the findings and results should remain idiosyncratic to this specific case, and consideration for further research regarding the wider scope could be made in the future.

## **4. Settings**

This chapter introduces the case study of Stopanska Banka and its loan disbursement process. The loan approval process was described by employees working in different sectors of the bank, but who are all engaged in the loan process. Firstly, this section will briefly present the company that has been chosen for our research. Secondly, the goal is to describe how the loan approval process is organised within the bank and what type of decision-making is involved in each step of the process.

### **4.1. Case Description**

In this study, our focus is on analyzing the level of technology advancement in each stage of the decision-making process at Stopanska Banka AD Skopje. This paper pays special attention to the loan approval process. The first part depicts the case of Stopanska Banka and the rationale for choosing and analysing this organisation. Following this, the empirical findings from the semi-structured interviews will be presented.

Stopanska Banka AD – Skopje was founded in 1944. It was initially established under the name of Makedonska Stopanska Banka and is the oldest commercial bank in the country (Stopanska Banka, 2021). Its creation laid the foundations of banking operations at the time of the People's Republic of Macedonia and has been involved in significant facility investments and development projects in the country throughout the years (Stopanska Banka, 2021).

Throughout its growth and organisational development, the bank adapted all of its features to the social and economic context of the country, until it became a joint-stock company in 1990 (Stopanska Banka, 2021a). At the beginning of the 21st century, the majority of the bank's shares were bought by the National Bank of Greece (NBG) - one of the largest banking groups in Southeast Europe. As a result of this significant event, the Bank continued to grow and develop in line with world banking standards (Stopanska Banka, 2021a). Like many financial institutions,

Stopanska Banka faced many challenges. One of the greatest challenges until now has been to transform and restructure itself into a modern financial institution. This has involved being organized in line with best international banking practice and being able to operate within today's functioning market economy (Stopanska Banka, 2021a).

After its acquisition, the bank strengthened its competitiveness through intensive restructuring. The bank implemented a sophisticated information system and a new organizational structure (Stopanska Banka, 2021a). Furthermore, it ameliorated its credit portfolio, introduced standardized credit decision-making, implemented risk management and procurement procedures, and re-defined the role of employees (Stopanska Banka, 2021a).

Today, Stopanska Banka AD - Skopje is the bank that holds the largest number of customers in the country, both in terms of individuals and legal entities. The bank has also developed the biggest location network, the largest portfolio of credit and deposit products, and has become the financial institution with the largest assets (Stopanska Banka, 2021a). Additionally, it has become one of the top banks in North Macedonia in terms of equity and assets. Stopanska Banka AD - Skopje has now become part of the exclusive group of the largest banks in the region and country, holding 18,11 percent of the total market share (Stopanska Banka, 2021a, The Banks, 2021). In Macedonia, the top three banks have almost 50 percent of the total market share, which shows the great concentration in the market (The Banks, 2021).

There are several reasons for choosing Stopanska Banka AD - Skopje as our case study for this research paper. As previously mentioned, the banking industry is one of the current trending sectors that is associated with digitalization, more specifically implementing digital technologies within organisational and structural operations. Digital technologies and AI have the power to give the most impactful transformation on the banking industry (Mehrotra, 2019).

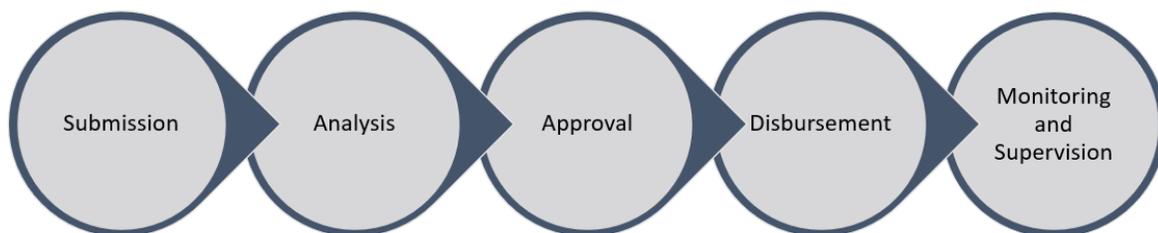
Secondly, being able to establish an effective decision-making process in the banking sector, especially in loan disbursement, is key to the success of a financial organisation. A trustworthy and safe banking environment is highly important to customers, as trust in banks is considered

essential for an effective financial system (Fungacova et al, 2019). Assessing the importance of digital technology in providing better decision making is therefore a valuable area to look into.

Regarding the choice of the bank, with the huge presence of Stopanska Bank in the region and in the country, as well as with its large client base and market share (The Banks, 2021), it represents a great entity to base the analysis on. Additionally, the bank's great adaptation, restructuring practices and IT improvements (Stopanska Banka, 2021a) make it a perfect candidate for our research - that is research based on digital technologies and decision making in banking operations regarding loans.

## 4.2. The Loan Approval Process

Due to the complexities involved with the loan approval system, the various steps of the process will be split into several parts in order to establish an easier and clearer analysis. This will enable us to describe the process and to analyse it in a more structured manner in the next chapter. The different parts are divided as follows: loan submission, analysis, approval and disbursement and monitoring. The aim of this chapter is to address the empirical results stated by the interviewees regarding our research question, which is explaining how digital systems assist in the decision-making process regarding loan approval activities in Stopanska Banka AD Skopje. The categorization of each stage is depicted on Figure 2.



*Figure 2. Steps of the loan process*

The loan approval process in banks is a highly complex process. Depending on the type and size of a loan, the loan approval process varies from simple inputs and quick decisions, to highly complex analysis, calculations, and dispersed decisions. As a few of the interviewees state, a loan goes through different stages and departments in order to have one final decision (Participant 3, Participant 4, Participant 5). Due to the complex nature of the process, we shall divide the process into a few stages in order to analyze it better. We take submission or application of the loan as an initial, first step, then analysis of the loan and its characteristics, followed by the approval process and finally the disbursement of the loan and its monitoring. We shall begin with a review of the processes at each level, along with the decision making and complexity within the stages and finally analyze the digital technology involvement at each stage.

In order for the loan approval process to be completed, different departments work together in multiple stages and in succession. Participant 3 divides the loan approval process into 7 stages. According to the participant, the process begins with client acquisition. Depending on the type of loan, whether it is a loan for individual borrowers or legal entities, the client can either submit an application for a loan or account managers can be engaged in client search and acquisition in the market. After this, the second stage is to undertake the acceptance check by the employees in order to determine if the potential client or the loan structure is in line with the bank's principles and policies for financing. The third stage is negotiating the conditions and structure of the loan. After the structure and conditions are accepted, an analysis of the loan is made and a loan proposal is created by the account managers/associates. Thereafter, if all conditions are accepted by all the stakeholders engaged in the decision making, the loan is approved. After being approved, the next stage is the contract phase and disbursement of the loan. Finally, the whole loan process does not end with the disbursement itself, but with a final monitoring of the loan and repayment locks the whole process into place. The loan process flow is depicted in the following diagram.

