Josip Juraj Strossmayer University of Osijek

Faculty of Economics in Osijek

International inter-university postgraduate interdisciplinary doctoral program

ENTREPRENEURSHIP AND INNOVATIVENESS

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MODEL OF INTERNAL RANKING OF CLIENTS IN ISLAMIC BANKS FOR SMALL AND MEDIUM-SIZED ENTERPRISES

DOCTORAL DISSERTATION

Osijek, 2024

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Supervisors: Nataša Šarlija, full professor, University J.J. Strossmayer, Osijek

Mehmet Asutay, full professor, Durham University Business School

Osijek, 2024

IZJAVA
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PRAVU PRIJENOSA INTELEKTUALNOG VLASNIŠTVA,
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Ime i prezime studentice: Nerma Saračević
Matični broj studenta: 447
OIB: 7259662661
e-mail za kontakt: saracevicnerma@bih.net.ba

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Mentori: prof. dr. sc. Nataša Šarlija
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MODEL INTERNOG RANGIRANJA KLIJENATA U ISLAMSKIM BANKAMA ZA MALA I SREDNJA PODUZEĆA

Nerma Saračević

Disertacija je izrađena u: Sarajevu i Tešnju
Mentori: prof. dr. sc. Nataša Šarlija
prof. dr. sc. Mehmet Asutay

Kratki sažetak doktorske disertacije: Ovo istraživanje ima za cilj da razvije model za unapređenje upravljanja kreditnim rizikom u islamskim bankama kreiranjem rejting modela za procjenu kreditne sposobnosti malih i srednjih preduzeća (MSP). Istraživanje se fokusira na jedinstveno poslovanje islamskih finansijskih institucija, koje se pridržavaju islamskih principa kao što su beskamatno finansiranje i izbjegavanje špekulativnih i zabranjenih aktivnosti. Uprkos naglasku na internim ocjenama od strane globalnih bankarskih standarda, islamske banke su zaostajale u razvoju takvih modela, uglavnom se pridržavajući konvencionalnih praksi upravljanja rizikom uprkos svojim temeljnim principima dijeljenja dobiti i gubitka. Ova studija predlaže model za procjenu vjerovatnoće neizvršenja obaveza za MSP u okviru islamskog bankarstva, rješavajući problem boljeg upravljanja kreditnim rizikom u oblasti MSP u sadašnjim islamskim finansijskim praksama.

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MODEL OF INTERNAL RANKING OF CLIENTS IN ISLAMIC BANKS FOR SMALL AND MEDIUM-SIZED ENTERPRISES

Nerma Saračević

The thesis was completed in Sarajevo and Tešanj
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Mehmet Asutay, PhD

Short abstract: This research aims to develop a model for enhancing credit risk management in Islamic banks by creating rating models to assess the creditworthiness of small and medium enterprises (SMEs). The research focuses on the unique operations of Islamic financial institutions, adhering to Islamic principles such as interest-free financing and avoidance of speculative and prohibited activities. Despite the emphasis on internal ratings by global banking standards, Islamic banks have lagged in developing such models, largely adhering to conventional risk management practices despite their fundamental Profit and Loss Sharing principles. This study proposes a model to estimate the probability of default for SMEs within the framework of Islamic banking, addressing the issue of better credit risk management in the SME sector within current Islamic financial practices.

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Mojim momcima

Mama vas voli najviše na svijetu

Table of Content

Chapter 1: Introduction: Research Problem, Aims and Methodology of the Research

1.1 Introduction

The Great Financial Crisis from 2008 and 2009, as well as the current ongoing post-pandemic crisis, created subsequent financial disturbances on the world market, violently affecting the businesses of SME entities. SMEs are often highlighted in the available literature as crucial for driving development in developing countries.

By working in the financial sector in the last decades, I realised that the challenges for start-ups and small businesses are enormous compared to the already established businesses. Based on my experience in the financial sector, which provides financial resources for SMEs, the question that arose was: are there any Islamic financial tools to provide some different options for SMEs? Considering the magnitude of internal barriers, challenges (organisation, business years, education, types of activities), and external barriers (access to funds, competition, legislative issues), obtaining the necessary resources is the main disadvantage for SMEs. Islam finance as a value-based proposition according to Islamic economic theory is expected to provide solutions for the vulnerable, including small businesses, going beyond the narrowness of the risk issue and financial implications (Chapra, 2000; Khorshid, 2015; Naqvi, 2002), among others. Islamic finance recognises rewards based on risk exposure (*Al-Gughrmu bil-uhrmu*), opening the possibilities for equity-based finance (Tag el-Din, 2013).

It is not surprising that conventional financial institutions follow the debt-based economy, creating indebtedness among small and large enterprises. However, Islamic finance essentializes equity-based finance at least in its theoretical proposition of Islamic moral economy (IME)[1] (Asutay, 2007; (2012)). Therefore, it is not surprising that a large number of businesses have become zombie firms, and as such, they are subject to closure. The question that imposes itself is whether the value-based products of Islamic financial institutions can offer alternative solutions for economies.

[1] Islamic moral economy, Islamic political economy and Islamic economics are words that are used interchangeable for the theory of Islam regarding to economics

The founding fathers of Islamic political/moral economy (Chapra, 2000; Khorshid, 2015; Naqvi, 2002; Siddiqi, 2009; and others) have proposed a value-based economy where Islamic finance is an operational tool of such an economic system. As such, Islamic finance is expected to deliver human-centric developmentalism, creating differences in community members' lives. In that sense, IME provides the utopian model of an economic system according to which everyday reality must be engineered. This was my primary motivation to explore the contribution of Islamic finance to creating such change and also to recognise the limitations as a result of human endeavours in interpreting the revealed knowledge.

In the initial readings on Islamic economics, banking, and finance in the existing literature, which define the nature of Islamic financial tools as profit and loss sharing (PLS) and just-based principles and imperatives, Islamic finance is clearly distinguished from other financial alternatives. The most distinguishing factor is PLS, as it requires a paradigm shift within the economic system in which the modes of production will be different from existing models of capitalism and socialism. As capitalism and socialism clearly differentiate themselves from each other as a result of their epistemological positionings, IME and its tool, Islamic finance, are expected to deliver different modes of production that cannot just act as landers as is the case in capitalism and socialism but must be actively involved in financing and delivering the PLS expectations.

This notation of the paradigm shift in arrangements and relationships as a result of PLS in factors of modes of production (capital, land, labour, and entrepreneurship) opens a new door for research in customers' (entrepreneurs') inter-banking ranking within Islamic banks. Since the prefix 'Islamic' before banks is expected to mean something different, there should be a distinction between Islamic and conventional banks.

Therefore, this research, based on the available information and data, proposes a model for the internal ranking of SMEs' clients, which can be used by Islamic banks to get insight into the businesses and hence resolve the issue of moral hazard and asymmetric information as the main obstacles in utilising the PLS models within Islamic banks. The proposed model would facilitate efficient and appropriate decision-making by the clients of SMEs for their potential financing, and as such, it is an important contribution for the Islamic financial industry to activate their PLS modules for enhancing

businesses and also provide banks and financial firms with pragmatic solutions for the classification of customers.

Using years of experience in commercial financial institutions focused on small and medium-sized enterprises (SMEs), this research includes extensive empirical data. These insights contribute to this research because SMEs, generally, face more significant barriers in accessing finance and resources for their development compared to larger corporate entities.

1.2 Problem Statement

The purpose of this research is to explore enhancement of the credit risk management for small and medium enterprises (SMEs) in Islamic banks (IB) by introducing the rating models for evaluating the creditworthiness of SMEs. The basis of this research is allocated within specific operations of Islamic financial institutions, on which Islamic banks operate. The specificity is reflected in fulfilment of Islamic principles, such as interest-free financing projects, avoidance of speculations in operations of business activities, avoidance of engagement with *haram* (prohibited) activities as well as conducting the business activities based on the assets-based products of Islamic banks (*murabahah, istisna'a, salam, ijara*) or equity-based products (*musharakah, diminishing musharakah, mudharabah*) through the financing from specific types of deposits.

Internal rating has long been the focus of banking institutions in the world. Central banks set the minimum standards for the operation of banks, and each bank individually makes its internal model of risk assessment of clients. The models are based on different variables, in line with the objectives and assessment of the type and severity of the risk that the bank determines to be relevant. The global financial crisis has intensified and accelerated the efforts of banks to carry out a quality assessment of the potential risks that could increase losses and threaten their solvency. Hence, modelling the internal rating of clients has become extremely important. Most conventional banks have their internal rating models. However, Islamic financial institutions haven't paid enough attention to this issue ((Khan & Ahmed, 2007) (Elgharbawy, 2020)). Islamic banks have a specific perception of risk in the banking industry for a variety of business principles (Profit and Loss Sharing - PLS principle) compared to conventional banks.

However, many of the PLS postulates remain within the theoretical frame as the practical reality of Islamic banks resembles the conventional logic in risk management.

Islamic Finance Service Board (IFSB) provides standards for the operations of Islamic financial institutions in all business segments, as well as in the area of credit risk and capital adequacy for institutions offering Islamic financial services. An important aspect of the supervision of Islamic financial institutions is the *Shari'ah* board which helps banks, customers and regulatory authorities through specialized seminars/roundtables by the Accounting and Audit Organization for Islamic Financial Institutions (AAOIFI). However, this fast-growing industry in the world, which proved to be very stable in times of financial turbulence, has not yet formed its special rules for determining internal rating models. It is a unique challenge to develop a model for the internal customer rating of a bank based on Islamic banking principles. In short, this research aims to propose a model for estimating the probability of default (PD) for small and medium enterprises that adhere to Islamic principles and are willing to obtain funds from Islamic banks.

1.3 Research Aim, Objectives, and Research Questions

This research aims at empirically examining, developing, and testing a model of internal rating of SME customers of Islamic banks. In doing so, statistical methods of model development are used, and the model for measuring the internal rating of Islamic bank customers, as well as their efficiency and accuracy. The importance of using internal model rankings is also presented.

It is anticipated that this research will achieve the following objectives:

1. Developing and testing a model of internal rating of SME customers for a bank that operates under the principles of Islamic banking.
2. Comparing the internal rating model with the existing system of evaluating SME's creditworthiness.
3. Show the importance of the use of internal rating models.

Based on the aim and objectives, the following research questions were formulated:

1. What methods of assessing the client's creditworthiness have been used in Islamic banking?

2. Does the internal rating model provide greater accuracy and certainty in the process of assessing customers' future creditworthiness?
3. Compared to commercial banks, which variables are important for modelling the internal rating based on the data of Islamic bank clients?
4. Can the assessment of creditworthiness through the internal rating model for SME clients improve the availability of funds for these types of companies?

Within the stated goals and research questions, this paper presents the way of developing the model for internal ranking of clients, variables selected and used to make up the model, as well as the validation and accuracy of the model.

1.4 Research Hypothesis Development

Risk management is very important for the banking sector, whether it pertains to conventional or Islamic banks. Liquidity risks, market risks, operational risks, currency risks, capital risks and credit risks are identified within banks' operations (Sarlija, 2008). The success of banks and other financial institutions, as well as their survival depends on the level of efficiency in managing these risks (Khan & Ahmed, 2007). Considering the role of banks as financial intermediaries between investors, depositors and borrowers, the security and trust, banks are expected to disclose to owners and depositors the activities of banks (Akram & Rahman, 2018). These activities define the level of risk exposure in terms of loss and liquidity issues.

In their work, Bekhet and Eletter (2014) state that the analysis of financial history, as well as other data about the client, are the most important internal rating factors before making a credit decision. Namely, this procedure in credit risk management minimizes losses that could occur in the non-fulfilment of contractual obligations of borrowers. Based on this, we hypothesize:

H_1: The use of internal rating models in Islamic banks contributes to better quality of risk management.

The economic development of a country (among other factors) depends on the health of the banking system (Siraj & Pillai, 2012). Therefore, various scientific studies have analysed the financial performance of the financial sector of several countries individually as well as comparatively. Accordingly, the researchers used financial ratios for these analyses. Considering that some countries in the world use a dual banking

system, researchers compared the financial performance of banks through their financial ratios (Masruki *et al*., 2011; Siraj & Pillai, 2012; Mohamed *et al*., 2016; Ramadhan *et al*., 2019).

Theoretical differences between Islamic and conventional banks are not recognized in terms of total earnings, access to market capital and efficiency. Although Islamic banks do not recognize interest rate risk, there is still a risk of transferring funds between the depositor and the borrower as well as within conventional banking systems. The main distinguishing factors between Islamic and conventional institutions are differences in asset quality and stability, and a difference in cost management (Beck *et al*., 2013).

As the performances of Islamic and conventional banks are compared, the customer creditworthiness analysis tools are also compared in the above banking systems. In the process of deciding on a client's loan application, they can use judgement techniques and/or credit scoring models (Abdou *et al.*, 2014). These are already available techniques within the financial industry used to make judgements on SME customers. However, when it comes to pure Islamic techniques of creditworthiness, there are very few, if any, non-theoretical and practical developments to come up with an adequate model for classifying customers.

The development of credit scoring models is based on historical data of clients who are divided into the groups of non-default and default, in addition to the classification of clients based on their financial and non-financial data (Mileris & Boguslauskas, 2011). Many authors found the financial ratio to be a good classification and predictor of a company's performance (Chijoriga, 2011; Altman & Sabato, 2013; Yoshino & Taghizadeh-Hesary, 2015). Due to the lack of access to financial sources for development, the use of financial ratios by SMEs to design credit score models has become very common.

H_2: The internal rating model for SME customers in Islamic banks can be based on the same type of information as in conventional banks, considering the principles of Islamic finance.

Al Amari (2012) highlighted the significance of the credit scoring model in credit risk assessment. He points out that creditworthiness is a more effective and consistent approach compared to the approach of judgement used in financial institutions as a singular method. When analysing the judgemental approach to creditworthiness

assessment, Abdou and Pointon (2011) state that this tool depends on the past and present experiences of credit analysts. They also considered in their analyses whether the borrowers have the option of repayment within a certain period. Furthermore, the assessment method controls for subjectivity, individual affinities, and the inconsistency of credit analysts. Hence, Abdou *et al*. (2014) consider that credit scoring is necessary to reduce the cost of credit assessment of the borrower's ability and improve the efficiency and effectiveness of the decision-making process.

H_3: Decisions made by using internal rating models are more precise compared to the decisions made by the judgemental system.

Yoshino & Taghizadeh-Hesary (2015) explored the application of scorecard models, among other analytical techniques, that can contribute to banks providing greater financial support to financially healthier SMEs on more favourable terms due to the lower risk of default. SMEs with poorer financial indicators would have a lower level of financing with a less favourable interest rate. Such a client classification system would help healthy SMEs to have easier access to finance with banks and higher economic growth at the level of the overall economy of the countries in which they operate.

The importance of credit scoring was highlighted in a study of 31,880 SMEs in the United States from 1984 to 2000. It was concluded that thanks to credit scoring, credit institutions can assess a client's creditworthiness based on hard information (financial statements) instead of personal estimates (World Bank Group, 2018).

H_4: Internal rating models for SMEs lead to financing a larger number of SMEs.

In short, as the literature suggests and how we hypothesize our statements, this research should present that the design of scoring models based on the available data can predict the financial health of SMEs, and thus facilitate the decision of Islamic banks to finance these companies.

1.5 Data and Methodology

The data available for this research is provided by Bosna Bank International Sarajevo. (BBI). This is the only Islamic bank in Bosnia and Herzegovina (B&H). The database contains the financial statements of 419 small and medium enterprises over the period

2009–2013, classified in the trading and manufacturing industries, with additional descriptions of the activity. All these SMEs and customers are financed based on the diminishing *musharakah* model of joint partnerships. The database also captures the classification of healthy vs. distressed customers. A customer is defined as 'distressed' if they cannot pay a single obligation continuously over a period longer than 90 days in one year, whereas a healthy customer is considered to have consistent continued payment of financial obligations towards a bank.

The collected data is analysed using a range of different statistical methods:

1. Descriptive statistics involve calculating the mean values (mean, quartiles, median) and measures of dispersion (variance, standard deviation).
2. Testing hypotheses: In cases where the distribution of random variables is theoretically known, parametric tests will be used. When distributions are not theoretically known, the corresponding non-parametric tests will be used. For data measured on a nominal or ordinal scale, the chi-square test and Fisher's exact test will be used. To test differences in the expectations of two random variables, a t-test will be used as a parametric test or a Mann-Whitney nonparametric test as a non-parametric test when the difference in the distribution is tested.
3. Two-way tables are used in cases where the analysis of categorical data concerns more than one variable. It is also known as the contingency table. If statistical tests call into question the relationship between the variables, these tables provide the basis for statistical inference.
4. For model development in this research, logistic regression has been used as the most important tool for categorical response data. Namely, the use of the binary logistic regression model is used in estimating whether the client is creditworthy.
5. Validation is a process that confirms that the internal rating model is adequate, accurate and reliable. It helps researchers find more precise results related to credit risk modelling and management in commercial and Islamic banks. To rate the risk of SMEs by banks, a set of measures is used: hit rates (healthy, distressed, and total), KS statistics, AUC, and GINI coefficients.

1.6 The Limitation of the Study

The period of using the financial support of the sole Islamic bank in B&H determined the number of clients included in the study. Namely, the time of the client's existence in the bank due to the creation of the model was a minimum of 5 years. From the total database, a minimal number of clients participated in the model's definition due to the bank's relatively short existence.

The data in the database covered the period of the global financial crisis. Therefore, the financial indicators were affected by this event, resulting in potential differences compared to a more stable financial environment. The benefit to the banks in B&H is the stability of the banking system, the currency board, and the strength and solidity of management by the Central Bank of B&H.

At the time of designing the research, there was a complete lack of literature on credit risks and assessment of client health using statistical methods in Islamic banks. Most of the time, the assessment of the creditworthiness of clients was carried out using the expert opinion method.

During the research, Basel III standards were adopted, and Islamic banks began to introduce the analysis of creditworthiness and the assessment of the financial health of clients using mathematical, statistical, and other methods, not just the expert method.

1.7 The expected scientific and practical contributions

The expectation for the scientific contribution of this thesis is based on the development and improvement of risk tools, which in previous studies were recommended as an important part of the risk assessment for Islamic banks. As the literature review has identified insufficient development of this tool, this research aims to fill this niche gap in the scientific area.

Expected scientific and practical contributions:

1. Development of internal rating models for the SME segment in an Islamic bank.
2. Better risk assessment in Islamic banks due to the usage of internal rating models.

3. A high-quality tool for banks to reduce the risk of loss by respecting the principles of Islamic finance.
4. Improvement of risk assessment tools for SME customers financed on equity-based products.
5. Lessons to be learned for conventional banks from managing credit risk in Islamic banks.
6. The use of internal rating models might contribute to the faster development of SMEs through cooperation with Islamic banks.
7. The model could help determine the types of financing that could be offered to SME customers.

1.8 Research Overview

This study consists of 7 chapters of which two are empirical. The first empirical chapter presents the economics of B&H, analyses the dataset, and describes the research methodology and results. In the second empirical chapter, the model of internal rating of clients and model validation are presented and interpreted.

The thesis is designed as follows:

The first chapter introduces the research and discusses the author's motivation, goals, and research issues. The research methodology and the expected contributions of the obtained results are also described.

Chapter two contains an introduction to the definition of SMEs, their characteristics, as well as a description of the status of SMEs in financial institutions in terms of financing. The literature dealing with the theory and practical models and methods used in credit risk management has also been researched. Basel standards are described as a regulatory framework for measuring risk in commercial banks.

In Chapter Three we explore the literature on credit risk in Islamic finance, regulatory issues in managing credit risk for SMEs, and regulatory institutions that cover these issues.

Chapter Four describes the Islamic principles of financing, the origin of Islamic finance, and its relevance in the development of SMEs. The basic types of contracts in Islamic finance are also listed.

Chapter Five highlights the economic situation in B&H, post-war issues, the status of SMEs, and the role of Islamic finance. Empirical research of the database, independent and dependent variables, methods of analysis, and results are presented.

Chapter Six provides information on the structure of the variables of the Internal rating model for SMEs, its interpretation, as well as the validation of the model.

Chapter seven is the final part of the dissertation in which the discussion and conclusion are presented. Guidelines for future research are recommended to contribute to the development of models for easier credit risk identification, which can facilitate the decision of Islamic banks to finance SMEs.

Chapter 2: A Literature Review: SMEs and Their Financing

This section explores the existing literature, which deals with a model of the internal ranking of SMEs within Islamic banks. The section systematically surveys available published materials, papers, and other relevant documents that define the concept, characteristics, and role of SMEs as business entities in the economies of developed and developing countries. The analysis included an examination of the percentage share of the total number of companies, value added, and number of employees, comparing B&H to EU countries. There is a description of the challenges SMEs face when trying to access financing in various nations.

2.1 Defining the SMEs

SMEs represent one of the most important segments of any economy whether developed or developing. Until now, in the world, there is no single definition of an SME due to the lack of uniform criteria for their classification. The category of micro, small, and medium-sized enterprises is suggested for enterprises that employ fewer than 250 persons and that have an annual turnover under 50 million Euro, and/or an annual balance sheet total not exceeding 43 million Euro. Small and medium enterprises are thus defined as firms made up of 10 to 250 employees, with more than ten million Euro turnover or annual balance sheet total (European Commission, 2005). International Financial Corporation (IFC) defines a small enterprise as having up to 50 employees, and medium-sized businesses as having 50 to 300 employees. (International Financial Corporation, 2012). The classification of the companies according to their size, turnover, and number of employees is presented in Table 2.1.

Table 1. Definition of micro, small, and medium-sized enterprises

Enterprise category	Headcount: Annual Work Unit (AWU)	Annual turnover	or	Annual balance sheet total
Medium-sized	<250	≤€50 million		≤€43 million
Small	< 50	≤€10 million		≤€10 million
Micro	< 10	≤€ 2 million		≤€ 2 million

Source: (European Commision, 2005)

Another classification of the SMEs comes from Global Financial Markets which categorizes its clients' sub-borrowers according to the following definitions:

1. Microenterprise if loan < US$10.000 at origination
2. Small Business if loan < US$100.000 at origination

3. Medium Business if loan < US$ 1 million at origination (US$2 million for more advanced countries)

According to the above definition IFC defines SMEs based on qualifying under three following indicators provided in Table 2:

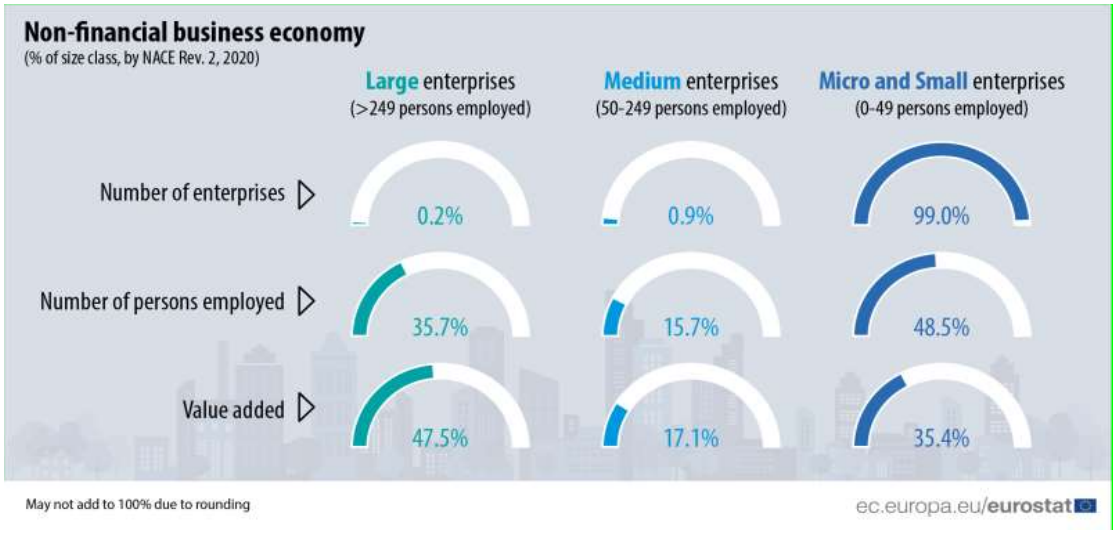
Table 2. Indicators for the definition of SMEs

INDICATOR	Micro	Small	Medium
Employees	<10	10<50	50<300
Total Assets	<$100.000	$100.000<$3 million	$3 million<$15 million
Total Annual Sales	<$100.000	$100.000<$3 million	$3 million<$15 million

Source: (International Financial Corporation:, 2012)

In economic theory, SMEs have several advantages compared to large companies in terms of market participation, particularly the ability to adapt quickly to market changes. The permanent challenge for SMEs is to become competitive and to retain that position through quality adaptation to changes in the environment (OECD, 2000). This goal is achieved through the application of knowledge and innovation, thereby generating economic growth, new jobs, the development of technology, and a healthy economic and social environment (OECD, 2000). SMEs play a key role in a country's development. Across the European Union, there were 24.8 million SMEs in the non-financial business sector in 2017. SMEs account for 99.8% of all enterprises in this particular sector, 66.4% of total employment, and 56.8% of the total value added generated by the non-financial business sector (Eurostat, 2020).

Table 3. Overview of SMEs and Large Enterprises in the EU-28



Source: (Eurostat, 2020)

According to Eurostat (2020) and the data above, there is a comprehensive overview of SMEs and large enterprises in the EU-28. This analysis provides a fundamental understanding of the structure and distribution of these enterprises in this region regarding the number of enterprises, people employed, and value added.

Table 4. Projected annual growth in 2023 of value added (both nominal and real), employment, and number of enterprises SMEs and large enterprises

Enterprise Type	Value Added (not adjusted for inflation)	Value Added (adjusted for inflation)	Employment	Number of Enterprises
Micro SMEs	5.6%	-0.8%	0.5%	0.4%
Small SMEs	5.0%	-1.3%	-0.5%	-0.8%
Medium-sized SMEs	4.8%	-1.5%	-0.9%	-1.2%
Large Enterprises	5.2%	-1.1%	-0.4%	-0.7%
All SMEs	5.2%	-1.2%	-0.2%	0.3%
Total	5.2%	-1.1%	-0.2%	0.3%

***Source*:** (European Commision, 2023)

The above data provide insight into the expected economic trends in the sector of SMEs, as well as large companies within the EU-27. According to the predictions of the European Commission for the year 2023 (Table 4), annual growth in added value (nominal and real), employment, and the number of companies for SMEs and large companies is expected. As we can see, micro-SMEs present value-added growth of 5.6% (not adjusted for inflation), with a slight decline of -0.8% when adjusted for inflation. Also, employment in these companies grew by 0.5%, while the number of companies increased by 0.4%. Further, small SMEs present a smaller growth in value added of 5.0% (unadjusted for inflation) and a larger decline of -1.3% when adjusted for inflation. A drop in employment by -0.5% and the number of companies by -0.8% is expected, too.

Also, medium-sized SMEs present growth in value added of 4.8% (without adjusting for inflation), falling to -1.5% when adjusted for inflation. A drop in employment and the number of companies is expected by -0.9% and -1.2%, respectively. As for large enterprises, value added is expected to grow by 5.2% (unadjusted for inflation), decreasing to -1.1% when adjusted for inflation. Employment and the number of companies expect a drop of -0.4% and -0.7%, respectively.

All SMEs show an increase in value added of 5.2% (without adjusting for inflation) and a decrease of -1.2% when adjusted for inflation. Employment and the number of companies should decrease by -0.2%, and the number of employees should increase to 0.3%.

2.2 Overview of SMEs and Large Enterprises in the B&H

Unlike the EU-28, B&H recorded different trends in defining small and medium-sized enterprises as well as in participation in the number of employees and the total income of the country. Namely, microenterprises are not analysed separately but are included in small enterprises, while the definition of medium enterprises is different in terms of number of employees, reported assets, and total income compared to the EU, as shown in Table 2.4. Criteria for classifying small enterprises include having less than 50 employees, total assets below five hundred thousand EUR, and total income less than 1.0 million EUR. The criteria for medium enterprises are the number of employees between 50 and 250, total assets between 0.5 mil. EUR and 2 mil. EUR, and the total annual income between 2.0 mil. EUR and 4.0 mil. EUR (LRC doo Sarajevo, 2019).

Table 5. Indicators for the Definition of SMEs in B&H

INDICATOR	Small	Medium
Employees	<50	50 < 250
Total Assets	<€ 500.000	€500.000 < €2 million
Total Annual Sales	< € 1 million	€2 million < €4 million

Source: (LRC doo Sarajevo, 2019)

The COVID-19 pandemic has had a severe impact on the economic environment of B&H, leading to significant declines in certain sectors. Particularly, the transportation and storage industry, along with the wholesale and retail trade sectors, witnessed substantial contractions in SME value added of 14.8% and 13.2%, respectively. Moreover, the manufacturing and hospitality industries, which encompass accommodation and food services, faced declines in SME value added by 12.2% and 11.9% respectively. In contrast, the administrative and support services sector demonstrated resilience in 2020, showing a 6.0% increase in SME value added (European Commission, 2021).

In the economic structure of B&H, SMEs are the framework of the 'non-financial business economy'. In the year 2018, they contributed to 62.7% of the total value added and accounted for 69.1% of total employment. These figures surpass the respective EU averages by 9.8 and 4.2 percentage points, underscoring the importance of SMEs in the country. However, the average productivity of SMEs in B&H, computed as value added per employee, stood at approximately EUR 14,000 in 2018. This figure significantly trails the EU average of EUR 41,600. Additionally, the average of 5.6 persons employed by SMEs in B&H exceeds the EU average of 3.7, which indicates a potential area for efficiency improvement (European Commission, 2021).

Table 6. Number of Companies, Employees, Total Income of SMEs and Large Companies in B&H

	ENTERPRISES		PERSONS EMPLOYED		VALUE ADDED	
Enterprise Size	**Number of Enterprises**	**Share of Enterprises**	**Number of Persons Employed**	**Share of Employment**	**Value Added (€ Billion)**	**Share of Value Added**
SMEs (0-249 persons employed)	67,009	99.6%	374,055	69.1%	5.255	62.7%
Large Enterprises (250+ persons employed)	233	0.4%	167,659	30.9%	3.124	37.3%

Source: (European Commission, 2021)

Comparing the percentage share of the number of companies, the number of employees and the total income of SMEs and large companies in B&H and the EU-27, we can conclude that SMEs in the EU have a different share expressed in percentages than in B&H. Namely, 99.8% of the total number of SMEs in the EU participate with 52.5% in the total income and 64,3% of the total number of employees. B&H shows different trends where the total number of SMEs is 99.6% in the whole market generates 62.70% of the country's total revenue and employs 69.1% of the total number of employees. This trend demonstrates significant SME activity. However, other indicators such as the average net salary and consumer basket, along with the substantial number of young people leaving the country, raise concerns about SME development. They are most often related to the overall strategy of the country and the financial institutions operating in B&H, which results in a lack of access to the financial resources needed to do business. When considering the banking policies in B&H regarding the prohibition on financing companies less than 3 years old, it is evident that there is a lack of access to financial resources for this type of business entity.

The Dayton Agreement, as a kind of basis for the beginning of peace and the beginning of the development of the economy on a democratic basis, is supposed to ensure that all nationalities and entities fulfil their interests. The development of the economy after the war and post-Yugoslav period meant the transition from the socialist modes of production (market management by the central authority) to the open market of the capitalist modes of production. Market supply and demand are influenced by the political stability of the country, which ensures the harmonization of economic aims between the entities Federation B&H, Republika Srpska and Brcko District. One way to establish a market economy would have to be freedom of entrepreneurship where free access to resources would be allowed based on the benefits gained through market competition. This would increase resource efficiency and increase the wealth of society as a whole (Tomas, 2018).

The transition from a socialist economy to a full market economy has been challenging due to political disputes within the country, slow adjustment processes to international community demands for changes in the law and the "purchase" of social peace by political structures. As a result, SMEs have faced difficulties in accessing resources and developing into competitive economic units in the market.

2.3 Characteristics of SMEs

The academic scrutiny of SMEs is relatively new (Wiklund & Shepherd, 2005), as we are tracking the SMEs from the industrial period in the Western context. Their emergence is mainly triggered by an individualistic understanding of economic life within the neoclassical economics paving the way for the emergence of the new capitalistic class within the modern social context. As a result of the research on the entrepreneurial orientation of SMEs, it is noted that the below-listed entrepreneurial initiatives share a common position in terms of structure, orientation, and sustainability.

1. The founders are one or more partners who are also owners and managers. They independently make the key business decisions, which implies that the owners are in close contact with co-workers, suppliers, customers, financial institutions and other groups that are related to the business of the company (Smallbone *et al.*, 1995; Chittoor *et al.*, 2019).

2. Small and medium enterprises play a vital role in meeting the demand for goods and services that large companies may struggle to fulfil. While most SMEs operate in

wholesale, retail, and service industries, many also specialize in producing precision tools, custom machinery, surgical equipment, and fashion items. This requires them to quickly adapt to market needs. (Sevilla & Soonthornthada, 2000; Jamieson, 2012).

3. SMEs provide a wider possibility of innovation and faster implementation of new knowledge and business models. They are more flexible as they do not have a formal and hierarchical organization ((Dobbs & Hamilton, 2007; Ibarra *et al.*, 2020).

4. These enterprises employ a large number of the working population, with a small cost involved. Analysing the participation of SMEs and large companies in the United States, Edmiston (2007), International Labour Organisation (2019) conclude that small businesses generate the majority of new jobs in the total number of new employees. However, the number of jobs generated by large companies that have proven to be safer and more stable cannot be ignored.

5. SMEs are faced with high costs of promotion and distribution of their products and services. These costs are a part of the total cost price and can make the product less competitive (Hatten, 2015).

6. Nicolescu (2009) concludes that the main features of SMEs are: low size and complexity, high typological diversity, intensive human dimension, low formalization degree, strong interconnection between the formal and informal elements, relative simplicity of processual and structural organization, high flexibility, strong personalization, intensive decisional centralization, and finally - relatively frequent use of the authoritarian and, respective, participative approach.

7. Limited access to financial resources for business ventures, and new projects, as well as the financing of SMEs which have already taken their places on the market. From the perspective of the owners of SMEs available financial resources are viewed by comparison: the use of resources based on debt or equity; or the use of internal or external sources. According to Abdusaleh and Worthington (2013), the possibility of financing SMEs is the most important factor in promoting the growth of enterprises and the economy of the country. As the main internal source of financing SMEs use the personal savings of the owner and retained earnings (Abdusaleh and Worthington, 2013), and as informal sources of financial assistance to family members and friends according to Abouzeedan (2003). According to an OECD report (Organisation for Economic Co-operation and Development, 2015) bank lending is still the most common

form of external finance for SMEs, but with more rigorous rules for access to these resources of financing.

2.4 The Limited Access to Financial Resources for SMEs

Although the global economic crisis from 2008 had devastating effects on the economies of most countries in the world, SMEs have shown great flexibility, and they survived this period more easily than larger companies in terms of the decline of the economy and employment. However, contrary to expectations, the recovery of SMEs is very slow, whereas large companies show signs of a faster recovery. Possible reasons are, as mentioned in the report to the Organisation for Economic Co-operation and Development (OECD, 2009), a decline in demand for goods and services and a tightening of credit criteria for SMEs globally.

Access to financial resources has been difficult over the years of the growth and development of SMEs, and during the past five years, it has become even more complex due to an unstable banking sector. Many banks are relying on government assistance for their recovery. They prefer to provide financial support and restructure the obligations for large firms rather than for SMEs, which are typically considered high-risk and low-capitalized.

Many SMEs are dependent on internal sources of capital, and they have a problem obtaining external sources of capital and financing. If they gain access to external borrowing, they are burdened by a high percentage of interest because small enterprises are considered riskier and often more prone to collapse than large companies. This problem of financing SMEs is widespread around the world equally, depending on the differences reported in the countries' financial infrastructure (Holmes *et al*., 1994; Boocock *et al*., 2001; Karadag, 2016 and 2018; and Etemad, 2019).

2.5 A Review of Obstacles in Financing of SMEs

In his study Kaya (2014) analysed the forms of SME financing and problems of their financing in the Euro area, as well as measures that can facilitate access to financial resources, mostly the banks' lending. Kaya's research covers the period between 2002 and 2010 exploring both the mutual obstacles of SMEs and individuals across the countries such as Germany, Spain, and Italy. The author highlights the common problems that have been recorded for all SMEs in the Euro area:

- Limited scope of access to funds due to organizational structure and business strategy which are very rarely made public, so they are considered non-transparent.
- SMEs focus narrowly on bank lending, and they are more vulnerable to changes in banking lending conditions.
- Legally limited amounts of fixed costs (marketing, legal and accounting), organisational form, and ownership structure are the main barriers to capital market entry and stock emissions. As a result, large companies have advantages due to access to investors through capital markets.