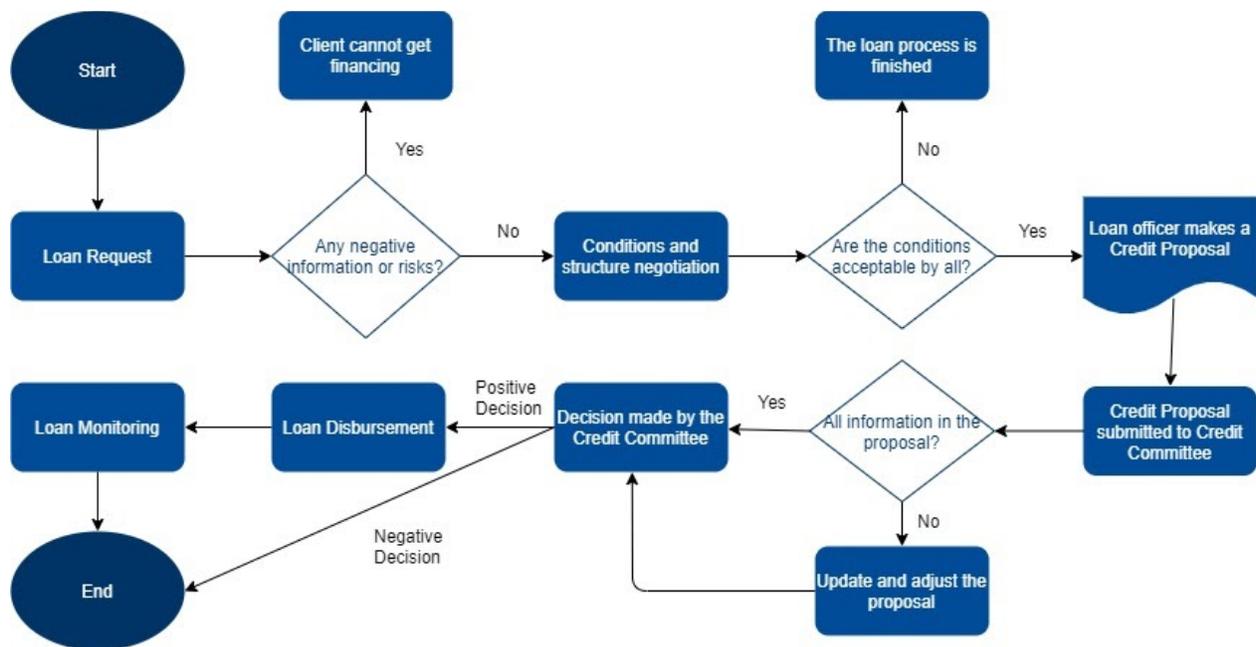


Figure 3. The Loan Disbursement Process

### 4.3. The Loan Approval Process Stages

The following paragraphs present each stage of the loan approval process at Stopanska Banka AD - Skopje. In each stage, we provide a brief description of the process and the decision-making activities involved in each step, as described by our respondents. A preview of the digital technology involved in all stages will then be provided in the next section.

#### 4.3.1 Loan submission

The first stage in every loan approval process is the ‘loan submission’. Generally, there are two types of loans, granted to either private individuals or legal entities. In Stopanska Banka AD, the legal loans are divided between the two segments ‘Small Banking Business’ (SBB) loans and ‘Corporate’ loans (Participant 6). According to Participant 5, the SBB division can grant loans to

legal entities up to the amount of 700,000 EUR. Everything above that amount goes to the Corporate Division.

There are various ways in which loan applications can be initiated. Typically, a loan application (or loan submission) is either initiated by a person or by an entity interested in a loan. However, it may also originate from account managers (AM) or relationship managers (RM) from the bank itself, as they engage in the market and offer their loan services to potential clients. Usually, each department will have 'account managers' or 'relationship managers' responsible for loans, who we shall sometimes refer to as 'loan officers'. Their primary job is to create some interaction with clients regarding loan disbursement.

As the interviewees state, at Stopanska Banka, there are different possible ways to apply for a loan. A potential borrower can initiate a loan application by physically going to one of the branches of the bank and applying there by communicating with one of the branch's relationship managers or loan advisors. This is more common for private individuals and regarding smaller loans. When it comes to larger loan amounts (usually for corporate entities), the potential clients can get into contact with the account managers by applying at the headquarters of the bank. However, the bank also offers the opportunity for customers to apply by phone via the contact center of the bank. This represents an easy and convenient way to apply for a loan, without physically needing to go to a branch or an office (Participant 2). However, in order to do so, the client needs to already be receiving his or her salary through Stopanska Banka.

The decision-making process in the first stage of the loan disbursement is highly important. In this initial step, Participant 3 mentions that the client 'checkup' is essential so as to find out whether or not it is acceptable for the bank to grant a loan. Additionally, the bank's procedures and policies represent significant elements that need to be considered and followed when pursuing this (Participant 7). Respective loan officers need to investigate and look out for negative information, criminal acts or any other unacceptable characteristics that have been defined by Stopanska Banka. Additionally, they need to assess the initial potential in regard to the repayment of the loan. Therefore, respective loan officers (and also sometimes head department officers) are faced with decisions regarding whether or not a particular client is satisfactory and that proceeding with a loan application is acceptable. This is accomplished even before the application gets to the actual

analysis phase. If the applicant is acceptable in terms of what the bank expects, then the negotiation process starts. Here, the loan officer is responsible for making decisions regarding loan conditions such as the interest rate, structure, and repayment period. As participant 3 states, These conditions need to be acceptable to both the bank and the client.

The loan application process can be considered as semi decision-intensive. Participant 2 defines their tasks as “straightforward”. Their decision making mainly involves basic decisions and routine thinking. However, participant 3 mentions that they are actively involved in the front office area and are responsible for initial investigations concerning: negative information regarding clients, their repayment capacity, and whether they have an acceptable professional activity. All of these elements have to be in line with the bank’s standards. So in this case, loan officers are still engaged in making own decisions based on the accessible information they have. Additionally, it can be taken that basic decisions at this level are also important for the organization, as it can make or break the loan granting, if proper initial analysis is not made and the client turns out to be non-performing at the end, or not in line with the bank’s policies. It was stated that “*The basic decisions are still essential for the existence of the organisation and are important for other complete studies, analysis, and overall critical thinking*” (Participant 2). One of the participants rated, on a scale of 1 - 5, that she would rate the complexity of their decision making as 3. So we can conclude that here, there is a moderate need for decision making.

#### 4.3.2 Loan analysis

If the terms and conditions are acceptable to both parties, the following step in the process is the analysis of the loan. There are different types of loan analysis, depending on the type of loan, the requested amount, its structure and a few other characteristics (Participant 6). If the client’s purpose for demanding a loan is considered as straightforward and the loan amount is relatively low, then its analysis will remain rather simple. On the other hand, more complex loans and those with high amounts will be subject to more complex and longer analyses. In the analysis stage, the account managers need to analyze the client’s financial stability, assess the potential regarding loan repayment, identify any risks, and depict the benefits arising from financing this specific client. If the borrower is a private individual, the representatives would typically check his or her credit history, debt-to-income ratio, and salary. This will enable the analysts to determine the

creditworthiness of the client and the loan amount that can be granted (Participant 2). When it comes to making an analysis for a loan directed towards legal entities, the client has to submit financial statements for the past three years, documentation regarding any projects that involve financing, and other documents that can be relevant to the analysis. Participant 5 states other requirements for analyzing purposes: *“being a profitable company, having a positive EBITDA, having a good credit rating for the company and its owner, the company having a minimum of 2 years of existence, and other indicators that are significant for the approval process.”* The analysis is created through a ‘Credit Proposal’ that subsequently goes through different later stages of approval (Participant 3, Participant 4).

This stage of the loan disbursement process also involves some essential decision-making activity. Firstly, the actors responsible for the analysis process need to make decisions regarding which documentation is needed to be requested from the client. This ensures that sufficient information is collected in order to make an appropriate analysis of the loan (Participant 3). Loan officers also need to preview and analyze the right areas of the loan application in order to have a complete and relevant proposal to submit to the Credit Committee (CC) (Participant 6). Different departments involved in the proposal process could request more information regarding the client, the specific loan, its purpose or the project before submitting the proposal to the Credit Committee. This ensures that the CC gets a full understanding of the proposal before making a decision regarding the loan proceeding.

The loan officers have the responsibility to bring the true picture to the table and avoid personal biases for more loan approvals. As Participant 1 states, the loan officers have clear KPIs (Key Performance Indicators) and they naturally stray towards approving as many loans as possible to achieve the KPIs. However, in order to prevent biases, they use different methods of analysis, such as adding multiple options for the loan, suggesting different interest rates, or providing different scenarios for the loan approval. This way they can portray a realistic picture of the client’s repayment capacity.

### 4.3.3 Loan approval

Following the creation of a Credit Proposal initiated by the loan officers, the application then needs to go through the Credit Committee (CC) in order to get approved. Participant 3 mentioned that the goal of the loan officers is to defend the proposal which they have analyzed and provide all relevant information that can lead to the confirmation of a loan. Depending on the complexity of the loan, the approval process could go through different levels within the Credit Committee. The more complex the case appears to be, the more complex decision-making regarding the approval will become. The decision is then finalised through the signing of the Credit Proposal by all actors involved in the application approval process . The CC is formed by managers from various departments and have different levels of authority regarding the approval (Participant 3). Employees call this authority “pouvoir” which translates as ‘power’ and is used to describe the different authorities and discretions of managers over the approval of an application. The “pouvoir” of managers becomes more apparent when dealing with a loan application case that is seemingly complex. According to participant 3, banks function as a system where “*all managers have those pouvoir decision-making levels and all managers act on them*”. Some departments may require additional information or explanation regarding the proposal in order to validate a decision (Participant 3).

The decision-making process in this stage is relatively complex, involving many actors that aim to make a decision regarding the credit proposal created by loan officers. The major decisions that the pouvoir holders need to make happen in this stage. All managers from various levels of the approval process need to consider carefully the whole credit proposal and the defence made by the loan officer. Additionally, some of the participants in the Committee can ask for more information before making a final decision, or even add several conditions for a positive decision. Participant 3 states “*...in this kind of a complex chain functioning, the decisions are more complex, and you need to act within it.*” Additionally, some clients can give bad, unclear, non-relevant information, or even not give information about certain areas at all. With that, not only does the decision process become really complicated and unclear, but also the decision maker can make a wrong decision on the proposal, on the basis of an incomplete picture of the company and due to the lack of right information. The Committee then makes a decision regarding the credit proposal by signing it. That is why obtaining all necessary information to make a right decision is key. If the decision is

not favourable regarding the granting of a loan, then the financing process ends here. On the other hand, if the decision is positive, then the process moves on to the next stage which is loan disbursement.

#### *4.3.4 Loan disbursement*

Once all signatories have made a positive decision regarding the approval, and the credit proposal is accepted by the Credit Committee, the next step involves the disbursement of the loan funds. Before the disbursement of the loan, the client and the bank go through a contractual phase in order to agree up and sign all terms and conditions. The Loan Disbursement Department also needs to check if the credit file is complete, and whether the disbursement follows the bank's policies and procedures (Participant 1). Following this, the Loan Disbursement Department has the responsibility to disburse the funds to the client based on the approved Credit Proposal.

Here, the department is frequently faced with having to make decisions regarding the disbursement of the loan, when documentation regarding a particular client is incomplete (Participant 1). Participant 1 mentions that the employees at her level are not often faced with decision making associated with this issue, but that their supervisors entail them to do so. She states "*my supervisors want me to make decisions on certain exceptions of the rules*". They need to make the decisions while identifying certain risks that can arise from the decisions made. Also, this department is in communication with other supplementary departments in order to confirm that everything is in line with the procedures and ready for disbursement, such as renewed insurance policies and appraisal requests (Participant 1).

This process should be straightforward because the decision for approval of the loan has already been made. However, this department is also faced with some hard decisions. The main one is lack of documentation for the loan disbursement and proceeding with the loan disbursement without complete files. Although this may seem a small thing, it contains high risks for the bank, especially reputational risk. Participant 1 mentions that they need to assess whether the documentation which is missing is critical for the bank. These decisions are not simple because if the client in the future fails to repay the loan, the bank will not have any legal grounds to protect its interests. The bank will need to put aside higher amounts of reserves for risky clients, which means less liquidity.

Finally, the reputational risk arises from the National Bank's Audit. A negative audit report from the Central bank, could even go to the extent of the bank losing its license to operate.

#### 4.3.5 Loan monitoring

The loan disbursement stage is not the final step of a loan granting process. Following the disbursement of the loan, some supervision and monitoring of the loan is put into place. Participant 3 states that *"the process does not stop here, as the final phase is monitoring of the disbursed loan, and supervising its use and its payment discipline"*. The loan officers have a responsibility to monitor the loan repayment process after the funds have been transferred to the client. The goal is for the loan officers to keep an eye on the payment discipline of the client and mitigate any credit risks from the client not being able to repay the loan (Participant 3).

If a client is not able to repay the loan, (i.e. he or she does not have the capacity to cover the loan liabilities, and has no other tangible alternatives) the loan can become a non-performing loan (NPL). In order to try and find alternatives for the client to be able to pay his or her installments, the Work-Out Department gets involved in this matter (Participant 4). The responsibility of the department is to do some restructuring of the loan in order to help the client pay its debt liabilities. This can involve coming up with different rates of interest, different installment frequencies, different amounts of installments, etc.. Participant 4 states that *"the main activity of the Work Out Department is undertaking measures for business recovery of companies, which have temporal problems in their business and struggle with repaying the granted loans from the banks"*. The goal is to prevent the loan from becoming an NPL. Participant 3 mentions that, in the project financing loans for example, much more supervision and monitoring is required because the whole repayment of the loan is dependent on the cash flow of the sole project that is being financed.

The decision-making involved at this stage for the Work-Out Department is very important. The loan officers need to monitor the loan, assess if and when the client struggles with repayment, and call attention to this particular case in order to mitigate any risks (Participant 3). If the situation happens that the case needs to be escalated to the Work-Out Department, then the employees in this department need to make big decisions regarding if something can be done to help the client with repayment. If something can be done, then it is their responsibility to decide which area and

what variables can be restructured in order to make an optimal repayment schedule for the client to follow (Participant 4).

## 5. Empirical Findings

This chapter seeks to provide an overview of the empirical findings collected from seven semi-structured interviews conducted with employees from Stopanska Banka. Firstly, this section aims to present the various technological tools used in the loan disbursement process in the bank, and how these are used towards assisting the decision-making process. Secondly, the various benefits and challenges (as perceived by employees) of using digital technologies in the decision-making process for loan disbursements will be presented. Finally, this section will also state the reasons for some limited use of digital technologies in the bank and the implications emerging from this.

### 5.1. Digital Technology in the Loan Process

This section describes the use of digital technologies in assisting employees in the decision-making process regarding loan disbursement procedures in the bank. In order to best describe the use of the digital systems in the bank, we shall separate the digital technologies into different categories: ‘Information and Communication Software’, ‘External Sources’, ‘Data Processing Software’, and ‘Digital Tools for customer services’. Each of the following digital technologies are used for different purposes in the loan disbursement process at Stopanska Banka.

#### 5.1.1 Information and Communication Software

At Stopanska Banka, employees in the loan disbursement process use various digital technologies to extract relevant information that will help in the decision-making process. Employees of the bank stated that they use various types of digital software that compile relevant data for the operations.

*“We use Globus for the whole client base, so all the details about the clients, loans, card exposures, blockades history, account balance and other information for individual and legal entities is there. 360 is something we use for credit history, MKB, average salaries*

*etc. And Intranet is something like our website where we get information from” (Participant 5).*

Participant 5 explains the use of the different systems used throughout the whole loan approval process for extracting data. In the process, gathering all the information regarding a potential client is essential in order to make a decision for loan granting. Participant 5 also mentions other digital systems that help in finding necessary information for analysing a loan case.