Chowdhury*et al*. (2013) research covers 100 small and medium enterprises from 6 major economic areas in Bangladesh: Trading & Traders, Agro Processing Products Import & Export, Wood & Steel Furniture, Sea Services Company, Importer Exporter & Commercial Agent in International Market, General & Merchant Commission Agent. After a survey of nineteen questions using the Howard and Sharp method from 1983 (Chowdhury, Azam, & Islam, 2013), they provided the following results:

- Lack of payment security instruments;
- High interest in state bonds;
- Lack of ability to prepare a business plan;
- High rate of unpaid loans in the banking sector;
- Lack of long-term relationships in financial institutions.

Although they conclude that banks are obliged to find capital to help the country's economic development through SME financing, it is important for our research that Bangladeshi researchers recommend the use of credit rating systems as the essential factor for measuring the soundness of enterprises. Namely, they imply that these approaches and adaptation of this risk management system for SMEs and NGOs can eliminate the need for credit guarantees.

Machmud & Huda (2010-2014) included a sample of 161 SME companies from three provinces in Indonesia focussing on 3 industries that are considered the predominant industries in the country. The three industries are the production of textiles and clothing, parts and components for the automotive industry and components for the production

of electronics and machinery. They account for 55% of total SME production in Indonesia. The authors singled out the three main commonly known sources of funding grouped as:

- Formal external sources (banks, cooperatives, microfinance institutions, credit unions, state and suppliers);
- Informal external sources (friends, family or loanees);
- Internal sources (private savings or earned profits).

The authors conclude that the most important features of SMEs access to formal sources of funding are:

- Characteristics of business owners such as age, gender, and years of experience play a role in their access to banks. Respondents over 40 years of age with 10 to 20 years of work experience have more open access.;
- Capital;
- Collateral;
- Cash flow; and
- Business condition.

As obstacles perceived by the SMEs themselves, the authors specified:

- SMEs perception of the high cost of financing through formal financial institutions;
- Lack of mortgage security, most often due to the incompleteness of the property ownership registration process;
- Owners' need for quick financing, which directs them to expensive informal financial sources;
- SMEs do not have the expert administrative staff to draw up the serious business plan required by formal financial institutions.

Several researchers have conducted studies on SME difficulties in accessing financial resources by analysing data at the level of multiple countries in the world. So, Beck *et al.* (2005), analysing data from 54 countries around the world, concluded that SMEs are more than twice as vulnerable to barriers to access to finance compared to large

companies, thus limiting their growth more than large companies. These researchers concluded that these barriers are:

- Bank requirements related to the security of loans;
- Complexity of bank documentation;
- High financing price (interest);
- A need for special connections in financial institutions;
- Lack of funds earmarked for lending;
- Lack of access to specific forms of funding such as export credits, leasing and long-term funding.

Furthermore, in his work Wang (2016) used the Enterprise Survey from the World Bank which covers data from 119 developing countries. The result of the research is that the main obstacle to the growth of SMEs is access to finance, where the key qualities that are taken into account are (i) size of the enterprise, (ii) age of the enterprise, (iii) growth rate, (iv) form of ownership, and (v) the role of the state.

Respondents to this survey cite high funding costs as an obstacle to external financing, as well as a lack of support from consultants in accessing external financial institutions. Thaker, *et al*. (2020) conducted research on the role of Islamic banks in financing SMEs in Malaysia and Indonesia and the challenges they face in financing entrepreneurial activities. They have highlighted the main factors that are considered in decision-making on approving the funds:

- Product Offering;

The need for SMEs to provide funding based on financial capital (equity-based products such as *Musharakah*, *Mudharabah*, and *Ijarah*) rather than on a debt basis.

- Regulatory Framework;

Islamic financial products are less standardised and harmonised, and there is a flaw in the legal framework for the operations of Islamic banks. Therefore, they are often compelled to follow laws designed to regulate commercial banks.

- Transaction Costs and Non-movable Collateral;

The cost of financing in Islamic banks proved significantly higher than in commercial banking systems due to the process of *Shari'ah* verification of financing. The lack of real estate as collateral security is also a challenge that SMEs cannot provide. Therefore, Islamic banks are also unwillingly to finance SMEs.

- Knowledge and Information ;

The availability of information on Islamic financial products is very limited, as is the number of products that could be obtained by commercial banks at a low price.

-Smart Collaboration;

There is a lack of cooperation between the state and private capital in the offer of Islamic products, especially in terms of capital unification, risk-taking, training and information. Greater cooperation would increase the interest of investors and beneficiaries of financial resources.

In addition to the findings above, according to the Croatian Banking Association (CBA) (2014, p. 6), the universal risk profile of SMEs is testified by the data of the European Central Bank (ECB) for the eurozone countries. Related to these data, some of these EU banks are reluctant to decide on financing for enterprises.

The majority of businesses in the EU reported rising bank interest rates and a marked decline in alternative financing expenses, a pattern that cut across all firm sizes and national borders (European Central Bank, 2022). In particular, a net 71% of businesses (up from 34% previously) reported increases in bank interest rates. Since the survey's inception in 2009, no equivalent proportion has been seen in the responses to inquiries concerning the terms and conditions of bank funding, which suggests that lending standards have been tighter generally for all businesses. This change is consistent with the tightening of terms and conditions, as well as the collateral requirements. It also takes into account the recent and further widening of margins applied to bank loans as reported in the euro area BLS for the second quarter of 2022 (European Central Bank, 2022).

The ECB (2013) followed the average interest rate on newly granted loans in the amounts up to 250 thousand €, from 250 thousand € to one million € and over one million €, which are in some way attributed to loans for small, medium and large

businesses, respectively. It is concluded that the interest rate for all loans of small amounts (to small firms) is higher than for the larger loans (larger companies) in all countries of the eurozone in 2013 (27 countries), equally. In the same study, CBA referenced a 2013 survey conducted by the Institute for International Finance, Bain & Co, as cited in (Croatian Banking Association, 2014) report. The study revealed that in Europe, after the implementation of new capital requirements, there are no banks that engage in business with high-risk companies requiring an interest rate of 10% or more.

A comprehensive index that reflects the terms and prices of credit offered to businesses reveals a decline across all firm sizes. One of three key components is an indicator of how euro area enterprises view financing circumstances, designated in Figure 2.1 by the shortened form "price T&C", and it primarily covers changes in bank interest rates and other expenses of bank financing (charges, fees, and commissions). On a level not seen since the survey's inception in 2009, 40% of both SMEs and large businesses describe the recent worsening situation (shown by positive indicator levels).

Figure 1. Financing Conditions as Perceived by Euro Area Firms

Another indicator, which summarises financing conditions in terms of companies' balance sheet quality (profits, own capital, and creditworthiness), declined slightly during this survey round for both large companies (4%) and SMEs (5%), primarily reflecting companies' low perceptions of their ability to secure external financing (see Section 4). Last but not least, the indicator shown in the graphic as "non-price T&C" focuses mostly on elements like collateral requirements and other loan terms but also considers banks' willingness to extend credit. This indicator has recently shown a

decline for small businesses while showing an improvement for bigger businesses. The distinction results from the fact that, in contrast to SMEs, major businesses reported an increase in banks' readiness to extend loans.

In their work, Beck & Demirguc-Kunt (2006) showed through research that access to finance for SMEs is an important constraint for their growth and that innovative financial instruments can help access financing even in the absence of well-developed institutions. The authors recommend that additional analysis should be made, especially the use of time series variation, micro-economic databases, and country case studies, as well as financial tools to help SMEs reduce financial constraints and increase their access to external sources of funding.

Using a database based on a survey of 91 banks in 45 countries around the world, the authors Beck *et al.* (2008) analysed the characteristics of the financing of SMEs worldwide. They found that banks consider the SME sector highly profitable, but the biggest limitation in developing countries is the unstable macroeconomic environment, while the main constraint in developed countries is the high concentration of competition. Specifically, they concluded that banks in developing countries are less exposed to the SME segment, place fewer investment loans, and charge higher fees and interest rates for this segment of the economy.

Scientific papers that analysed the dual systems of financing SME segments, *i.e.*, conventional and Islamic financial institutions, show that SMEs have the same treatment in both segments. In their article, Hove *et al.* (2014) concluded that SMEs are uncompetitive due to a lack of financial resources and ultrahigh interest rates and fees.

Therefore, they recommended the adoption of Islamic interest-free principles by more financial institutions, which would increase the competitiveness of SMEs and entrepreneurial motivation in the countries of South Africa.

A report of the International Finance Corporation (IFC) from June 2014 showed that about 35% of SMEs in the Middle East and North Africa (MENA region) do not have access to the formal Islamic banking sector due to a lack of Shari'ah-compliant modes of financing in this market. Also, it is concluded that there are huge opportunities to convert existing conventional banking financing for SMEs into Islamic banking financing based on Shari'ah-compliant products. IFC estimated it amounts to $4.1 billion, or 8% of the whole SME portfolio.

Malaysia is one of the countries that is devoting special attention to the SME sector, although there are structural deficiencies and problems. Analysing the knowledge and use of Islamic financing by Muslim entrepreneurs in Malaysia, authors Osman and Ali (2008) conclude that support for the SME sector in Malaysia is inadequate, especially for Islamic financial institutions. Islamic banks have indicated difficulties in the absence of information and documentation, reluctance to disclose the financial position, the lack of special programmes for SMEs, and the complexity of the procedures and processes for the approval of funding. This paper recommends that Islamic financial institutions should encourage greater involvement of SMEs through a simplified process of collecting the documents in order to promote Islamic principles of business and the growth and development of the society in which they operate.

Based on the above, it can be concluded that SMEs face challenges in accessing funds, and there is a gap in the financial institutions' policies for financing this crucial segment of society, which plays a significant role in development. The inadequacy of access to finance for SMEs is equal to that of conventional and Islamic banking. In the last few years, after the global financial crisis, state governments around the world have seriously addressed this problem. Due to the growing Islamic financial industry in countries that traditionally developed conventional banking, the legal framework for business IFIs is now in accordance with Shari'ah principles. Taking into account the reasons behind the global financial crisis, besides the additional financial capital that enables the recovery and growth of the economy, the ethics of business IFIs is certainly

one important feature that should partially contribute to the stabilisation of economic trends.

2.6 Alternative sources of financing SMEs

The most common source of financing for legal entities is classic bank lending. However, companies frequently need new sources of funds for various business challenges. SMEs, in most cases, depend on internal sources for investment and the realised profit of the company. This type of investment makes up 63.3% of financing, while external funds (most often bank loans) account for 35% (Thomadakis, 2017).

The development of alternative sources of funding such as ethical finance, green finance, Islamic banks, fintech companies, microfinance, Islamic microfinance, *etc*. is becoming the new driving force for enhancing entrepreneurship and, ultimately, economic growth. The strategic development of the legal frameworks for these types of financing is crucial for the sustainability of SMEs.

For Bosnia and Herzegovina's entrepreneurs and those viewed as entrepreneurs, access to financial resources is a frequent barrier. According to the 2011 Global Entrepreneurship Monitor, some entrepreneurs and non-entrepreneurs had the same views on the challenges of obtaining financing to launch a firm (Levie, 2015). There are still problems, notably in 2022–2023, when two-thirds of new business owners in B&H put off starting their ventures (Mwaura *et al*., 2020) due to limited formal finance options and a lack of knowledge about available financial help. Bosnian entrepreneurs have difficulty obtaining money. The supply, demand, knowledge, and benevolence gaps were among the components of the business funding gap that the literature identified, particularly for small and medium-sized firms (SMEs). When there is a lack of money, a supply gap arises. The limited availability of financial resources contributes to the demand gap. Financial resource ignorance will result in a knowledge gap. The benevolence gap is one type of funding source that is hesitant to finance SMEs (Sanchez-Vidal, 2005). Both official and informal finance are regularly used to get money. Large amounts of financing can be obtained from banks or other financial entities. However, formal banks demand extensive documentation, which some new business owners find difficult to achieve. These requirements include a demonstrated credit history, the availability of financial documents, and a high level of security. Due to a lack of understanding about the many external financial sources, minority

enterprises in B&H, especially those that are just starting, seldom use official external sources of funding and instead frequently rely on personal finances to maintain their operations (Petkovic, 2016).

Entrepreneurs who are beginning their businesses have the option of using informal finance, which is funding that does not include a formal middleman between fund owners or investors and recipients. The benefits include easy administration, flexible financing options, and affordable returns. In Bosnia, 28% of new business owners choose to obtain outside funding from immediate family members (spouse, parent, or sibling), with official finance coming in second (Mwaura & Levie, 2021). Perhaps the second-most popular financial choice, government assistance, is quite rare.

Table 7. External financing technique for SMEs and Entrepreneurs

Low Risk/Return	Low Risk/Return	Medium Risk/Return	High Risk/Return
Asset-Based Finance	**Alternative Debt**	**'Hybrid' Instruments**	**Equity Instruments**
Asset-based lending	Corporate Bonds	Subordinated Loans/Bonds	Private Equity
Factoring	Securitised Debt	Silent participations	Venture Capital
Purchase Order Finance	Covered Bonds	Participating Loans	Business Angels
Warehouse Receipt	Private Placement	Profit Participation Right	Specialised platforms for Public Listing of SMEs
Leasing	Crowdfunding (debt)	Convertible Bonds	Crowdfunding (equity)
		Bonds with Warrants	
		Mezzanine Finance	

Source: (OECD, 2013) Alternative financing instruments for SMEs and Entrepreneurs: The case of Mezzanine Finance, OECD, Paris.

In Islamic finance, financial inclusion refers to people and organisations in society that have access to and use a range of reasonably priced, high-quality Islamic financial goods and services that suitably satisfy their requirements, while adhering to Islamic principles. Financial inclusion is crucial in securing a guarantee that all members of society, including minority and majority entrepreneurs, will receive support for the development of start-up businesses, or SMEs, and to promote socioeconomic development. The use of technology is one of the creative and relevant financial solutions that must be promoted in the framework of financial inclusion to close the gaps currently present. Today, technology and the internet are inextricably linked to every aspect of human activity. Banks and other formal financial institutions evolve via digitalization as they adjust to technological advancements. Customers are more

satisfied with banks that use digitization to deliver their services (Zouari & Abdelhedi, 2021).

In the financial sector, digital funding options have become increasingly common. As the most well-known financial institution, the bank offers a range of digital services, including entirely digital (branchless) banking, remittances, and online payments. Peer-to-peer lending and crowdfunding are two examples of alternative fintech financing sources that provide financial inclusion solutions. By offering affordable financial services adhering to Islamic principles, fintech in Islamic finance can enhance financial inclusion for those excluded due to religious beliefs. According to an empirical analysis, adding Shari'ah investment to the digital sector, including fintech, increases national economic growth, promotes efficiency, and reduces costs (Barata, 2019).

The emergence of alternative institutions for financing businesses is very much triggered by rigorous regulations that tie banks when issuing loans. Given the very difficult access to bank loans, SMEs are forced to search for other financial instruments presented in Table 7.

2.6.1 Asset-Based Finance

The first group of financial instruments for SMEs, treated as low risk, are the products from Table 7. in column 1- Asset-Based Finance.

This is the next group of products:

- Asset-based loan
- Factoring
- Purchase Order Finance
- Warehouse Receipt
- Leasing

Asset-based loan

Asset-based loans use the borrower's assets as collateral to protect the loan. Receivables, inventory, marketable securities, real estate, plants, and equipment are

examples of assets that can be used as collateral for loans (PP&E). Asset-based borrowing is considered less risky than an unsecured loan (a loan behind which there are no assets or real estate) and therefore results in a lower interest rate. Asset-based loans secured by receivables would be considered safer than a property-based secured loan because the property is illiquid and it could be difficult for the lender to sell the property quickly in the market (Ivashina *et al*., 2022).

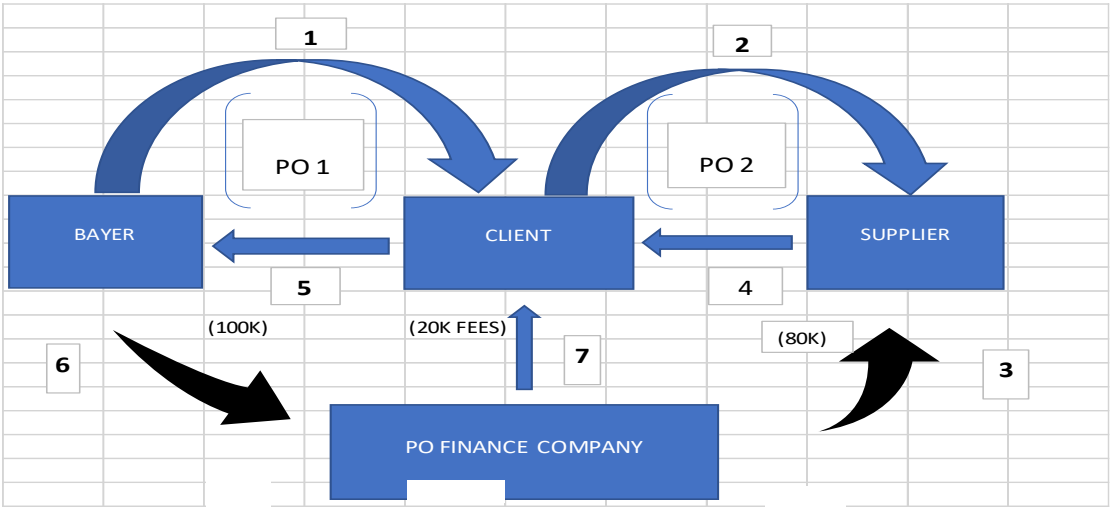
Factoring

Factoring, receivables factoring, or debtor financing is the process of obtaining working capital in which a factoring company buys a debt or invoice from another company and reduces it by a certain amount (a discount). The factor requires the payment of additional fees, usually a small percentage after the debt is settled. Factoring transfers ownership of the accounts to the other party, who then collects the debt. It is commonly used in export transactions due to the acceleration of cash flow. As an example, the exporter collects 80% of the invoice amount today through the factoring company for payment in 60 days (Auboin *et al*., 2016).

Purchase Order Finance

Purchase order financing (PO finance) is a short-term commercial financing option that provides capital to pay suppliers in advance for verified orders. Companies that are beneficiaries of this method of financing avoid the outflow of cash reserves or rejection of the order due to a lack of funds. This type of financing allows companies to accept extraordinary or larger orders and quickly adjust the credit base up or down to meet the needs of uninterrupted businesses (Zhao & Huchzermeier, 2019). The use of these financial instruments is common for the payment of funds to the supplier in advance to produce the goods to be delivered to the end customer. Also, the end customer may have other payment terms that are due in more than 90 days. PO Finance enables cash flow adjustment before the payment from the end customer.

Figure 2. PO Finance - Transaction flow



Source: Author's work

Warehouse Receipt Finance

Warehouse receipt financing is a form of financing that finances the sale or purchase of a shipment of goods. The basis of financing is the sale of goods according to the document of warehouse receipt in an independent warehouse to secure the financing. Goods considered collateral are pledged by legal procedure, represent a physical form of pledge, and further serve as part of low-risk financial instruments to finance SMEs (Hollinger & Rutten, 2009). The advantages of warehouse receipt finance could be summarised as follows:

- No mortgage is required,
- It is based on the value of goods which are quickly marketable,
- Easier access to funds for micro and small businesses,
- Speeding up the process of trade,
- Better insight into the trend of goods prices.

Beneficiaries of this funding could be Farmers, Traders, Rice Millers, Oil Mills, Flour Mills, Exporters and other Agro-Industries participants Gunawan *et al*. (2019).

Leasing

Another type of asset-based financing is leasing, which can be defined as an arrangement between the lessor (owner of the asset) and the lessee (user of the asset) whereby the lessor purchases an asset for the lessee and allows him to use it in exchange

for periodical payments called lease rentals or minimum lease payments (MLP) (Borad Bulaki, 2015).

Like other financial instruments, leasing also has its advantages and disadvantages.

Table 8: The Advantages and Disadvantages of Leasing

Advantages	Disadvantages
Simple Source of Funding	Leasing costs
Avoiding the Risk of Obsolescence	Limited Financial Benefits
Does not Appear as Debt in the Balance Sheet	Form of Hidden Debt
Flexible Way of Financing Fixed Assets	Without Assets Ownership
Low Maintenance Costs	Risk of Denial of Use of the Leased Asset
Increasing Liquidity	Decrease in Return on Equity
Low Capital Expenditure	Limited Tax Benefits (for Start-ups)

Source: Overview of different resources (Borad Bulaki, 2015)

There are advantages and disadvantages to utilising the leasing contract for financing SMEs. As Table 8 highlights, the cost of maintenance, the flexibility of the lease contract, and the invisibility of debt are the main advantages. However, some issues emerge as a result of using this tool. Primarily, it is a hidden debt with significant leasing costs for the enterprise.

2.6.2 Alternative Debt

The second group of financial instruments for SMEs, treated as low risk, are the products from Table 7. in column 2 - Alternative Debt.

This is the next group of products:

- Corporate Bonds
- Securitized Debt
- Covered Bonds
- Private Placement
- Crowdfunding (debt)

Market-based (external) sources of funding, such as corporate bonds and equity, are very rarely used by SMEs. According to the reports of the European Investment Bank for 2016, in total financing, SMEs were financed by corporate bonds at 0.4% and private equity at 0.3% (Thomadakis, 2017). Therefore, the use of these financial instruments should be approximated for SMEs, and the basic information is provided in the continuation of this research.

Corporate Bond

When it comes to the definition of a corporate bond, it is described as a security issued by a company and sold to investors. It is a type of debt relationship in which the company receives the necessary capital with the obligation to pay the agreed interest until the maturity of the bond and, upon maturity, the amount of the bond. The basis for issuing a bond is the company's ability to repay the debt, and it is assessed based on the company's future business results and profitability. Investment of the money obtained by issuing bonds can be different, such as purchasing assets, expanding the product range, refinancing the old debt, taking a new market, or some other investment at the discretion of management (Malavasi *et al.*, 2017).

Securitised Debt

Securitized debt instruments are alternative debt instruments used to finance SMEs. They are considered low-risk financing instruments because of the assets that always stand behind the securities issued in this case. Namely, securitization is a financial procedure in which the issuance of securities based on certain assets is implied, and it is usually debt. The buyer of securities receives income from the underlying asset, *i.e.*, debt.

There are two types of this financial instrument:

1. Mortgage securities are bonds secured by real estate or real estate loans.

2. Securities protected by assets are bonds arising from consumer debt, *e.g.* financing a new car, student loan, *etc*. These loans become assets in the books of banks. Listed assets are sold to a securities issuer who issues securities based on those assets (Cusmano & Thompson, 2018).

The disadvantage of securitized debts is that they create a complex financial system. When a securitized debt is pooled and sold, it becomes difficult to determine who owes the money to whom. This results in economic problems that can affect the entire financial system. One of the world's economic crises is caused by the uncontrolled issuance of similar securities (Cusmano & Thompson, 2018).

Covered bonds

Covered bonds are debt instruments with mortgage coverage (property as a security for payment) or public sector debt to which investors have the right of preferential collection in the event of default. Covered bonds are used as a financing instrument with savings deposits, secured securities, and other types of financing. In addition to the purpose of financing, it enables credit institutions to reduce costs when approving mortgage loans as well as for financing public debt (European Covered Bond Council, 2021) (Tuskan & Stojanovic, 2019).

Directive on Undertakings for Collective Investments in Transferable Securities (UCITS) in article 52(4) (cited from (European Covered Bond Council, 2021)) defines the minimum requirements that provide the basis for privileged treatment of covered bonds in different areas of European financial market regulation like:

- The covered bond issuer must be a credit institution.
- Covered bond issuance must be governed by a special legal framework.
- Issuing institutions must be subject to special prudential public supervision.
- The set of eligible cover assets must be defined by law.
- The cover asset pool must provide sufficient collateral to cover bondholder claims throughout the whole term of the covered bond.
- Bondholders must have a priority claim on the cover asset pool in case of default of the issuer.

Private placement

"Private placements are a financing instrument, classified between bank financing and corporate bonds, that enables companies to choose the most appropriate funding source in terms of maturity, minimum issuance size, rating requirements, and others." (cited from Boston Consulting Group, 2017). Private placement as a financial instrument is a very important form of financing for SMEs. Namely, the issuance procedure and documentation are much simpler as opposed to bank financing. Transactions are confidential; documents are standardised; and issuance costs are lower compared to public markets. For SMEs, they are usually the first entry into the capital markets.
For wholesale companies, they are also a significant form of financing because they can expand into the market more easily. The best practices for private placements as a

financial instrument in the EU can be found in France and Germany: the German Schuldschein (SSD) market and the French Euro-PP market. There are no specific regulatory barriers to the development of local markets as well as cross-border markets (Boston Consulting Group, 2017).

Crowdfunding (debt)

Crowdfunding is an alternative financing instrument, most often for start-ups. Fundraising is done through the formation of an online (network) platform. This method of financing does not require bank participation, but the platform enables the direct raising of funds publicly. According to Damiano and Rovere (2018) "Crowdfunding is a funding tool that may be accessed by individuals, SMEs, non-profit organisations, and innovative start-ups, which allows to raise funds from individuals or groups to finance projects, whether reward-based or not." Participants in this process are the platform's creators or borrowers who seek and receive funds from crowd funders, which are private or legal entities that lend funds.

2.6.3 Hybrid Instruments

Hybrid financing instruments are fixed-income securities that combine elements of stocks and corporate bonds. Rating agencies state that these instruments are "in the continuity of debt and capital". Hybrids are classified as subordinated debt, which means that in the process of eventual liquidation of the issuer, they are in the collection range below all other debts but above equity. Due to the nature of the collection risk, these instruments, as stated above, are considered medium-risk return instruments (Liberadzki & Liberadzki, 2016).

The third group of financial instruments for SMEs, treated as medium risk, are the products from Table 7. in column 3 – Hybrid instruments.
This is the next group of products:

- Subordinated debt/loans
- Participating loans
- Silent participation
- Profit participation right
- Convertible bond
- Bond with a warrant

- Mezzanine financing

Subordinated debt/loans

Subordinated debt is formed from loans or bonds in which the lender agrees that senior or secured creditors are fully settled or paid before the payment of any other interest or principal (Sazonov *et al*., 2016). Usually, subordinated loans are unsecured, where the collection in case of bankruptcy is after older lenders but before capital investors. The interest rate defined in the loan agreement is always paid, provided that the older creditors are paid before (Gilson *et al*., 1990). It is common for the principal to be paid at the end of the maturity period. Subordinated bonds are also an unsecured form of financing for SMEs in which interest is paid periodically through coupons and a full set of bonds is repaid at maturity. Also, in the case of bankruptcy for the credited client, the payment is committed after the older creditors and before the owner. Interest rates are significantly higher due to the high risk of lending (Borad, 2009).

Participating loans

Participating loans are defined as loans in which the fee is defined in accordance with the results of the work of the client who is credited, *i.e.*, it is related to the results of the sale, the realised profit, the share price, or the total income, which means that it is not predetermined or fixed. In the event of bankruptcy, the lender does not participate in the loss, but the claimant is involved in the process of liquidating the SME (Cusmano & Thompson, 2018).

Silent participation

'Silent participation' is more of an equity investment than a participatory loan. It is a type of alternative hybrid form of investment for SMEs in which one or more investors become co-owners in the company without assuming any obligation to the company's creditors (Britchenko & Polishchuk, 2018). Their responsibility is to limit the amount of investment in the company, so they can be defined as 'limited partners'. In addition to the right to supervise the company's activities and the right to information and decision-making, their activity is limited to the company's internal affairs; they are not exposed to the company's external clients. It is common for a silent investor to participate in a loss up to the amount of invested capital, but it may or may not be defined in the contract (cited from the OECD, 2015).

Profit Participation Right

Profit participation right is a type of investment that gives the owner rights over the company's assets. These are usually the right to participate in the company's profits, the subscription of new shares or the right to participate in the distribution of the surplus after liquidation. However, this type of investment does not give the owner the right to shares, nor the right to attend the shareholders' meeting and make business decisions. It is also allowed to negotiate the interest which is not dependent on the company's profit (Moritz *et al*., 2016).

Convertible bond

The convertible bond is a hybrid financial instrument - a security that has both debt and equity characteristics. If used as a type of debt security, it provides the investor with the right or obligation to exchange a convertible bond for a predetermined number of shares of the issuing company at a precisely determined time of the bond life cycle. Compared to debt or equity financing, convertible bonds have certain advantages, such as lower interest rates accepted by investors and tax benefits because the interest payments on these bonds are treated as deductible items (Ceocea *et al.*, 2021).

Warrant Bond

A warrant bond is like a convertible bond. The similarity is reflected in the fact that both types of securities give the buyer the right to buy the company's shares at a certain price. They differ in the ability to sell the warrants and/or hold bonds with orders to purchase shares by the holder of this type of financial instrument, while the owners of convertible shares as investors have the right to purchase shares. By purchasing bonds with an attached warrant, the warrant allows the purchase of a certain number of shares with a fixed share price from issuers of the bond but does not oblige them to purchase. The price stated on the warrant may be different from the price on the day of purchase of shares (DeMerceau, 2021).

Mezzanine financing

Mezzanine financing is a source of capital whose position lies between senior debt that is less risky and equity. It is used when access to the senior source of funds is difficult and when a company does not want to dilute capital. It is a means by which companies access new capital to increase liquidity, without changing the basic equity structure. It is usually seen as a 'subordinated debt' or 'preferred equity' with a fixed-rate coupon

or dividend. Mezzanine capital may be granted certain rights to share in the joint capital, but it has a material lesser effect on the dilution of equity than ordinary capital (Cusmano & Thompson, 2018). Although mezzanine financing is more expensive than senior debt, its maturity is longer, usually up to 7 years. Due to the maturity element of several years, it is considered a 'patient' financial resource and allows enough business time to grow, achieve financial goals, and thus refinance from the source of senior debt to maturity (cited from (Organisation for Economic Co-operation and Development, 2015).

Mezzanine financing is used as an additional source for various types of transactions, facilitating the business process. Thus, in practice, it is used for the following:

- refinancing,
- capital growth,
- recapitalization of the company,
- balance sheet optimization,
- acquisition of companies,
- maintaining the ownership structure.
- management buyout.

Mezzanine financing has both - advantages and disadvantages and is viewed depending on the purpose of use. Although more expensive than senior debt, it is simpler than regular bank loans, supports long-term growth with longer maturities, and allows companies to achieve goals that require capital above senior available debt (cited from (Prudential Private Capital, 2020).

All these debt-based instruments are problematic from an Islamic finance perspective, as they are all priced using interest. Islamic finance essentialises equity financing which implies that underlying assets must be part and parcel of any transaction. This implies creating a synthetic economy through financialization creating a debt-based economy, which is clearly problematic from an Islamic perspective. Hence, equity-based financing which endorses the PLS nature of the contractual arrangement is essential. However, the main challenge in implementing equity-based financing and its tools is the lack of risk management tools. The existing debt-based models primarily are operationalised by using debt-based risk management tools.

2.6.4 Equity Instruments

The fourth group of financial instruments for SMEs, treated as high risk, are the products from Table 7. In column 4 –

This is the next group of products:

- Private equity funds
- Venture capital
- Business angels

Private equity funds

Private equity (PE) capital is not listed on the public stock exchange, so investors or private equity funds invest directly in private companies (Cumming & Walz, 2010). Fundraising in private equity funds is done by private investors, private equity companies, venture capital companies (angel investors), or institutional investors (Dai, 2022). They are commonly used to finance start-up companies, for growth capital or capital acquisitions, and to strengthen or optimise the balance sheet. The limited partnership agreement contains the terms and conditions of the fund, and the PE funds are closed-end investment structures. The duration of the fund is 10 to 12 years (Wright, 2007; Lahmann *et al*., 2017).

Venture Capital

Venture capital (VC) is a form of financing that invests in start-ups and small businesses (Bessière *et al*., 2018). Although it carries a high risk of investment, these forms of business organisation have a high potential for rapid growth and development. According to Manigart & Sapienza (2017), venture capital typically consists of investments made by one or more businesses or people. Their employees are usually very experienced in investing, asset management, and VC investment jobs. The advantage of cooperation with VC is the acquisition of knowledge and quick access to money for the rapid growth of start-ups or small businesses. There is no obligation to return the funds if the project fails, but the VC expects a return on investment. They enter the ownership structure of the company, and if the entrepreneur wants to keep managing the company, then he should also have majority ownership. Otherwise, he loses control of the management of his entrepreneurial venture (Abbasi *et al*., 2017).

Business angels

Business angels are individuals who generally have significant business experience, own large amounts of assets, and directly invest assets in new and small businesses with the potential for rapid growth (Harrison *et al.*, 2015). A significant part of this method of investing is the transfer of knowledge from the angel investor to the entrepreneur in terms of company management, i.e., the transfer of sales and management skills, as well as business contacts necessary for business.

In the financing of start-ups and small businesses, business angels belong to the second group in terms of importance and amount of investment after family and friends, who are considered the first group of financial resources for SMEs. The EU encourages the promotion of good business angel investment practices, creates a friendly environment for them, and encourages entrepreneurs to engage in this type of cooperation. Business angels are aware of the difficulties in the growth and development of new companies, are a very patient source of funding, and do not expect a return on investment soon (European Commission, 2017).

According to data from 2019, the average amount invested by business angels is between EUR 25,000 and EUR 250,000. More than 90% of the capital invested in the early stages of investing in new businesses in the EU came from this source of funding. The size of the visible business angel investment market in Europe is around €10 billion. These data show the importance of this method of financing from the point of view of small business growth, the development of SMEs, and the economies of the countries in which it is invested (Business Angel Institute, 2020).

The equity-based financing should also be used in Islamic finance, as it has a great potential to significantly impact how SMEs are funded and supported. However, there is much work to be done before equity finance can become the primary source of capital for entrepreneurial communities. Indebtedness and passing financial liability to the business are still dominant sources of financing for most SMEs, as available equity resources are very limited to meet the large demand. One of the financial industries that was expected to close the gap for very high demand for equity financing is Islamic finance. Unfortunately, Islamic finance in its current form mainly uses debt-based instruments for bankable members of the business community.

2.7 Basel standards approach for measuring risks in conventional banking

The expansion of international markets and the development of technology, information systems, and communication technologies also require changes in the functioning of the global financial sector. Overall, globalisation has increased the risk profile of financial institutions. To ensure the financial stability of financial institutions, the Basel Committee on Banking Supervision (BCBS) prescribes standards that measure risks and determine capital allocations to cover unexpected losses that the bank may have. Basel II, which was released in 2004, aimed at increasing the stability of the financial sector through the establishment of new methods of measurement and risk control. This method improves the calculation of the capital requirements to cover unexpected losses (Basel Committee on Banking Supervision, 2003).

Basel II represents the concept of calculating the capital adequacy of a bank, thereby defining the rules for the measurement and management of the risks to which the bank is exposed during its business. As capital represents protection from unexpected losses and is the basis of bank growth, Basel II rules define how much the value of a bank's capital is sufficient to cover unexpected losses.

Since the primary function of own capital is to protect the bank from the risk of insolvency, banks are obliged to adjust this value to the risk assets of the bank. Capital adequacy is the basis for the growth, development, and stability of the bank. If the bank's own capital is too low, there is a danger of the inability to absorb losses; the likelihood of bankruptcy increases, but the client deposits are also jeopardized. If the capital is too high, it is impossible to achieve a sufficiently high rate of return on sources of funds, thus leading to a business profitability problem. (Šarlija & Gereč, 2008).

The following is a table showing the pillars of the Basel II Accord.

Table 9. Pillars of Basel II

PILLAR 1	PILLAR 2	PILLAR 3
Minimum Capital Requirements:	**Supervisory Review:**	**Market Discipline:**
- Risk management incentives. - New operational risk capital charge - Risk-weighted assets (RWA) for credit are more risk-sensitive. - Market risk largely uncharged	- Solvency reports - Regulatory review - Capital determination. - Regulatory intervention - Addresses risks that are not captured in Pillar 1 like concentration, and liquidity risks.	- Minimum disclosure requirements - Scope - Capital transparency. - Capital adequacy. - Risk measurement & management. - Risk profiling

Source: Bakiciol *et al*., 2013,

Basel III standards were created in response to the global financial crisis. They are designed to minimize the likelihood of future banking crises. The implementation of Basel III standards involves a transition period from 2011 to the end of 2018; the application started on January 1, 2019 (Basel Committee on Banking Supervision, 2021). The new standards are the continuation of Basel II, the increase in the value of capital adequacy, and better liquidity management of banks to achieve the above object and prevent bank insolvency. According to the Basel II standards, the pillars are: the calculation of minimum capital requirements (Pillar 1), supervision of capital adequacy (Pillar 2), and introduction of greater market discipline (Pillar 3). The calculation of minimum capital requirements is determined for the following types of risks: credit risk, operational risk, market risk, and other types of risks (Basel Committee on Banking Supervision, 2021). The banks determine which method will be used for the calculation of minimum capital requirements.