*“Systems we use in our operations: Temenos 24, 360 client, Intranet etc. Temenos is basically Globus. So, we use Globus for the whole client base, so all the details about the clients, loans, card exposures, blockades history, account balance and other information for individual and legal entities is there. 360 is something we use for credit history, MKB, average salaries etc. And Intranet is something like our website where we get info from there.” (Participant 5).*

These systems serve as tools to assist loan officers, making it easier for them to gather the necessary information that is needed for undertaking a loan analysis (Participant 3, Participant 5, Participant 6). Throughout the whole loan disbursement process, employees are able to use some of the digital systems to check information or generate more reports if needed. They use the systems more intensively in the loan analysis. Even once the loan has been disbursed, employees of Stopanska Banka use digital tools. The ‘monitoring and supervision of the disbursed loan’ department uses the SAP and Globus systems (Participant 4). Apart from the systems, the department uses an internal database for delinquency amounts and days of delay, as well as information from the Central Bank’s database (Participant 4). The systems help with the ways of restructuring the loans in the optimal way for repayment (Participant 4).

Similarly to many organisations, Stopanska Banka uses a software that is common throughout the whole organisation. This platform is described by most of our respondents (Participants 1,3,4,5,6).

*“We use the bank’s systems - GLOBUS system mainly, which I think almost the whole bank uses”. (Participant 4). / “We are highly dependent on the ‘Globus system’. We have been*

*using it for over 20 years, it is updated every year, but globally it stays the same.”*  
*(Participant 1).*

As described by Participant 4 and other respondents, GLOBUS system is a digital platform that is used by the whole organisation. Digital systems are involved in assisting the bank employees in their daily tasks but are also used as a communication tool. By having a common platform, employees throughout the whole bank can input and access the same information (Participant 4). This system therefore seems to be a central component of the loan disbursement process at Stopanska Banka, and has been in use for a long time.

The loan disbursement process is relatively dependent on digital technology as transfers of loan funds to bank accounts are done through the systems. Here, the loan disbursement officers use Globus and e-banking to make the disbursement of the loan funds (Participant 1). The department uses the Globus system to do the actual transfer of the funds, while they use the e-banking software to record all the data for the loans, so they can later access it for generating reports regarding certain areas and characteristics of the loan.

### *5.1.2 External Sources*

In addition to the bank’s internal systems, employees also use external systems to collect information (e.g. ownership and related entities, collateral preview, overall exposure in NBRM reports). Overall, the interviewees state that they use a lot of the systems in the analysis phase as it acts as a backup and support for the proposal, since you have plenty of accessible information (Participant 5, Participant 6).

As Participant 2 states, they do use some data sources to help with the initial assessment and information check of the client before going into the loan application and analysis process. For example, they use the Macedonian Credit Bureau (MKB in the original language) to check the potential borrower’s credit history and current exposure in order to determine the creditworthiness (Participant 2, Participant 7).

*“We deal with a lot of data there. For example, the clients’ available balances, salary, accounts, loans, deposits, loans in other banks throughout the country:”. (Participant 2)*

In addition to that, they use external sources such as the Credit Registry to get detailed access to the loan history of the client, then the Collateral Register to check the collateral status, or the Current State Register to see reports about the company’s ownership. Furthermore, Stopanska Banka employees also make use of online websites to get relevant information.

*“I have access to some web sites that are very useful for acquiring new clients. By having access to their summary of financial statements, their share of the market, etc... I have an open path for starting a new cooperation. Also from their web sites on the Internet you can easily find the owners of the business, their contacts, maybe their collaborators too, so you widen up your possibilities to acquire potential clients.” (Participant 5)”*

### 5.1.3 Data Processing Software

At Stopanska Banka, digital technologies are not only used to store or find information, but also to manipulate and process data. For example, loan officers use Excel to summarise or assemble relevant information in one place:

*“...before getting in contact with insurance companies, I need to export excel files from the global system and put them all into one excel file which contains various information such as: number of insurance policy, insurance company name, when the insurance policy expires, the value of the voucher, the detailed description of the voucher. This is when I use more data.”. (Participant 1).*

Participant 1 also states that in their department, they can generate and create reports and documents from the system, which can help other departments make decisions in their area. This can be information such as installment schedules, interest information, collateral information, etc.

*“We generate data, so that other departments can use this data for their decision-making.”. (Participant 2)*

It is also stated by Participant 2 that they do not personally deal with a lot of data manually since a lot of it is dealt with by automated systems in the processes. The automation process, when a loan is disbursed, consists of all the information being sent to their system, and then it automatically calculates the monthly liabilities. Then it sends this information directly to the client with initial estimations of how much they need to pay in principal and interest (Participant 1). In addition to this, Participant 4 states that they can also use the systems for their department to generate reports and schedules about loan restructuring, installments, interest, frequency, etc.

#### 5.1.4 Digital tools for customer services

Finally, employees at Stopanska Banka also utilize digital technology as tools to operate their customer services. They use the 'Customer Relationship Management software' (CRM) and automated systems such as the 'VISA international system' (Participant 2). These systems are mostly used in order to have close contact with clients, and to monitor the development of a particular loan (Participant 2).

Table 2. Digital systems used in Stopanska Banka and description

<b>Types of digital technology used</b>	<b>Digital technologies and purpose</b>
<i>Information and communication software</i>	<p><b>Globus</b></p> <ul style="list-style-type: none"> <li>• Used to store and find information about the client base, personal client details, loan information, credit cards, blockages history, accounts, etc.</li> <li>• Used for getting all information about the client for assessment and analyses purposes.</li> <li>• Used for disbursement of the loans.</li> <li>• Used for the restructuring of suspicious loans (interest, amount, period, frequency etc).</li> </ul>

	<p><b>Customer Relationship Management Software (CRM)</b></p> <ul style="list-style-type: none"> <li>• A program which integrates all information from external sources and systems such as Credit Bureau and others, where the information about the client’s credit history, product usage and more, can be found.</li> </ul> <p><b>E-banking</b></p> <ul style="list-style-type: none"> <li>• Used for recording data on credit frames/credit lines, collateral (value, insurance policy, appraisal date), loans (amount, interest rate, repayment schedule).</li> </ul>
<i>Databases</i>	<p><b>Macedonian Credit Bureau (MKB)</b></p> <ul style="list-style-type: none"> <li>• Used to retrieve information regarding potential clients’ available balances, salary, accounts, loans, deposits, loans in other banks throughout the country.</li> </ul> <p><b>CRM or external sources</b></p> <ul style="list-style-type: none"> <li>• Used for acquiring information about client credit history, product usage and more, and using external sources to check other needed information such as indebtedness, products, repayment history, blockages etc.</li> </ul> <p><b>Intranet systems</b></p> <ul style="list-style-type: none"> <li>• Used to get information. It serves as a central software for employees to communicate with each other and share information between themselves.</li> </ul>
<i>Data analysis software</i>	<p><b>Excel</b></p> <ul style="list-style-type: none"> <li>• Used to summarise data and output key ratios.</li> </ul>

<i>Digital tools for customer services</i>	<p style="text-align: center;"><b>VISA International System</b></p> <ul style="list-style-type: none"> <li>• Used for dealing with internet transactions. They use the system to check any problems with transactions or cards and use it to fix them.</li> </ul>
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## 5.2. Benefits of using digital systems in the loan disbursement process

The employees at Stopanska Banka AD have noted several benefits to using the digital systems and databases in the bank. The employees note why the advantages are so important and mention reasons why that is essential to their operations.

### 5.2.1 Digital Technologies help saving time

Participant 1 notes that the primary benefit of their digital platforms is the acceleration of the whole loan administration process. They contribute towards saving time and energy, and that they also get more satisfied customers because they can respond to their requests and needs instantly (Participant 1, Participant 7).

*“For example, if a client asks me when their next insurance policy expires or if the appraisal department wants the information to make a new appraisal report, I would need to search through the archives to find this information. It is all easily available and accessible by just clicking a few buttons in the Globus system.” (Participant 1).*

Participant 1 points out that they use their digital systems to generate data for themselves or other departments to assist in their decision making process. These digital tools help to save time due to the developed ability to retrieve information in a simple manner.