Credit risk is the probability that one party to a financial contract might not be able to fulfil its obligations partially or in their entirety, which might make the other side suffer a financial loss (Rehman, Muhammad, Sarwar, & al., 2019). Defined methods are:

- Standardised Approach
- Internal Ratings Based Approach - basic (FIRB)
- Internal Ratings Based Approach - advanced (AIRB)

The IRB approaches are more complex approaches to calculating capital adequacy to cover unexpected losses and should be the method that conventional and Islamic banks use in light of the aforementioned Basel II and Basel III objectives. These approaches imply the existence of qualitative and quantitative databases within banks, which are the basis of the IRB approach. Based on the discussion above, the banks themselves determine the main characteristics of the client's creditworthiness and the related level of capital requirements (Basel Committee on Banking Supervision, 2021).

This approach assumes the following:

- The existence of an accurate internal database based on losses related to the bank's exposure to credit risk in a certain period of time,
- High accuracy of the applied model of calculating minimum capital to cover losses,
- High-quality internal reporting and audit,
- Use of relevant external data sources of potential losses arising from credit risk (centralized information about the credit status of clients, credit bureaus, information about the value of equity of clients).

Foundation IRB approach and Advanced IRB approach differ in responsibility for the determination of risk elements *i.e.*, whether the bank or the regulator sets the basic elements as shown below:

Table 10. The difference between FIRB and AIRB

	PD	LGD	EAD	M
Foundation IRB	Bank	Regulator	Regulator	Regulator
Advanced IRB	Bank	Bank	Bank	Bank

***Source**:* (Consultative Document; Overview of the New Basel Capital Accord, 2003)

IRB approach defines four components of credit risk in terms of exposure of banks:

- Probability of default (PD) - the probability of default by the debtor equal to or longer than one year.
- Loss given default (LGD) - the loss at the time of default, and it is estimated in terms of the type of collateral.
- Exposure at default (EAD) - the size of the exposure when you pay - is calculated by the type of receivables (balance sheet or off-balance sheet receivables).
- Maturity (M) - which measures the effective maturity of exposure.

PD is an estimate of the probability that the client will not be able to pay its obligation by time specified (Westgaard & Van Der Wijs, 2001). PD is an integral part of the assessment of credit risk and defining the amount of capital adequacy to cover unexpected losses (Jacobson & al., 2005). As per Basel III standards obligation of the bank is to mark as the default claim if one of the two cases below occurs:

- The inability or unwillingness of the client to pay in part or in full, the obligation for the defined period,
- The debtor has not made any payments towards their credit obligations for over 90 days.

As banks are required to operate according to Basel standards and adjust capital per the recommendations, risk-weighted assets are one of the most important parts of the process of risk management, liquidity, and stability in banking institutions. Therefore, SMEs are on the margins of interest in financing by banks due to their organisational nature, particularly the lack of financial strength, non-transparent financial statements, not enough information about the business and financial soundness of the firm, a lack of collateral, and other factors. All these factors make SMEs, and particularly start-ups, unattractive for bank financing.

Namely, non-payment of liabilities to the bank on time causes a rise in costs to banks through an increase in the cost of mandatory provisions for expected losses, which directly affects the stability and position of the bank (Angori, G.; Aristei, D.; Gallo, M.; 2019). Although funding amounts for SMEs are relatively small, banks have increased costs associated with managing this portfolio. The number of clients requires a larger number of operational executors to monitor them, both for healthy clients and even more for clients who are in failure status (Sethi & Bathia, 2012).

To encourage banks to finance SMEs and reduce the costs associated with managing this portfolio, the credit risk assessment for small and medium-sized enterprises can be carried out as a classic credit analysis or using some of the quantitative models, such as credit risk models. These models are mainly structured as debt-based financial models, and they do not apply to equity-based financing.

The frame of the IRB approach is based on the following elements:

- Components of risk for each group of assets,

- Methods which perform the calculation of risk-weighted assets and their transformation into capital requirements,
- Minimum requirements, qualitative and quantitative standards that the bank must fulfil if it is to apply the IRB approach (Thalassinos, Liapis, & Thalassinos, 2014).

The capital ratio is calculated as the amount of regulatory capital divided by the amount of risk assets. The higher the amount of risk assets, the greater the capital is needed and vice versa.

$$Risk\ based\ capital\ ratio = \frac{Regulatory\ capital}{Risk\ weighted\ assets}$$

According to Basel III, the minimum capital requirement is 6% of share capital (paid-in capital of the founder, by issuing shares, retained earnings, reserves and reserves for general banking risks), 4.5% of share capital and 2.5% as well as the obligation of the bank to protect the share capital with the capital conservation buffer.

To strengthen the profitability position and control of debt of the banks, Basel III introduces a minimum leverage ratio which is calculated by dividing the Tier 1 capital by the average total consolidated assets of the bank. Banks should maintain a leverage ratio of at least 3%.

$$Leverage\ ratio\ = \frac{Tier\ 1}{\begin{matrix} On-and\ off-balance\ sheet\ exposures \\ (including\ derivates, repos\ and\ other\ secururities \\ financing\ transaction) \end{matrix}} \geq 3\%$$

A leverage ratio constrains the build-up of debt to fund banks' investments and activities (bank leverage), reducing the risk of a deleveraging spiral during downturns (Basel Committee on Banking Supervision, 2017). Regarding the short-term liquidity position, liquidity risk management of the banks, among other things, imposes the obligation of the banks to provide a minimum coverage ratio of liquidity (Liquidity Coverage Ratio, or LCR), which represents the ratio between the levels of the protective layer of liquidity and total net liquidity outflows during the period of stress for a period of 30 calendar days. In terms of the long-term liquidity position, Basel III introduces the net stable ratio of funding and establishes a management standard for structural or long-term liquidity. It requires that the available amount of stable funding exceed the

required amount of stable funding in a period of one year of crisis. Available stable sources (capital, long-term loans, and stable deposits) must be larger than the required stable sources that are assessed based on the maturity and quality of the approved loans.

To issue a loan based on Basel standards, financial institutions (banks) are bound by principles relating to creditworthiness, which do not assess the creditworthiness of any individual but a legal entity in terms of a firm, enterprise, business, organisation, etc. structure, business model, and balance sheet.

Chapter 3: A Literature Review on Credit Risk Models for SMEs

This chapter comprises three distinct sections, each serving a unique purpose in understanding the landscape of commercial financial institutions and regulatory frameworks within both conventional and Islamic finance. The initial segment delves into an extensive review of existing literature concerning commercial financial institutions, exploring insights from both conventional and Islamic financial sources. The following section sheds light on the intricate regulatory challenges inherent in managing credit risk for small and medium enterprises (SMEs), with a specific emphasis on Islamic Financial Institutions (IFIs). Concluding the chapter, the third section offers an insightful examination of regulatory bodies within Islamic finance, elucidating their regulatory frameworks, applications, and operational practices.

3.1 Conventional and Islamic Banking: Insights into Credit Risk Management and Research

3.1.1 Conventional Banks Approach

Credit risk management and credit risk research in conventional and Islamic banking are of interest to many global financial institutions, investors, scientists, and government regulators. The development of tools for measuring and managing credit risks is particularly significant after the great financial crisis of 2008 and the subsequent development and growth of Islamic financial institutions that proved more resilient than commercial ones during this period (Fund *et al*., 2010).

The specificity of Islamic financial operations based on Shari'ah law is an additional challenge for researching and measuring credit risk. The reason for the application of more precise tools is a better assessment of the creditworthiness of borrowers, especially SMEs, which are a development pillar in developing and developed countries. The role of SMEs in developing and developed countries is observed depending on the level of economic growth and development of these economies. In both cases, these companies are the development wheel – for some a tool for getting out of poverty, and for others a base for the development of social welfare. The lack of data on the financial status of SME companies is an aggravating circumstance for the

development of a model that assesses the ability of companies to perform their obligations on time.

Although there is very little research on Islamic financial institutions, for the reasons mentioned above, we can find some techniques in conventional banking institutions. The most commonly used methods for developing credit assessment models are quantitative methods that utilise statistical packages. Some classical and advanced methods used for this purpose are discriminant analysis, regression analysis, neural networks, decision trees, random forests, K-Nearest Neighbours (KNN), and support vector machines (Siddiqi, 2012) (The World Bank Group, 2019).

The mentioned methods can be used individually or in combination. However, during the development of the model for credit risk assessment, the factors of accuracy and the possibility of interpretation of the model are considered. It is also important (considering the latitude of use) whether it can be generalised, *i.e*., used generally for all financial institutions, industrial areas, and countries.

Economist Beaver (1966) carried out one of the earliest investigations. Examining a sample of 158 manufacturing companies divided equally between healthy and bankrupt groups, Beaver analysed 30 financial ratios, which he then organised into six categories. He selected these ratios based on their prominence in professional literature, their success in prior research, or their association with cash flow-based indicators. From each category, a classification breakdown test was performed, identifying the ratio with the smallest classification error for differentiating financially stable entities from those facing financial difficulties over a five-year observation period.

The next study, which used a multivariate model, was published by Altman in 1968 and was called the ‘Z-score model’. Since it is the first such model, it will be described in more detail.

This model uses a multivariate discriminant analysis - MDA approach that combines ratios and categorical variables to obtain a measure called the score of credit risk, with the aim of best discriminating against companies that are successful and unsuccessful. The combination of predictor variables is called a linear discriminant function. This model defines the lower and upper limit functions, which are guides for making decisions on the financing of companies. Altman’s initial sample contains sixty-six companies classified into two groups (failure and non-failure) with thirty-three

companies in each of these groups. Altman selected failure companies from the publicly traded manufacturing sector that failed from 1946 to 1965. It's compared with another group of healthy companies selected based on their assets and industry. The threshold value for discriminatory Z scores is 1.81, which means that companies will go bankrupt below this value. The upper limit Z score is 2.99, above which are healthy companies. MDA results correctly differentiated 94% of failed companies and 97% of non-failed companies, observing the financial statement from a year before the failure. This percentage of accuracy decreased for the prediction of failure for 2 to 5 years earlier. Significant financial ratios were found in five ratios, as follows:

Working capital/total assets:

This ratio measures a company's operational liquidity and the extent to which its short-term obligations can be met with its short-term assets. A high ratio indicates that the company has a lot of liquid assets relative to its size, which might suggest strong short-term financial health. In short, it indicates net liquid assets relative to the size of the company.

Retained earnings/total assets:

This ratio measures the portion of the company's assets that have been financed by retained earnings, or accumulated profits. The high ratio could indicate that the company has been profitable over time and has been reinvesting its profit. In short, it indicates profitability through the ages of the company.

Earnings before interest and tax/total assets:

This ratio is the profitability indicator of the company relative to its assets. This ratio gives an understanding of how effectively a company is using its assets to create profit before the payment of interest and taxes. It measures the efficiency of a company's asset management, displaying how successfully its investment in assets converts to earnings. It indicates the ability of the company to generate profits from its funds.

Market value of equity/book value of total liabilities:

It measures the part of the company's financing that comes from shareholders (as opposed to creditors). A higher ratio suggests that the company has a strong financial position. It indicates how much the market value of companies can decline before they become insolvent.

Sales/total assets:

This ratio measures how effectively the company uses its assets to achieve results in sales. A higher ratio indicates that the company is more efficient at using its assets to generate sales. Also, it is a standard measure for turnover, which depends on the industrial sector.

In creating models for assessment of the company's health, they should be used together and in context to get a complete picture of the company's financial condition.

Deakin (1972) conducted an important study on a sample of 64 business entities, which, following the approach of his predecessors, were divided into two distinct groups: companies with initiated bankruptcy proceedings and financially stable companies. Deakin carefully chose companies that were similar in terms of their business operations and assets. Initially, Deakin's model incorporated 14 ratios, but he later refined it to include only five ratios that were most effective in predicting corporate failure for each of the five years leading up to the failure.

Deakin's research involved two primary empirical experiments. The first method employed an approach like Beaver's univariate analysis. In the second experiment, Deakin applied a discriminant analysis technique, which allowed for a more comprehensive assessment of the data. The results of the study indicated that discriminant analysis could be effectively used to predict business failure with a reasonably high degree of accuracy, utilising ratios as the predictive variables three years ahead of the actual failure. Moreover, the model's classification error remained relatively low, at just 3% to 4.5% over the three-year period, showcasing the potential of this approach in bankruptcy prediction research.

Nevertheless, it was time for small businesses to receive attention in the field of bankruptcy prediction research. Edmister (1972) was among the first to conduct a study with a sample comprising small companies. In his research, Edmister examined the possibility of predicting bankruptcy using a sample of 562 small businesses. He included nineteen financial ratios, most of which were commonly mentioned in the literature. Edmister's definition of bankruptcy did not require a formal initiation of proceedings; instead, it was defined as a business's inability to settle its debts or pay overdue credit obligations.

Edmister employed the well-known multivariate discriminant analysis and focused on the period between 1958 and 1965, as well as the financial reports from that period. His study introduced some innovative features compared to previous research. The main characteristic of Edmister's model is the use of dummy variables, which depend on the calculated financial ratios. Additionally, Edmister used a three-year average of ratios and a three-year trend of financial ratios and compared the ratios of the business entity with the average ratios of the industry in which the observed business entity operates. This approach provided a more comprehensive analysis of small businesses and their potential for bankruptcy, expanding the field of bankruptcy prediction research.

Pinches et al., (1973) studied financial ratio factor patterns in the United States, focusing on their long-term stability. Their findings suggested that the composition of financial ratio groups remained reasonably stable over time. Their analysis examined 48 ratios from 221 firms, selecting a wide array of financial ratios and classifying them empirically. Through exploratory factor analysis, they identified seven empirical categories: return on investment, capital intensity, inventory intensity, financial leverage, receivables intensity, short-term liquidity, and cash position.

Research on financial ratio analysis persists. Green (1978) explored corporate health indicators by using liquidity, leverage, activity, and profitability ratios to evaluate a company's performance and its potential for success. Green asserted that financial ratios have long been considered indicators of corporate health.

Johnson (1978) used principal component factor analysis and orthogonal rotation to classify financial ratios empirically. From a total of 41 financial ratios, he identified nine empirical ratios. Similarly, Laurent (1979) employed this method, resulting in 10 factors, while Gombola and Ketz (1983) found eight factors

Ohlson (1980) made significant contributions to the field of bankruptcy prediction research with his innovative study. In 1980, he published the results of his research, which analysed a total of 2,163 firms across six years from 1970 to 1976. Unlike the equal group sizes employed in Altman's and Beaver's studies, Ohlson decided to split the firms into two unequal groups. He classified the business entities into 105 companies that were declared bankrupt and the remaining 2,058 as financially stable companies.

Ohlson's research methodology involved examining financial statements from the business entities over three years before the start of bankruptcy proceedings. Based on these statements, he extracted nine key indicators. As a result of his study, the Ohlson O-Score was introduced.

During the design of the model, three models were formed, as follows: (i) a model that predicts a problem in servicing obligations within one year of operation, (ii) a model that predicts the client's bankruptcy within two years, and (iii) a model that predicts bankruptcy within a two-year time frame. The accuracy of these models is deemed to be quite satisfactory, boasting an accuracy rate of 96.3%. This underlines the importance of Ohlson's research in the domain of bankruptcy prediction and demonstrates the value of using various financial indicators to forecast potential corporate failures with high accuracy.

In the field of bankruptcy prediction, the models developed by Altman (1968) and Ohlson (1980) stand out as some of the most highly cited works, relying on accounting variables and employing various techniques.

Zmijewski's approach to bankruptcy prediction focused on analysing financial ratios that measured a company's debt or leverage performance and liquidity. In his study, he applied probit analysis to a sample consisting of forty companies in bankruptcy and eight hundred companies still in operation. Subsequently, he developed a model that incorporated return on assets (ROA), leverage, and liquidity ratios.

The models designed by Altman, Ohlson, and Zmijewski remain widely utilised by practitioners across the globe. These accounting-based measures are well-regarded. However, a recurring concern is their generalizability due to their development based on specific samples, including firms within a particular industry and period. When employing the original statistical techniques, Zmijewski's model is deemed the most accurate and boasts the highest predictive power. Conversely, when logit regression is utilised, Ohlson's model exhibits the greatest predictive power. Overall, Ohlson's model proves to be the most predictive when the same statistical technique is applied across all models.

Chen and Shimerda (1981) evaluated the effectiveness of financial ratios in predicting a company's future strength. Their research indicated that empirical studies over the years have demonstrated the utility of financial ratios. They argued that numerous

financial ratios, specifically 41, are valuable in assessing a company's financial performance and overall condition. Taffler (1983) also examined the importance of financial ratio analysis. His 1983 study started with 80 potentially useful financial ratios and ultimately concluded that only four were deemed useful.

Over the years, interest in financial ratio analysis has grown. Gibson (1982) posits that 'probably no tool is more effective in evaluating the financial future of a company than the proper use of financial ratios. Gibson suggests that financial ratios can effectively assess a company's debt position, profitability, and liquidity, providing a list and description of ratios commonly used in annual reports.

Mutchler (1985) employed a multivariate analysis method, utilising financial indicators and non-financial variables to predict an auditor's opinion based on the assumption of an ongoing business. Mutchler (1986) expanded this research by incorporating additional company variables and examining multiple audit firms. The study's findings revealed that audit firms did not provide opinions on the assumption of time-limited businesses for small enterprises facing financial challenges.

The growing interest in this topic has attracted an increasing number of researchers to explore the area of company bankruptcy prediction. One of the most cited and practically applied prediction models is that of Zavgren (1985). Zavgren introduced a model based on non-parametric statistical analysis, such as logit. Unlike previous researchers, including Altman, who relied on normal assumptions in developing their models, Zavgren's approach did not assume normality.

In her study, Zavgren employed logit analysis. The sample consisted of 45 manufacturing business entities against which bankruptcy proceedings were initiated. Additionally, the sample included an equal number of financially stable business entities of comparable size and activity. The study examined the period from 1972 to 1978.

Due to the fullness of available ratios, it is essential to identify a smaller set of ratios that can still achieve the study's objectives, whether for predicting financial performance, loan defaults, or bankruptcy. Koh and Killough (1990) determined that a large number of ratios is not necessary for predicting business failure; instead, a set of dominant ratios derived from a larger set of related ratios is sufficient.

Friedland (1996) identifies several key factors in determining whether to approve a loan for a small business, including the financial reports of the enterprise, the credit bureau report of the business owner, and the credit bureau report of the business itself. After looking at previous research on the important financial ratios that make up the probability of default models, it is clear that these models are made up of ratios from five different groups: liquidity, activity, profitability, efficiency, and leverage. The primary variation among these models lies in the assortment of specific ratios used to create each model.

However, as the subject of this research is the creation of a credit risk model for SMEs, Altman & Sabato (2007) prepared a model and showed 87% accuracy for default prediction for one year. They take into account five accounting ratio categories describing the main aspects of a company's financial profile: liquidity, profitability, leverage, coverage, and activity. This article investigates credit risk modelling for SMEs in the US market, including the use of logistic regression, and provides empirical evidence on the performance of these models.

Decisions regarding the financing of SMEs are primarily based on the subjective assessment of the enterprises' creditworthiness. Studies focused on internal rating models for SMEs' default probability in conventional banks reveal that both personal and business activities play significant roles in these models (Friedland, 1966; Feldman, 1997; Arriaza, 1999; Frame *et al*., 2001; Kozubkov *et al*., 2015). It can be inferred that the business owner's willingness and ability to repay a personal loan are likely correlated with the enterprise's capacity to fulfil its loan obligations.

Shamser et al. (2001) observed a consistent trend in the changing financial ratios of liquidity, profitability, and cash flows for companies listed on Bursa Malaysia. They noted a gradual decline in company performance, while the leverage ratio exhibited a gradual increase.

In another study, Abbas & Rashid (2011) assessed bankruptcy prediction for non-financial companies in Pakistan. Their model comprised three ratios: sales to total assets (activity), EBIT to current liabilities (leverage), and cash flow ratio (liquidity).

Sarlija & Jeger (2011) conducted a study on financially distressed companies in Croatia during the period from 2006 to 2009, which covered both the pre-recession era and the early stages of the recession. Their findings revealed that the economic conditions

reflected in the 2008/2009 model, encompassing three activity ratios (total revenue/total assets, total revenue/short-term assets, inventory/sales), and one leverage ratio (equity/total assets), were significantly different from those in the preceding two years.

The ongoing research into financial ratio analysis highlights the significance of selecting appropriate ratios for specific purposes. By understanding the utility of various financial ratios, companies and investors can make more informed decisions about financial performance, stability, and future growth prospects. As studies continue to refine the selection and classification of these ratios, the field of financial analysis will become increasingly effective in predicting and assessing the financial health of companies.

Predicting the success or failure of an enterprise has been a very attractive research area for many years. The reason for that is very simple and obvious. If researchers can identify and detect a problem that a particular company has before it leaves consequences, actions can be taken that would either solve the problem or minimise it so that the damage is as small as possible. For this and other reasons, anticipating the difficulties of a company is becoming an increasingly attractive topic, thus giving early warnings to state regulators so that the consequences are as small as possible.

The latest studies within the field of bankruptcy and insolvency prediction compare various differing approaches, modelling techniques, and individual models to ascertain whether any one technique is superior to its counterparts.

Jackson and Wood (2013) evaluate several different methods that have been popularly used in the prior literature to assess firm health, along with some more recent approaches. In the current economic climate of global financial turmoil, they seek to assess how these various methods and approaches perform for the UK by using data from recent insolvency cases and post-IRFS implementation. They concluded that models based on market data, such as an option valuation approach, outperformed earlier models relying heavily on accounting numbers.

Another important study is a paper by Zhang *et al.* (2013). They proposed a hybrid system to predict corporate bankruptcy. The whole procedure consists of the following four stages: first, sequential forward selection was used to extract the most important features; second, a rule-based model was chosen to fit the given dataset since it can

present psychical meaning; third, a genetic ant colony algorithm (GACA) was introduced; and finally, the stratified K-fold cross-validation technique was used to enhance the generalisation of the model.

Very important research was made by Balcean and Ooghe (2006), in which 43 different models were reviewed. They classified models into four categories: univariate, risk index, multivariate discriminant analysis (MDA), and conditional probability models. The most popular model was MDA, which was used in 21 different prediction studies. The second most common technique was the logit model.

According to Megan and Circa (2014), these models are potentially able to identify the financial variables that are statistically significant in distinguishing entities that will file for insolvency from those that will not.

Supriyanto and Darmawan (2018) conducted a study of the financial distress of 119 mining companies listed on the Indonesian Stock Exchange for data available between 2011 and 2014. Altman Z-score used as an analytical tool includes four financial ratios: net working capital to total assets, retained earnings to total assets, earnings before interest and tax to total assets. Testing the hypothesis on the impact of these variables, they concluded that all four financial ratios have a positive effect on financial distress.

In their research on significant financial ratios in Malaysia, Ma'aji, *et al.* (2018) highlighted key ratios: the debt ratio is positively related to failure among SMEs, but the relationship between EBIT (earnings before interest and taxes) and failure is negative, implying that as EBIT decreases, the likelihood of business failure increases. This can be particularly observed in SMEs experiencing distress, as they tend to be less profitable in comparison to their non-distressed counterparts. This is primarily due to the substantial amount of liability they carry, which effectively erodes their profit margins. Zulkarnain *et al.* (2001) posited that when the latter two ratios are high, companies may face difficulties in fulfilling their obligations on time.

At the very beginning of modelling for insolvency or failure prediction, statistical methods were used. With the growing databases collected by banks and other risk assessment institutions, the use of modelling methods is expanding. Along with classical statistical methods such as the aforementioned logistic and probit regression, there are other artificial intelligence methods such as nearest neighbour analysis, Bayesian networks, artificial neural networks (ANN), decision trees, genetic algorithms

(GA), multiple criteria decision-making (MCDM), and support vector machines (SVM) (Zhang et al., 2014). Recently, some fuzzy inference systems emerged, such as the adaptive network-based fuzzy inference system (Moradi & Rafiei, 2019).

An interesting study was provided by Kohv and Lukason (2021). Their dataset contains 12901 samples of companies collected from an Estonian commercial bank with defaulted (156) and non-defaulted (12745) firms for the period 2013-2018. Logistic regression and neural network (machine learning) methods were used for analysis. Twelve variables were used in the study: eight financial ratios, the tax arrears domain combining TMAX, TMEDIAN, and TCOUNT variables, and annual report delay. The variable "the tax arrears" strongly outperforms all other domains. The prediction accuracy for the defaulted group is 80.9% and 83.5% overall.

Efficient financial management and strategic planning are vital for operating a financially thriving business. Financial ratio analysis plays a very important role in understanding financial statements, detecting trends over time, and evaluating a company's overall financial condition. By examining the relationships between financial statement accounts, ratio analysis can identify a firm's strengths and weaknesses, offering valuable insights.

Financial ratio analysis has long been acknowledged as a necessary tool for evaluating the financial health of firms. Numerous authors and economic experts from around the world emphasize its importance. Financial ratios, whether analysed individually or collectively, are widely acknowledged as essential benchmark measures for evaluating and analysing company performance. This method uncovers key financial information about a firm's operational efficiency, liquidity, and stability, which serves as important guidance for company management, investors, and analysts. Furthermore, ratios exceed simple numbers to illustrate a company's capacity to generate profits, finance its operations, achieve growth through sales rather than debt, and address a broad range of other factors.

To enhance the accuracy of these models in practical applications, Timmermans (2014) recommends using a substantial and specific sample that is tailored to the industry and period being examined. By doing so, the predictive power of these models can be maximised, yielding more reliable and actionable insights that can effectively guide decision-makers in their assessment of potential bankruptcy risks.

While analysing the mentioned models, it became obvious that the research samples primarily consisted of large and medium-sized companies. The main reason for this focus was easier access to information and more transparent operations of such companies, which provided researchers with the necessary data for their studies. The financial data of small businesses and smaller enterprises, on the other hand, was more challenging to obtain, resulting in fewer studies focusing on them.

3.1.2 Islamic Banks Approach

The credit risk in Islamic finance, as explained by Khan and Ahmed (2007), arises in the form of settlement or payment risk. This risk occurs when one party to a contract makes a payment (e.g., in a *Salam* or *Istisna* contract) or delivers property (e.g., in a *Murabaha* contract) before receiving the property it has paid for or before receiving cash, which exposes the party to potential losses. In the case of equity financing methods (such as *Mudarabah* and *Musharakah*), the credit risk will be the non-payment of the Islamic bank's share by the entrepreneur when the payment is due.

This problem can increase for banks in these cases due to the problem of incorrect information if the bank does not have enough information about the actual profit of the company. Since *Murabahah* contracts are trade contracts, credit risk arises in the form of counterparty risk due to the failure of the trading partner.

When comparing the lending activities of commercial banks with the investment transactions and activities of Islamic banks, it is evident that they differ significantly in nature. Specifically, Islamic banks utilise 'Unrestricted Profit-Sharing Investment Accounts (UPSIAs)' based on Mudharabah contracts, which serve as a substantial funding source (Sundararajan, 2008). Unique to Islamic finance, Islamic banking operates on the principle of profit-loss sharing.

Islamic banks in various countries have demonstrated stability during economic recessions. There are several contributing factors to this resilience. Firstly, IBs do not charge interest, which reduces their incentive to engage in high-risk practices for profit maximisation compared to CBs. Additionally, IBs usually have smaller asset sizes and are not as globalised as their commercial counterparts. Meanwhile, the Islamic financial market continues to experience robust growth.

In terms of credit risk management, 73.3% of Islamic banks employ the standardised approach, while 11.1% utilise the foundation internal rating-based approach, and another 5.6% adopt the advanced internal rating-based approach (Tafri *et al*., 2011). Internal rating models enable banks to align their actual risk exposure with capital requirements, making Islamic banks better positioned when using the internal rating-based approach to determine capital adequacy (Tafri *et al*., 2011). To accurately capture the unique risks associated with Islamic banks, customised internal rating models tailored for Islamic banks should be developed (Oyong & Bambang , 2020).

Research on the development of internal rating models for IBs has relatively recently begun. It is anticipated that this research will yield valuable insights into the internal rating models of SMEs financed through diminishing *musharakah*. As the field of IB continues to evolve, the adoption of tailored risk management strategies and the development of specialised internal rating models would contribute to the overall stability and growth of Islamic banks in the global financial landscape.

The ongoing research and development of internal rating models for IBs are expected to lead to significant advancements in the industry. These models would make credit risk management more efficient and effective by taking into account the specific needs and risk profiles of IBs. This would help IBs stay competitive in a financial market that is becoming more globalised.

Furthermore, this research would help establish best practices and guidelines for IBs, contributing to the standardisation of risk management approaches within the industry. As IF gains more capacity, regulators and supervisory authorities will also benefit from a better understanding of the specific risk management strategies and tools used by IBs, enabling them to develop appropriate regulatory cover and oversight mechanisms.

In addition to refining credit risk management practices, internal rating models customised for IBs could potentially impact innovation in other areas of IF, such as supervision of liquidity risk management, operational risk management, and market risk management. This comprehensive approach to risk management would improve the resilience and stability of IBs, making them more attractive to both investors and customers.

The development of customised internal rating models for IBs would not only benefit SMEs financed through diminishing *musharakah* but also facilitate the expansion of

Islamic banking services to other sectors, such as retail, corporate, and infrastructure financing. This broadening of services could enable IBs to reach new markets, diversify their portfolios, and better understand and serve the needs of their customers.

A review of previous research has shown a lack of research on internal rating models in Islamic finance.

Risk assessment methods in Islamic finance were originally developed for individuals to finance the purchase of houses and apartments.

For example, in their work, Sidik *et al.* (2013) use the IT2FS (Interval Type-2 Fuzzy Sets) algorithm based on two variables: the sum of late days and the instalment amount. A detailed account of the calculation of said logarithm can be seen in Mendel *et al.* (2006) and Wu and Mendel (2009). In one scenario, the Type-2 fuzzy set interval model that supports subjective assessments in maintaining Shari'ah principles was proposed. The second scenario suggested a way to calculate the value of the actual loss.

Given that *Shari'ah* law allows the calculation of penalties (*i.e.*, the calculation of 'default interest' if we relate to the terminology in commercial banks) only if the client cannot prove that the delay was due to unintentional, involuntary conduct, the authors concluded that this was a fairer system than the conventional.

Further, Abdou *et al*. (2014) based their work on the applications of 487 clients of the Islamic Bank in Great Britain. Applying the methods of discriminant analysis, logistic regression, and multi-layer Perceptron, it was concluded that the key elements for modelling the assessment of the creditworthiness of clients were monthly expenses, age, and marital status.

Based on 12,795 individuals' data, the authors Wibowo *et al.* (2019) used logistic regression analysis with data imbalance and the SMOTE (Synthetic Minority Over Sampling Technique). They conclude that the results are not much different. Variables that have a significant effect are marital status, the first 2 digits of the home zip code, length of stay, length of work, economic sector, and the first 2 digits of the office zip code. The accuracy of this model in predicting creditworthiness tested by the Kolmogorov-Smirnov (KS)–test is 68,77% (for the formulated model with Logistic Regression with data imbalance) and 68.33% (for the formulated model with the SMOTE method). The authors propose using SMOTE methods because accuracy in

Confusion Metrix test validation shows a higher percentage (98,81) than Logistic Regression with data imbalance (87.77%).

Saracevic and Sarlija (2017) analysed the usefulness of financial ratios in discriminating between healthy from distressed companies in the case of an Islamic bank. They concluded that profitability ratios and activity ratios are the most important indicators for distinguishing healthy and distressed companies.

The study of (Saracevic & Hodzic, 2020) focuses on the credit risk assessment in Islamic banking, particularly using a case study of *diminishing musharakah* from an Islamic bank in Bosnia and Herzegovina. The research employs logistic regression to analyse financial data from 151 small and medium-sized enterprises (SMEs) for the years 2012 and 2013, aiming to develop a model that predicts the probability of default (PD). Unlike traditional banks, Islamic banks emphasize profit-loss sharing (PLS), necessitating enhanced methods for assessing creditworthiness, especially post-2008 financial crisis when reliance shifted from expert opinion to more rigorous statistical models in response to global demands and the growth of Islamic financing.

The lack of research in this field can be mostly attributed to the challenges in obtaining adequate and accurate financial data from clients of Islamic banks, especially small and medium enterprises (SMEs). The fact that SMEs typically are not required to publicly disclose their financial results and other business-related data complicates this issue. This lack of transparency and access to data obstructs the development and processing of effective credit risk assessment models adapted for Islamic banking. Despite these facts and challenges, the study and development of credit risk assessment methods that align with *Shari'ah* principles are vital for this industry.

In this chapter, we discussed that credit risk assessment methods in Islamic banks for SMEs, particularly equity-based financing such as partnership agreements, have not been thoroughly researched. However, the literature frequently investigates corporate credit risk forecasting for commercial banks, and it is highly accurate.

So, the development of credit risk assessment models for SMEs and equity-based financing in Islamic banks presents a unique challenge and also offers significant opportunities to increase innovation and growth in Islamic finance.

3.2 Credit Analysis Process for SMEs

Efficient credit risk management is the most important field in banking operations to maintain the financial stability and liquidity of the banking sector. The increasing sensitivity of this sector to credit risks has caused special attention to the prescription of internal procedures for assessing this risk (Konovalova *et al*., 2016).

Following the process of analysing clients' creditworthiness, the classic subjective assessment of analysts and credit assessment models as techniques are utilised. Classic subjective methods of assessing borrowers' credit risks represent expert assessments, which in a very volatile business environment can be significantly reduced in accuracy and prediction (Song *et al*., 2020).

Therefore, various models were developed that were designed with different methods using quantitative and qualitative data to predict the credit health of clients. A precise assessment of each client builds an assessment of the bank's overall portfolio (Konovalova, *et al*., 2016).

3.2.1 Classic Credit Analysis

In conventional banks, the customer rating process is part of the lending process. The most important function of customer ranking is to identify the possible deterioration of the customer's credit position, which would allow the bank to reduce credit risk with certain measures.

Customer rating modelling includes different types of information: (i) quantitative information - financial statements for the minimum of two years of business (Balance Sheet, Income Statement, Investments, cash flow), (ii) qualitative information - information collected by the relationship manager relevant to the decision-making process on the possibility of servicing any client indebtedness, behavioural (experiential) data if the client had a credit history in the bank, belonging to an industrial branch, and specificity of the branch, belonging to the country, *i.e.* country risk, and local specifics.

Three units of the bank usually participate in defining this important indicator: (i) unit for communication with clients - relationship manager, (ii) credit analysis unit, and (iii) risk assessment unit.

Classical credit analysis, as part of the process of assessing the creditworthiness of clients, is performed by professionals who use the acquired experience and learned techniques. For this purpose, they process the following documentation:

- Financial statements of the clients.
- Business plan and projection of activity (i.e., cash flow projection).
- Qualitative elements of the loan application and the clients.
- Purpose of the loan.
- Loan collateral.

Limited by the bank's strategy, regulatory rules and capital requirements, analysts make a recommendation giving an opinion on approving or rejecting a loan application.

In classical credit analysis, the expert opinion of analysts contains the following assessments:

- whether the loan application is justified.

- legal orderliness of the application and the future client.

- financial statement in a time series for 3 accounting periods.

- cash flow for 3 accounting periods.

- business plan during loan repayment.

- client's position in the industrial sector.

- position of the industrial sector on the total market.

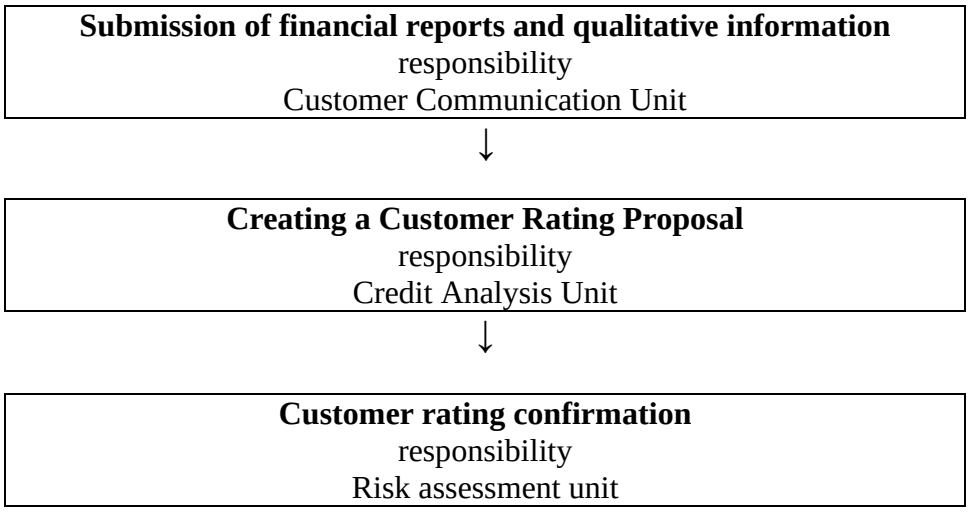
- assessment of the quality of management, and their business strategies

- legal status and quality of credit pledge.