Furthermore, digital technologies used at Stopanska Banka also help to save time thanks to automated operations such as calculations. Participant 5 mentions that with the advancement of the systems, they can orient their time and energy towards other activities and adds: “...most of the complex operations in banks are easily replaced with advanced tools for calculations.”

*“You use working tools that immediately calculate the amount of money that can be approved to the client, you have access to his credit history from the start, so you know from the start what type of client he is. He can apply for credit without coming to the bank, so bankers have effective time to process the request, and many possibilities for better decision making.” (Participant 5).*

Our respondent believes that saving time in operations such as searching for relevant information regarding a client, helps to shorten the time involved in the initial processes. This in turn creates more time which can be used in actually processing the loan request, thus making better decisions regarding the disbursement of a loan.

### *5.2.2 Digital Technologies help analyzing data*

The first main benefit we can see in the bank’s use of digital technology to analyze data is the use of software and digital tools to analyze the financial stability and repayment of a company or individual person. As mentioned, the loan officers require and gather data and documentation from the clients regarding financial statements, project information, or even salary information on individual persons. All the data is then inputted into the software to reveal summaries of key ratios for the customers. It can output key ratios for profitability, debt, liquidity, repayment and much more information. Compared to the periods when such software was not available, huge differences can be seen in the periods when this is now in use.

Secondly, during the loan disbursement phase, after the transfer of funds, employees input the basic information regarding the loan into their software Globus, from where the software uses the data to calculate all the needed information and generate full reports for amortization plans, interest payments, loan repayment schedules etc. This is considered very useful and quite advanced, as the

number of calculations and amount of effort put into creating these reports for all loans would be extensive if no software was put into place in the bank.

*“I enter data on the amount, the interest rate, whether it is fixed or flexible, the maturity date, the collateral description details of the value, the insurance policy, the appraisal report, then the credit itself, etc. All of the data is contained in the ‘Globus system’ which is highly integrated.” (Participant 1).*

Participant 3 notes that the digital systems in the bank generally give a very accurate picture of the financial stability of the client. He also mentions that he finds the use of digital systems to be essential to their department, since it is used in all of their credit proposals and analyses (Participant 3). However, he notes a very valid point and an example of why these systems are not always accurate, which will be discussed in the following paragraph.

Participant 3 mentions that previously, all analysis and calculations were done manually as there was not any software in use for risk management to enable greater efficiency in collecting a wide range of data from a variety of different institutions.

*“Now, there is one source for getting multiple types of data. Also the bank’s software is more advanced to the level that, if previously mobile payments weren’t a thing, now it is a common practice. This goes for e-banking as well.” (Participant 3).*

Now with the implementation of the software, better and faster analysis is able to be achieved through utilizing the calculation capacity of the tools they have. In addition, more advanced and improved technology has, for example, led to the implementation and common use of e-banking and mobile payments.

### 5.2.3 Digital Technologies help retrieve information

Participant 4 also agrees with the benefit of accuracy derived from using digital systems. Through the use of their systems, information can be retrieved virtually instantaneously and, due to access to NBRM or Credit Bureau external databases, information relevant to companies can be reached. However, she states that the digital systems are not so much essential for their area of work ('work-out department'), but, rather, are more important for the awarding of corporate loans. Participant 4 explains that their digital tools help to generate rapidly information that is relevant to their particular tasks.

*“With our systems we can generate relevant information for our work in a few seconds, and with the access to the external databases from NBRM, Credit Bureau and others, we can get national information for the companies.” (Participant 4).*

Participant 5 notes the benefits of technology for the clients, which are essentially improved quality and productivity of their business. She states that human intervention is reduced to a minimum, with better control of money, payment of bills when wanted and significantly lower costs for provisions. She states that with e-commerce, businesses have wider opportunities for selling their products (Participant 5).

*“You work with big data, a lot of information, and you constantly need to adapt to new technologies.” (Participant 5).*

Participant 5 also cites the accessibility of information as being a big benefit and that digital systems increase the efficiency of strategic decisions. She believes that digital systems play a large role in their line of work, since they have working tools that immediately calculate the amount of funds that can be approved to the client, they have access to the client's credit history from the start, so they know from the start the type of client they are dealing with (Participant 5).

Additionally, participants 1 and 3 state that they also use internal and external sources to gather data, such as the NBRM platform, Credit bureau, credit register, or collateral register. The

Customer Relationship Management Software (CRM), a program which integrates all the information from external sources and systems such as Credit Bureau or others and which details information about client credit history, product usage, etc. is a tool which is widely used. Having digital tools to be able to gather the right kind of information is therefore valuable for employees at Stopanska Banka to make adequate decisions regarding particular clients.

#### *5.2.4 Digital Technologies help summarising data*

Digital technology at Stopanska Banka is also used to gather information in ways that make it easier to access such information in the future. Additionally, this digital software is used in the bank to summarise information so that it is easier for other employees to comprehend.

*“I need to export excel files from the Globus system and summarise them into one excel file which contains various information such as: number of insurance policy, insurance company name, when the insurance policy expires, the value of the voucher, the detailed description of the voucher.” [...] “We generate data, so that other departments can use this data for their decision-making.” (Participant 1).*

Here, digital tools such as Globus help the employees export the necessary information they need. Then they turn to ‘excel’ which helps to summarise relevant information into a more comprehensible format for easier analysis.

### **5.3. Challenges of using digital systems**

As much as the digital systems provide benefits to Stopanska Banka employees involved in the loan approval process, they also have some issues. The employees note several challenges that they face and mention ways in which they would like the systems to be adapted in order to improve their operations.

### 5.3.1 Digital Technologies require human assistance

Participant 1 notes that so far they have not identified any major challenges in the usage of the digital systems. When they spot some kind of weakness in the system, they can easily make a suggestion, via a so-called “business request” to the IT department, which they usually follow up and make changes in the system. Thus the department is always trying to improve the systems and implement new features.

*“For example, recently we needed to add a new field in the system, to make a certain report complete, and the IT department quickly responded.” (Participant 1).*

Participant 3 states that digital systems are not perfect and that there are certain occasions where human judgement is important. Depending on the industry, available data, or the type of booking, as well as many other challenges, digital software can sometimes give false results. The following example provided by the participant depicts a strong picture of how digital systems may be flawed if not monitored. That is why human judgement is crucial to detect and mitigate these flaws.

*“For example, for different industries there are different assumptions. One example where this is happening is the construction industry here. Their system of booking of the presales while the building is being constructed, in accounting they are booked as liabilities. Just with this fact that they are booked as liabilities, the system downgrades their statements and ratios, where in reality, these are basically advances that the client is getting as funds. When the building is finished they are transferred in revenues and the whole picture changes. However, if we were to leave this calculation just up to the system, we would most definitely decline the client due to this “over debt” that he would have, when it is not true. So depending when you are analyzing this, totally different results will occur. ”*

Finally, regarding human intuition, participant 3 states the importance of human interaction in this whole process. Although he states that the goal is for companies to be “less dependent on people and more on some self-generating tools for assisting in this process”, the human factor cannot be

“fully replaced”. Specifically, in addition to detecting mistakes made by technology, the human factor also plays a very important role, especially in negotiation and the communication process.

*“A computer cannot know what to negotiate. It can give you guidelines for a scope of conditions, but our job is to find the right and optimal option. And the AMs need to make right decisions for the conditions in order not to lose the client at the very start.”*  
(Participant 3)

Additionally, as stated in the example in the construction industry, technology can give a false conclusion based on the given facts. However, it is the loan officers’ job to use their human touch and experience to detect such inaccuracies. They need to use their professional experience in this field to mitigate these types of errors.

### 5.3.2 Lack of relevant data / information

In addition to this, Participant 4 gave the issue of bad data as a main challenge in the use of digital systems. She states that in some situations, the presented data do not represent the real situation. Sometimes, this can be errors, non updated figures, or even temporary booking, and the most difficult decisions are the ones where there is lack of information or distorted information (Participant 4). Participant 3 also stands by this issue, as these types of challenges can make the decision making more complex and steer the employees into making false decisions based on a non-completed profile of the case.