The final decision on the loan application is concluded by the bank's credit committee, considering not only the recommendations of credit analysts but also the interests of the bank related to target markets and clients. Therefore, this decision may be different from the recommendation of the Credit Claims Analysis Service.

For the decision-making process to be as correct as possible, credit risk models based on quantitative and more complex models of both (quantitative and qualitative elements) have been developed and used for several decades. Their role is to assess possible financial problems or bankruptcy in the forthcoming period for certain companies.

Figure 3. The flow of documents in the client ranking process appears like this:



Source: (Carl L. Pritchard, 2014)

The client ranking process established in this way ensures the independence of the ranking process and impartiality in determining the rating.

3.3 Regulatory Issues in Managing Credit Risk for SMEs

The Basel Committee on Banking Supervision (1999) defines credit risk as the potential for bank borrowers or counterparties to fail to meet their credit obligations according to the agreed terms. Effective comprehension and management of credit risk are determining factors in a bank's financial performance. Zidan (2014) asserts that strong credit risk management enhances practical supervision of asset quality and stimulates the development of sound credit policies, which in turn positively influences banks' financial performance.

Luqman (2014) notes that an increase in credit risk fundamentally affects profitability by raising loan loss provisions, which are offset against the bank's income and loan assets. Numerous studies have investigated the relationship between credit risk and financial performance. While many researchers have concluded that credit risk impacts profitability, they have also uncovered various complexities within the organisation, which are extensively discussed in the literature.

However, there are inconsistencies regarding the extent and nature of the correlation between credit risk and the financial performance of Islamic banks across different economies. Karim *et al.* (2010) analysed the relationship between the profitability of Islamic banks in the following three countries in Africa: Tunisia, Egypt, and Sudan. They examined bank-specific determinants, specific to the industry, and macroeconomic determinants within the banking system, including credit risk. Employing a panel data technique, their findings indicated that credit risk had a significantly negative effect on the profitability of Islamic banks in Africa from 1999 to 2009. Similarly, Chowdhury and Rasid (2015) analysed 44 Islamic banks from Africa and Asia to identify factors influencing profitability in Islamic banks. According to their findings, the loan loss provision to total loan coefficient consistently manifested a negative sign across all regression models, suggesting that credit risk negatively correlates with the profitability of Islamic banks in this region. Consequently, these findings align with those of Karim *et al*. (2010).

Credit risk at Bosnia Bank International (Islamic bank) offers a unique view of risks within the Islamic banking sector, as this bank is subject to perhaps higher credit risk

due to its exposure to financing within the legal constraints of the commercial banking sector. As other countries practising Islamic banking have different legal and economic environments, credit risk in the Islamic banking sector may also differ between developing and developed countries.(Waemustafa & Sukri, 2015). Islamic banks in developing countries, such as Bosnia, may face increased sensitivity to credit risk due to inadequate legal regulations and the economic situation in the country. In contrast to developed nations, the economic shifts in emerging economies can be swayed by a multitude of elements, political instability being among them.

3.3.1 Credit Risk Issues in Islamic Banking

Credit risk assessment is one of the main activities of any bank in the world. The number of granted and rejected loans, the quality of the clients who received the loans, and the speed of the loan approval process depend on the success of the creditworthiness evaluation process. The more accurate and faster the process, the more loans will be approved for financially healthy clients and fewer for financially distressed clients. In the case of small and medium enterprises (SMEs), the process of credit risk evaluation always includes the willingness and ability of clients to perform according to the terms and conditions in the credit contracts, financial analysis, and the capacity of SMEs to repay the loans, as well as the analysis of collateral and market conditions. However, this can be done as a classical credit analysis or by using some quantitative approach, such as credit risk models.

Many scientific studies deal with credit risk management not only in the conventional but also in the Islamic financial sector. The significance of this research is equally valuable for the management of financial institutions, investment processes, business partners, and government agencies for banking regulation. Global importance has grown after major financial crises and their negative impacts on economies around the world. The growth of the Islamic financial industry and the impact of financial crises on the overall world economic and financial markets have increased interest in a more detailed scientific analysis of the factors that affect the risk of financing and the creditworthiness of clients.

In the case of IB, credit risk is viewed from the perspective of IB's role in the financing contracts. Namely, IB may have the role of *Mudarib* or *Musharakah* partner, and there may be a risk of non-fulfilment of obligations of the other contracting party regarding

the collection of deferred payment or delivery of property within the agreed time (Febianto, 2012). Hence, failure can also occur as a delay in payment or non-payment.

Also, the Islamic Financial Service Board (IFSB) defines credit risk as "the potential that a counterparty fails to meet its obligations under agreed terms". This definition is applicable to IIFS (Institutions Offering Islamic Financial Services) managing the financing exposures of receivables and leases (for example, *Murābahah*, Diminishing *Mushārakah* and *Ijārah*) and working capital financing transactions and projects (for example, *Salam*, *Istisnā`* or *Muḍārabah*)" (2005, p. 6).

Although commercial and Islamic banks have and face risks that coincide, IBs recognise specific risks. Therefore, they are managed based on the recommendations and standards of institutional bodies (noted in Section 3.3) that regulate these activities. The reference documents setting out the guidelines for credit risk management in IIFS (Institutions Offering Islamic Financial Services) are the following: IFSB-1 (December 2005); IFSB-13 (March 2012); IFSB-15 (December 2013); IFSB-16 (March 2014); and IFSB-17 (April 2015). These standards determine that IIFS are required to have an adequate credit risk management process, including their institution's individual risk tendency, risk profile, and market and macroeconomic conditions. In this regard, IIFS is required to adopt policies and processes for risk identification, measurement, assessment, monitoring, reporting, and control, and thus credit risk mitigation.

Islamic Financial Services Board (IFSB) as a regulatory institution in IF (Chapter 3.3) defines that credit risk may arise from multiple IB activities such as on-balance sheet and off-balance sheet exposures, which include financing, investment activities, interbank financing, trade financing, and Shari'ah-compliant hedging transactions. Financial exposure in terms of credit risk IIFS refers to financing through Contracts: *Diminishing Musharakah*, *Murabah* and *Ijara*h, and working capital financing (*Salam*, *Istisna* and *Mudharabah*). Adewale *et al.* (2020) recognize common risks and possible risks that only IBs face. These risks are shown in Table 11.

Table 11. Possible Risks in IB

Risk Classification	Type of Inherent Risk
General or common risks	Credit Market Operational Liquidity Strategic Legal and regulatory Reputational Technology
Risks unique to Islamic banking	Sharī'ah non-compliance Equity investment Rate of return Displaced commercial
Emerging risks	Cyber security Money laundering and financing of terrorism Cloud concentration Third-party/outsourcing Vendor lock-in

Source: Adewale *et al.* 2020

Shari'ah non-compliance risk is considered an operational risk occurring from the non-compliance of the institution's products and services with the rules and principles of *Shari'ah* law.

Specific credit risk in the IFIs can be linked to the risk of investment in equity through partnership agreements. Namely, equity investment risk can be observed as the risk arising from the conclusion of a partnership agreement (*Mudharaba* and *Musharakah*) in order to take action regarding a particular financing or some general business activity defined by the partnership agreement. The provider of financial resources in the noted contract endures this business risk (IFSB, 2005).

Displaced commercial risk is "the risk arising from assets managed on behalf of investment account holders that is effectively transferred to the Islamic Financial Institution's capital because the institution forgoes part or all of its *Mudarib's* share (profit) on such fund when it considers this necessary as a result of commercial pressure in order to increase the return that would otherwise be payable to the investment account holders" (IFSB 2005/2 Standard Paragraph 76).

The Rate of return risk is essentially different from interest rate risk in commercial banks. This risk in IB is related to the results of IB's investment activity, which are based on the investment accounts of clients in IB. Specifically, commercial banks have a fixed yield on loans based on interest rates, while IBs have an uncertain value of earnings on investment returns. Also, the return on deposits has been determined by the interest rate in commercial banks and the yield on deposits in Islamic banks has not been agreed upon in advance, but it is expected (Zainol & Kassim, 2010).

Analysing the development of risk management in IF, Rahalhleh *et al*. (2019) singled out several papers that touched on the topic of risk management, especially credit risk. The table shows the authors, research questions, and main results. Given that these papers conclude that there is a difference in the impact of certain types of risks between IB and CB, it is recommended to develop and strengthen Islamic financial standards for easier management and control over the stability of IFIs.

Table 12. Overview of Works on the Development of Risk Management in IF

Authors	Research Questions	Main Findings
Hassan et al. (2019)	• What is the relationship between liquidity risk and credit risk in IBs? • What is the impact of liquidity risk on bank stability? • What is the performance difference of IBs and CBs concerning liquidity, credit risk, and bank stability?	• There is a negative relationship between liquidity risk and stability for only IBs. • Islamic banks are better than conventional in managing risk.
Mokni et al. (2015)	• What is the current state of risk management among IBs and CBs in the MENA region?	• CBs and IBs continue to rely on traditional credit risk mitigation tools. • Credit risk is considered the most important for both CBs and IBs followed by liquidity risk.
Abedifar et al. (2013)	• What is the state of bank credit and insolvency risk for IBs and CBs with Islamic windows?	• Small IBs in majority Muslim states were shown to have a lower credit risk than did CBs of a similar size.
Masood et al. (2012)	• What are the differences between Islamic and non-Islamic banks in the UAE regarding credit risk management?	• IBs in the UAE are more likely to use newer, sophisticated and robust credit risk management techniques of credit risk management than non-Islamic banks.
Khalid and Amjad (2012)	• To what extent do Islamic banks in Pakistan use risk management practices (RMPs) and techniques in dealing with different types of risk?	• Islamic banks are reasonably efficient at managing risk. • Understanding risk and risk management, risk monitoring and credit risk analysis are the most influential variables in RMPs.
Abu Hussain and Al-Ajmi (2012)	• Do bankers understand risk and risk management? • Do banks identify the potential risks to which they are exposed? • Do banks have a system in place for assessing and analysing risk?	• Banks in Bahrain have a clear understanding of risk and risk management and follow efficient risk identification, risk assessment analysis, risk monitoring, credit risk analysis and risk-management practices.

	• Do banks monitor and control risks efficiently? • Do banks have efficient risk management strategies in place? • Do banks examine credit risk efficiently? • What types of RI methods do banks use? • What types of risks are banks exposed to?	• IBs differ from their conventional counterparts in understanding risk and risk management. • The three most important risks facing both CBs and IBs are credit risk, liquidity risk, and operational risk. • IBs face greater risk than CBs do. • Country, liquidity, operational, residual, and settlement risks are greater for IBs than for CBs.
Hassan (2011)	• What is the current state of risk management in Islamic and conventional banks in the Middle East?	• There is a positive relationship between risk management practices and understanding risk, risk management, risk identification, risk assessment, risk monitoring, and credit risk analysis in IBs and CBs.
Tafri et al. (2011)	• What risk management tools are used in IBs and commercial banks in Malaysia, and selected Islamic banks outside Malaysia? • What are the differences and similarities between CBs and IBs in the practice of managing credit risk, market risk, liquidity risk, and operational risk?	• IBs and CBs differ in the extent of their use of market value at risk (VaR), stress-testing results, credit risk mitigation methods, and operational risk management tools. • Risk management tools and systems for Islamic banking are inadequate (e.g., IT professionals with relevant expertise in process integration and risk analytics).
Hassan (2009)	• What are the main risks faced by IBs in Brunei? • To what extent do IBs in Brunei engage in risk management practices (RMP) and what are the techniques used?	• Brunei IBs face three main types of risks: foreign exchange risk, credit risk, and operating risk.
Siddiqui (2008)	• What are the main IFS contracts used by IBs in Pakistan? • What are the main causes of risk faced by IBs?	• IBs in Pakistan are mostly used for: (i) Murabaha (ii) Ijarah (iii) Mudharabah and Musharakah • Mudharabah and Musharakah are associated with various investment risks where information is asymmetric. These risks later lead to moral hazard and adverse selection issues
Al-Tamimi and Al-Mazrooei (2007)	• What are the main risks faced by IBs in UAE? • How do the different risks faced by UAE national and foreign banks compare?	• The UAE faces three main risks: credit risk, operating risk, and foreign exchange risk.

Source: Rahalhleh *et al.*, 2019.

Referring to the main topic of this dissertation, we present our review of Table 12 related to credit risks in IBs and CBs, liquidity, and stability of banks, as well as the risks of basic Islamic financial instruments - *Mudharabah* and *Musharakah.*

So, we can conclude that the relationship between liquidity risk and credit risk in Islamic banks (IB) and commercial banks (CB) can be analysed based on their financial structure and operations as follows:

1. Relationship between liquidity risk and credit risk in IBs

Observing the relationship between liquidity risk and credit risk in IBs, we conclude that Islamic banks operate on *Shari´ah* principles, which prohibit the collection and payment of interest (*riba*). Instead, they engage in arrangements based on profit and loss sharing, trade finance and secured real estate finance. This unique structure affects both liquidity risk and credit risk.

IBs may face higher liquidity risk compared to CBs due to the limited availability of 4-compliant instruments for liquidity management. Furthermore, their assets are often less liquid since they are backed by real assets or commodities.

Credit risk in IBs is mainly related to the performance of the underlying asset or business. Because IBs participate in the sharing of profit and loss, their credit risk is usually linked to the performance of their investments. The risk of non-payment is less pronounced in IBs because they generally avoid interest-based business.

2. Relationship between liquidity risk and credit risk in CBs

CBs function within an interest-driven framework, its primary source of revenue being the differential between the interest rates it gets from loans and those it offers on deposits.

Therefore, CBs face liquidity risk when they are unable to meet their financial obligations due to a mismatch between the maturity of assets and liabilities (collection of receivables from borrowers and obligation towards deposit holders). They have access to a wider variety of instruments for liquidity management compared to IBs.

Considering credit risk, we conclude that CBs face credit risk when borrowers default on their loans or when they are more than 90 days late in fulfilling their obligations. The level of credit risk depends on the CRM assessment of the creditworthiness of the borrowers and in this regard the quality of the bank's loan portfolio.

If we compare the relationship between liquidity risk and bank stability from the table above, we can conclude:

Both for IB and CB, distressed liquidity can adversely affect the bank's stability. If the bank faces difficulties in meeting its financial obligations, it can resort to selling its

assets at a discount, creating losses, or borrowing from other institutions at higher interest rates. These actions can damage the bank's capital and reduce its profitability, which ultimately leads to a decline in the bank's stability.

Below we present the difference between IBs and CBs concerning liquidity, credit risk, and bank stability:

Related to our findings derived from Table 12 IBs typically face higher liquidity risk compared to CBs due to their unique financial structure and the limited availability of *Shari'ah*-compliant instruments for liquidity management.

Islamic banks (IBs) typically exhibit a lower credit risk profile compared to conventional banks (CBs) due to the prohibition of interest-based lending practices. Instead, IBs engage in profit and loss sharing (PLS) agreements with partners, thereby aligning their interests with the performance of underlying assets or businesses.

The stability of both IBs and CBs hinges on their adept management of liquidity and credit risks. While IBs may face heightened liquidity risk, their reliance on asset-based financing practices and lower credit risk contribute positively to their overall stability. Conversely, CBs may benefit from a broader array of liquidity management tools, yet their exposure to elevated credit risk presents a potential challenge to their stability.

It is also very important to understand the various other factors, such as the regulatory environment, market conditions and bank-specific factors. All of it also contributes to the overall stability of banks.

The main findings of these authors in Table 12 indicate the justification for the preparation of our study (dissertation) as a tool that will facilitate the management of credit risk related to investment PLS contracts *Mudharaba*h and *Musharakah*.

In *Mudharabah* contracts Islamic bankers could perceive higher risk than in *Musharakah* contracts due to the reliance on the entrepreneur's management skills and the risk of loss in case of business failure. Furthermore, there might be concerns related to moral hazard and asymmetric information, where the entrepreneur would not disclose accurate information or act in the best interest of the bank.

Musharakah (partnership contract):

In *Musharakah* contracts, both the bank and the entrepreneur contribute capital to a joint venture and share profits and losses according to their capital contributions. This type of contract exposes the bank to risks similar to *Mudarabah,* with the additional risk of disagreements between partners or mismanagement affecting the joint venture's performance. However, since the bank has a more active role in decision-making, it would have better control over the risks than *Mudharabah.*

3.4. Regulatory Institutions in Islamic Finance

The development of the Islamic financial sector as a fast-growing industry, the introduction of new products, and the need to standardise the operations of IFIs initiated the formation of regulatory bodies to coordinate the activities of IFIs and assist in their development. Given the numerical growth of IFI and the activity of researchers and business practitioners to analyse Islamic business principles, there was a need to define the regulatory framework, supervision, and corporate governance issues, as well as the interests of other participants in this growing financial industry. In order to facilitate the acceptance of Islamic Finance (IF) in different countries and increase the number of Islamic financial institutions (IFIs) as well as their client base, efforts are being made to establish regulating institutions. These bodies will oversee and standardize the activities of IFIs while considering the specific characteristics of each country.

Throughout the years of IFI development, several institutional bodies have been formed, and their overview and main functions are listed in the following table:

Table 13. Main Islamic Financial Organisations

Acronym	Name	Function
IDB	Islamic Development Bank	Formed in 1975 as an institution for developing and promoting Islamic finance and economy. Membership Companies: **ICD** - Islamic Corporation for the Development of the Private Sector. **ICIEC** – Islamic Corporation for the Insurance of Investment and Export. **IRTI** – Islamic Research and Training Institute. **ITFC** - International Islamic Trade Finance Corporation. **SOLIDARITY FUND** – reduction of poverty in membership countries. **ARCIFI** – Arbitration and Reconciliation Centre for Islamic Financial Institutions;

AAOIFI	Accounting & Auditing Organisation for Islamic Financial Institutions	Accounting and Shari'ah standard setting body for Islamic financial institutions
IFSB	Islamic Financial Services Board	Standard-setting institution to ensure best practices and help member countries with regulating Islamic financial institutions
IIFM	International Islamic Financial Markets (IIFM)	Trade association to promote capital markets
IRA	Islamic International Rating Agency	Rating Agency
LMC	Liquidity Management Centre	An institution that provides liquidity enhancement to the financial system
CIBAFI	General Council of Islamic Banks and Financial Institutions	Trade association of Islamic banks to enhance member institutions' ability to better service customers around the world through transparent banking practices

***Source**:* Askari, *et al.*, (2015)

As with all commercial banks, IBs must manage risks, and be involved in measuring, monitoring, reporting and controlling credit risks. They also adhere to regulatory rules related to capital adequacy, regulations and standards that apply to client financing activities. Therefore, the IFSB and the AAOIFI are considered to be the basic standards bodies that help IIFS maintain business stability.

Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) is an independent non-profit corporate body which deals with the development of international standards applicable to Islamic financial institutions. The Bahrain-based organization began to definite standards as early as 1991. AAOIFI accepts generally accepted accounting principles, unless there is a conflict with *Shari´ah*. These standards are applied by central banks, regulatory institutions, Islamic banks and other IIFS, as well as accounting, legal and audit firms from more than forty-five countries around the world. *Shari´ah* AAOIFI standards are not mandatory, but many countries (Bahrain, UAE, Qatar, Jordan, the Kyrgyz Republic, Kazakhstan, Mauritius, Oman, Pakistan and Sudan) have imposed them as mandatory and request IFIs to adopt them and apply them in their daily activities.

AAOIFI (2020) has produced 117 standards arranged in several groups according to their purpose: Accounting Standards (33), Auditing Standards (8), Governance Standards (14), Ethic Standards (3) and *Shari´ah* standards (59).

The IFSB was established 11 years after the AAOIFI with the aim of broader regulation and recognition of the IFI, and unifying the standards of the Islamic finance industry because Basel standards do not apply to IB due to the nature of commercial banks based on interest. IFSB is an international organization based in Kuala Lumpur, Malaysia, established in November 2002 to standardize IIFI's operations. Since its inception in March 2003, IFSB has been promoting and enhancing the stability of the Islamic financial industry by issuing global business principles, and prudential standards that cover banking, the capital market and the insurance industry.

The IFSB (2005) corporate governance framework for IFI, mainly IBs, differs from the scope of AAOIFI *Shari'ah* standards and is categorized into several basic areas: (i) general rules for the management of IFIs, (ii) compliance to *Shari'ah* rules in the operation of IFIs, (iii) rights of investment account holders, and (iv) transparency of financial reporting, especially in the part related to investment accounts.

3.5. Conclusion

AAOIFI and the Islamic Financial Services Board (IFSB) have key functions in the development and regulation of the Islamic finance industry. By providing a comprehensive set of standards that adhere to *Shari´ah* principles, these organisations promote transparency, accountability, and stability in the sector.

AAOIFI, with its wide range of standards covering accounting, auditing, governance, ethics, and *Shari´ah*, has become the authoritative reference for Islamic financial institutions worldwide. The adoption of AAOIFI standards by several countries highlights their importance in promoting best practices and ensuring compliance with *Shari'ah* principles.

On the other hand, the IFSB, established to address the unique characteristics of Islamic finance that differ from conventional finance, complements the efforts of the AAOIFI by focusing on broader regulation and standardisation of the industry. The IFSB's prudential standards serve the banking, capital markets, and insurance sectors, enhancing the overall stability of the Islamic finance industry.

In collaboration, AAOIFI and IFSB contribute significantly to the growth, development, and harmonisation of the Islamic financial sector, ensuring that it remains competitive, sustainable, and *Shari´ah*-compliant. Their efforts led to increased trust in

Islamic financial institutions, enabling them to meet the diverse needs of customers around the world while supporting ethical values and promoting financial inclusion.

Chapter 4: Islamic Finance and Its Relevance to SME Financing

This chapter aims to provide a general insight into Islamic finance, highlighting its principles, the most important financial instruments and the regulatory framework.
We discuss Islamic finance, a system characterized by the prohibition of interest (*riba)*, emphasizing risk sharing, and encouraging ethical investment. By presenting the basics of Islamic financing, we analyse its potential for financing SMEs. Also, we compare Islamic finance with the commercial financial sector.

SMEs, which are recognized as the basis of economies, face significant challenges in accessing commercial forms of financing. These challenges are the result of strict credit requirements, high interest rates and a mismatch between the financial products offered by conventional banks and the needs of SMEs. Islamic finance represents an alternative financing instrument that is aligned with the ethical values of Muslim entrepreneurs and also offers practical financial solutions for SME businesses around the world.

By understanding the principles and practices of Islamic finance, stakeholders, including policymakers, financial institutions and entrepreneurs, can better utilize this form of finance to support innovation, create jobs and contribute to sustainable economic development.

4.1 Risk Management Evolution in Commercial and Islamic Sectors

Each banking activity carries some level of risk. Although risk is always present in the banking sector, active risk management in the commercial banking sector began in the late 1990s, after the bankruptcy of Baring PLC Bank with two hundred years of tradition. The practice of active risk management is still underdeveloped in the Islamic banking sector due to the relatively short period of practical application of the profit-loss sharing principle (PLS), which began in the 1970s. After the global financial crisis and the collapse of large financial banking systems because of the problems of repaying subprime mortgage loans, Islamic banks (IB) started a more serious risk management process. Risk management in IB is recommended with the use of Basel standards, for the part of the business that can apply these rules, but part of the business specific for the Islamic banking market also evolves. These principles include the prohibition of interest and the sharing of profits and losses in accordance with other *Shari'ah*

principles. In economies that practice both financial systems, there is a real risk that riskier clients will search for funding from Islamic banks due to the nature of the funding and the opportunities of sharing the loss with depositors of Islamic banks (Ahmed & Khan, 2007; Hasan & Dridi, 2010).

As the practical application of Islamic banking is relatively brief, risk management in IB is recent, scientific, and practical. Considering that large companies, with large and multinational projects, specifically observed in both banking sectors (commercial and Islamic) for reasons of great engagement of investment capital and the expected profit, SMEs have remained on the margins of interest of financial institutions, both in terms of investment and in terms of risk management.

Since the SME segment represents the main wheel of development in any economy; it is the foundation of entrepreneurship and innovation and also engages most of the working population, we believe that it is necessary to pay attention to this segment by increasing access to finance. This is possible with the use of adequate tools of risk measurement through the function of credit risk management (CRM), which would relax the Islamic banking sector and encourage it to join this segment of the economy with more attention.

In Islamic banks there are two types of financial contracts (i) debt-based and (ii) equity-based financing. According to Dusuki (2007) Islamic financial institutions use five groups of financial contracts to comply with *Shari'ah*:

(1) Voluntary altruistic contracts such as *al-qard al-hasan;*

(2) Exchange modes which can be represented through *Murabaha* (cost-plus sales), *bay bi-thaman ajil* (credit sales) and *Ijarah* (leasing);

(3) Islamic forwards contracts (*Salam* and *Istisna*);

(4) PLS modes like *Mudharabah* (silent partnership) and *Musharakah* (partnership financing);

(5) Hybrid modes like diminishing *Musharakah* and hire purchase (*ijarah thumma al-bay*).

PLS financing modes are presented through partnership agreements and contracts (*Mudharabah* and *Musharakah),* partnerships directly with the client or through Islamic financial institutions. These are the basic partnership financing agreements

allowed by *Shari'ah* and also represent the highest-risk jobs for investors. For this reason, it's more rarely used in IB, thereby reducing access to financial resources for SME companies. Debt-based contracts make up the majority of IB's assets, which disregards Islamic injunctions concerning moral, productive, and socially responsible business activities. Muslim investors are encouraged to invest in the permitted business activities through personal involvement in the establishment of new businesses or to enter into partnership agreements with private individuals or companies who do not have financial resources but have other resources for a successful business.

Tafri *et al.* (2011), in their paper, analysed the current practice and future trends in risk management methodology and Islamic and commercial banks in Malaysia and some banks outside of Malaysia. The aim was to identify the methods and tools used in the management of credit, market, and operational risk between the banks. It is concluded that there are significant differences in management practices and mitigation of risk in conventional and Islamic banks and that there is no coherence between the use of risk tools in one and the other banks. A probable reason is the different nature of the banking systems and the lack of tools for measuring risk-based interest-free financial contracts under *Shari'ah*. Due to the need for separation of capital for current and investment loans, Islamic banks need more capital compared to commercial banks. Further, the paper concluded that 73.3% of Islamic banks used the standardised approach to measuring risk, compared to 11.1% that used the foundation approach, and 5.6% have adopted the advanced IRB (internal rating-based) approach. Results of the survey of selected banks indicate that commercial and Islamic banks are planning to introduce the IRB approach to credit risk measurement in the future, but most of these banks are not ready for the application of the model at this time. The authors also concluded, and they suggested that risk management tools were inadequate and that it was necessary to enter the innovation and development of products for risk management in Islamic banks.

Chapra & Khan (2000) stated the numerous advantages of using the IRB approach: it enables mapping the risk profile for each type of asset individually, taking into account the diversified Islamic financing modes; it indicates the current risk exposure of banks according to their capital requirements; it is expected that this approach generates more

reliable information through the integration of internal and external information; and external credit assessment should be seen as a benchmark.

Hoque H. and Liu H. (2021) in their research also conclude that Islamic banks (IBs) have higher regulatory capital ratios compared to commercial banks (CBs), with both types of banks exceeding the minimum required capital ratios on average. While the regulatory capital of CBs has a strong correlation with asset risk, the same cannot be said for IBs. This finding suggests the lack of effectiveness of the regulatory framework of Islamic banking in managing asset risk.

4.2 Theoretical Framework of Islamic Finance: Islamic Moral Economy

The Islamic banking sector is going through fast expansion, leading to an increase in its obligations. The Islamic financial system is not simply a copy of the Western conventional banking system; it is based on a profound worldview. The Islamic banking system is an integral component of the Islamic economic system. AAOIFI (1428 H-2007) stated that Islamic banks were established on a principle that does not allow the division between worldly and religious affairs. The foundation necessitates adherence to *Shari'ah* as the fundamental principle governing all facets of life. This pertains to both religious practices and commercial dealings, which must adhere to *Shari'ah* principles.

The basic goal of the Islamic banking system, as a component of Islamic economics, is to promote social justice and human development by establishing an Islamic economic system. Islamic banking aims to not only be a successful financial institution but also to work for the welfare of all humanity, unlike other financial organisations.

The main goal of the Islamic economic system is to provide an economic framework that ensures human well-being by eliminating prohibited elements such as *riba*, *gharar*, and *maysir*, which are believed to produce social injustice. The Islamic banking system, as a component of the Islamic economic system, was intended to contribute to a certain purpose. However, it mostly concentrates on removing forbidden aspects from the financial system and overlooks the primary goal of the Islamic economic system. The Islamic banking system has successfully offered *Shari'ah*-based and *Shari'ah*-

compliant products to individuals but has not significantly contributed to the fundamental goals of the Islamic economic system.

4.2.1 Islamic Banking and Development: Problematization

Islam places a significant emphasis on human well-being and development, prioritizing it over mere economic prosperity. This holistic approach, as highlighted by Sadeq (1987), underscores the importance of considering various aspects of human life beyond just economic welfare. Chapra (2003) further elaborates on this point, asserting that while economic progress is crucial, it alone is insufficient for comprehensive human development. Mirakhor and Askari (2010) contribute to this discourse by arguing that human progress should be evaluated based on multiple dimensions, rather than solely relying on indicators like gross national income, as commonly accepted in Western paradigms.

Within the framework of Islam, individuals are granted the freedom to fulfil their basic needs, such as adequate nourishment, clothing, and fulfilling their responsibilities, provided that these actions do not bring harm to themselves or society. However, Islam cautions against excessive indulgence in such pursuits, recognizing that while they may offer temporary gratification, they could ultimately hinder societal progress in the long term. Instead, Islam advocates for a balanced lifestyle that encompasses self-care, familial obligations, and concern for others, thereby fostering holistic human growth.

Central to this concept is the notion of *Huquq-ul-Ibad*, which refers to the rights individuals have over each other. By respecting these rights and refraining from infringing upon them, both individuals and society at large stand to benefit, as elucidated by Hamid (2014). This interconnectedness underscores Islam's emphasis on fostering harmonious relationships and promoting collective well-being, which in turn contributes to overall human progress and societal advancement.

In the context of entrepreneurship, this perspective underscores the importance of considering not only economic gains but also the broader impact of business activities on individuals, communities, and society as a whole. By aligning entrepreneurial endeavours with principles of social responsibility and ethical conduct, entrepreneurs

can contribute to sustainable development and the well-being of all stakeholders involved.

Economic growth remains a pressing global concern, particularly given the pronounced economic disparities among nations. Three-quarters of individuals residing in underdeveloped nations collectively hold only around 15% of the world's income, while a mere 20% of the global population enjoys a staggering 85% of total global wealth (Melikidze *et al*., 1995). Addressing this disparity necessitates a collaborative effort among Muslim countries to bolster cooperation and mutual support, thereby fostering relationships that can significantly contribute to global prosperity, particularly within Muslim nations.

Across various sectors, numerous Muslim nations excel, showcasing leadership and innovation. For instance, Malaysia has emerged as a global pioneer in Islamic finance, offering innovative and reliable financial solutions. Meanwhile, Pakistan leads in the production of twenty different food products within agriculture, and Saudi Arabia, along with GCC nations and Middle Eastern countries, holds global leadership in the oil industry. Additionally, central Asian states such as Azerbaijan, Kazakhstan, Turkmenistan, and Uzbekistan are prominent players in the oil business. Turkey distinguishes itself as a major industrial goods provider to global markets, particularly in Europe and America, and its tourism sector is experiencing significant growth. Recognizing and embracing the leadership of these nations in their respective fields can strengthen interconnectivity among them, ultimately benefiting the Muslim community (Kureshi & Hayat, 2014).

Historically, Muslims shared a sense of unity and common identity under the notion of '*ummah*.' However, the fragmentation of the Muslim world following the collapse of the Ottoman Caliphate led to the rise of nationalism and a decline in ummah solidarity. Rebuilding robust economic, political, and defence cooperation among Muslim nations can facilitate a transition towards greater unity and collective progress. Such collaboration holds the potential to alleviate poverty and foster shared prosperity across Muslim nations.

Kureshi and Hayat (2014) shed light on the economic disparities faced by Muslim countries, highlighting the urgent need for long-term planning and strategic

interventions. Enhancing educational and healthcare infrastructure, creating job opportunities, and promoting sustainable economic development are imperative for advancing individuals and society as a whole.

In assessing economic progress, it is essential to move beyond traditional metrics such as gross national product (GNP) and per capita income. Instead, a more comprehensive approach, such as the UNDP Human Development Index (HDI) framework, incorporating indicators of social justice and inequality, is needed (ANTO, 2009). True progress requires structural improvements across society, economic advancement, reduced inequality, and poverty eradication. Only by addressing these multifaceted challenges holistically can meaningful and sustainable development be achieved (Todaro, 2014).

Human development includes health facilities, education possibilities, economics, quality of life, personal freedom, and environmental circumstances. The goal of human development is to enhance people's living standards and quality of life by empowering them. The concept of human development emphasises the significance of human progress. Islam promotes the eradication of poverty through acts of generosity and promoting equality among individuals. Many African Muslim countries score low in human development, whereas the Muslim countries excelling in human development are primarily oil-producing nations.

Omoniyi (2013) discussed the connection between lesser production and development in underdeveloped nations, attributing it to factors such as lack of education, skills, and inadequate health facilities. Islam may address these fundamental issues by mandating education and encouraging diverse sources of income for both men and women. Islam also emphasises maintaining a balance in wealth expenditure, which aids in accumulating capital. From these funds, Muslims must give *zakat*, which assists many individuals in society to become self-sufficient. In a capitalist system, governments levy substantial taxes on individuals' income, but in Islam, only *zakat* is mandatory, which is a modest fraction of people's income. There is a method called *infaq*, which involves spending money for the benefit of others with the hope of receiving rewards thereafter. These are the Islamic strategies that promote the flow of money. Shah (2013) suggests that in poor nations, *zakat* is the most effective alternative for stimulating investment, which can lead to increased production by enabling entrepreneurial

activity. This would provide employment possibilities, leading to individuals receiving earnings and incomes that enhance their quality of life.

Islamic banks' performance may be assessed using several ratio approaches. A study by the Jordan Islamic Bank for Finance and Investment revealed that short-term investments can enhance the profitability of Islamic banks (Saleh & Zeitun, 2006). Kader *et al*. (2007) found that Islamic banks in the UAE are less hazardous, more lucrative, and more efficient compared to conventional banks.

Asutay and Harningtyas (2015) researched the performance of Islamic banks concerning *maqasid al-shariah*. This research assesses the performance of Islamic banks in various Muslim and non-Muslim nations, such as Indonesia, Pakistan, Malaysia, Turkey, Qatar, and the United Kingdom. A detailed discussion was held on the performance of Islamic banks. Indonesia is the top performer in Islamic banking, followed by Pakistan, Malaysia, and Turkey. While these countries show satisfactory individual performance, the industry as a whole is lacking due to poor social and environmental performance. Many banks struggle with issues related to *zakat* distribution and a lack of support for educational grants and advertising. The industry's global performance has displayed encouraging trends.

The concept of development has evolved, leading to changes in the methodologies used to quantify development. Criticism of just using GNP and per capita income as measures of progress is based on the argument that several other indicators should also be considered. Several economists tried to propose other ways of evaluating progress using socio-economic indicators, but they faced criticism for overlooking distributional, social, and human welfare considerations (Desai, 2014).

Human development reports are a strategy used to demonstrate and analyse the correlation between human activities and their impact on human development. Work encompasses several forms of labour, including paid, unpaid, creative, caring, volunteer, and other activities, in addition to traditional occupations. These works are linked to human development and can impact it favourably or adversely, as stated in the Human Development Report of 2015.

Evidence of good progress in human development is evident globally. The UNDP Human Development Office reports that human development has been on an upward trend since 1990, resulting in billions of people experiencing an improved quality of life and a drop in poverty levels. Today, career options have expanded due to global integration and technological advancements. An indication of progress may be seen in the rise in global trade from $13 trillion in 2005 to $24 trillion in 2014. Additionally, out of the world's 7.3 billion population, 3.2 billion individuals have access to the internet. According to a data sheet released by UNDP, since 1990, thirty-four additional nations have been classified as extremely high human development countries, with their combined population increasing from 0.5 billion to 1.2 billion. Conversely, the population residing in nations with low human development has fallen from 3.2 billion to 1.2 billion. Human development is continually expanding worldwide. Economic growth is not the sole determinant of human development in a nation; there are several other elements at play. When comparing Cuba and Lebanon in 2014, their HDI indices were equal, indicating they both fell short of high human development. However, a significant disparity is observed when analysing their gross national income per capita. Lebanon's GNI per capita is more than double that of Cuba, according to the UNDP 2015 report.