*“If we do not have relevant information, the decision process gets really complicated and unclear, but also it can happen that on the basis of an incomplete picture of the company, the decision maker can give a false decision on the proposal, due to the lack of right information.”* (Participant 3)

### 5.3.3 *Slow digital transformation*

Participant 5 states that another challenge is that it is difficult to change the mindset of the elderly generation concerning the use of digital systems that the bank provides, as some of them still do not believe in these technologies or understand them. Additionally, she notes that with these new technologies, it is very probable that some work positions, such as bank tellers, might vanish. Participant 7 also states that with the increased use of digital technologies, branches could be the places that can downsize in terms of numbers of employees.

In addition to the benefits participant 7 states, she mentions that there would have been way more if the systems were more advanced. The big challenge is that the system is now old and has been used by the bank for many years. So, updating it would bring further advantages in saving time and risks. Also, another challenge encountered is due to the overuse of system operations leading to its slow working or to delays. If that happens, It can also sometimes contribute towards non-updated payments or information.

## **5.4. Limited use of digital technologies at Stopanska Banka**

### 5.4.1 *Reasons for not using more advanced technology*

From what we have analyzed, we can see a clear picture of the advancement level of the digital technologies in the bank. Participant 4 mentions that the processes are digitized enough for the time being while participant 5 states that the technologies from year to year are progressing, but that they can improve in some areas. However, participant 7 states that the benefits of the systems would have been way more prominent if the systems were more advanced. Participant 1 mentions that she feels that the processes that are involved in that department are not digitized enough and that only a small portion of her work depends on the digital systems.

*“I wouldn’t say the loan administration as a process is very technologically advanced. 90 percent of the time consists of me going to the files, making sure everything is there, that*

*the content is in accordance with the bank's procedures. And only about 10 percent of the time, I use the 'Global candidating' system, it is the easiest and the quickest platform. It is not that technologically advanced as the human factor here plays the highest role."*  
(Participant 1)

We can identify numerous reasons as to why the bank is not using advanced digital technology to support its operations. Participant 3 mentioned that new digital advancements in the organisation will “*depend on how much the bank is willing to invest in its systems*”. Moreover, Participant 2 states that the main reason for not implementing new digital technology such as AI in the decision making process for loan disbursements is due to a lack of monetary provision.

*“There is no particular reason, despite maybe a limited budget. When most people think of the challenges of a digital transformation, security and budget concern are among the first that spring to mind.”* (Participant 2)

It is also stated that even if the bank is able to implement more advanced digital technology, client lack of knowledge about technology and concerns about the personal face-to-face touch would still prevent the clients adapting to the use of digitalization.

*“I think that commonly, even if they have advanced technologies, people don't really want to use them. They would rather do transactions face to face. We have seen many new digital options come up during the pandemic, but people still prefer to go and do the transactions face to face.”* (Participant 1)

The interviewees also added that some other banks in the industry have more advanced approaches to certain areas than their bank. Regarding loan analysis tools, participant 3 mentions that they still use excel sheets to calculate important key ratios in the credit proposals for clients, while another bank has a software tool that directly calculates and outputs the results in accordance with the data provided.

*“For comparison, one of our competitors with a foreign capital in this region has developed a tool which takes all the data from the clients and their system outputs a complete summary of the ratios, financials etc. That is really useful. We also use something similar for our analysis. But it is not a system like theirs, but an excel template where we fill in the information and then formulas give us these ratios and further information. These tools help out a lot in the analysis.” (Participant 3)*

This suggests that although other players may have different and more advanced tools to assist in the operations, Stopanska Banka has still not reached this level of digital advancement. Furthermore, Participant 1 mentioned that she does not think that Stopanska Banka will adopt new technology such as AI in the near future and added:

*“We are highly dependent on the ‘Globus system’. We have been using it for over 20 years, it is updated every year, but globally it stays the same.” (Participant 1)*

#### *5.4.2 Implications of not using more digital technology*

Some implications of not using more digital technology in the decision-making process for loan disbursement have been mentioned by employees of Stopanska Banka. Firstly, humans are prone to occasionally making some mistakes which may have an impact on the outcome of a decision-making process.

*“This morning there was a situation in which a colleague of mine entered a loan with a 0 interest rate, which was a mistake. So the other department immediately reacted to this by sending an email saying: ‘‘can you please correct this, we don’t give loans with 0 interest rates!’’ (Participant 2).*

Additionally, participant 6 mentions that the use of digital technology has an impact on the coordination and dependency of activities involved in the loan approval process. Different departments are successively dependent on each other during the procedure, and the input of

variables in one has an effect in the other. If one department makes a mistake in the systems that is connected with the upcoming work of the subsequent department, then the latter cannot continue with their work. In that case, they will need to coordinate to correct the situation. The level of dependency in the work involving the systems is sometimes huge.

*“For example, if we input some variables in the system, such as the conditions of a loan or codes for types or loan, which are preliminary for the disbursement department to make their amortization plans, then if we input the wrong ones, they will not be able to properly do that. So in that case, they have to contact us and coordinate so we have everything as it should.”*

## 6. Discussion

### 6.1. The use of digital technology in the decision-making process

As mentioned earlier, Colson (2019) provides in his article a framework to assess the level of digital technology usage in decision making processes. Colson (2019) provides different decision-making models: the ‘human judgement based decision-making’, the ‘data supported decision-making’, the ‘AI based decision-making’, and the ‘combined human judgment and AI decision making’. We will take our results and use the framework to analyze the level of digital technology used in the decision making process in the bank.

#### *6.1.1. Data-driven decision making*

Our results have shown that throughout most of the loan disbursement process, decision-making was mostly supported by data. Therefore, Stopanska Banka would be using in its loan approval process, the ‘decision-making model that utilizes summarised data’ presented by Colson (2019). As presented in the results section, employees from the bank use various types of digital technology to assist them in their task in the ‘application’, ‘analysis’, ‘disbursement’, and ‘monitoring’ stages. A great majority of these digital technologies involve software that is used to retrieve and summarise data in order to make accurate judgments regarding potential client loan disbursements. As mentioned by Colson (2019), in this ‘data-driven’ workflow, human judgement plays the main role but uses summarised data in order to make decisions. The use of machines (such as databases, distributed file systems, etc) help to scale down the unmanageable amount of data into more straightforward summaries that are easier for humans to digest (Colson, 2019).

#### *6.1.2. Human judgement*

However, our results have shown us that human judgement alone also takes place in the decision making process for loan disbursement at Stopanska Banka. For example, in the ‘approval stage’,

most of the decision-making is based on human judgment and little digital technology is used here. Of course, employees in this stage rely on previously summarised data and can still request more information through digital technology to assist them. However, this stage of the process is mainly based on their own reasoning, and experience. Furthermore, our results have shown that when there is a lack of information, decision-making relies mainly on human intuition. For example, in the ‘disbursement stage’, employees are allowed to have ‘exceptions of the rules’ in their decisions when there is a lack of client information. This type of situation is described by Hoßfeld (2017) as being a decision structure under uncertainty in which the decision maker has a minimum of two possible alternatives but where the relevant information for this particular decision is missing. The result in this kind of situation is unknown and the various alternatives are uncertain (Hoßfeld, 2017). Here, the employees of the bank use their own intuition and therefore take significant risks due to the increased uncertainty that has emerged, as a result of the lack of information regarding a potential client. According to Colson (2019), relying mainly on human intuition is ‘inefficient’ and ‘limits the ability of an organisation’. Here, employees at Stopanska Banka do not rely solely on human intuition as their decisions are mostly supported by data. Moreover, our results show that employees view human intuition as essential, for example, in communication and negotiation activities, or to correct possible mistakes made by digital technologies. A number of studies have postulated the benefits of synergizing digital technologies and human expertise (e.g. Wiethof et al., 2021; Bhandari and Reddiboina, 2019).

Furthermore, our results show that Stopanska Banka does not make use of AI in its decision-making processes. The organisation therefore does not follow Colson (2019)’s ‘decision-making model that utilises AI’ or the ‘decision-making model combining human judgement and AI’. This is interesting to point out as Colson (2019) believes that organisations must evolve towards utilising AI in order to process data to improve overall decision-making. The reasons behind Stopanska Banka not using AI in their loan disbursement decision-making process, as well as the challenges arising as a result of this, will be elaborated upon further on.

## **6.2. Benefits of using digital technology in the decision-making process**

Our results have shown that digital technologies bring many benefits to Stopanska Banka such as helping to gather information efficiently, analyse data, summarise data, save time, and communicate better within the bank. In this next section, we will discuss, by using some theories found in literature, how these various benefits brought by digital technologies contribute to improving the decision-making process for loan disbursements at Stopanska Banka.

### *6.2.1. Gathering information*

Our results show how employees perceive digital technology as a tool to retrieve and gather information. As presented in the literature review, Saaty (2008) stated that information helps to understand particular occurrences, and improves the ability to make good judgments in decision-making. The author also indicates that it is easy to believe that all kinds of information is useful and that the more information is used, the better. Saaty (2008) explains that too much information can often be as bad as too little information. Furthermore, Adeosun et al. (2008, p.50) mention that banks need to be able to obtain information “when it is needed, where it is needed, and in the form in which it is needed.” The authors express that in order to obtain complete and useful information, data must be organized, stored and managed in an efficient manner. As presented in the results section, Participant 4 explained that their digital software help employees gather relevant information for their work.

Our findings also show that digital technology is used by the bank’s employees to summarise information. As presented in the results, Participant 1 mentioned summarizing the information of a particular client into excel files. They firstly generate the information from their system, such as Globus, and then use excel files to summarize them. Theory presented by Turpin and Marias (2004) suggested that “packaging information in more visually appealing and digestible formats” helps to deliver the right message and make decisions based on that information.

### *6.2.2. Analysis of data using technology*

Adeosun et al. (2008) mentioned that manually processed information often comes with increased uncertainty in a decision-making context in the banking industry. The authors therefore recommend using digital technologies for any complex analysis in order to make better decisions. Furthermore, if we refer back to Cherviakov et al. (2020) in the literature, digital technologies help to improve the speed of analysis of a particular situation, reduce risks of mistakes, and improve the quality of decisions.

Digital technologies are used in Stopanska Banka for analyzing data, and making calculations regarding loan disbursements. Automated calculations help employees save time but also can help them to prevent themselves from making calculation mistakes. As we have seen in the results, it does occasionally happen that employees make mistakes, so digital resources can be helpful to mitigate these errors. On the other hand, our results show that digital technologies can sometimes provide wrong results, and that employees must sometimes verify calculation outcomes. Our respondents seem to view digital technologies the same way as Cherviakov et al. (2020). Digital technologies can help in analysing data and reducing processing time, but human competence is still valuable. For some operations, they point out that human judgement is non-replaceable.

### *6.2.3. Time saving*

Adeosun et al. (2008) state that one reason why processing information manually in the banking industry can be complex, is due to the fact that many decisions have to be made within a certain time limit. The authors explain that it is often not possible to process the needed information manually within an operation's set time frame. Adeosun et al. (2008) therefore emphasize the importance of digital technologies in decision making processes.

One of the biggest benefits of using digital technologies stated by Stopanska Banka employees, is that it saves time and energy. This is mainly due to the fact that digital software is used to find relevant information from large databases easily. As mentioned above, digital technology is also used in the bank to help with calculations which saves employees a lot of time. Our respondents

mentioned the importance of having a fast decision-making process for loan disbursements. By saving time in tedious work such as searching for data and performing calculations, employees are able to spend more time on other activities. Overall, this leaves more time to employees to focus on actual decision making regarding the loan disbursement.

#### *6.2.4. Better communication*

As explained previously, decision-making in an organisation is often the result of a decision-making process that involves multiple stages and people. In the banking industry, making decisions and solving complex problems requires the expertise of multiple individuals that work together (Adeosun et al., 2008). At Stopanska Banka, decision-making in the loan approval process involves several stages and many different employees from various departments. Therefore, ensuring effective communication is essential in such an environment and where decision-making is the result of so many factors. As presented in the results section, Stopanska Banka uses ‘Globus’ throughout the whole organisation as a software system. Utilization of this same digital technology throughout different departments helps with communicating and sharing the same information. Adeosun et al. (2008) state that it is essential for different departments and branches within the banking industry to implement efficient communication and collaboration to improve operations such as reducing the time-to-serve customer. Additionally, in Stopanska Banka, as different departments are successively dependent on each other during the process, good communication between them is essential to make the process flow properly.

### **6.3. Challenges of using digital technology in the decision-making process**

#### *6.3.1. The need for human assistance*

Our results have shown that digital technologies present some challenges in regards to their use at Stopanska Banka. Employees stated that while digital technologies are useful in helping them, these still require human assistance. For example, an IT department is needed in case of technical issues with various pieces of software. Furthermore, digital technology used to help in some loan

case analysis can present some mistakes, as mentioned above. Employees are therefore required in order to check and make sure the results presented by digital software are correct.

Colson (2019) believes that using both digital technologies and humans is more efficient in making better decisions rather than using just human ability or digital technology such as AI on their own. As mentioned previously, Cherviakov et al. (2020) state that the use of digital technology is useful for analysing data and reducing processing time. However, the authors believe that human expertise is still needed to verify results.

### *6.3.2. Some operations cannot be done by digital technologies*

Our respondents mentioned that some activities can not be performed by digital technology and that it is simply up to humans to do it. For example, this is the case when it comes to negotiations with clients and selling operations. As one of the participants states, a robot cannot be given the job to negotiate conditions. It can contribute by perhaps stating a suggestion where conditions could range, but the actual work is done by the employees.

Furthermore, digital technologies alone could show some limitations. It has been said by our respondents that if information regarding a potential client is missing, employees must use their intuition to make some decisions. Additionally, if the software outputs wrong results due to various reasons, the employees need to detect them and resolve the issues. The interviewees give an emphasis on the human factor in the process. The fact that in some areas it is highly needed to set the process straight from mistakes and improve it in soft-skill phases, makes the statement of the non-replaceability even more concrete.

## **6.4. The lack of use of digital technology in the decision-making process**

### *6.4.1. Limitations of digital technology usage in the process*

While digital technology is used throughout a great majority of the decision-making processes for loan disbursement at Stopanska Banka, its use can be somewhat limited. As we have seen, the decision-making process is mainly orchestrated by the employees themselves using various sources of data, their knowledge, expertise, and intuition. Our results are similar to the ones presented by Pusnik et al. (2019), in the sense that not all of the process includes digital technology, and that a lot of it relies on human capabilities.

The digital technology (software and databases) used in the decision-making process in the bank generate many valuable benefits. However, it can be argued that these digital technologies are rather basic and that more advanced technologies such as AI could be utilised in order to improve the decision-making process at Stopanska Banka. A large amount of literature and theory has looked into Artificial Intelligence and how it has the ability to improve decision-making (e.g. Colson, 2019; Jarrahi, 2018; Phillips-Wren, 2012).

Furthermore, there can be various setbacks as a result of not using digital technology in some parts of the process. Humans are prone to sometimes making mistakes, as illustrated by the ‘0 interest rate’ mistake example provided by participant 2 in the results. Additionally, analysing a loan manually can take a long time due to the numerous calculations and ratios the loan officers have to do, as mentioned by participant 3. Also, the human error is higher when left analyzing without any digital tools to assist.