It is crucial for governments to support initiatives that have a beneficial impact on human development in order to raise the global level of human development. Various occupations, like coal mining, have detrimental effects on the environment. Around fifty million individuals worldwide work in industries that directly or indirectly harm human development, as reported by UNDP. To enhance human growth, it is crucial to either shut down activities that hinder it or modify them to have a beneficial impact. Individuals employed in these industries should be provided with alternative employment opportunities in various areas to prevent financial hardship. Another approach to ending these types of jobs is to generate superior employment possibilities for individuals and guide them in that direction. It is crucial to raise knowledge among individuals to contribute to the advancement of society and future generations. Policymakers have a crucial responsibility to create laws aimed at addressing these concerns on both national and international scales (UNDP, 2015).

As per the Human Development Report by UNDP in 2015, there is a significant gender imbalance in the workforce. 72% of working-age males globally were employed, compared to only 47% of women. The cultural expectation in many countries places a disproportionate burden on women for household tasks, which may impact their ability to contribute to social work. Women contribute more to labour overall than men. Reportedly, women produce 52% of worldwide work, while men contribute 48%. This disparity persists in terms of employment incentives. According to the survey, 59% of work worldwide is paid, with 41% being unpaid. Within paid employment, 38% is attributed to males and 21% to females. Out of 41% of unpaid work, 31% is done by women, and 10% is done by men.

The UNDP has been consistently releasing human development reports since 1990. The system includes many indicators, including the Human Development Index, which assesses three elements of human development: per capita income, life expectancy, and literacy rate (ANTO, 2009). This approach to assessing human development is quite successful; however, some economists have pointed out some limitations. McGillivray (1991) raised doubts about whether the HDI is truly an indicator of progress or a tool for comparing nations. Hicks (1997) proposed including the GINI coefficient in the calculation of the Human Development Index (HDI) across all its variables.

Human Development Report 2023-2024 highlights a critical moment in global development. It addresses significant challenges such as increased inequality, political polarization and the urgent need to recreate cooperation in an increasingly divided world. The report highlights a reversal in the two-decade trend of narrowing inequality between rich and poorer nations, noting that this "stagnation" is significantly holding back human development and contributing to worsening global divisions (UNDP, 2024). The persistence of gender-based disparities is highlighted through the Gender Inequality Index (GII), which shows continued challenges in health, empowerment, and labour market participation, underscoring the global struggle to achieve gender equality.

Góes and Bekkers (2022) examine the impact of geopolitical conflicts and the potential decoupling of global trade blocs on economic growth and technology diffusion, using a dynamic multisector multiregional general equilibrium model. Their findings suggest that dividing the global trading system into two blocs would decrease global welfare by

approximately 5% by 2040 compared to a no-decoupling scenario. The study highlights that the welfare losses from decoupling would be unevenly distributed, with Western bloc countries facing losses between 1-8%, while Eastern bloc countries could see losses ranging from 8-12%. The largest negative impacts would disproportionately affect lower-income, less productive countries, typically in the Eastern Bloc, highlighting the benefits of maintaining a multilateral trade regime (UNDP, 2024).

The Muslim population is dispersed throughout several nations and countries, making it challenging to assess their performance in terms of human development. Examining the human development reports released by UNDP reveals that Muslim nations exhibit a wide range of human development levels, spanning from extremely high to very poor. Only a small number of Muslim nations have a very high or high level of human development, while the majority fall into categories with medium or low levels of human development. Allocating funds for quality education and healthcare facilities is crucial to enhancing human development in several Muslim nations. Education and health budgets in many Muslim countries are insufficient, thereby impacting human growth in these nations. Several Muslim nations have enhanced human development circumstances. Those with lower levels of human development might emulate their path to elevate living standards (Sajjad, 2020).

Human growth in Islam is a sacred endeavour that aligns with the principles of Islam. The *Quran* and *Sunnah* promote the well-being of humanity. The comprehensive goal of promoting the well-being of humanity may be accomplished through the objectives of *Shari´ah* (*Maqāsid al Shari'ah*). Imam Ghazali stated that the *Shari'ah* aims to enhance the welfare of all humanity by protecting their religion, human essence, intellect, descendants, and money. Anything that guarantees the protection of these five elements benefits the public and is considered favourable (Chapra, 2000).

Islamic economic theory lacks operational axioms, resulting in a significant disparity between the current Islamic banking system and the goals of the Islamic economic system. The Islamic financial system is more aligned with the neo-classical conventional system than the Islamic economic system. The Islamic financial system's neo-classical conventional nature has hindered its ability to support the Islamic economic system, which is focused on the welfare of all humanity (Asutay, 2007).

Measuring the performance of Islamic banks according to the Islamic moral economy framework is essential to assessing how well Islamic banking and finance are adhering to its principles and promoting social development, as stated by Asutay (2012).

Islamic banking and financial operations lack social justice since they primarily focus on prohibiting *riba*. To address this issue, it is necessary to develop alternative banking models, Islamic social banks and Islamic community development banks. The creation of innovative Islamic banking models will aid in the advancement of human lives, with a primary emphasis on society (Asutay, 2008).

The Islamic idea of growth encompasses both material and moral dimensions. Islam emphasises both the material and moral needs of humans, including ethical and social aspects. Sadeq (2006) describes Islamic growth as the enhancement of both tangible and intangible requirements of humanity. It aims to achieve progress by advancing, reorganising, and reorienting, as well as by enhancing the spiritual aspects of the entire social and economic system. This approach should adhere to the authentic principles of Islam.

Ahmad (2006) proposed an alternative Islamic perspective on development, suggesting that comprehensive economic progress may be attained through *Tawhid*, *Rububiyyah*, *Khilafah*, and *Tazkiyah*. This strategy can lead to economic progress in all dimensions, including material, moral, and spiritual components. This initiative aims to create a system that may enhance the quality of life in Muslim nations through high-quality production. It also encompasses technical advancement. This form of advancement has the potential to enhance Muslim nations and unify them.

The Islamic economic system in the West is associated with Islamic foundational movements aiming to establish Islam as a comprehensive system governing all aspects of life (Bjorvatn, 1998). Following their defeat in the 1967 war against Israel, many individuals in the Arab world attributed the loss to their failure to adhere to Allah's commands. Consequently, basic movements attracted a large number of followers due to their advocacy for the reinstatement of Islamic law. They thought that Islam had the power to alleviate societal issues, whether they were social or economic in nature. This perspective attracted notice due to poverty, unemployment, and inequality in Islamic nations (Marty & Appleby, 1993).

Western scholars often argue that Islamic law places less emphasis on human achievement and monetary prosperity. Muslims prioritise the afterlife above their current lives. They believe that this type of activity is detrimental to economic progress (Nienhaus, 2013). The well-being of mankind is a fundamental aspect of Islamic law. The entire Islamic economic system is founded on the well-being of humanity. The distinction between conventional and Islamic economic systems lies in the belief that the Islamic system focuses on the prosperity of individuals not only in this world but also in the hereafter life, whereas the conventional system primarily promotes financial success in this world. Comparing the conventional and Islamic economic systems reveals that the Islamic system is more extensive and inclusive. The objectives and purposes of the Islamic economic system can be advantageous for humanity.

The primary problem with the Islamic economic system currently is that it remains theoretical and has not been fully implemented. It is not established globally, including in Islamic nations. One challenge of the Islamic economic system is that Islamic banking, as a component of this system, is not meeting its genuine goals. Asutay (2015) pointed out a significant disparity between the Islamic banking system and its goals. The societal failure is attributed to the fact that the Islamic banking system operates within the conventional system and lacks a baseline to entirely eradicate the element of riba from its operations. He mentioned that the Islamic banking system is only duplicating conventional items for the market rather than benefiting society.

Asutay (2007) stated that the Islamic banking system has deviated from its original objectives due to the sluggish advancement of Islamic economics and the influence of the riches from Gulf nations, which has led to a more liberal operation of Islamic banking. Islamic economics established fundamental principles for the Islamic banking system but did not offer practical guidelines, leading Islamic banking to embrace conventional operating principles.

Asutay (2012) pointed out the insufficient socio-economic growth in the Islamic banking sector. Additionally, the sector tends to focus on short-term investments in real estate rather than long-term investments in production, industry, and agriculture. This behaviour demonstrates its concentration and preferences. Asutay (2015) attributed the lack of collaboration between moral and social expectations and the operations of Islamic banks to the insufficient grasp and attitude of Islamic experts on Shariah on the

Shari´ah boards of Islamic banks. The academics are emphasising form (intentions) while overlooking the content, which is the essence of Islamic moral economics.

Economic growth is associated with financial development, a relationship that many economists are now studying (Hassan *et al*., 2011). The Islamic banking system aims to offer Sharia-compliant financial products and expand its role in society's growth. Establishing a prosperous Islamic banking and financial system is essential to fulfilling its core objective of promoting human growth.

Islam emphasises the need to boost output by investing money rather than hoarding it through saving. Islam promotes spending money to enhance the living standards of the poor and middle class, since increased expenditures by the wealthy may stimulate the economy and enable the less fortunate to raise their income levels. Poor individuals will be able to invest in education, food, and healthcare with these earnings, leading to societal growth (Saleem, 2008).

Islamic banking and finance focus on asset-backed transactions to enhance productivity and stability in the economy, whereas conventional banking relies on debt-based transactions that can lead to increased debt and financial instability in society (Chapra, 2008). Hassan *et al*. (2013) said that social obligations should be included in the framework for evaluating the performance of Islamic banks. Mohammed *et al*. (2008) recommended using the *maqāsid al shari´ah* approach to assess the performance of Islamic banks.

Shahid Saleem (2008) stated that the lack of an Islamic economic system hinders resources, production, and distribution, leading to inflation. He proposed remedies to the difficulties, suggesting that providing financial support to small and medium firms, growing agriculture, and collecting *Zakat* from individuals and corporations may help alleviate the issue. *Qard e-Hasan* is also capable of addressing these issues. Utilising Islamic finance modalities is crucial as they enable the accumulation of financial resources to support lucrative and safe enterprises. Implementing a universal banking system that closely resembles Islamic banking will decrease reliance on commercial banks. The banking system should provide loans to individuals with strong credit ratings and security holders.

Evaluating banks' performance is crucial to assessing their fulfilment of commitments to stakeholders and compliance with *Shari'ah* principles (Janachi, 1995). Economists view development as beneficial if it contributes to the reduction and eradication of poverty, unemployment, and inequality in society. This may be accomplished by using resources to create essential goods like food, shelter, and healthcare and ensuring their fair distribution. This can be done by enhancing people's living conditions and offering them economic and social opportunities (Todaro & Smith, 2015; Seers, 1969). Many Muslim nations, including those in Africa and Asia, struggle to provide basic requirements to their populations, with a huge number of people living below the poverty line. Muslim countries have a responsibility to utilise their resources to address this issue.

According to data from the World Bank (2023), poverty estimates remain virtually unchanged, except for South Asia and Sub-Saharan Africa where there are upward revisions in poverty estimates. For example, the rate of extreme poverty, as measured by the international poverty line of $2.15, increases by 1.9 percentage points to 10.5% for South Asia and by 0.5 percentage points to 35.4% for Sub-Saharan Africa. Globally, extreme poverty is estimated to increase from 8.5% to 9%, representing 41 million more people living in extreme poverty in 2019. At the $3.65 poverty line, India accounts for 40% of the slight upward revision of the global poverty rate from 23.6% to 24.1%. At the $6.85 poverty line, virtually no change is observed in global poverty estimates.

Over the past decade, the Islamic banking sector has seen significant growth and evolution. The Islamic finance industry has continued to expand, with an estimated growth rate of around 10% in recent years, driven by increased demand for Islamic finance products and increasing market share in majority Islamic finance regions such as the Gulf Cooperation Council (GCC) countries and Southeast Asia (S&P Global, 2023).

However, challenges related to short-term investment preferences, as Asutay pointed out in 2012 and 2015, have seen some developments. Recent trends point to a broader approach, which includes long-term investments and diversification beyond traditional real estate sectors. For example, there has been increased activity in sectors such as agriculture and infrastructure through Islamic financing mechanisms (Islamic Finance News, 2022). In addition, sukuk (Islamic bond) markets have seen significant activity,

although issuance volumes have fluctuated due to various economic factors (Global, 2023).

Efforts to introduce the axioms of Islamic moral economics into standard business and financial flows have brought Islamic finance closer to alignment with global sustainability and ethical financing principles, which reflect the core values of the Sharia that emphasize ethical and social considerations.

Furthermore, international cooperation and regulatory development of the Islamic financial sector, as well as the improvement of regulations for commercial banks, have influenced the good positioning of the Islamic financial industry. Institutions such as the International Monetary Fund (IMF) have emphasized the importance of Islamic finance for financial stability and inclusion, especially in Muslim-majority countries (IMF (2017)).

Although the Islamic banking sector continues to face various challenges, its journey over the past decade suggests significant changes in globally integrated financial practices that are somewhat aligned with economic and ethical goals.

4.2.2 Islamic Political/Moral Economy Framework

Modern economic science, as we know and research it today, originates from fundamental theoretical revolutions that took place from the middle to the end of the 18th century. During this period, the foundations of the neoclassical orthodoxy that still dominate economic thinking were developed. The central discussion of that time, which is applicable today, was between the concept of homo-economicus, developed by Adam Smith, and homo-sociologicus, advocated by Emile Durkheim (Screpanti, 2005) (Screpanti et al., 2005). Smith's perspective emphasizes economic individuality and self-maximization, while Durkheim emphasizes the importance of social structures and their influence on economic decisions.

Classical political economy uses empirical methods and rational analysis to understand market forces and economic behaviour. Founders such as Adam Smith, David Ricardo, and John Stuart Mill focused on individualism and the market mechanism as key components of economic theory. The main goal of classical political economy is the

optimization of production and efficiency, which is considered crucial for economic growth and development (Moore, 1988) (Moore et al., 1988).

The goals of a common political economy tend to focus on three key aspects: materials, efficiency, and marketing, but also in recent years on social responsibility, green energy and the UN Social Development Goals. However, the Islamic political economy extends these considerations not only to material success but also to spiritual development, with the goal of ultimate success in both this life and the hereafter. More recently, this perspective has evolved to further encompass concepts such as sustainability and the well-being of people and the planet. This broader approach reflects a holistic view that integrates economic activities with ethical and environmental management.

Unlike classical political economy, Islamic political economy is based on principles derived from Islamic revealed knowledge, which is found in the main sources of Islam, namely the *Qur'an*, *Hadith*, *Ijma'*, and *Qiyas.* Islam is defined as a religion of perfection that encompasses all matters including spirituality, morality, ideology, education, sociality, economy, and politics with the guidance of these areas stemming from *Quranic* injunctions. Therefore, we can comfortably assert that Islamic political economy enjoys a *Quranic* epistemology. As such, it gives a divine and definitive understanding of all aspects of life. This is in contrast to political economy that follows a human-centric approach, which due to the nature of human development will change greatly with time.

This school of economics places ethical and moral imperatives at the centre of economic analysis, emphasizing concepts such as fairness, prohibition of *riba* (interest), and social justice. Islamic political economy strives for an economic system that refers to the common good, spiritual satisfaction and social cohesion (Wilson, 2001; Khan, 2013).

Asutay (2007), as an important theorist in the field of Islamic political economy, particularly emphasizes the role of political factors in the success of Islamic financial institutions. According to Asutay, political support and social awareness of Islamic financial principles determine the successful implementation and maintenance of Islamic economic models.

Although classical political economy strives for material wealth and efficiency, Islamic political economy directs economic activity towards the achievement of higher spiritual and social goals. Their differences lie in principles and goals: while classical economics values individual success and market competition, Islamic economics emphasizes community, ethics and moral values in everyday economic transactions (Kahf, 2003; Karadogan, 2014).

Understanding the differences between classical and Islamic political economy is the basis for expanding perspectives on how economic systems can affect society. Islamic political economy provides an alternative perspective on global economic challenges, proposing models that can be used to address issues such as inequality, environmental sustainability and social justice. Through this approach, the Islamic political economy not only transforms the financial sector but also offers new paradigms for a more sustainable and fair global economic system.

4.2.3 Evolution of Islamic financial products and impact on entrepreneurship development

The research aims to explore available literature indicating the evolution of Islamic business models which promoted entrepreneurial activities across different historical stages since the beginning of Islam. We can identify three historical stages of their development: the early period of Islam (infant stage), the evolution of Islamic law (expansion of business modules), adoption of Islamic business modules into finance (*Shari'ah* compliancy stage).

Entrepreneurship plays a crucial role in boosting the economy by creating new jobs, contributing to tax revenues, fostering innovation, and promoting the prosperity of Muslim societies. It also generates halal wealth and aligns with Islamic principles, driving positive social and political impacts such as reducing poverty and enhancing economic independence within Muslim communities. Additionally, it enables fair and equal opportunities for business growth under *Shari´ah* compliance, with the ultimate goal of achieving Falah, which is the main objective of all.

4.2.3.1 Islam as an Entrepreneurial Religion

Gumusay (2015) attributes entrepreneurial activities of the Islamic realm, which include not only the socio-economic perspective, as profit-ESG oriented, but also extend its objective to religiospiritual goals such as pleasing Allah and achieving success in this life and the afterlife. Therefore, the success of an entrepreneurship venture is not measured by profit-loss as the only criteria, it has a much wider scope of measuring success, such as a religious aspect or spiritual growth and understanding of profit-loss as *a rizq* (sustenance) increase. Moreover, interlinking entrepreneurial activities along with socio-economic/ethical and religious-spiritual pillars proves the embeddedness of religious pillars into entrepreneurship activities for the sake of not only profit maximisation but also human development, poverty reduction, reaching social justice, and hereafter reward. Furthermore, Islamic financial products and legal forms of keeping the business viable and sustainable within the borders of *Khilafa* have not frequently been the topic of the scriptures (revelation) interpretation and application to the context. Governance regulations and support to improve and excel at entrepreneurship activities through pure Islamic financial products have been marginalised in the past, and this reflects on Islamic entrepreneurship in today's modern life on micro, mezzo, and macro levels.

Ever since Islam was raised on the Arabian Peninsula, it has coexisted with different cultures for the past 14 centuries under different social, religious, and historical structures, yet it has kept its capability to cope with it through universal religious pillars (Adas, 2006). He has proven that true Islam promotes prosperity along with economic and human prosperity (*homoislamicus*), aiming to fulfil both economic and ethical (human) purposes. It is aligned with the verse from the Qur'an: "When the prayers are ended, disperse and go in quest of Allah's bounty" (Quran, 62:10). Hence, he attributes that the purpose of entrepreneurship based on Islamic perspectives has higher importance than conventional entrepreneurship (homo-economicus) or religious narrow view (homo-*traditionalius*).

Furthermore, we will explore some reasons for slowing down the development of Islamic business products, which are essential for enhancing entrepreneurial activities and flourishing. It becomes a fundamental factor for economic growth, human development, job creation, worldwide economic leadership, justice, and equity. The

absence of entrepreneurial innovations and mega-corporations without deep roots often leads Westerners to incorrectly believe that Islam hinders economic growth due to its perceived conservatism and conformity. However, this belief is refuted by Adas, Gumusay, and Kuran.

Hence, in the writings of Adas, Gumusay, and Kuran, we find that Islam, from its early stages, promoted entrepreneurial-oriented activities, as it is embedded in the business modules of Islamic commercial law. The following sections will elaborate on these modules within the entrepreneurial context.

4.3. Historical Overview of Islamic Business Models

Islam represents a holistic approach to the religious, social, economic, and political aspects of human life under universal laws, guiding mankind towards *falah* in both the here and hereafter worlds. Therefore, as discussed earlier, Islam does support the economic development of societies by not limiting market forces and the market economy, availing of free market competition, recognizing private ownership, and ensuring the rights of all parties. Hence, economic activities and transactions are operated under specific business models or contracts that are recognized and adopted by the *Shari˙ah* law, as some of them existed before the birth of Islam. Furthermore, Islam has generally permitted all types of financial transactions and contracts, except those that involve *Riba* (usury or interest), *Gharar* (uncertainty and speculation), prohibited transactions (which involve trading pork, pornography, gambling, or alcohol), and dealing with unlawful goods and services. In addition to the above-mentioned, major difference between Islamic and conventional finance (the capitalistic approach), the primary purpose of doing business in Islamic finance is not maximization of profit as is the case with its conventional counterpart. The primary purpose or objective of economic activities from an Islamic perspective is to conduct them per the values of Islam for human-centric development.

4.3.1 *Musharakah* model

Musharakah 'Shirkah' means partnership, which allows partners to pool economic resources such as money, services, and goods into mutual business.

By its nature, *Musarakah* represents a non-debt and equity-payoff contract based on profit and loss sharing, contrary to rigid commercial debt-interest-based arrangements from financial institutions. The nature of this contract is a partnership *(shirkah).*

Shirkah is originally a pre-Islamic business model which has been Islamicized and officially introduced/recognized through *fiqhi* literature in the 9th century (Udovitch, 1965). According to historical resources, it is found that *Musharakah* was originally practised in the Near East in the era of the Babylonians, and through trading routes, they spread to the Arabian Peninsula and other parts of Asia (Yasseri, 1999).

Musharkah played a significant role as a business model in economic growth in the first two Hijri centuries or so-called the Golden Age of Islam, where the governance of the Islamic state spread on 4 continents and business opportunities did so (Haque, 2017). Unfortunately, the successful continuity of the *Musharakah* model opportunity in the post-formative and contemporary Islamic ages was not recognised in the right capacity and context, mostly due to jurists' poor attitude towards utilising it through financial institutions, as will be explained in the upcoming text.

Therefor*e,* the *Musharakah* used to be deployed in several forms, according to *fiqh* literature:

- **i.** *Shirkat-ul-Milk* is a joint partnership in property for two or more persons, such as the mutual ownership of real estate property or a compulsory partnership in property owned by inheritance.
- **ii.** *Shirkat-ul-Aqd,* or partnership by contract, is formed by two or more parties for commercial ventures and is also subdivided into the following:
- **iii.** *Shirkat-ul-Amwal,* or trade partnership, is defined as pooling the money of two or more parties into mutual business for commercial purposes.
- **iv.** *Shirkat-al-Abdan* is a labour (service) partnership where two or more parties are involved in the delivery of a type of service to a third party, upon which revenue and profit are shared among partners.
- **v.** *Shirkat-al-Wojooh,* or partnership in goodwill (credit partnership), is where two or more parties purchase goods on credit for a deferred price and resell them with margin profit.

Mudharabah, or silent partnership, is where one of the parties provides the capital (investor or silent partner) and another partner(s) provides labour, representing business operations and management. The financial loss is fully borne by the silent partner, where the profit (if found) is shared among all partners.

In a sum, it is obvious that the *Musharakah* business model hasn't changed much from its original form since the mediaeval era. Moreover, the jurists had failed to improve and enhance this type of business model into corporative forms, which bring more advantages in contemporary ages such as limited liability, unlimited life of company, liquidity, management, and legalisation of formal artificial entities (businesses with limited liability). All of these advantages were rooted 14 centuries ago in the *Musharakah* business model, which was supposed to be "mined" and explored with no limitation imposed for the greater prosperity of markets and economies rolled under Islam. This might also be one of the major reasons why the Industrial Revolution did not happen in the Islamic world, and therefore Muslim societies were declared backward in terms of technological and human development.

4.3.2 *Mudharabah* model

Mudharabah, also named by *Muqaradah,* is a non-debt business model that falls under the *Shirka* type limited liability contract, which constitutes a partnership between the principal (Rabb-u-Mal), who provides the funds (capital), and the agent *(Mudharib),* who provides a labour service in the form of management and business operation activities. Therefore, this business model constitutes a partnership between capital and entrepreneurship in the contemporary world. Its origins are linked to the Babylonians, from whom it was transferred to *Makkanian* traders (Udovitch, 1965). *Mudharabah* models have been confirmed and accepted by the Prophet pbuh and the consensus (ijma') of scholars. It was probably adopted in the early age of Islam because it avoids riba (interest) and allows the principal (Rabbul mal) to deploy labour without a fixed rate (wage) (Lone, 2016). Therefore, shariah law recognises two types of this business model: *Mudharabah Muqayada* (restricted *Mudharabha),* which refers to specific business ventures, and *Mudharabah Mutlaqah* (unrestricted *Mudharabah),* which refers to unspecific business ventures that depend on agent *(mudharib*) choice.

The main constraints or disadvantages that have been addressed in this type of business model are the high financial risk of the principal (100%), which created an agency problem, while the profit (if any) is divided among the principal and agent as per pre-agreed terms. Furthermore, it is also noticed that control over management and spending (cash flow) can create another problem, such as asymmetric information and moral hazards. In addition to the above-mentioned, trustworthiness is one of the major conditions before entering this type of agreement, which can be compared with today's screening and prequalification conditions for business proposals.

However, recent research on this subject has attributed that the *Mudharabah* model was successfully utilised in the first two centuries primarily due to the dynamism of jurists and the ongoing *ijtihad*. Hence, the inability to utilise *Mudhrabah* in financial intermediation as a main instrument to support entrepreneurial activities goes back to jurists' intellectual inability or limitation to respond to innovative challenges and economic decline of the Muslim world caused by static ijtihad by adopting the taqlid instead of establishing proactive and corresponded ijtihad to the actual market and entrepreneurs' requirements. Yet, there is a call for scholars and jurists to reconstruct this type of business model, considering the bottom-to-top superstructure and the implementation of dynamic contemporary ijtihad in order to support the growth of entrepreneurial activities (for example, the development of hybrid products such as preferred Ijarah PPI).

4.3.3 Debt Instruments Models

Murabaha (sale with a profit margin), as the name states, is a sale business model where the seller discloses the original price and adds a profit margin while offering it to the buyer. The terms and conditions of the Shariah compliance contract apply. When the original price of the selling item is not known, then the contract is named *Musawah*, and no profit margin is considered because the sale is processed through bargaining (Musawah Knowledge Building Working Group, 2018).

Murabaha as a mode of financing can be applied only in transactions where a commodity is intended to be purchased. Therefore, financing company overhead by using this type of mode will not be appropriate. If the buyer does not intend to purchase

a specific commodity but instead uses it for other purposes, the transaction is questionable.

This type of business model can be applied in business financing when *Musharakah* or *Mudharabah* do not work but are under the condition of a specific commodity purchase with a deferred payment option.

4.3.4 *Ijarah* Model

Ijarah in Arabic refers to giving something on rent, which describes *Ijarah* primarily as a business model rather than a financing model. Islamic jurists differ between the two meanings of the *Ijara*. The first one is related to hiring someone's professional services against a fixed wage as consideration for his services (freelancers). The employer is called "*must'ajir*," while the employee is called "*ajir*". Another type of ijarah is the classical operational lease model related to the use of assets, which applies to assets and property only with nonservices included. Therefore, the lessor is called *mu'jir*, the lessee *musta'jir*, and the rent "*ujrah*" (Yanthiani, 2020).

Some conventional financial institutions have adopted the leasing model instead of long-term lending based on interest. This type of arrangement is called a financial lease, which is not permissible according to Shariah rules. Therefore, as mentioned in the *Murabaha* models, it is prevailing that *the Ijarah* contract in its financing capacity has not been utilised, especially when talking about financial leases, because it involves interest as a concept.

4.3.5 *Salam* Model

Salam (sale with advance payment and deferred delivery) is a financial model that is approved by the Prophet Muhammad in order to avoid debt and interest. Salam is intended to support the financing of small farms and traders in return for the delivery of an agreed commodity, considering quality and quantity, at a certain delivery date. Therefore, this type of business model is considered a debt instrument that can be used by financial institutions, especially for agricultural purposes. However, the Salam model remains limited to financing other industries as it involves the purchase of commodities. Furthermore, dealing with commodities instead of money creates the

main obstacle for Islamic finance institutions to operate within the modern conventional banking system. This might require major changes in the approach to Islamic finance institutions in order to actualize this type of financing in the market, especially for start-ups and entrepreneurial activities (Abdulazeem, 2010).

4.3.6 *Istisna* Model

Istisna (custom-built preparation of manufactured or other durable assets) is another form of indebted sale contract used to order the manufacturing of specific goods. The Istisna contract can be cancelled at any time before starting manufacturing, and payment is made upon delivery of the intended manufactured goods.

In the modern finance system, *the Istisna* model could be suitable for use in the real estate sector or specifically for the construction of houses or buildings. The payment terms and conditions might be discussed between parties and accordingly considered through different forms of arrangements, such as BOT (buy, operate, and transfer arrangements) (Markom, Engku, 2012). Again, if the *Istisna* is intended to be used for financing start-ups or entrepreneurial activities, then Islamic finance institutions shall consider its nature and adopt the terms and conditions. For example, this model is suitable for financing a project where delivery of manufacturing goods is involved.

In short, since the birth of Islam until the middle of the 20th century, the abovementioned Islamic business models have been utilised by entrepreneurs and businessmen under *Shari´ah* jurisdiction as a form of undertaking trading and other business activities between individuals without involving institutions as intermediaries (Greuning & Iqbal, 2008). These models have defined the business relations between individuals under Shariah law for a long time by serving their purpose and assisting individuals to achieve Falah. It is found that this pre-modern age, and especially the golden age of Islam, has been depicted as a very successful period where jurists and rulers positively responded to the market needs of Muslim societies by facilitating business models found in use that were adopted and Islamized under *Shari´ah* law without any hesitation. This proves the innovativeness of opportunities in non-religious practices is accepted under *Shari´ah* compliance rules.

4.4 Evolution of Business Environment

Besides the business models that were adopted and established to carry on the business activities under *Shari'ah* law, the system has recognised the need for a supervisory or regulatory body that will be accountable to ensure that all transactions are lawful, in addition to quality control to avoid any fraud or business ethical misconduct. In later years, it took the name of *Hisbah,* which was acting on behalf of the public to resolve any kind of dispute and to ensure justice under the general motto of commanding good and prohibiting evil. The *Hisbah* institution was recognised and established by the government from the early age of the Muslim community in Madinah, and it continued to have a significant role in the organisation of markets until the end of the Ottoman Empire in the 20th century.

The second important movement that played an important role in the business environment operated within the Ottoman state is what is called *Akhlisim,* or brotherhood. The non-government movement has been recognised by the state, and it is a product of mutual solidarity among traders and craftsmen to comply with business ethics for the sake of social benefit maximisation.

The third phenomenon in the Ottoman Empire was the rise of the Cash *Waqfs* in the 15th century, which played a significant role in the socio-economic development of communities with the stress on those newly conquered lands where the Muslim community started to grow. It is a very unique financial non-interest model for supporting small businesses, which acts as a financial intermediary to provide funds for business ventures. Under this scope, it can be recognised as the forerunner of the modern Islamic Finance Institution.

4.4.1 *Hisbah* regulatory (accountability) body

The Prophet (pbuh) set up the free market in Madinah upon establishing the Muslim community in order to enable economic activities and the growth of the young Muslim community. Therefore, economic activities were permitted under the surveillance of Shariah law and the personal monitoring of the Prophet pbuh, what was later called '*Hisbah*'. It derives its authority from the Qur'anic general apostolate to command good and prohibit evil: "And from among you there should be a party that invites good,

enjoins the right, and forbids the wrong" (Al-Qur'an). Also, the *Hadith* provides general guidance to terminate evil whenever it occurs by doing as the hadith narrates: "Whoever amongst you sees an evil, he must change it with his hand; if he is unable to do so, then with his tongue; and if he is unable to do so, then with his heart; and that is the weakest form of Faith". After some time, the Prophet (pbuh) appointed Umer ibn Al Khattab as *Muhtesib* (administrator of the market) to watch over the market in Madinah and also Sa'd ibn Al'As in Makkah.

Hisbah, or protection of the public interest of the community, has a main objective to ensure that all economic transactions are done in *Shari'ah* compliance and that all qualitative & quantitative requirements are met. Moreover, it refers to a much wider scope of activities related to market supervision and government policies which include the following: checking the quality, quantity and measures of goods in the market, resolving complaints of the public in the front of administrative department, preventing fraud or any misconduct in the market, regulating weights and measures in the market, control over the artificial increase in prices, ensuring that all transactions are lawful. This controlling mechanism continues to be developed and plays an important role in economic sustainability within *the Abasid* rule. Sometimes, *the Muhtseb* role was reflected through jurists and other officials, but it remained within the original capacity of regulating market activities under business ethics.

During the Ottoman era, it also played a very important role in monitoring internal and external business activities by ensuring compliance with Shariah law and commercial law. As a result of the Ottomans' efforts to protect markets from fraud and prohibited activities, new mechanisms or policies were adopted, such as *the Nerkh* system or price protection system. *The Nerkh* system helped in the elimination of price monopolies and the rise of black markets. Moreover, it has also contributed to maintaining demand and supply of goods in order to avoid inflation.

When the soldiers (military) started to interfere in economic affairs (shifting trade routes from land to sea), the Islamic organisational institutions started to lose their credibility and importance in overcontrolling markets.

The *Hisbah* plays an important role in the construction of society and in setting justice by imposing compliance with work ethics standards based on divine Shariah objectives.

Therefore, it represents the independent institution or regulatory body between the public and official administration in terms of social and economic control, business ethics and market regulations, and prevention of monopolies, cheating, fraud, and corruption. Hence, its importance and higher objective are not only lawful economic transactions but also assisting individuals to achieve the *Falah* in this and the hereafter.

This review of *Hisbah* shows the dedication of the state towards stability, equity, and justice from its first stages across its formal existence. Moral economy is embedded in Islamic jurisprudence and practical commercial systems in the form of standardised systems, protection of customers, quality control, and development of communities. Besides its regulatory-economic-based objective, the primary role is achieving justice in the community (Md Shah *et al*., 2013).

4.4.2 *Akhilism* in the Ottoman State

Akhilism (brotherhood) associations have been found among Ottoman cities since the 13th century, which attributed to the development of socio-economic factors within communities such as ethics, production, and trade, aiming for social benefit maximisation under the umbrella of lawful usage of economic opportunities. It was a professional non-governmental organization(s) to promote moral values in societies, especially among tradesmen and entrepreneurs (craftsmen) who were expected to be dedicated to religious values and ready to accept *Akhi* principles based on two rules:

- Social Rules: obey the orders of God and avoid interdictions; be hospitable and helpful; embrace people without taking into consideration religion and cult; not talk against people; resist cruelty and injustice; try to guide people to the right path; and not have hatred and enmity towards anyone.
- Economic Rules: make do with little, be generous, love and entertain guests, don't cheat and don't lie in trade, help the weak that are fair over the strong that are unfair, be accurate, give priority to public interests, consider manual labour sacred, and don't burgle (Chowdhury & Somani, 2020).

Therefore, *Akhism* associations represented a central control for material supply channels, the production of goods, and sales. At the same time, it has created a bridge between the state and citizens. Furthermore, the functions of these associations were

related to various sectors, such as labour unions, consumer rights protection, chambers, and quality control. In small towns, the association represented all small businesses with no difference in terms of industry, while in larger cities, each industry had its association.

From a business ethical perspective, *Akhism* promotes production in the capacity to meet the essential needs of the community by applying high quality and the finest product design. On the other hand, the association was very strict towards prohibited activities and acted against illegal or non-moral production, avoiding products that may be harmful to *ummah*. This concept establishes *Akhilism* as a filter for what is now known as ESG standards, which emerged in the West a century later.

In addition to the previous importance of the ethical factor, *Akhism* also played a very significant role in training and qualifying highly productive and moral entrepreneurs through an established comprehensive education system, considering unlimited respect for the elders. The education of new entrepreneurs was conducted over nine years based on a master-trainee relationship divided into three completion stages.

This approach to building socio-economic societies was very unique, and it lasted until the end of the Ottoman Empire. By this time, it had modified and changed its objectives due to economic challenges related to the supply of raw materials from abroad and the involvement of non-Muslims in associations, which led to changing the name to Lonca, which has a much stronger financial and administrative focus than *Akhilism*, whose primary concern was ethical issues (Ozbirecikli, 2010).

4.4.3 The Cash *Waqfs* in the Ottoman State

The institution of Cash *Waqfs* emerged in the 15th century as an extension of charity institutions, and it was shaped within the Ottoman economic mindset to finance the investments made to improve social benefits and social welfare. It is represented by the possibility that anybody, poor or rich, could donate any amount of cash to the Cash Waqfs pool, which was not limited only to the financing of charitable activities but was also accessible to relatively small traders and entrepreneurs (artisans, craftsmen, and merchants) in the form of a non-interest loan to finance their business ventures. As a secondary purpose, it offered financial intermediation services where neither the

interest rate nor the high-profit rate target was imposed by the financier (*Waqfs*). The only purpose or objective was to facilitate the needs of the poor (charity works), public expenditures (such as education, hospitals, public roads, and travellers' resorts), credit, and financial transactions. Several legal forms were used according to waqfs notary documents, mostly accepted, and approved by *Shari´ah* jurisdiction: *bey'i istiglal*, *bida'a*, purchase for re-renting, *istirbah* in military court, *mudarabah*, *murabahah*, operations and transactions at the Ministry of *Awqaf*, and *qard hasan*.

The Ottomans created Cash *Waqfs* institution as a self-sustainable economic system to improve the social welfare of all inhabitants on their lands through a balanced distribution of wealth channelling the funds to those in need and investing surplus funds to high-returns producing activities. It created a sustainable endowment model in the Balkan countries under Ottoman authority which later expanded to other parts of the Empire. Even today, some of the endowments established at the time of Ottoman rule still exist, such as those in Bosnia Herzegovina Gazi Husrev-bey, Isa-bey *waqf*, *and* Curcic *waqf)*.

The Cash *Waqf* institution was the only one of its kind in the whole world because of its governing type, neither state nor private sector; it was founded for the greater public welfare, where the maximisation of return on profit was not the primary component on which it depended. Such a fund was established in Bangladesh under the name of Grameen Bank (Chowdhury & Somani, 2020).

4.4.4 Postcolonial period and the emergence of Islamic Finance Institutions (IFI)

The historical facts demonstrate that Muslims were able, over the long period of Islamic state history, to establish a sustainable, independent, and just economic system that served Muslim and non-Muslim communities. Many different business models have been adopted and improved under Islamic jurisdiction, proving that Shariah law is not limited to a certain period or particular region or culture. Therefore, the growth of economic activities remained in smooth form under the scope of Shari'ah compliance, flavoured by an increased dose of ethical and social public benefits that are embedded in *Shari´ah* divine law.

However, political changes in the 19th century led to the capitulation of the Ottoman Empire, and formally, the 14-century-old *Khalifat* ended, so Islamic public order was transformed into the Western system. This huge political change affected Muslim communities in such a way that most Muslim territories were occupied or colonised by leading European countries, which marginalised the Islamic economic order and gave way to a capitalistic or commercial system in those countries. Besides the imposition of new policies, economic order, and the exploitation of Muslim countries' wealth, the colonial powers did not contribute much to the human or social development of their populations.

In the postcolonial stage, Muslim countries claimed independence under commercially grounded sown laws, which were adopted and formally used by all countries. Therefore, after witnessing the Industrial Revolution and the rise of commercial banking, an overwhelming majority of Muslim scholars were concerned about commercial interest-based banking systems, so they called for alternative mechanisms to perform economic transactions in Muslim societies. In the 1890s, the Barclays Bank opened a Cairo branch to process financial transactions related to the construction of the Suez Canal. This was the first commercial bank in the Muslim world (Komijani & Taghizadeh-Hesary, 2018).

After the Second World War scholars conducted practical research on interest-free financing, starting on a modest scale and gradually expanding its scope. As a result of various efforts, it was found that the first Islamic financial institutions arose in Egypt as follows:

Mit Ghamar (1963–1977) was founded in Egypt under the inspiration of German saving banks. It mobilised small savings from the rural sector, and investments in entrepreneurs were facilitated on a profit-sharing basis.

Nasser Social Bank, founded in Egypt in 1971, was the first interest-free financial institution with the word “bank” in its name. This is the first time that the government has recognised interest-free financing after the collapse of a Shariah-based state. The bank used to provide microcredits to small projects, and its aims were mainly social-oriented towards providing loans to those who were in need, such as the poor, and scholarships to students.

Dubai Islamic Bank in Dubai (UAE) was established in 1975 on the private initiative of businessmen who had surplus money. Without a doubt, official support from the governments of the UAE and Kuwait was crucial to making it happen.

The Islamic Development Bank (IDB), established in KSA and starting to operate in 1975, was the most important development in the history of Islamic banking in the postcolonial period.

Following the period from 1975 to 1990, Islamic banking and finance institutions matured into viable alternative models of financial intermediation. IFIs started to develop various types of financial products, which, in the end, showed good commercial results. Markets across all Muslim countries witnessed the establishment of a large number of Islamic financial institutions in the private sector. Since its beginning, three countries — Iran, Pakistan, and Sudan — have shown very serious intentions to eliminate interest-based financial products and replace them with Islamic-based products. In the 1990s, initiatives to bring Islamic-friendly regulations to many countries started to emerge.

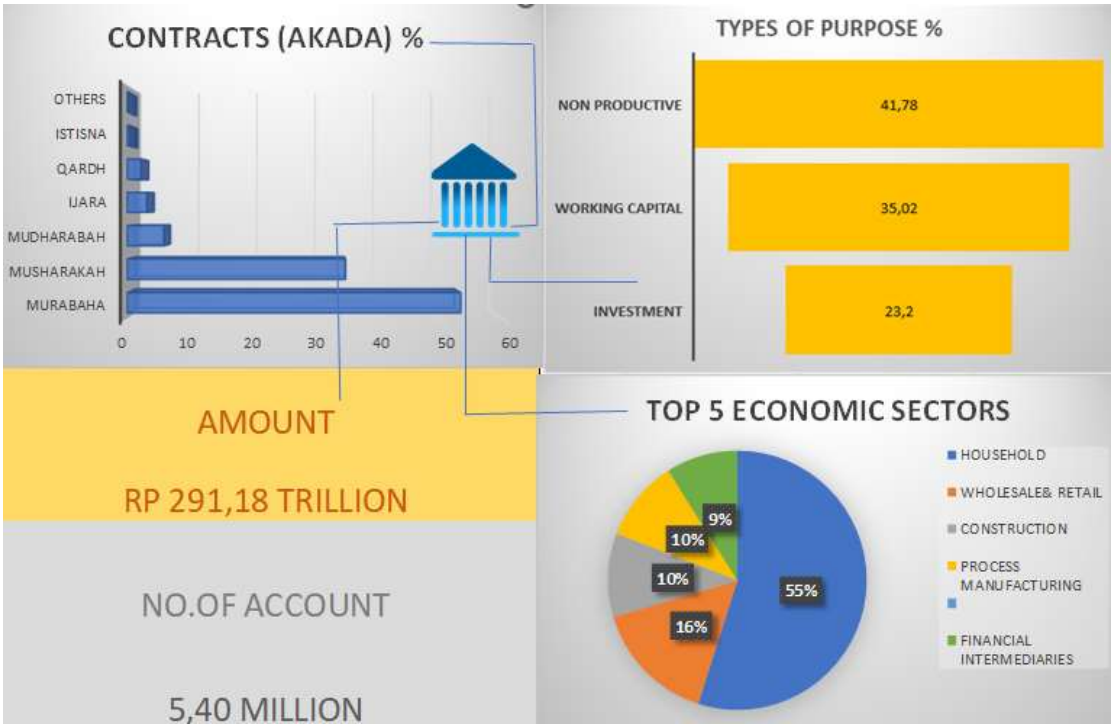
According to Usmani (2002), nine categories of Islamic banking contracts can be ordered in terms of low-to-high investor risk: 1) Debt instruments: *qard al-hasan* ("benevolent loans" or interest-free loans), *bai muajjal (sale* with deferred payment), *murabahah* and *musawamah* (sale with profit margin), *salam* (sale with advance payment and deferred delivery), and *istisna'a* (commissioned preparation of plants or other durable assets with periodic payments); 2) semi-debt instruments: *ijarah* (operating lease); 3) non-debt instruments: *musharakah* (similar to venture capital), specific-purpose *mudarabah*, and general-purpose *mudarabah*; 4) the conditional instruments: *bai muajjal*-based tradable securities (derivatives of *bai muajjal*), and *istisna'a* (staggered payment arrangements); 5) the asset *ijarah* bonds; 6) the rent-sharing certificate projects; 7) the Salam certificates; 8) the general *mudarabah* certificates; 9) the decreasing participation or redeemable *mudarabah*.

4.5 Islamic financial products (contracts) and IFIs

The economic world in the 19th century changed from personal to impersonal, while Islamic law (governance) did not succeed in adopting and transforming to impersonal

until the 1970s. For several historical reasons, the Islamic world witnessed institutional inefficiency in supporting business activities and enabling small businesses to convert to large scale and boost economic creativity (Kuran, 2008). This institutional stagnation, where business contracts and commercial practices remained unchanged from the 10th century onward, continued until the rise of IFIs. Still, it remains questionable whether it serves its purpose of supporting entrepreneurial ventures given its poor performance. The modes of financing provided by IFIs become profit maximization-oriented, similar to those in conventional banking, lacking real Islamic socio-ethical values, which marked the Golden Age of Islam until the 10th century. The most common reasons for stagnation of institutional innovativeness and juristic flexible approach to new socio-economic trends over the period from the 10th century onward go back to the following: decentralisation and duplication of juristic decisions, since 75% of scholars were earning for life from their businesses; the institution of the Cash *Waqf* did not develop into a financial institution; superstructure top-to-bottom-based; understanding of innovated-new perspectives *"Bid'a"; lack of keeping business records; the specifics of inherent law; clerical impediments to innovation; lack of state incentive support to develop entrepreneurial activities; growing military impact on the economy.*

Figure 4. **Usage of Islamic finance products (Thaker *et al.*** (2020))

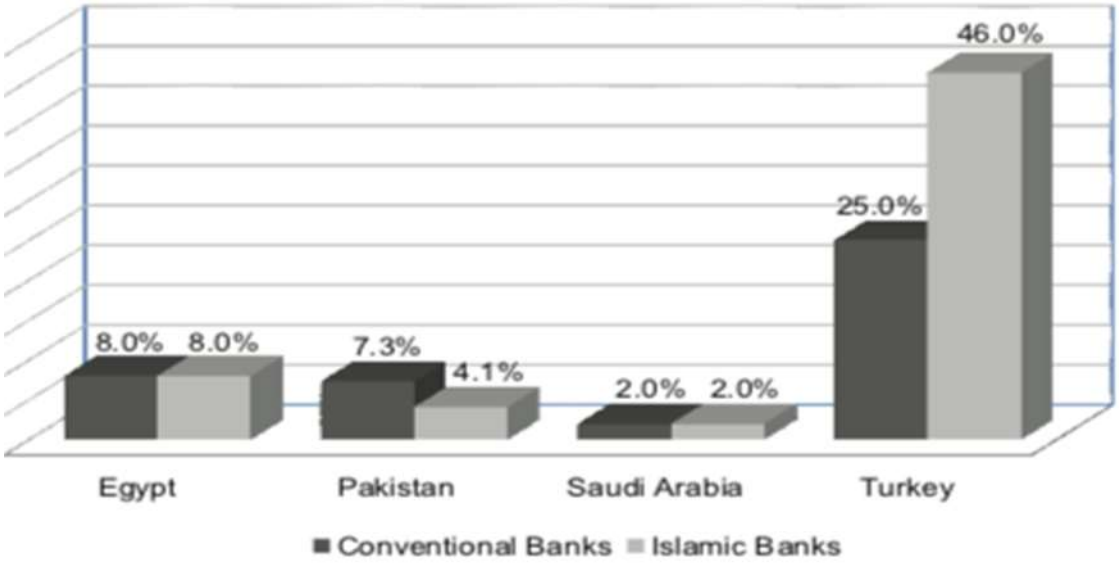


Since the first Islamic banks opened in Egypt and the UAE in the 1970s, Islamic finance institutions have tried to deploy and utilise all approved (Shariah-approved) financial business models such as *Mudhraba, Musharaka, Salam, Ijara, Istisna,* etc. in order to meet market demands or requirements for providing funds to support various projects and ventures under the umbrella of Islamic finance. These financial products have been accepted and approved in the earlier stage of raising Muslim markets in Madinah to enable and carry on business activities between parties. Indeed, it served its purpose in the first two centuries during the rise of Islam, and it resulted in the successful opening of new markets along with land expansions. It had proven flexibility and readiness to cope with other cultures. In other words, business models that existed in the time of Prophet Muhammad were not new or invented, but they were adopted by the first Muslim society in Madinah by practising them in the free market. Yet, all business models were free from usury and non-permitted activities. These facts emphasise the importance of economic independence for young society, enabling entrepreneurial activities to grow and use the resources and opportunities in permitted forms to bring economic prosperity and sustainability (Akbar, 1993).

4.6 Lack of Institutional innovativeness towards entrepreneurial diversity

In this last, but most important, section, we intend to address several observations related to IFIs and Islamic business contracts' performance in entrepreneurial activities. According to World Trade Report , small businesses represent 95% of the companies, which provide more than 65% of the jobs. Therefore, the SME sector takes a very important place in national development strategy in most countries (World Trade Organisation, 2013). Furthermore, 20% of small businesses succeed in getting financing for their operations and projects, while 80% struggle due to rigid terms and conditions imposed by financial institutions (Kabir Hassan, 2016). Hence, there is a huge gap and ignored opportunities for SME companies, which cannot reach financing funds due to several technical reasons, as mentioned in the following paragraph.

Figure 5. The ratio of SMEs Bank Lending to Total Bank Lending in Sample Countries



Source: International Finance Corporation (2014),

Small businesses, in general, are confronted with difficulties in getting funds from IFIs primarily because of the rigorous terms and conditions imposed by the bank, such as the high risk of new business, collateral conditions, lack of financial track record, legal status, business information and documentation, a weak business plan, and uncertainty of cash flow. On the other hand, many Islamic finance products remain underutilized due to governance, commercial limitations, and a lack of business innovation by institutions to maximize the performance of Islamic financial products embedded with socio-economic objectives. An indicative example can be seen in the *Mudarabah* financing model, which possesses a huge capability in financing SMEs and start-ups as equity-based contracts, but IFIs did not overcome the current constraints related to this model (high risk, moral hazard, and asymmetric information) because of their commercial orientation instead of socio-economic orientation (Ebrakim & Sheikh, 2015). However, IFIs continue to provide financial intermediation based on business contract models, which were used in the past for "personal" financing arrangements of trade or other entrepreneurial ventures that had been successfully utilised through Shari'ah law and accepted by the public.

Table 14. Enable Environment and Supply Side Analysis (SMEs and Islamic SMEs)

	SME Offering	Islamic SME Offering	Enabling Environment
Egypt	Low	Very low	Low
Pakistan	Moderate	Low	Medium
Saudi Arabia	Moderate	Moderate	High
Jordan	Low	Very low	High
Morocco	Moderate	Very low	Medium
Tunisia	Very low	Very low	Medium
Yemen	Low	Very low	Low
Iraq	Very low	Very low	Low
Lebanon	Low	Very low	Medium

Source: (International Finance Corporation, 2014)

Considering the postcolonial period in Muslim countries, when the IFIs arose as a necessity recognised by the founding fathers in the 1960s to maximise the socio-economic benefits of Muslim societies, they were later redefined as commercial-profit-oriented objectives under limited Islamic jurisprudence. Therefore, one of the main reasons why business contracts have not yet been utilised to their maximum capacity in terms of economic development is the gap between promised expectations to focus on social aspects and the actual "commercial" performance of IFIs. Asutay attributed that IFIs have failed to adopt the social dimension and social justice into their operations by applying Quranic technical rules of prohibition of riba. He calls for institutional development and reorienting to social banking, community banking, ethical and social investment, microfinancing, and community-oriented projects as objectives of IFIs (Asutay, 2008).

4.7 Islamic Banks and Financing Entrepreneurship

Despite the recent unprecedented growth in the IBF sector, through the implementation of Islamic business models in intermediation, the indicators show that the direction of classical business models has been directed from the original aspiration and development of *al-Maqasid al-Shariah* (Ahmed, 2011). In other words, Islamic

financial institutions, which adopted the classical models of business law, have achieved remarkable financial performance and impressive growth in assets (as evidenced in Table 15), but have failed to serve social and developmental needs by promoting entrepreneurial expectations (Asutay, 2012), as the industry focused only on growth at the expense of equity.

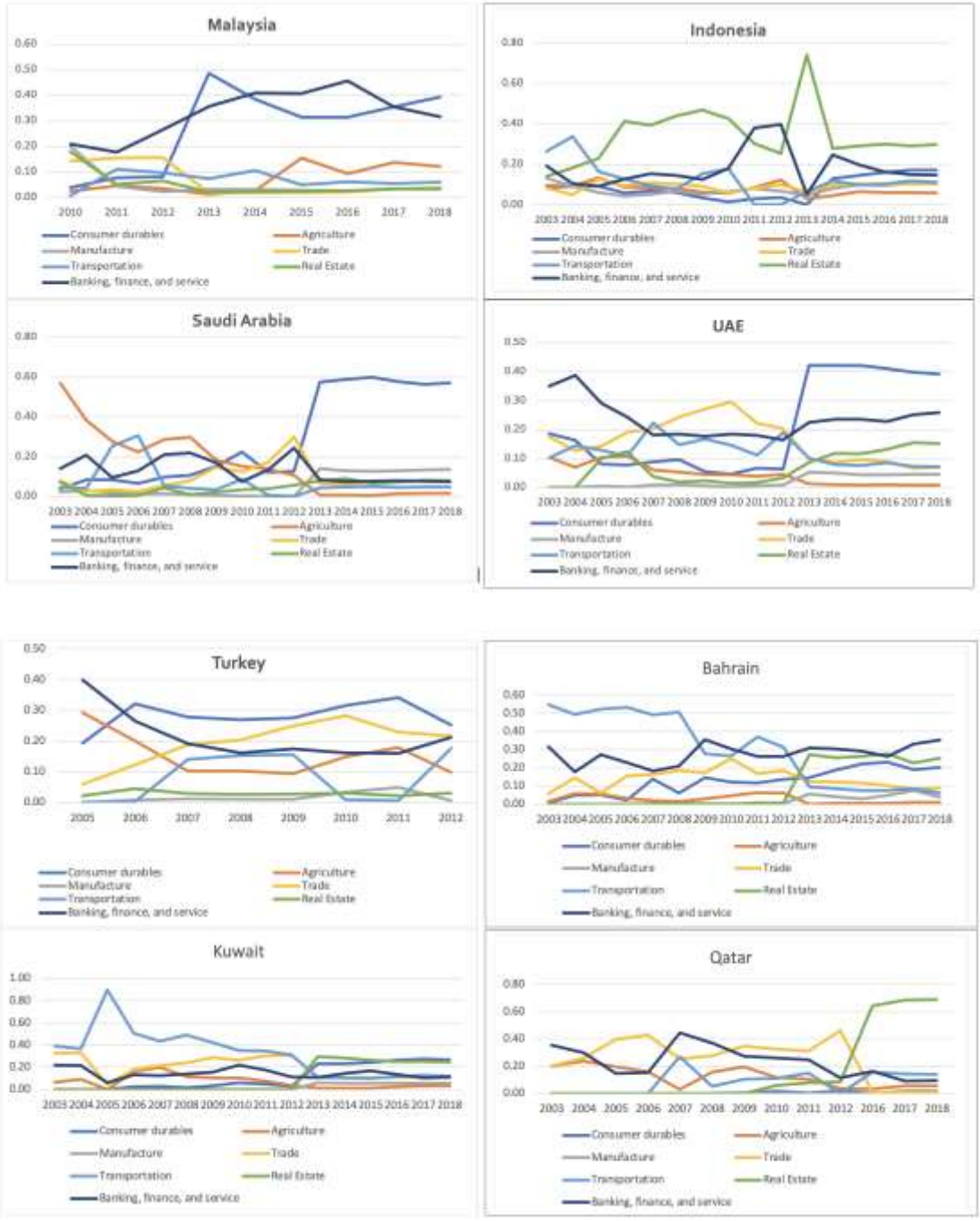
Table 15. Global deepening

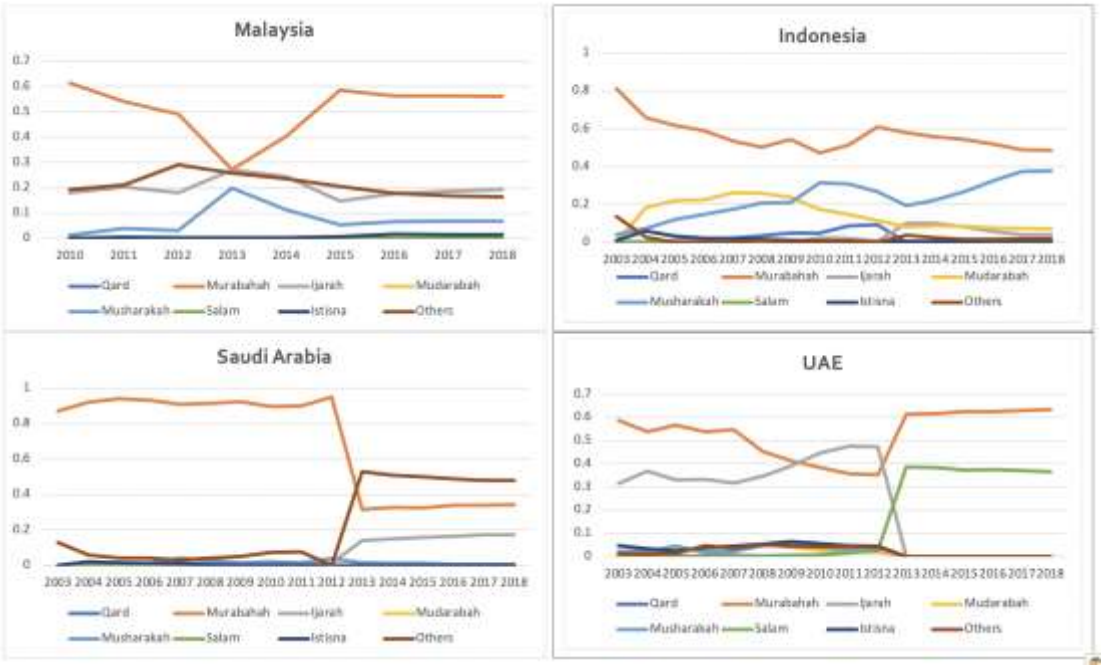
Region	Islamic Banking Assets	*Sukūk* Outstanding	Islamic Funds Assets	*Takāful* Contributions	Total	Share (%)
Gulf Cooperation Council (GCC)	1,212.5	332.3	46.0	12.7	1,603.5	52.4
South-East Asia (SEA)	287.5	390.3	37.5	4.7	720.0	23.5
Middle East & South Asia (MESA)	477.1	26.9	22.0	5.6	531.6	17.4
Africa	58.2	1.8	4.0	0.6	64.6	2.1
Others	68.8	24.4	45.1	0.7	139.0	4.5
Total	2,104.1	775.7	154.6	24.3	3,058.7	100.0
Share (%)	68.7	25.4	5.1	0.8	100	

Source: (Islamic Financial Services Industry Stability Report 2022)

Several studies, among others (Aggarwal & Yousef, 2000; Iqbal & Molyneux, 2005; Hasan, 2007; Nagaoka, 2007; Khan, 2013 and Asutay, 2012), examine the sectorial distribution of Islamic banking financing, which promotes entrepreneurial development. They all confirm that debt-based financing is the dominant feature, while the real estate sector, financial sector, and consumer durables have become the majority financing areas in the IBF industry, and hence financialization has become the driving factor of the industry instead of entrepreneurial innovation and diversity. Such financialization can be observed in Table 16, depicting instrument-based financing in selected countries.

Figure 6. **Financing Entrepreneurial Sectors of Islamic Banks**





***Source*:** The Islamic Banks and Financial Institutions Information (www.ibisonline.org)

As can be seen in Figure 6, Islamic banks mostly allocate their funds to the real estate sector, the financial sector, and consumer durables. Thus, the financialization of Islamic banking, mainly in the GCC model and the Malaysian model, is obvious. However, emerging countries, such as Indonesia and Turkey, seem to have a different trajectory, as it seems that Turkish and Indonesian Islamic banks provide financing to the manufacturing industry, contributing to the development of entrepreneurial activities, as expected. Thus, perhaps Turkey and Indonesia will lead an entirely different model of Islamic finance formation and the re-development of Islamic entrepreneurship.

Table 16. Distribution of PLS and Debt Financing Methods in Selected Countries

Countries	IBF Instruments	2012	2013	2014	2015	2016	2017	2018
Kuwait	*Musharakah*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Mudarabah	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Qard alhasna	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Murabaha	79.78 %	72.73 %	83.39%	86.91%	86.96 %	85.90 %	83.80 %
	Ijara	16.93 %	21.26 %	19.65 %	17.94 %	17.95%	17.83 %	19.28 %
	Salam	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Istisna	5.67%	11.12%	2.96 %	2.21 %	1.70 %	1.26 %	1.58%
UAE	*Musharakah*	3.89%	7.13%	7.22%	6.18%	4.65%	3.85%	2.87%
	Mudarabah	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	Qard alhasna	0.02%	0.04%	0.06%	0.10 %	0.17 %	0.15%	0.05%
	Murabaha	61.21%	49.38%	47.39%	43.01%	39.42%	48.93%	48.65%
	Ijara	22.42%	27.54%	32.11%	40.81%	45.35%	42.58%	43.50%
	Salam	N/A	N/A	N/A	0.88%	2.19%	2.50%	3.03%
	Istisna	5.62%	6.14%	6.45%	5.45%	5.00%	3.03%	2.35%
Bahrain	*Musharakah*	2.34%	3.07%	4.13%	5.59%	5.89%	8.74%	5.38%
	Mudarabah	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Qard alhasna	5.02	5.29%	0.01%	0.00%	0.00%	0.00%	N/A
	Murabaha	104.20%	82.08%	69.56%	82.35%	82.28%	40.90%	69.41%
	Ijara	15.35%	12.61%	16.16%	16.03%	15.85%	37.37%	23.04%
	Salam	N/A	N/A	N/A	N/A	N/A	N/A	0.39%
	Istisna	2.18%	0.02%	0.13%	0.21%	0.02%	0.07%	0.16%
Saudi Arabia	*Musharakah*	1.13%	0.82%	0.75%	0.73%	0.50%	0.60%	N/A
	Mudarabah	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Qard alhasna	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Murabaha	99.64%	168.03%	160.81%	97.49%	98.26%	97.35%	97.13%
	Ijara	0.32%	0.38%	0.34%	0.23%	0.17%	0.20 %	N/A
	Salam	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Istisna	2.07%	1.31%	0.82%	0.29%	0.00%	N/A	N/A
Malaysia	*Musharakah*	0.51%	0.44%	0.62%	1.90%	2.49%	3.88%	4.73%
	Mudarabah	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Qard alhasna	0.23%	0.17%	0.09%	0.03%	0.001%	0.02%	0.00%
	Murabaha	73.43%	66.04%	64.84%	63.53%	61.07%	61.52%	60.39%
	Ijara	21.88%	27.31%	26.77%	23.81%	22.51%	20.68 %	24.19%
	Salam	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Istisna	2.17%	1.12%	0.90%	0.72%	0.50%	0.26	0.17%
Qatar	*Musharakah*	0.09%	0.00%	0.63%	0.33%	0.15%	0.14%	0.43%
	Mudarabah	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Qard alhasna	0.01%	0.0%1	0.00%	0.00%	0.00%	N/A	N/A
	Murabaha	72.11%	47.61%	67.39%	73.28%	79.97%	79.75%	77.28%
	Ijara	23.37%	19.83%	19.13%	15.98%	14.33%	16.49 %	19.24%
	Salam	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Istisna	11.00%	6.71%	6.62%	5.83%	4.97%	3.47%	2.51%
Turkey	*Musharakah*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Mudarabah	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Qard alhasna	20.00%	N/A	N/A	N/A	N/A	25.21%	N/A
	Murabaha	66.91%	85.66%	90.30%	98.87%	98.15%	73.47%	98.83%
	Ijara	4.27%	2.97%	1.33%	0.77%	1.23%	1.01 %	2.75 %
	Salam	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	Istisna	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Indonesia	*Musharakah*	20.73%	24.55%	16.84%	17.31%	16.18%	15.10%	19.42%
	Mudarabah	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Qard alhasna	3.53	3.47%	2.86%	5.44%	9.67%	6.26%	4.09%
	Murabaha	50.29%	51.12%	29.79%	34.46%	37.65%	41.38%	41.10%
	Ijara	0.47%	0.02%	1.12%	1.02%	0.44%	0.27 %	0.22%
	Salam	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Istisna	1.49%	1.05%	0.50%	0.20%	0.16%	0.08%	0.06%

Source: ifsbonline.org

It can easily be concluded from the analysis that the utilisation of *musharakah*, *mudarabah,* and *qard al-hasan* is insignificant compared to the overall development of the country or banking sector. With the dominance of financialization in the industry, PLS instruments *mudharabah* and *musharakah* have been given up and replaced with *murabahah* syndrome and, more recently, with *tawarruq* syndrome, which completely compromises the development of entrepreneurial innovation and start-ups. This sends a message that Islamic financial institutions, despite the adoption of classical business models, have compromised their entrepreneurial spirit and adopted a capitalistic spirit (Ahmed, 2011) and the real economy, diverging from the expectations of Islamic economic manifestation (Aksak & Asutay, 2015).

In short, the remarkable financial performance of Islamic classical business models in terms of growth (Table 16) does not mean that the industry is moving in the right direction. The compromise on the foundational issues in terms of developmental consequences through entrepreneurial financing brings into question the credibility of transmitted models from historical momentum in modern forms. It can therefore be argued through critical analysis of the progress, expansion, and performance of Islamic banks that the values and norms of Islamic business models are compromised for the 'financialization' through financial engineering, and entrepreneurial spirit is given up.

4.8 Reconstructing Islamic Business Models for Future Prosperity

Islamic contract products have survived for 14 centuries since Islam was born in the Arabian Peninsula, yet they are shaping modern Islamic financing institutions. As aforementioned, Islamic contracts have been adopted and Islamized under *Shari´ah* compliance terms and conditions to serve their purpose in the first 200 years of Islam by imposing its norms and forms wherever Muslim traders reached them.

This competitiveness of Islamic products draws from universal Islamic objectives towards reaching socio-economic justice and efficient use of resources under the ethical scope in order to achieve *falah* in both here and hereafter. Economic activities are all important segments of life that Islam has treated by the Qur'anic clearly underlined rules under which trade is permissible except those that include *Riba*, *Gharar*, haram transactions, and unlawful activities.

After establishing a free market in Madinah, the Prophet (pbuh) has imposed that trading goods and deals in the market shall be checked regularly in order to avoid fraud and unlawful transactions and to keep quality and quantity of goods up to standards. This is called *the Hisbah* mechanism in Islamic literature, which calls for accountability for everyone and following ethical principles in business activities. *Muhtasib* was also appointed to act on behalf of the public interest in front of the ruler whenever disputes arose. Besides *Hisbah*, we found in the Ottoman Empire other forms such as *Akhism*, which had the purpose of keeping financial products within an ethical and social frame over time until the fall of the Ottoman state and the rise of financial institutions. *Akhism* associations played a key role in education and producing qualified craftsmen or traders at the time. It was also very strict in production volume, and the controlled usage of resources indicates that *Akhism* had adopted some of the ESG policies before they arose in the modern economy. Islamic business models (products) have stagnated after the 10th century due to several reasons, but most of them can be addressed by the fixity of Islamic decentralised jurisprudence to deal with rising challenges and cope with innovative solutions towards maximisation of socio-economic benefits.

After the Industrial Revolution took place, we witnessed the awakening of Islamic finance in a new "conventional" non-Islamic environment that required institutionalisation and interpersonal relations. Therefore, Islamic contracts are now being deployed to connect rich, wealthy people with surplus money and those entrepreneurs who need financing for their ventures and projects. Hence, the same business models that were used for personal finance arrangements now involve third parties and financial institutions, which deal with both investors and entrepreneurs. In the personal direct dealing stage, these models are used to serve a purpose and contribute to the growth of entrepreneurial activities, but at the time of institutions, the

research showed that investments through financial intermediaries are very low compared with the household or construction industry. Moreover, Islamic finance products are obviously not performing well through IFIs, which impose a profit-based approach and rely on some Islamic finance models. As Asutay attributed, it calls for the reconstruction of IFIs along with models of financing to regain the continuity of entrepreneurial activities and ensure ethical and social natural embeddedness in IFIs.

Table 17. The Most Effective Islamic Financing Instruments to Support SMEs

Instrument Type	1st stage	2nd stage	3rd stage	4th stage	The first preferred stage	The last preferred stage
Qard al-Hassan	57.6% (147)	35.3% (90)	41.2% (105)	27.8% (71)	1st	4th
Zakat	46.7% (119)	23.5% (60)	27.8% (71)	19.6% (50)	1st	4th
Mudarabah	39.6% (101)	46.7% (119)	45.1% (115)	63.5% (162)	4th	1st
Waqf	39.6% (101)	18.0% (46)	24.3% (62)	18.0% (46)	1st	2nd-4th
Musharakah	38.4% (98)	45.5% (116)	44.7% (114)	57.6% (147)	4th	1st
Sadaqah	37.3% (95)	17.6% (45)	24.7% (63)	14.1% (36)	1st	4th

Source: Asutay *et al.*, 2021

Referring to Table 17, *Qardul Hasan, Zakah, Mudarabah, Musharakah, Waqf, and Sadaqah* stand out as powerful instruments for fostering the growth of micro, small, and medium enterprises (MSMEs). *Qardul Hasan*, or benevolent loans, provide interest-free financial assistance, facilitating capital access for entrepreneurs without burdening them with interest payments. *Zakah*, the Islamic wealth tax, serves as a redistributive mechanism, channelling funds towards those in need and promoting economic equity. Mudarabah and *Musharakah* are partnership-based financial arrangements, enabling MSMEs to secure capital through shared investments and profits. *Waqf*, a charitable endowment, can create sustainable income streams for MSMEs by allocating assets to generate revenues. Additionally, *Sadaqah, or* voluntary charitable giving, allows individuals and businesses to contribute to MSME development initiatives. Together, these Islamic financial tools not only provide capital but also align with ethical principles, fostering a socially responsible approach to business and finance. Their efficiency lies in promoting financial inclusion, equitable distribution of resources, and sustainable economic development for the MSME sector.

4.8.1 Islamic Banking Overview

Since their founding in 1975 until today, IFs have recorded continuity in growth, size, and impact. Although it originated in Middle Eastern countries, this funding model has continued to spread to Muslim-majority countries in Asia and Africa, as well as parts of Europe and the rest of the world. The reason for this is the greater awareness of the purpose of Islamic finance products and their original function related to development and materialisation in the real economy, as well as the fact that these financing models are not intended exclusively for Muslims. Increasing basic standardisation of IF as well as legal frameworks for doing business in different countries has contributed to the growth of confidence in this type of financial industry, too.

There are different forms of organising the provision of Islamic financial products in different countries around the world. The dual banking system, *i.e.*, the subsidiary or Islamic window model, is a common business start-up model in Islamic banking as a separate part of some commercial banks. A subsidiary or Islamic model of windows loses importance with the increase in the size of the Islamic financial services industry in a country, and over time, Islamic windows transform into Islamic banking institutions. The only countries where the Islamic banking system applies exclusively are Iran and Sudan.

Given the globalisation of the business of large corporations and the movement of finance, goods, and people, there is a need to establish Islamic financial institutions in Europe as well as in other parts of the world. Table 18. lists some European countries that have created legal frameworks for the partial or complete establishment of Islamic financial institutions, thus enabling them to operate according to Islamic financial principles in part or in full.

Table 18. SMEs and Islamic Finance in some European Countries

Country	Description	Existing infrastructure for IF	Status SMEs
United Kingdom (gov.uk/ukti, 2014)	The first country in Europe to promote Retail IF. The UK Government has officially unveiled its intentions to be the world's largest hub for IF at the World Islamic Economic Forum 2013 in London.	Regulatory framework through adopting various Taxation Acts from 2000; more than 20 institutions offering Islamic finance and six fully Shari´ah compliant banks; 12 educational centres specialized in IF.	Orientation IFI on retail banking and partially on corporate.