As presented previously, Stopanska Banka’s decision-making process is mainly based on a data-driven decision-making model. Colson (2019) explains that there are still limitations in the ‘data-driven decision-making model’, as the process is still primarily driven by human judgement. According to the author, data reduction or summary is essential for humans to process. However, summarized data can hide some significant insights, leaving some important information aside

(Colson, 2019). Furthermore, Colson (2019) states that data does not prevent humans from cognitive biases.

#### *6.4.2. Why is more advanced digital technology not used in the process*

While digital technology is used throughout the whole decision-making process for loan disbursements at Stopanska Banka, its nature remains less advanced than one could expect. Most of the digital technologies in the process are software used to store, process, and extract data to make further rational decisions. Some literature has shown that the banking industry has been greatly restructured through digitalisation, and recent research has emerged feeding a great hype around the use of Artificial Intelligence. However, according to our results, Stopanska Banka does not have very advanced digital technology and does not use AI in its decision-making process for loan approvals.

Several reasons explain why more advanced digital technologies may not be implemented in the loan disbursement process. The first, and maybe most obvious reason, can be related to the cost-benefit analysis theory, mentioned previously in the literature review with Corrigan (2008). As presented in our results, employees from Stopanska Banka believe that implementing new technologies depends on the bank's budget and will to invest into new systems.

Another factor, mentioned by employees that explains why more advanced digital technologies are not implemented in decision-making processes at Stopanska Banka, is due to a question of habit. While some research says that digitalisation restructured the whole banking sector, some other studies state that banking is a relatively conservative industry (e.g. Pusnik et al., 2019). Stopanska Banka has been using the same digital system 'Globus' for the past 20 years and still utilises tools such as Excel.

Finally, another reason for not utilizing more advanced technology, mentioned by some of our respondents, is that investing in them would be unnecessary as the type of tasks do not require more advanced technology. While the loan disbursement process is relatively complex, employees

believe that the digital technology that they use in the decision-making process is sufficient. Therefore, some employees believe that the use of AI in their decision-making process would be unnecessary. Although a lot of literature emphasises the benefits of implementing more advanced digital technologies, especially AI, there may be no need for that for the loan process, as their level of digitalization could be considered satisfactory for now.

#### *6.4.3 Stopanska employees' view of the use of more advanced technology in the future*

While some employees believe the implementation of AI would be unnecessary, the majority of the participants have positive views regarding Stopanska Banka being more digitally advanced in the future. Participant 3 states that the trend of digital improvement in the banking industry is evident and that they will see improvements in the bank and in the whole industry. However, that would depend on the degree to which the bank is willing to advance and invest in that. It can be that banks are considering budget limits or just consider that the level of digitalization is acceptable.

Additionally, views concerning the use of Artificial Intelligence at Stopanska Banka appear to be different. Namely, most of the participants state that the bank currently does not use AI in their processes. This could be for many reasons, as mentioned, such as budget constraints, or lack of knowledge in the field. Some state that AI is still not needed in their operations. However, some of the participants seem to have a different picture of what AI could be in the bank. Some mention that AI might be present based on the software that they have for calculations (participant 3), while some mention that AI is being implemented as the bank continues with the trend towards having less humans in branches (participant 7). However, the respondents have a positive view that AI could be implemented in the bank in the future, and even more throughout the industry.

*“We hope one day in the future a robot can do our credit proposal and analyze it.”  
(Participant 3)*

## 7. Conclusion

This research set out to investigate a real-life case of how digital technology is used in a decision-making process. Therefore, this paper aimed at having a better understanding of this, by answering the following research question: *How is digital technology used in decision-making processes for loan approval operations in Stopanska Banka AD Skopje?*

This study used a qualitative research method and data was collected through seven interviews with employees working in the loan disbursement process. This investigation presents several interesting conclusions. Firstly, one of the most important findings to emerge from this study is that digital technology plays a significant role in the decision-making process for loan disbursements at Stopanska Banka. Digital tools such as information and communication software, internal databases, and external sources, are used in the bank to store, retrieve, gather, summarise or analyse data. Furthermore, other digital technologies are used to improve overall connections and communication through the loan disbursement process and most importantly, accelerate the whole process. Secondly, our research has shown that these digital tools provide several benefits to the decision-making process regarding loan disbursements. These include gathering relevant information, saving time, helping with data analysis, and improving communication. These various benefits improve significantly the decision-making process at Stopanska by optimizing the speed as well as the quality of the process. Thirdly, our findings show that most of the technology used in Stopanska Banka is not particularly advanced. The organisation has been using the same central system for over the past 20 years, uses software such as Excel, and employees consult online websites to get information. Moreover, Stopanska Banka does not use advanced technology such as Artificial Intelligence. These results confirm previous research stating that traditional systems such as banks are less likely to change and adopt new alternatives. Finally, our findings have addressed several limitations or challenges presented by employees that spring from using digital technologies in the decision-making process. The first main challenge is that these technologies still require human assistance. In addition, digital technologies can sometimes present some errors in certain situations in data analysis. In these cases, human judgement and expertise play a vital role in order to mitigate these types of risks.

This study was set out to gain some understanding of how digital technology is currently used in decision-making processes in the banking industry. Our research paper presents some limitations which have already been stated in the methodology section. Furthermore, several challenges emerged during our research process, the major challenge being time constraint. However, the findings of this paper have significant implications for the understanding of how digital technology is currently used in the decision-making process for loan disbursement in a major bank. Little research has focused on analyzing the use of digital technology throughout a whole decision-making process. This paper therefore presents interesting theoretical insights by introducing a real-life example of this in the banking industry. This case study presents what technology is used and how it is used throughout each stage of the loan disbursement process.

Furthermore, this study also presents some interesting practical implications. This case study provides insights into how managers can utilize digital technologies to improve their decision-making processes, as well as the setbacks and challenges resulting from the implementation of such technology. It may also give managers in the banking industry an understanding regarding the level of implementation and importance of digitalization in their decision-making processes.

This study is interesting in understanding the phenomenon of using digital technologies for decision-making in the banking industry. Our study contributes to the literature by providing a real-life example of how a major bank does this. With the rapid development of technology, and the digitalisation of firms, further studies in the area of digital technology and decision-making are worth undertaking in the future. For example, future research could be a cross-national study involving a larger number of banks, in order to see if our results could be generalised to the whole banking industry. It would be interesting to see the evolution of the ways in which banks will implement new technologies in their future decision-making processes.

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# Appendices

## Appendix A - Interview Guide - Questions for the interviews

Topic	Questions for participants
Introductory	<p>Presentation of ourselves:</p> <ul style="list-style-type: none"><li>• Lund University students</li><li>• Focus of study: understanding the use of digitalized technology in decision-making in the banking industry</li><li>• Ethical issues addressed: recording and anonymization;</li><li>• Which department do you work in?</li><li>• What are your main activities and responsibilities?</li><li>• Could you please explain how the loan approval/analysis/disbursement processes usually go?</li></ul>
Decision-Making	<ul style="list-style-type: none"><li>• What kind of decision making is mostly involved in your specific area?</li><li>• Could you provide some examples?</li><li>• Do you deal with a lot of data?</li><li>• What does that look like?</li><li>• Are the decisions straightforward or complex?</li><li>• Could you provide some examples of some decisions that were difficult to be made for you?</li></ul>

Digitalization and  
Decision-Making

- What type of digital technology do you use to assist in your daily work? (Automated systems, AI, etc..)
- What are the main benefits of using these digital systems?
- What are the main challenges of using these digital systems?
- How much are the digital systems involved in the decision-making process?
- Could you give us some examples of system use in your operations?
- Do you believe that digitalization has become essential for your decision making?

Then and now:

- How long have you been working in the banking industry? And specifically in this bank?
- How would you say your processes are technologically advanced compared to your previous processes in this bank?
- Which areas have the processes changed digitally in?
- Do you think your processes are digitized enough or could they improve more in some areas? If so, which areas and how?
- Do you feel like the processes will improve and advance digitally in the future?