France (Oseni, Kabir Hassan, & Matri, 2013)	The initiative of the French state to reform and adapt the existing legislation for operations of the IFIs during 2008. The government is concentrated on investment, corporate banking and Sukuk issues.	Partly adaptation of the regulatory framework for operations of the IFIs from 2009 by Europlace through the elimination of tax and legal obstacles. There are many IFI and education centres.	In 2009 French Constitutional Court found two articles for SME Access in Credit Law to be inconstitutional regarding the possibility of accessing Islamic products such as *Murabaha*, *istisna* and *ijarah*.
Germany (European Central Bank, 2013) (CPI Financial, 2015)	European country which issued the Islamic bond Sukuk in 2004 by federal state Saxony-Anhalt fully redeemed in 2009. 2012 introduced investment banking through the WestLB Islamic Deutschland Index.	In 2009 Federal Financial Supervisory Authority (BaFin) accepted a request from a foreign institution to conduct Islamic banking operations. German FI participates in the IF industry through subsidiaries in London, Dubai and Kuala Lumpur. First IB "KT Bank AG" has operated since 01 July 2015 ()	Due to the underdeveloped infrastructure for a business of IB, there are no specific recommendations for financing SMEs under Islamic principles of business.
Italy (European Central Bank, 2013) (University of Turin Italy, 2015)	Operations only over IB from abroad especially from the MENA region	There is no regulatory framework for the operation of the IBs. There are many initiatives and working groups for cooperation and promoting IF. Banca d'Italia has hosted many conferences. The University of Turin promotes IF.	SIMEST (working group for supporting Italian companies abroad) worked on launching SMEs in the MENA region through equity-based or semi-equity-based instruments.
Ireland (Owens & Ismail, 2014) (European Central Bank, 2013) (Irish Islamic Chamber of Commerce, 2011)	IF has had a friendly environment since 2003. First through the investment funds, Islamic retail banking over Bank of Ireland and sukuk from 2005. Many promotors of the IF funds from worldwide are established in Ireland.	There is a regulatory framework for IF. 20% of the Islamic funds outside of the Middle East are located in Ireland. In 2011 Irish Government published ''Strategy for the International Financial Services Industry in Ireland 2011-2016'' Education: Chartered Institute of Management Accountants (CIMA)	Irish Islamic Chamber of Commerce published in 2011 the Strategy for Development of IF in Ireland with recommendations for access of SMEs to IF instruments.
Luxembourg (Ernst & Young, 2015)	First European country to host an IFI in 1978. The first EU country to list sukuk in 2002. Leading non-Muslim country for *Shari'ah*-compliant investment funds.	The Central Bank of Luxembourg is the first EU Central bank to become a member of IFSB in 2009. Double taxation treaties have been signed with over 70 countries, and it is advantageous for operations with IFI. Education: The Institute for Training in Banking offers a diploma in IF.	There is no special recommendation for access of SMEs to IB financial instruments.
Turkey (Business Insider, 2015) (World Bank, 2014) (Thomson Reuters, 2013)	Government support through the "Special Finance Houses" decree from 1983. Established new IBs from 1984 until 2015. 2010 framework for corporate sukuk was set up. Mutual fund regulation with	There are four IBs, and it was planned to establish Islamic units by two state-run banks: Ziraat Bank and Halkbank by the end of 2015. In March 2015 the establishment of an IB indirectly related to state-	World Bank (WB) supported SMEs and exporters through an approved $250 million fund in 2014. The amount of $160 million was allocated for Islamic finance.

	no interest-bearing securities was adopted in 2014.	run Vakifbank was approved. Education: through the Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC) as a part of the Organisation of Islamic Cooperation (OIC).	
Bosnia&Herzegovina (Bosnia Bank International, 2015)	Very low development of IF. The first IB - Bosna Bank International (BBI) was established in 2000. There is no framework for IB.	BBI operates through many branches around B&H. Education: Master study of IB at the University of Sarajevo supported by BBI.	SMEs financing through the sales channels of BBI bank. Very small share in the total financial sector of B&H.

Note: The table shows the literature related to the regulation of the business of IFIs in different European countries.

Table 18 above shows a description of the activities undertaken for the implementation of IF, and the existing infrastructure for IIFS operations in the individual countries, but also, relevant to this research, the status of SMEs and whether it provides a facilitative relationship to these legal forms in order to access financing. As described in Section 2.4, SMEs have difficult access to finance even in IF, although there are, in some European countries (Italy and Ireland), specific documents, strategies, and recommendations for financing SMEs under IB. In 2014, the World Bank recognised the importance of Islamic financial institutions, and within the approved fund of $ 240 million, $ 160 million was allocated for the development of Islamic finance (Business Insider, 2015).

During the past decade, due to large world immigration in 4 Nordic countries (Sweden, Denmark, Norway and Finland), the number of Muslim populations increased to 1.28 million. For the above reasons, there is a need for halal loans, especially in the area of housing construction, which would provide access to financing for both builders and individuals. The joint venture model with gradual transfer of ownership to the buyer, which is the preferred model in the most widely used IF home finance alternatives, creates seemingly insurmountable taxation challenges. Establishing a regulatory framework for Islamic financing can be a challenge for the above reasons (Brekke, 2020).

According to global indicators (Cambridge International Financial Advisory, 2020), over the past 10 years, the Islamic financial sector has undergone significant changes, especially regarding the growth sector. Namely, although the commercial financial sector caused the global financial crisis in 2008, IBs have been growing steadily, and

since 2006, a compound annual growth rate (CAGR) of around 10.8% has been recorded. At the end of 2020, there will be forty-seven financial institutions in the world with more than $10 billion in Sharia-compliant assets, up one from the year before, with twenty-seven institutions recording a pre-tax profit of more than $500m in 2019 (Gillet, 2020).

According to The Banker and its ranking of the Top Islamic Financial Institutions 2020 (Gillet, 2020), we can see in Table 19 how much assets IFs hold in bn$:

Table 19. Assets hold in IFIs

Total Shari'ah assets in ranking	$1791bn
Total Shari'ah assets of standalone institutions (excl. windows)	$1338bn
Total Shari'ah profits of standalone institutions	$16,2bn
Average ROA for standalone institutions	1,21%

Source: The Banker (Gillet, 2020)

Shari´ah-compliant assets have a significant growth trend overall compared to 2019, and according to The Banker (Gillet, 2020), they will rise 8.2% in 2020. However, certain regions of the world showed different trends in 2020. Middle East and North Africa (MENA) increased by 9.2%, but countries within the Gulf Cooperative Council (GCC) had an asset growth of 12.2%, and other countries in the MENA region only had 3.8%. Sub-Saharan African countries had a very high decline in Shariah-compliant assets of 23.5% compared to 2019, which is an alarming figure for the Islamic financial industry. To analyse the actual trends of the Islamic financial industry, this analysis found that 5.4% growth in the Asian region is modest, but a compound annual growth rate (CAGR) of 7.7% in the last five years shows that Asia is the fastest-growing region in the overall IF market.

On the other hand, the editor of the Global Islamic Finance Report (GIFR) Dar (2020) warns that interest in the services of Islamic financial institutions has been declining over the years, which is presented through "asset under management" (AUM).

An aggregate of assets under management (AUM) is a set of assets under the management of pure IIFS and conventional ones that offer Islamic financial services. They include assets held by banks, sukuk (Islamic bonds), assets managed by Islamic funds, Islamic funds managed by conventional managers, Islamic insurance companies

(takaful), Islamic microfinance institutions, and all other non-financial institutions offering Islamic financial services (Cambridge International Financial Advisory, 2020).

Potential Islamic financial AUM is defined as the assets under the management of IIFS for anyone who would like to have access to these services but does not have a market in which that access is available (Cambridge International Financial Advisory, 2020). Although the growth of IFI assets in value terms is very high and the figure of 2,733 bn US$ is impressive, the percentage decreases every year, so it is necessary to react quickly and re-interest the users of these services in IIFS products.

As we can see in Table 20 and Figure 6, the average growth of Islamic financial assets in the period 2009–2019 was 11.7%. If we look at the period 2009–2014, where this indicator is 16.10% and 6.50% for the period 2015–2019, it can be concluded that interest in IIFS services is significantly declining.

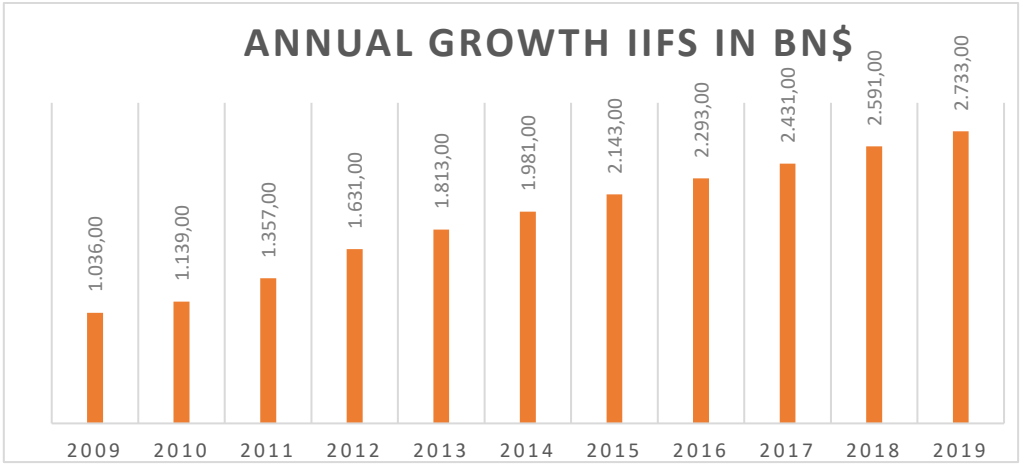
Table 20: Overview of Islamic Finance Industry 2009-2019

Countries	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
GlobalIslamic Financial AUM (US$)	1.036	1.139	1.357	1.631	1.813	1.981	2.143	2.293	2.431	2.591	2.733	
Annual Growth (%)	26.0	9.9	19.1	20.2	12.3	9.3	7.3	7.0	6.0	6.6	5.5	
Average Growth (2009-19)												11.7
Average Growth (2009-14)												16.1
Average Growth (2015-19)												6.5
Potential Islamic Financial AUM (trillion US$)	4.0	4.4	4.84	5.324	5.865	6.451	7.096	7.806	8.586	9.445	10.389	
Size gap (US$)	2.964	3.261	3.483	3.693	4.052	4.47	4.953	5.513	6.155	6.854	7.656	

Source: (Cambridge Internationl Financial Advisory, 2020)

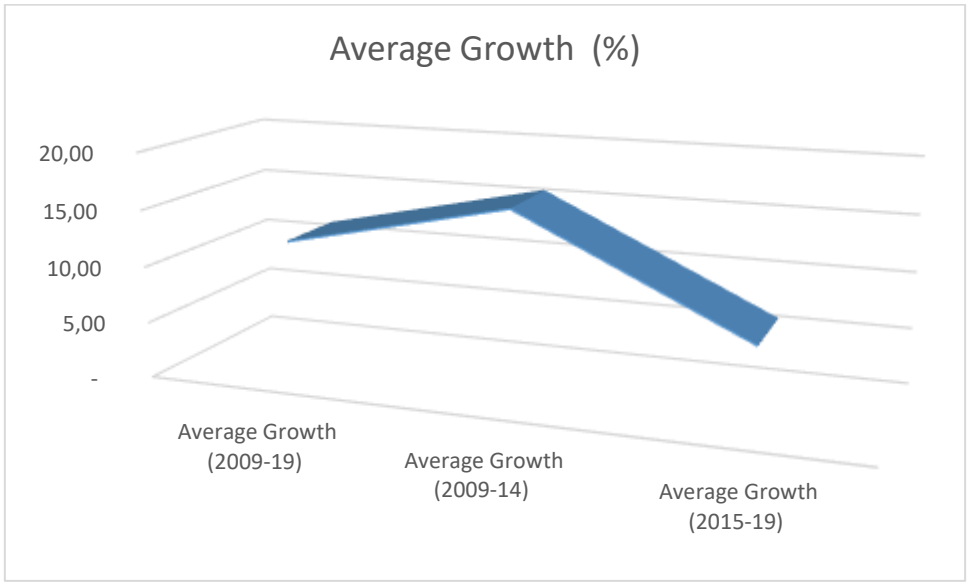
By analysing the actual and the potential AUM we can conclude that there is a large growing gap between these two items.

Figure 7. Annual Growth Islamic Finance Industry in bn$



Source: (Cambridge Internationl Financial Advisory, 2020) stylized

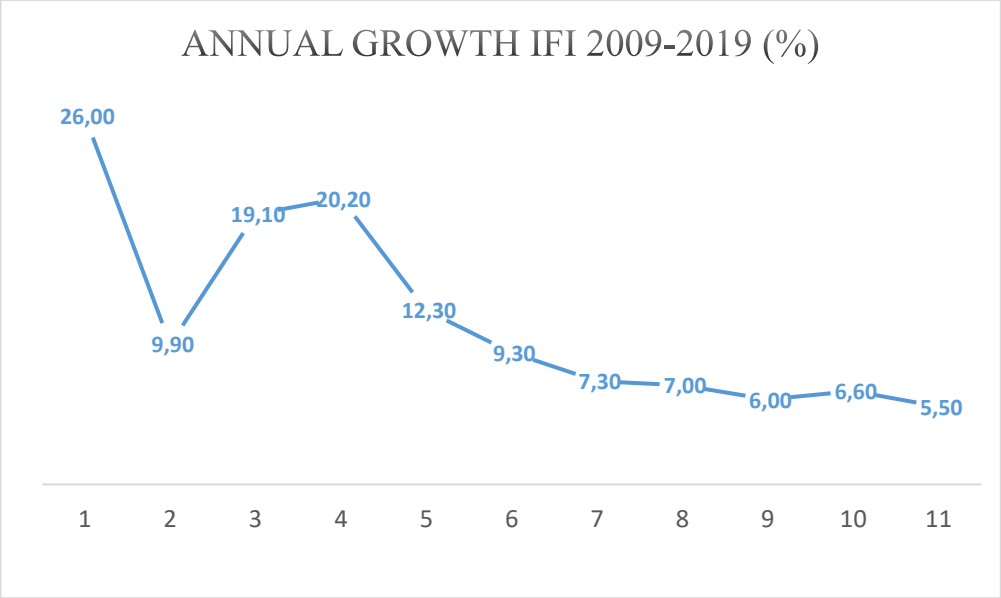
Figure 8. Average Growth in %



Source: (Cambridge Internationl Financial Advisory, 2020) stylized

Even more alarming is the presentation of the annual growth of IFI in % Figure 8 where the growth curve sharply decreases from 26,0 %, in 2009 to 5.50 % in 2019.

Figure 9. Annual Growth Islamic Finance Industry in %



Source: (Cambridge Internationl Financial Advisory, 2020) stylized

On one hand, the percentage of the Islamic financial industry declined, and on the other hand, the growing gap between the existing and potential market for IIFS indicates that it is necessary to develop and revise the demand for these products.

4.9 Comparison of Business Principles of Commercial and Islamic banks

The study of credit risk is a major concern for the development of prudential risk management systems governing both Islamic and conventional banks (Kabir *et al.*, 2015). In this work, we will use the definition of the Organization of Islamic Cooperation (OIC), which defines the Islamic Bank as a financial institution whose statutes, rules and procedures explicitly state their adherence to *Shari´ah* principles and the prohibition of charging and paying interest in any of its operations.

Islamic financial institutions (IFIs) aim to:

- promote and develop financial products and services based on Islamic principles.

- influence Islamic economic development.

- ensure equal distribution of resources and wealth (Al Rahahleh N, 2019).

Table 21. Basic Differences between Islamic and Commercial Banks

Principles	Islamic Banks	Commercial Banks
	Based on *Sharia´h* law.	Based on rules which are the opposite of *Sharia´h*, such as interest.
Prohibitions	1. Interest (*Riba*) 2. Uncertainty and risk (*Gharar)* 3. Gambling, speculation (*Maysir*) 4. Production of the goods involved in prohibited activities (alcohol or pork)	There is no prohibition of listed activities. The entire commercial banking sector was formed based on interest earnings.
Profit and risk-sharing (PLS) practice	The basic contract and the main purpose of Islamic banking is to connect investors and entrepreneurs with the mandatory sharing of profits and risks in the transaction.	Classic lending, where the entrepreneur is a borrower with a predetermined specified interest.
Products	*Shari´ah-compliant* products.	Interest-based products.
Ethicality and morality in operations	Transparency and complete clarity of the contracts. Strong moral activities- opposite of it considered as unlawful (*haram*).	Lack of transparency and ethics in activities.
Asset-back financing	Financial transactions should be based on a tangible, identifiable fundamental asset.	Financial institutions deal with money and monetary papers only.
Practical application of risk management	Still in development.	Highly developed with a growing number of advanced risk management models.
Money Market	The money market is generally limited and many times not available.	Structured, formal and organized money market.
***Sharia´h* Supervisory Board**	Obligatory in Islamic banks.	-
Zakat	Obligatory tax in Islam.	-

Source: (Akkizidis, 2008; Khandelwal, 2008, Al Rahahleh, 2019)

Following the differences in business principles that are visible from the above introduction, there is also a difference in the section of financial reporting of Islamic and commercial banks.

Table 22. Stylized Balance Sheet of Islamic and Conventional Banks

Balance Sheet in Islamic Financial Institutions	Balance Sheet of Conventional Financial Institutions
Assets	**Assets**
Cash and cash equivalents. Investment in Securities Sales Receivables	Cash and cash equivalents. Investment in Securities Loans and Advances

Investments in Leased Assets Investments in Real Estate Equity/Profit- Sharing Financing Investment in Subsidiaries Fixed Assets Other Assets	Statutory Deposits Investment in Subsidiaries Fixed Assets Other Assets
Liabilities	**Liabilities**
Current Accounts Other Liabilities Equity of PSIA* (Unrestricted) Profit Equalization Reserve Investment Risk Reserve	Current Accounts Saving and Time Deposits Other Liabilities
Owner´s Equity	**Owner´s Equity**
PSIA (Restricted) (Off-balance Sheet) (Letters of credit/guarantees)	Off-balance Sheet (Letters of credit/guarantees/derivates)
* **Profit and Sharing Investment Account**	

Source: International Monetary Fund**:** Staff Discussion Notes (2015)

One of the key differences between Islamic and conventional banks is that Islamic banks offer clients accounts for investments in partnership-based products *(Musharakah* and *Mudarabah*), while conventional banks offer deposit accounts with interest rates that are completely prohibited in IF. PSIA in Islamic banks may be "unrestricted" where the bank has the authority of the investors to manage and invest in projects under the PLS Partnership Agreements. Restricted PSIAs are usually registered off the balance sheet.

Chapter 5: Empirical Research

The focus of this research is to construct a model for predicting the creditworthiness of SMEs in an Islamic banking context. This initiative is rooted in the basic understanding that SMEs form the backbone of many economies globally. Yet, despite their potential, these companies often face numerous challenges, the most notable being access to financing. This study, therefore, aims to bridge this gap by proposing a model that could enhance the decision-making process in Islamic banks when it comes to financing these critical but often marginalised entities.

In this investigation, we focus on the *diminishing musharakah* contract, an equity-based financing model that is quite popular in the Islamic banking sector. The *diminishing musharakah* contract has its fundamental principles rooted in the *Shari´ah* law, where ethical and moral financing are highly emphasized. This concept dictates that the financiers and the entrepreneurs are not merely creditors and debtors, respectively, but rather partners in a business venture, sharing the risks and rewards proportionately.

To better appreciate the importance of this study, it is important to understand the basic principles of Islamic financing. Unlike conventional banking systems, which operate on a fixed interest rate model, Islamic banking adheres to the principle of profit and loss sharing. In the next chapters, we will describe, in a closer context, how we came to the formation of the model and its validation. As we have already explored the current methods employed in assessing the creditworthiness of SMEs, we have identified the gaps that our proposed model seeks to fill.

According to this model, both the bank and the client would share the profit or loss generated by the business venture, but taking into account the regulatory environment for IF, the full result would be achieved with a database that works in an environment necessary for doing business under *Shari´ah* principles. This arrangement is intended to promote greater access to finance for SMEs and minimise the risk for IB.

The model developed in this study has the potential to improve decision-making processes in Islamic banks, especially when financing SMEs through *musharakah* and *mudarabah* arrangements. By aligning with the ethical and moral principles of Islamic

finance, this model could facilitate easier access to capital for SMEs, potentially supporting their growth and wider economic contribution. This approach suggests a more flexible decision-making framework that could better support SMEs in securing the necessary financing.

In the next chapters, we will describe, in a closer context, how we came to the formation of the model and its validation.

5.1 Data and variables

This section will describe the Islamic bank database that was used to develop the internal rating model. The original data, provided by the Islamic bank, contained the financial statements of 419 SME clients. However, financial statements were not available for all clients throughout. The selection of clients was made based on their years of cooperation with the Islamic bank, the region in which they operated, and the industry in which they were active.

In this research, all entities of B&H are represented in this database, including the Federation of B&H, Brčko District, and Republika Srpska, although the majority of clients are from the 10 cantons of the FB&H.

Financial statements in the period from 2011 to 2013 were in part different compared to the period from 2009 to 2010 due to a change in keeping records of financial changes, as well as because of the adoption of a new law on accounting and the transition to new accounting standards. Due to such challenges, the author operated an individual calculation and selection of data for each client for all years in order to enable comparability of data on the same basis from 2009 to 2013.

Given that predictions of clients' creditworthiness are based on different methods of analysing changes in financial indicators over several years of operation, 37 financial indicators from 5 groups were calculated: liquidity, leverage ratios, activity, efficiency, and profitability. Every single one of the financial indicators is presented in Tables 25–29 in Section 5.1.2.

On December 31, 2013, among the clients in the database, some cooperated with the bank for 469 to 4306 days. For this study, the period in which the clients had financial

support from the bank and regularity in fulfilling obligations based on that financing is significant.

After removing clients who had a business history of less than 3 years or had missing data in the balance sheet statement, the data set used in this paper consisted of 151 small and medium companies that are clients of one Islamic Bank in Bosnia and Herzegovina. Among them, there are 103 healthy and 48 financially distressed companies. Financial ratios were calculated for 2012, and the financial state "distressed or healthy" was extracted from 2013.

If the company wasn't able to pay a single obligation continuously over a period longer than 90 days in one year, it was selected as financially distressed. The whole data set is divided into a development sample and a validation sample.

Industrial risk clusters are formed according to the NACE code of activity that the client deals with in the ten groups presented in Table 23, although in the basic database, clients are divided into two groups: trade and production.

As the subject of this research is related to the prediction of the creditworthiness of SMEs of clients who operate in an Islamic bank in a limited number, they are classified into seven groups: consumer cyclical, industrials, consumer non-cyclical, real estate, health care, information technology, and others.

Table 23. Industrial Risk Clusters

Energy	Materials	Industrials	Consumer Cyclical	Consumer Non- Cyclical	Real Estate	Information Technology	Telecom	Health Care	Utilities
oil&gas-E&P+ services	forest products, paper, pulp	airlines	automotive	food & drug retailing	hotels/resorts, leisure	software, hardwere, semiconductors	integrated telecom	pharmaceutical&biotechnology	electric utilities& energy trading
oil&gas-refining & marketing	irone ore, steel &ferous metals (including coking coal)	logistic, road & rail	automotive retailer	food products & beverage	office		wireless telecom	health care	multi utilities
thermal coal	precious metals	transportation infrastructure	household durables	agricultural products	residental		alternative curries		alternative energy
	non ferous metal	capital goods	media/advertising	tobacco	industrial				
	chemicals	commercial & professional services	entretaiment - hotels&leisure	household & personal products	retail				
	fertilizers	building products	speciality retail		management				
	container& packaging	construction & engineering	textiles & apparels		other real estate				
	construction materials		other consumer cyclical						

Source: The observed database contained 103 healthy and 48 distressed clients.

5.1.1 Measures of model validation

Continuing this work, we will focus on evaluating the created models. To validate scoring models, we will observe hit rates, type I and II errors, the Receiver Operating Characteristic (ROC) curve and the corresponding area under it, known as the Area Under the Curve (AUC), the Gini coefficient, and the Kolmogorov-Smirnov test (KS indicator). Before the validation process, we will briefly explain the terms listed above.

Methods for Model Development and Validation

Logistic regression

The dependent variable which we want to predict in this research is binary, i.e. it takes only two values, $Y = 1$ will indicate a distressed client while $Y = 0$ will indicate a healthy client. The probability that the client will not repay the loan, with the condition of realization of independent variables $X_1, X_2, \ldots\ldots X_k$ that influences the same, is given by the expression.

$$\pi = P(Y = 1|X_1 = x_1, X_2 = x_2, \dots, X_k = x_k).$$

The dependent variable is defined by an expression as

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k,$$

where α is a free coefficient that represents the value of variable *Y* if all independent variables are equal to zero, while β_i, $i = 1..., k$, are contributions to the influence of the i^{th} independent variable on the dependent variable. With certain manipulations of these expressions, we find a way to calculate the probability in the logistic regression model.

$$\pi = \frac{e^{\alpha+\beta_1 X_1+\beta_2 X_2+\cdots+\beta_k X_k}}{1 + e^{\alpha+\beta_1 X_1+\beta_2 X_2+\cdots+\beta_k X_k}}.$$

Since this function is non-linear in terms of parameters, we can linearize it by using the logit transformation, so we get the following form:

$$1 - \pi = \frac{1}{1 + e^{\alpha+\beta_1 X_1+\beta_2 X_2+\cdots+\beta_k X_k}}.$$

The quotient $\pi/(1-\pi)$ is called the "odds ratio", and if π is the probability of default, we calculate it using the formula:

$$\frac{\pi}{1-\pi} = e^{\alpha+\beta_1 X_1+\beta_2 X_2+\cdots+\beta_k X_k},$$

Which, after logarithmizing, becomes

$$\ln\left(\frac{\pi}{1-\pi}\right) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k.$$

(Wang. L., Zhang, Z., 2017)

5.1.1.1 Evaluation Metrics and Validation Techniques

Continuing this work, we will focus on evaluating the created models. To validate scoring models, we will observe hit rates, type I and II errors, the ROC curve and the corresponding area under it known as AUC, the Gini coefficient and the KS indicator. Before the validation process, we will briefly explain the terms listed above.

The *good hit rate* is the ratio of correctly classified good clients (according to the model) to really good clients.

The *Bad hit rate* is the ratio of correctly classified distressed clients (according to the model) to really distressed clients.

The *Total hit rate* is the ratio of the total number of clients correctly classified (according to the model) to the total number of clients.

Type I error, denoted as α, represents the probability of approving a loan to a distressed client, while *type II error*, denoted as β, represents the probability of disapproving a loan to a good client.

The precision or *accuracy* of the model is represented by the total hit rate, the *sensitivity* of the model is represented by the good hit rate, and the *specificity* of the model is represented by the distressed hit rate.

The ROC curve is a graphic presentation of the impact of different cut-off values on sensitivity. In this case, it shows how well the model distinguishes healthy from distressed clients. Namely, the further away the curve is, the better the model is.

AUC represents the area under the ROC curve. The closer the value is to one, the better the model predicts healthy customers as good and distressed customers as distressed.

The Gini coefficient is often used as a measure of the unevenness of the population for some characteristics and is calculated as 2*AUC-1. In the context of this research, the Gini coefficient is used as a measure of the risk-ranking ability of the scoring model. Given that the Gini index is expressed as a percentage, values closer to 0% suggest that the model does not distinguish healthy from distressed clients, while higher values indicate that the model distinguishes them well. The average scoring model has Gini coefficient values between 40% and 60%.

KS statistics are obtained as the largest absolute difference in the cumulative frequency of healthy and distressed clients. The table 24 contains the value for the KS indicator.

Table 24. The Value for the KS index

Value for KS	Evaluation
< 20	a card will likely not work
20-40	moderately
41-50	good
51-60	very good
61-75	excellent
>75	too good to be true

Source: Sarlija, N. (n.d.)

5.1.2 Financial Ratios

A financial ratio is a number that represents the ratio of one or more economic indicators to another based on the company's financial statements. It provides additional information to management, banks, government institutions, suppliers, and customers about the financial and business status of the company. On that basis, all the listed interested parties make decisions concerning their current and future cooperation with the company. (Šarlija N., 2009).

Financial ratios are classified into the following groups:

- Liquidity ratios are used to assess the company's ability to settle short-term liabilities with current assets, i.e., cash or assets that can be converted into cash in the short term.
- Leverage ratios indicate the capital structure and how a company finances its assets, i.e., how much the company is financed from other sources of funds. Therefore, they are used to assess the financial risk of a company.

- Activity ratios, also known as turnover ratios, represent the efficiency of the use of enterprise resources; in other words, they indicate the tempo of the circulation of assets in the business process. The calculation is performed by putting in the ratio of turnover and average balance.

- Efficiency ratios determine the relationship between income and expenditure or indicate how much revenue the enterprise generates per unit of expenditure.

- Profitability ratios demonstrate the return on invested capital, the strength of earnings, the success of asset management, and liquidity management.

Based on the balance sheets and income statements for all companies in the sample, financial ratios were calculated. The list of financial ratios used in this research is presented in the table below.

Table 25. Liquidity Ratios

Code	Indicator	Formula	Interpretation	Implication on riskiness
CR	Current ratio	current assets / current liabilities	It measures how many current assets can be converted into cash during one operating cycle in relation to total assets.	A higher ratio implies less risk; more assets to quickly respond to financial emergencies and faster achievement of liquidity.
CshR	Cash ratio	cash + cash equivalents. / current liabilities	It measures how many of the short-term liabilities could be paid off immediately if necessary.	CshR≥1 indicates a very low level of risk since the company has more than enough liquid assets to cover its short-term debts.
QR	Quick ratio	current assets inventories / total current liabilities	It measures a company's short-term liquidity, or its ability to cover its short-term obligations with its most liquid assets.	QR≥1 indicates lower risk because it shows that the company can meet its short-term obligations and has enough assets that can be quickly converted into cash to meet its current obligations.
CA/TA	Current Assets to Total Assets	current assets / total assets	It shows how much of the company's total assets are current or liquid	CA/TA (0.2 to 0.5): A moderate ratio indicates a balanced asset structure, where the company has a combination of current and long-term assets. This ratio provides insight into the company's asset structure and considers it balanced.
FA/NCp	Fixed Assets to Net Capital	fixed assets / net capital	It presents the capital structure of the company; and indicates how much the company´s net capital is invested in fixed assets.	Lower-It may indicate a lower level of risk if more capital is available in liquid assets or can quickly convert assets into cash.
				FSR>1 shows that the company may be

FSR	Financial Stability Ratios	fixed assets / equity + long-term liabilities	It shows the company's ability for long-term business while assessing the risk of insolvency.	overinvested because fixed assets are higher than long-term sources, which may mean that it also used short-term sources to invest in fixed assets.

All the indicators listed above could have a different impact on the overall riskiness, which depends on the industry and its relationship with other indicators in the overall analysis of the company, as well as on other factors that are currently happening.

Table 26. Leverage Ratios

Code	Indicator	Formula	Interpretation	Implication on riskiness
Csh/CA	Cash to Current assets	cash / current assets	It shows how much of the company's short-term assets can be immediately used to cover liabilities.	A higher ratio indicates that a larger part of current assets is in cash and can be interpreted as a lower risk.
WC/TA	Working Capital to Total Assets	working capital / total assets	It presents the measure of operational liquidity and financial efficiency of the company.	A higher ratio usually indicates that the company has a good short-term financial position i.e., that it has enough current assets to cover current liabilities and operating costs. At the same time, it indicates a lower risk.
ShtFD/TD	Short-Term Financial Debt to Total Debt	short term financial debt / total debt	This is a financial leverage ratio that measures the part of the company's total debt which will be due in the next year.	A higher ratio warns that a large number of short-term obligations is due, which can be a greater financial risk.
DR	Debt ratio	total liabilities / total assets	It measures the share of the company's total assets which is financed by debt (both short-term and long-term).	A higher ratio could suggest a higher financial risk because it means the company has more liabilities to repay. It is important, especially during times of financial stress.
Gearing	Gearing	liabilities(debt) / equity	This ratio is used to evaluate a company's financial leverage, meaning the extent to which the company is financed by debt.	A lower ratio suggests that a company is less reliant on borrowed money and might be more financially stable.

LofCI	Level of coverage I	Equity X 100 / fixed assets	The Level of Coverage I is a ratio that indicates how much of a company's fixed assets are financed by its equity.	A higher percentage suggests that the company is less dependent on external financing (like debt) to finance its fixed assets, and therefore might be financially more stable.
LofCII	Level of coverage II	(equity + LT liabilities) x 100 / LT assets	This ratio indicates how the company manages long-term assets which are funded by sources of long-term finance, which includes both equity and long-term liabilities.	A higher ratio indicates that the company has adequate long-term funding for its long-term assets, which implies financial stability.
LofCIII	Financial leverage ratio	total assets / equity	This ratio indicates the proportion of a company's total assets that are funded by its equity.	A higher ratio means the company is financing a large part of its assets using debt rather than equity, which implies higher financial risk.

In general, it is vital to consider all these ratios together to understand the company's financial health. Higher ratios may indicate less risk for certain metrics, but for others, such as the Financial Leverage Ratio, they could imply greater risk. Therefore, understanding the context of each ratio and its implications is of key importance. Finally, these ratios should be compared with industry standards or competitor ratios to get an extensive perspective.

Table 27. Activity Ratios

Code	Indicator	Formula	Interpretation	Implication on riskiness
TATR	Total assets turnover ratio	total revenue / total assets	This ratio indicates how effectively the company is expanding its assets to produce revenue.	A higher ratio signifies that the company is utilizing its assets efficiently to generate revenue, implying good management performance.
LTATR	Long-term assets turnover ratio	total revenue / long-term assets	The ratio indicates how successfully the company is employing its long-term assets (like properties and equipment) to create revenue.	A high ratio indicates that the company is using its long-term assets efficiently to generate sales, which may suggest good management performance.

CollDay	The collection period in days	365 / Turnover ratio of receivables	The average number of days that it takes for a company to collect payment from its customers after the sale has been made.	A short collection period indicates that the company collects payments from its customers quickly, which can be a sign of an efficient collection process**.**
OpCy	Operating cycle	Inventory period +Account receivable ratio	The average number of days a company holds its inventory before selling it.	A shorter operating cycle indicates that a company can quickly convert its inventory into cash, which could display operational efficiency and good cash flow management.
STATR	Short-term assets turnover ratio	total revenue / short- term assets	This ratio indicates how well the company is using its short-term assets to produce revenue.	A high ratio means that the company is using its short-term assets efficiently to generate sales, which can suggest effective asset management. In terms of riskiness, a lower STATR ratio could indicate a higher level of operational risk.
TrofRcvb	Turnover ratio of receivables	sales income / receivables	It indicates how successfully and frequently the company collects its receivables throughout the period, which implies effective collection processes. It also shows that customers pay their obligations on time.	A lower turnover ratio increases the credit risk because it could indicate that the company is selling the goods or services to customers who may not be able to pay on time. This increases the risk of bad debt expense.
DaySlsInv	Days sales in inventory	Inventory x 365 / Cost of sales	It indicates how long the company stores inventory before selling. If the value is lower, it indicates efficient inventory management and high inventory turnover.	A high ratio indicates liquidity issues, which indicates the risk of paying business obligations on time, which represents business risk, credit risk and liquidity risk.
TrofInv	Turnover ratio of investment	Net sales / (Stockholders' equity + Debt outstanding)	It shows how much funds the company needs for a certain level of sales. A high ratio shows a positive indicator of the company's operational efficiency.	A low level indicates a potential liquidity risk because there are not enough sales, and thus cash, to meet its obligations.

Activity indicators focus on asset and capital management, others focus on debt management, and some focus on the efficiency of business operations.

These ratios serve to evaluate various facets of the company's business operations and associated risks. However, a comprehensive understanding of the company's financial well-being typically emerges only after the overall examination of all these indicators.

Table 28. Efficiency Ratios

Code	Indicator	Formula	Interpretation	Implication on riskiness
Inv/CoGS	Average inventories ratio	$\frac{\text{Inventories}}{\text{cost of goods sold}}$	It compares a company's average inventory to its cost of goods sold.	A high ratio can be risky because it indicates too much inventory, which increases storage costs, the risk of obsolescence, and thus possible losses.
EofBAc	Efficiency of business activity (sales activity)	$\frac{\text{total sales}}{\text{sales expenses}}$	This ratio indicates the efficiency of operations, especially sales activities.	It can be presented in three different scenarios: substantial sales accompanied by high costs, reduced sales despite high sales expenses, or minimal sales correlated with low sales expenses. Each of these scenarios supports the company in managing its sales strategy.
EofOpAc	Efficiency of operating activity	$\frac{\text{operating income}}{\text{operating expenses}}$	It indicates the operational efficiency of the company measured by the ratio of operating income to operating costs.	The ratio >1 means lower risk because operating income is higher than operating costs. If the value is <1, the company is not profitable.
EofTAc	Efficiency of total activity	$\frac{\text{total income}}{\text{total expenditures}}$	This indicator gives an understanding of how well the company utilizes its resources to produce income and how effectively it manages its costs.	The ratio <1 indicates that the company is either earning less or spending more. This means they're a higher-risk client, as they might have trouble repaying a loan due to their financial situation.
EofFinOp	Efficiency of financial operations	$\frac{\text{financial revenue}}{\text{financial expenses}}$	It indicates how efficiently the business is managing its financial operations by comparing the financial revenue it	A ratio higher than 1 indicates that the system is generating more financial revenue than it is spending on financial

			generates to the financial expenses.	expenses. This implies efficient and profitable financial operations.

Based on the indicators provided above and their implications on riskiness, here's a summarized conclusion:

A comprehensive understanding of a company's risk profile can be achieved by looking at various efficiency ratios like the average inventories ratio (Inv/CoGS), efficiency of business activity (EofBAc), efficiency of operating activity (EofOpAc), efficiency of total activity (EofTAc), and efficiency of financial operations (EofFinOp).

A high average inventories ratio (Inv/CoGS) could signal potential risk as it indicates excessive inventory, which can lead to increased storage costs and potential losses due to obsolescence.

Efficiency of business activity (EofBAc) reflects the performance of the company's sales operations. Different scenarios provide insights into the company's sales strategy and its impact on profitability and risk.

The efficiency of operating activity ratio (EofOpAc) provides a picture of the company's operational profitability. A ratio greater than 1 is desirable as it signifies that the operating income surpasses operating costs, which suggests a lower risk profile. However, a ratio less than 1 implies that the company's operating costs exceed its income, thereby indicating a potential risk.

The efficiency of total activity ratio (EofTAc) offers a broader view of the company's efficiency in generating income against its total expenditures. A ratio less than 1 can imply higher risk as it shows the company's income is less than its expenditures, suggesting possible financial difficulties.

The efficiency of financial operations ratio (EofFinOp) highlights how well the company is managing its financial operations. A higher ratio, greater than 1, shows the

company generates more financial revenue than it incurs financial expenses, implying efficient financial operations and a potentially lower risk profile.

However, all the indicators presented here cannot be observed independently because they would not show an accurate assessment of the company's financial health and its real riskiness.

Table 29. Profitability Ratios

Code	Indicator	Formula	Interpretation	Implication on riskiness
GrMg	Gross margin	Gross profit ×100 / Net sales	It indicates the core profit-making ability of the company, before accounting for the operating costs.	A higher ratio means that the company has greater financial flexibility and is less risky because it has a higher ability to cover its operating costs.
NproMg	Net profit margin	Net income x100 / Net sales	A financial ratio used to calculate the percentage of profit which a company produces from its net revenue (revenue after operating costs).	Higher NproMg usually means that the company is more profitable, which reduces its financial risk.
ROA1	Gross ROA	Operating income / Total assets	It measures how effectively the company can generate operating income from its assets.	A higher ROA could indicate the company is generating more profit related to total assets. It may mean less risk for the company, investors or banks.
CoIncR	Cost income ratio	Operating expenses / Operating income	It presents the relation between income and the cost of acquiring that income in the company or bank.	The increased ratio shows more risks for entities because the company spends more to earn income.
RE/TA	Retained earnings total assets ratio	Retained earnings. / Total assets	It measures the amount of reinvested earnings, which reflects the size of the company's leverage.	A higher ratio indicates that a larger part of the company's assets is financed through internally generated retained earnings. It could indicate lower business risk and more financial flexibility.
OpMg	Operating margin	Operating profit x100 / Net sales	It measures the ratio between profit and sales after payment of production costs (wages and raw materials) before payment of interest and taxes.	A higher ratio indicates higher profitability and potentially lower risk, as the company retains more with every unit

				of sales to cover non-operating costs.
ROA	Return on assets	$\frac{\text{Net profit after taxes}}{\text{Total assets}}$	ROA ratio measures the company´s profitability through the relation between the other profit categories above, which may imply lower financial risk, as the company has more profits to cover its obligations. In this case, other profit categories are included in the relationship (net profit after taxes).	A higher ratio may indicate low risk as in the ROA1 explanation.
ROE	Return on equity	$\frac{\text{Net income}}{\text{Equity}}$	ROE is the measure of how well a company manages its investments to generate earnings growth.	A higher ROE ratio implies lower financial risk, as the company can generate more income for every unit of equity.
Prof ExSrc	Profitability of external sources of financing	$\frac{\text{Financial expenses}}{\text{External sources of financing}}$	It shows how much a company is spending in financial expenses (like interest on loans) for each unit it gets from external financing.	A higher ratio indicates a higher cost of external financing, which means a possible increase in the company's financial risk.

Based on the indicators and their implications on riskiness, the following conclusion can be made:

Observing the above table of the group of profitability indicators, we concluded that the financial health and risk level of the company are impacted by numerous factors, including the ones listed above.

Higher ratios for gross margin (GrMg), net profit margin (NproMg), gross return on assets (ROA1), retained earnings to total assets ratio (RE/TA), operating margin (OpMg), return on assets (ROA), and return on equity (ROE) imply that a company is more profitable, efficient, and financially stable, so results are decreasing its financial risk.

As an example, we emphasize that higher ratios of gross margin and net profit margin imply the company's capability to create profit before and after operating costs, indicating that it could cover its operating expenses effectively.

The high operating margin further indicates the company's capacity to retain a greater share of revenue from each unit of sales after covering operating costs.

We underline that it is very important during the analysis of the financial health of companies to take into account other facts which affect the predictability and assessment of their riskiness. It is customary to define their affiliation to the industrial sector, the size of the company, their ages and market position.

5.2 Results of Data Analysis

At the beginning of this data analysis, a bivariate analysis of each defined variable or financial coefficient is carried out to investigate their relationships with the categories ‘healthy’ and ‘distressed’.

The tables below present the results of descriptive statistics for a group of financial ratios: Liquidity, Leverage, Activity, Efficiency and Profitability. It contains the results of a statistical analysis comparing financial ratios between two groups of companies, which are labelled as ‘healthy’ and ‘distressed’.

This is a summary of each column in each table:

1. **Variable:** This column lists the different liquidity financial ratios which are being compared.
2. **Mean (healthy, distressed):** These two columns show the average value of the specified financial ratio for the "healthy" companies and the "distressed" companies, respectively.

   Std. Dev. (healthy, distressed): These columns show the standard deviation of each financial ratio for the "healthy" and "distressed" companies, respectively.
3. **Median (healthy, distressed):** These columns show the median value of each financial ratio for the "healthy" and "distressed" companies, respectively. The median is the middle value in a sorted list of numbers.

   t-value: This column shows the t-statistic from a t-test comparing the "healthy" and "distressed" companies for each financial ratio. The t-statistic measures the degree of difference between two groups, taking into account the variation or dispersion characteristic within each group.

   p-value: This column shows the p-value from the t-test. The p-value is the probability of observing a t-statistic as extreme as the one calculated if there were no difference between the "healthy" and "distressed" companies. A smaller p-value

suggests that the difference between the "healthy" and "distressed" companies is statistically significant, often considered to be the case when the p-value is less than 0.05.

This is evidenced by the p-values for all ratios exceeding the typically accepted significance level of 0.05. This implies that all of the presented financial ratios in this analysis may not effectively differentiate between financially stable and distressed clients. Other factors inside the company or environment or a combination of financial ratios may be required to better understand and predict the financial health of clients.

Table 30. Results of the Analysis Database – Liquidity Ratios

Variable	Mean		Std. Dev.		Median		t-value	p-value
	healthy	distressed	healthy	distressed	healthy	distressed		
Current ratios	1,31	1,20	0,838	0,924	1,12	1,00	-0,73	0,47
Quick ratio	0,73	0,78	0,543	0,778	0,63	0,57	0,50	0,62
Cash ratio	0,10	0,09	0,150	0,169	0,04	0,03	-0,07	0,95
Current assets/ total assets	0,56	0,49	0,280	0,254	0,51	0,45	-1,50	0,14
Fixed assets/ net capital	199,23	179,66	702,934	862,488	7,10	7,53	-0,15	0,88

Source: Author's work

In analysing the financial ratios of 'healthy' and 'distressed' companies, there are no differences through several metrics, such as the current ratio, quick ratio, cash ratio, the ratio of current assets to total assets, and the ratio of fixed assets to net capital. Therefore, according to our statistical analysis, none of these differences are statistically significant as the p-values are all greater than the conventional doorstep of 0.05.

This indicates that these specific financial ratios, in the context of the data set examined, may not serve as effective predictors or distinguishing characteristics between 'healthy' and 'distressed' companies. We assume that the financial health and status of a company likely involve a complex interaction of multiple factors and cannot be determined only based on these ratios.

Furthermore, the high standard deviation values in some measures indicate substantial variability within both groups, which might be worth further investigation.

These results underline the importance of taking a holistic approach to financial analysis, where no single ratio can provide complete information on a company's financial health.

After analysis, we have the following results:

- Current Ratios: This measure indicates a company's ability to meet its short-term liabilities. The findings indicate that the "healthy" companies possess an average current ratio of 1.31, contrasting with 1.20 for the "distressed" companies. But the difference is not statistically significant (p-value = 0.47), so we cannot confidently say that the 'healthy' companies have a higher current ratio than the 'distressed' companies.
- Quick Ratio: This is another measure of short-term financial health. Our results show that the "distressed" companies have a slightly higher mean value of the quick ratio (0.78) compared to the "healthy" companies (0.73). Also, we can conclude that the difference is not statistically significant (p-value = 0.62).
- Cash Ratio: This ratio measures a company's ability to pay its short-term liabilities with available cash or cash equivalents. Both "healthy" and "distressed" companies have similar mean cash ratios (0.10 and 0.09 respectively), and the p-value (0.95) validates that the difference is statistically insignificant.
- Current Assets to Total Assets: The 'healthy' companies have a slightly higher mean value (0.56 vs 0.49). This ratio indicates how much part of the company's total assets can be converted to cash within one year. While the "healthy" companies have a slightly higher ratio, according to p-value (0.14) the difference is not statistically significant.
- Fixed Assets to Net Capital: This ratio compares a company's fixed assets, such as buildings and equipment, to its net capital. The means for both 'healthy' and 'distressed' companies are surprisingly high (199.23 vs 179.66). According to the high value of the standard deviation and the p-value of 0.88, we cannot conclude that there is a statistically significant difference between the noted types of companies.

According to the results of the analysis for these indicators, despite there being some differences between the "healthy" and "distressed" companies across these financial ratios, none of these differences reach statistical significance. As we conclude, the aforementioned ratios may not effectively differentiate between 'healthy' and 'distressed' companies in this particular instance.

Table 31. Results of the Analysis Database- Leverage Ratios

Variable	Mean		Std.Dev.		Median		*t*-value	*p*-value
	healthy	**distressed**	**healthy**	**distressed**	**healthy**	**distressed**		
Financial stability ratio	1,00	1,53	0,804	2,167	0,92	1,00	**2,15**	**0,03**
Cash/current assets	0,16	0,16	0,233	0,287	0,07	0,06	0,07	0,95
Working capital/total assets	0,07	0,0003	0,234	0,216	0,05	-0,0001	-1,88	0,06*
Short-term fin. debt/total debt	0,24	0,19	0,218	0,146	0,18	0,16	-1,50	0,13
Short-term debt/ total debt	0,54	0,50	0,207	0,168	0,51	0,48	-1,39	0,17
Debt ratio	0,90	0,99	0,353	0,414	0,88	0,85	1,32	0,19
Gearing	7,30	15,99	11,365	31,237	3,33	2,88	**2,43**	**0,02**
Level of coverage I	895,80	345,29	4950,038	1360,258	46,06	38,25	-0,76	0,45
Level of coverage II	725,62	426,81	4785,492	1539,086	72,84	70,88	-0,42	0,67
Level of coverage III	25,73	22,19	23,908	20,574	16,62	18,35	-0,88	0,38

*10% level of significance

A leverage ratio is one of the main indicators of a company's financial health. By quantifying the indebtedness, we can comprehend how much a company leans on borrowed money to finance its operations. There are several different types of leverage ratios, each providing unique insights into a company's financial risk and capability to meet its debt obligations.

In our analysis, we found that the Financial Stability Ratio and Gearing show significant differences between financially stable and financially distressed clients. Both these ratios have p-values less than 0.05.

The Financial Stability Ratio evaluates how much of a company's capital is sourced from debt. A high ratio could signal a higher risk as it indicates a greater reliance on

debt. On the other hand, Gearing Ratio measures the proportion of a company's capital that is funded by debt. A higher Gearing Ratio could indicate that a company has high financial risk due to high debt levels.

In contrast, other leverage ratios such as Cash/Current Assets, Short-term Financial Debt/Total Debt, Short-term Debt/Total Debt, Debt Ratio, Level of Coverage I, Level of Coverage II, and Level of Coverage III without significant differences between the two client groups in these ratios, it suggests that these ratios by themselves may not effectively distinguish between financially stable and distressed clients.

These findings suggest that not all leverage ratios carry the same weight in predicting a company's financial stability. It is visible that the Financial Stability Ratio and Gearing are particularly useful in differentiating between financially stable and distressed clients.

Although statistical significance, expressed through p-value, is a powerful tool in data interpretation, it isn't the single determinant of a complete understanding. Credit risk management´s decisions often require considering more than just the statistical significance. The practical importance, the dimension of the difference, and the particular context of the situation should also be given due consideration. It might also be necessary to analyse a combination of financial ratios for a more comprehensive understanding and prediction of a client's financial health. More financial ratios analysis is needed to find the best set of ratios and financial indicators that can most accurately predict a company's financial stability.

- Financial stability ratio: A financial stability ratio is an extensive term and can refer to several different ratios used to measure a company's financial stability. Based on the results, the "distressed" companies have a higher mean stability ratio. With a t-value of 2.15 and a p-value of 0.03, this difference is statistically significant.

- Cash/current assets: This ratio measures the percentage of a company's current assets that are kept in cash or cash equivalents. Both "healthy" and "distressed" companies have the same mean ratio here, and the t-test confirms there is no statistically significant difference.

- Working capital/total assets: Working capital is current assets minus current liabilities. This ratio indicates the proportion of a company's assets funded by working capital.

  Taking average values into account, "healthy" companies have an average ratio of 0.07, while "distressed" companies have an almost negligible average ratio of 0.0003. However, the medians for both groups are 0.05 for "healthy" companies and -0.0001 for "distressed" companies.

  The t-value for this variable is -1.88, indicating that "healthy" companies tend to have a slightly higher ratio than "distressed" companies, but the p-value of 0.06 is on the verge of statistical significance at the standard level of 5%. When we consider the significance threshold of 10%, we can conclude that there is a moderate statistical significance in the difference in this ratio between "healthy" and "distressed" companies.

  Taking all of the above into account, while the difference may not be statistically significant at the strong 5% level, at the 10% significance level there is an indication that "healthy" companies have a slightly higher ratio of working capital to total assets than "distressed" companies.

- Short-term financial debt/total debt: This ratio shows us what proportion of a company's total debt is due within a year. The "healthy" companies have a slightly higher mean ratio, but the p-value of 0.13 suggests the difference is not statistically significant.

- Short-term debt/total debt: This ratio is similar to the previous one. Here too, the "healthy" companies have a higher mean ratio, but the difference is not statistically significant, with a p-value of 0.17.

- Debt ratio: This ratio measures the proportion of a company's assets financed by debt. The "distressed" companies have a higher mean debt ratio. But, with a p-value of 0.19, this difference is not statistically significant.

- Gearing: This term refers to a company's level of financial leverage, too. According to our findings, the "distressed" companies have a higher mean gearing ratio, and the t-test indicates this difference is statistically significant (p-value = 0.02).

- Level of coverage I, II, and III: These ratios refer to different coverage ratios as in Table 31, which are used to evaluate a company's ability to meet its financial obligations. However, none of the differences between the "healthy" and "distressed" companies for these ratios are statistically significant, based on the p-values.

We conclude that significant differences were found in the Financial Stability Ratio and Gearing Ratio. Distressed companies had higher values for both financial indicators, which indicates that they could be exposed to greater financial risk. As we have already emphasized, high values of the Financial Stability Ratio can indicate significant long-term indebtedness in relation to assets. Also, Gearing Ratio can indicate that the company is predominantly financed by debt instead of equity, which can cause problems in repaying obligations.

There weren't statistically significant differences shown by other financial indicators for 'healthy' and 'distressed' companies, which suggests that these ratios don't notably fluctuate between the two.

Table 32. Results of the Analysis Database - Activity Ratio

Variable	Mean		Std.Dev.		Median		t-value	p-value
	healthy	distressed	healthy	distressed	healthy	distressed		
Total assets turnover ratio	1,30	0,99	0,978	0,867	1,04	0,75	-1,89	0,06*
ST assets turnover ratio	2,67	2,40	1,978	2,403	2,23	1,75	-0,74	0,46
LT assets turnover ratio	22,03	11,11	87,510	40,464	2,65	1,51	-0,82	0,41
Turnover ratio of receivables	14,68	44,05	27,589	169,120	5,62	4,50	1,67	0,10**
Turnover ratios of investment	4,55	184,77	9,084	1259,165	2,47	2,02	1,44	0,15
Collection period in days	85,45	158,06	75,092	272,414	64,90	81,06	**2,44**	**0,016**
Days sales in inventory	110,40	118,30	194,562	139,189	50,32	78,40	0,25	0,805
Operating cycle	168,42	389,78	222,237	1290,751	115,76	134,76	1,63	0,11

* 10% level of significance; ** 10% level of significance

Collection period in days in the group of the Activity ratios presents that there is a statistically significant difference between healthy and distressed clients because t-value = 2,44 and p-value = 0,016.

Furthermore, the financial indicators in the same group, the Total Assets Turnover Ratio and the Turnover Ratio of Receivables, demonstrate a statistically significant difference between distressed and healthy companies, if we observe significance at the 10% level. Namely, for the Total assets turnover ratio t-value = -1,89 and p-value = 0,06 and for the Turnover ratio of receivables t-value = 1,67 and p-value = 0,10.

After analysing the data, we can conclude that there is a significant difference between the healthy and distressed clients in only one activity ratio: Collection Period in Days (p-value: 0.016). This implies that the Collection Period in Days may help in differentiating between financially stable and distressed clients.

The findings from the analysis of activity ratios between healthy and distressed clients can also offer insights into the impact on risk. Understanding the potential risks associated with different client groups is determining for businesses to effectively manage their healthy operations and financial strategies.

The statistically significant difference in the collection period between healthy and distressed clients suggests that the ability to collect payments on time could have a direct impact on the risk profile of a company. Healthy clients, who collect payments more promptly, are likely to experience lower liquidity risk and improved cash flow. This can eventually result in enhanced financial stability, making it easier for them to address their short-term liabilities and decrease their overall risk exposure.

On the other hand, distressed clients, who may have longer collection periods, could face higher liquidity risks due to potential delays in collecting payments. Therefore, the risk exposure to such clients could increase, which may negatively affect their creditworthiness.

As we concluded that the efficiency ratio does not show any significant differences between the two groups of clients, this indicates that this group of financial ratios is possibly not that relevant for assessing the risk of healthy and distressed clients. This emphasizes the importance of combining multiple financial indicators, rather than just observing a single group of them, for determining a company's risk exposure.

In conclusion, activity ratio analysis provides valuable insights into the risk profiles of different client groups. In this database, the Collection Period in Days appears to be particularly important in determining the model for the credit risk assessment.

On the other hand, by monitoring and managing this risk, companies can mitigate potential liquidity risks and improve their financial stability.

This table analyses various asset and operational efficiency ratios for ‘healthy’ and ‘distressed’ companies.

- Total assets turnover ratio: This ratio measures how efficiently a company uses its assets to generate sales. A higher ratio is usually better. The t-value for this variable is -1.89, which suggests that ‘healthy’ companies, on average, have a slightly higher total asset turnover ratio than ‘distressed’ companies. Considering these results, we can conclude that there is an indication that ‘healthy’ companies have a slightly higher efficiency of using their total assets to generate income compared to ‘distressed’ companies when we observe at the 10% significance level.
- Short-term (ST) assets turnover ratio: ‘Healthy’ companies show a bit higher mean ratio, but the difference is not statistically significant, given the p-value is 0.46.
- Long-term (LT) assets turnover ratio: Although the "healthy" companies noted a higher mean ratio, the statistical insignificance is suggested by the p-value of 0.41.
- Turnover ratio of receivables: This ratio reflects how many times the company collects its receivables during the year. The data shows that ‘healthy’ companies have an average receivables turnover ratio of 14.68, while ‘distressed’ companies show a significantly higher average ratio of 44.05. It is important to note that there is great variability among ‘distressed’ companies, which is evident from the standard deviation of 169.120, while for ‘healthy’ companies the standard deviation is much lower, 27.589. The medians for both groups are similar, with 5.62 for ‘healthy’ companies and 4.50 for ‘distressed’ companies, suggesting that there are several extreme values, especially among ‘distressed’ companies, that affect the average values.

  Given that this economic and statistical illogicality appeared in the years of the great financial crisis, we looked for reasons for it. Namely, companies, trying to pay their obligations to banks and suppliers on time, sold stock of goods at or below the purchase price. Then it is clear that they fell into a problem because

they were losing the price difference from which they finance their costs and expenses.

The t-value for this variable is 1.67 and the p-value is 0.10. At the 10% significance level, this difference becomes statistically significant, although it is on the edge of that threshold.

Accordingly, based on this analysis, we can conclude that, although ‘healthy’ companies on average have a lower receivables turnover ratio than "distressed" companies, the medians for both groups are similar, which indicates the existence of extreme values, especially among ‘distressed’ companies. This difference is marginally statistically significant at the 10% significance level.

- Turnover ratios of investment: This ratio presents how successfully the company manages investments. The mean ratio is significantly higher in the ‘distressed’ companies, but with the p-value of 0.15, this difference does not achieve statistical significance.
- Collection period in days: This is the average number of days it takes a company to collect payment after a sale has been made. A lower number is overall better.
- The mean value of the Collection Period is greater for the ‘distressed’ companies, a difference which holds statistical significance is indicated by a p-value of 0.016.
- Days sales in inventory: This is the average number of days that items stay in inventory before being sold. A lower number is generally better. The mean value of this ratio is slightly higher in the "distressed" companies, but a p-value of 0.805 suggests that this difference is not statistically significant.
- Operating cycle: The operating cycle is the average period between the acquisition of inventory and when the cash is received from the sale of the inventory. It is usually better to have a shorter cycle. In this case, the "distressed" companies have a high mean value, but the difference is not statistically significant as the p-value is 0.11.

We could conclude that only the difference in the collection period was statistically significant, with ‘distressed’ companies taking longer to collect payment after sales. This indicates that the "distressed" companies may have less efficient collection

processes and could be more risky. The other ratios did not show statistically significant differences between the "healthy" and "distressed" companies because the p-value was greater than 0,05. But, in this case, to form a coherent assessment model, we took two indicators (total assets turnover ratio and turnover ratio of receivables) at a significance level of 10%, which we stated above.

Table 33. Results of the Analysis Database- Efficiency Ratios

Variable	Mean		Std.Dev.		Median		t-value	p-value
	healthy	**distressed**	**healthy**	***distressed***	**healthy**	**distressed**		
Average inventories ratio	0,33	0,56	0,549	1,745	0,15	0,19	1,23	0,22
Efficiency of total activity	0,07	0,09	0,12	0,15	0,03	0,03	0,96	0,34
Efficiency of business activity (sales activity)	1,30	1,23	1,285	1,249	1,05	1,06	-0,31	0,75
Efficiency of financial operations	0,76	0,60	5,228	1,903	0,03	0,004	-0,21	0,83
Efficiency of operating activities	0,47	1,26	0,870	6,240	0,23	0,04	1,24	0,22

Source: Author's work

This table provides a detailed comparative analysis of efficiency ratios between two distinct categories of clients: those who are financially stable ('healthy') and those facing financial distress ('distressed'). Efficiency ratios serve as critical indicators of a company's effectiveness in utilizing its assets, resources, and operational capabilities to generate income. For each ratio, the table specifies the mean, standard deviation, and median values, as well as t-values and p-values.

After a detailed analysis of the provided data, it becomes obvious that there are not any statistically significant discrepancies between the healthy and distressed client categories concerning any of the efficiency ratios. The confirmation of this observation comes from all p-values being greater than the standard significance level of 0.05.

Thus, it can be inferred that when these efficiency ratios are evaluated individually, they may not provide a reliable method for differentiating between financially stable clients and those who are distressed. It should be acknowledged that a single ratio might not provide a decisive insight, but when combined, as noted in earlier tables, these ratios could yield a more comprehensive understanding of a client's financial health.

This table shows the various efficiency ratios regarding the 'healthy' and 'distressed' companies. Some of the explanations are as follows:

- Average inventories ratio: This ratio measures how many times a company has sold and replaced inventory during a given period. A lower ratio might suggest a company is overstocking inventory or not selling products efficiently. From the table above it is visible that the ‘distressed’ companies have a higher mean ratio, but the difference is not statistically significant, given a p-value of 0.22.
- Efficiency of total activity: This is a ratio which measures how efficiently the company use all resources to manage its activity. Based on the data from the table, the "distressed" companies have a higher mean ratio, but the difference is not statistically significant with a p-value of 0.34.
- Efficiency of business activity (sales activity): This is the measure of how efficiently the company uses its resources to generate sales. The ‘healthy’ companies have a slightly higher mean ratio, but the p-value of 0.75 indicates the difference is not statistically significant.
- Efficiency of financial operations: This ratio refers to a measure of how effectively the company manages its financial resources. From this data, we conclude that the ‘good’ companies have a higher mean ratio, but the p-value of 0.83 suggests the difference is not statistically significant.
- Efficiency of operating activities: This ratio is the measure of how efficiently a company uses its operating resources, like inventory and labour. The "distressed" companies have a higher mean ratio, but the difference is not statistically significant, with a p-value of 0.22.

Even though the disparities in these ratios might not be statistically significant (because $p > 0.05$) it is important to differentiate between statistical significance and practical or economic significance.

A small change in the efficiency ratio can indicate changes in important areas of operations and finances, which can affect the profitability and sustainability of the company. As an example, we can cite a better use of raw materials, and a shorter product processing process, which leads to a reduction in costs and an increase in efficiency.

However, as we mentioned for the previous groups of ratios, we can conclude that these efficiency ratios alone may not be sufficient to distinguish between 'healthy' and 'distressed' companies. Nevertheless, they remain important components for a more comprehensive assessment of the company's financial stability.

Table 34. Results of the Analysis Database: Profitability Ratios

Variable	Mean		Std.Dev.		Median		t-value	p-value
	healthy	distressed	healthy	distressed	healthy	distressed		
Gross margin	0,11	0,07	0,223	0,156	0,02	0,01	-1,03	0,31
Operating margin	0,05	0,05	0,086	0,095	0,02	0,01	-0,02	0,98
Net profit margin	0,04	0,04	0,073	0,082	0,01	0,00	-0,24	0,81
ROA	0,04	0,03	0,064	0,076	0,02	0,003	-0,48	0,63
ROA1	0,04	0,04	0,074	0,080	0,02	0,004	-0,42	0,68
ROE	0,19	0,19	0,291	0,300	0,09	0,02	0,09	0,93
Cost income ratio	389,01	119,92	3540,790	535,835	1,05	1,23	-0,48	0,63
Profitability of external source of financing	0,09	0,10	0,128	0,120	0,072	0,073	0,15	0,88
Retained earnings total assets ratio	0,13	0,07	0,15	0,13	0,08	0,01	**-2,31**	**0,02**

Source: Author's work

The table above presents a comparison of profitability ratios between two groups of clients: healthy (financially stable) and distressed (financially troubled). Profitability ratios measure a company's ability to generate profit in relation to revenue, assets and capital. The table shows the mean, standard deviation, and median values for each ratio, along with t-values and p-values derived from t-tests to determine whether there are statistically significant differences between the two groups. According to the presented analysis results, it can be concluded that most of the profitability ratios do not show a statistically significant difference between healthy and distressed clients, as indicated by their p-values greater than 0.05.

The Retained Earnings to Total Assets Ratio indicates the share of a company's assets financed by its retained earnings, and it indicates the company's ability to generate profits and reinvest them. In this case, the p-value of 0.02 is less than the 0.05 threshold, implying that there is a statistically significant difference between healthy and distressed clients concerning this ratio.

A mean value of 0.13 for healthy companies shows that they retain 13% of profit in relation to total assets. A standard deviation of 0.15 indicates that there is relatively significant variability in the ratio within this group of clients.

In the group of 'bad' clients, the average ratio of retained earnings is 0.007, which is significantly lower than in healthy firms. As the standard deviation is 0.13, this result

also indicates higher variability than in healthy companies. The median value of 0.01 is significantly lower than that of healthy companies, suggesting that the worst companies have a relatively low ratio of retained earnings to total assets.

T-value of -2.31 and p-value of 0.02 indicate a statistically significant difference between healthy and distressed companies. The 'distressed' firms had lower values for this ratio compared to 'healthy' firms. Since the p-value is less than 0.05, it means that this ratio can indicate the difference between financially healthy and distressed companies.

So, we can conclude that 'healthy' companies have a significantly higher ratio of retained earnings to total assets in comparison to 'distressed' companies.

The following table uses the Two-Way Summary Table method to present an analysis of the industries in which clients from the observed database operate, examining the relationship between industry affiliation and the success or failure of companies.

Table 35. Two-Way Summary Table

Target	Consumer Cyclical	Industrial	Consumer non-cyclical	Real Estate	Other	Health Care	ICT	Totals
Good (0)	33	8	17	26	7	4	8	103
Column %	66.00%	66.67%	60.71%	70.27%	77.78%	57.14%	100.00%	
Row %	32.04%	7.77%	16.50%	25.24%	6.80%	3.88%	7.77%	
Total %	21.85%	5.30%	11.26%	17.22%	4.64%	2.65%	5.30%	68.21%
Distressed (1)	17	4	11	11	2	3	0	48
Column %	34.00%	33.33%	39.29%	29.73%	22.22%	42.86%	0.00%	
Row %	35.42%	8.33%	22.92%	22.92%	4.17%	6.25%	0.00%	
Total %	11.26%	2.65%	7.28%	7.28%	1.32%	1.99%	0.00%	31.79%
Totals	50	12	28	37	9	7	8	151
Total %	33.11%	7.95%	18.54%	24.50%	5.96%	4.64%	5.30%	100.00%

Source: Author's work

The chi-square (χ^2) statistic for this table is 5.43. Based on this result, we have a p-value for the obtained chi-square (χ^2) statistic of 0.49. In other words, there is no statistically significant connection between industry and status (healthy or distressed) in the given sample.

In the table above the percentage values in each column and row indicate the distribution of healthy and distressed clients across various industries, while the total percentage values represent the overall number of clients in each industry.

After analysing the financial health of clients within the consumer cyclical industry, which includes sectors such as automotive, automotive retail, household durables, media advertising, entertainment, textile clothing and other consumer cyclical businesses, we can conclude that out of a total of 50 clients, 33 (or 66%) are classified as healthy clients, while 17 (or 34%) face financial difficulties. This assessment shows that the majority of clients in the consumer cyclical industry are financially stable, while a smaller number of clients face difficulties in meeting their financial obligations.

In conclusion, the given data represents a client base consisting of companies from various industry sectors such as airline logistics, road and rail infrastructure, capital goods, commercial and professional services, building products, construction and engineering. Of the total number of clients, 12 of them belong to these industrial groups. Out of those 12 clients, 8 (66.67%) were classified as healthy clients, while the remaining 4 (33%) were considered unhealthy. This analysis provides an overview of the distribution of clients and their financial health within the listed industry sectors. This information helps in understanding the overall financial health of clients within the specified industry sectors and can be used to make decisions about loan portfolio management and risk assessment.

In summary, it was found that the non-cyclical consumer industrial group has a total of 28 clients. 17 of them or 60.71% are healthy, and 39.29% or 11 clients are late in paying obligations for more than 90 days.

The real estate industry group contains 37 financially exposed clients, of which 29.73% or 11 of them are in arrears, and 27 or 70.27% are healthy.

In the health care industry group (pharmaceuticals & biotechnology, health care), among 7 clients 4, or 57.14%, were recorded as healthy and the other 42.86%, or 3 clients, were distressed.

The information of the technology industry group (software, hardware, semiconductors) records 8 clients, all of which are classified as healthy, so there are no clients who are late in paying their obligations.

Companies classified in other industries, 9 in total, are classified as a percentage of 77,78 or 7 of them in healthy, and 2 clients or 22,22% are clients in bad status.

This data highlights the importance of understanding the financial health of clients across industries. Consequently, it is important to adopt a risk management strategy in line with the specific patterns and obstacles of each industrial sector for the sustained stability of banks.

The Pearson Chi-square value is 5.43 and the corresponding p-value is 0.49. So, it means that there is not a significant association between the two variables.

This means that the variable "industry affiliation" does not provide enough evidence to conclude that it has a significant effect on predicting the dependent variable (whether the client is healthy or distressed). In other words, the industry in which the client operates is not essential in determining whether the client is good or bad.

Chapter 6: Development and Validation of Models

As explained in the section, logistic regression is one of the methods for creating a model for assessing the possibility of default in banks. Out of a total of thirty-seven variables evaluated in logistic regression with binomial distribution, six make up the final model. The model includes the Financial Stability Ratio from the group of liquidity ratios, Level of Coverage I and Gearing from the leverage ratios groups, as well as the Total Assets Turnover Ratio and Turnover of Receivables from the activity ratios group. Additionally, the model considers retained earnings of total assets from profitability ratios. The table below presents the parameter estimates for the binomial logistic regression model.

Table 36. Parameter Estimates for the Binomial Logistic Regression Model Distribution

Effect	Column	Estimate	Standard Error	Lower CL 95%	Upper CL 95%	*p*
Intercept	1	-0,24757	0,399134	-1,02986	0,534720	0,535085
Financial stability ratio	2	0,33847	0,155974	0,03276	0,644169	0,030005
Level of Coverage	3	-0,00002	0,000062	-0,00014	0,000099	0,714216
Gearing	4	-0,49901	1,093219	-2,64168	1,643659	0,648059
Total assets turnover ratio	5	-0,62709	0,263819	-1,14416	-0,110014	0,017455
Turnover of Receivable	6	0,00439	0,003509	-0,00249	0,011265	0,211130
Retained Earnings of Total assets	7	-2,32871	1,632309	-5,52797	0,870559	0,153685
Scale		1,00000	0,000000	1,00000	1,000000	

***Source**: Author´s work*

The variables in the model for assessing the creditworthiness of clients of an Islamic bank from B&H are explained below.

Financial Stability Ratio (FSR tf-1) - When this ratio is increased by 1 unit, the log odds for default show a significant increase of 0.33847 with a confidence interval (CL) between 0.03276 and 0.644169, and with all other variables held constant. This indicates that a higher *Financial Stability Ratio* is associated with a raised probability of default.

The result implies that, if the *Financial Stability Ratio* increases, the probability of the client being categorized as 'distressed' or facing default also rises. These findings

reveal the importance of controlling the Financial Stability Ratio, as it is a statistically significant variable in our model used to recognize clients´ creditworthiness.

In the case of *Level of Coverage, I* (LofCI), the higher the level of coverage, the lower the client´s probability of default. The changes in the *Level of Coverage I* have a minimal negative impact (estimate = -0,00002) on the probability of default.

Although this finding shows a "light" impact of this indicator in reducing the overall credit risk, we recommend constant monitoring of *Level of Coverage I* as part of controlling the overall financial health of the client.

As *Gearing* increases, the probability of default decreases. The estimate of -0.49901 represents the estimated impact of the Gearing variable on the probability of default. In this context, a negative value indicates an inverse correlation: *as Gearing* increases, the probability of default decreases. Thus, if a high value of *Gearing* means something positive about the client, we can use it as a positive indicator. Companies that operate in industries with a high level of income stability and predictable cash flows, with efficient management of their debt, or those that have a high degree of indebtedness due to development projects, may be considered less risky in terms of the probability of defaulting on their financial obligations. This means that high *Gearing* is perceived differently in the context of default risk.

Although there is a negative estimate for *Gearing*, the high standard error and p-value suggest that this relationship may not be precise enough, but with the other variables in the model, it makes the model more accurate.

Analysing the *Total Assets Turnover Ratio* (TATR tf-1), we conclude (based on the Estimate = -0.62709), that each increase in *Total Assets Turnover Ratio* by 1-unit results in a decrease in the log-odds probability of default by approximately 0.62709, while other variables are constant. This negative estimate shows an inverse correlation: the higher the *Total Assets Turnover Ratio*, the lower the probability of default.

Therefore, based on the analysis, we can conclude that a high *Total Assets Turnover Ratio* is a positive indicator in the assessment of the client. The value of standard error and p-value presented in the statistical tests table underscore the significance of this variable as an important part of evaluating the client's financial stability and risk of loan repayment within our model.

As the *Turnover of Receivables* increases, the probability of default also increases. The standard error is 0.003509, being relatively low suggesting a high precision in estimating the impact of this variable on the probability of default. Although the estimate is positive, the high p-value and confidence interval that includes zero suggest that the impact of Turnover of Receivables may not be sufficiently precise, but together with the rest of the indicators, it makes the model more accurate.

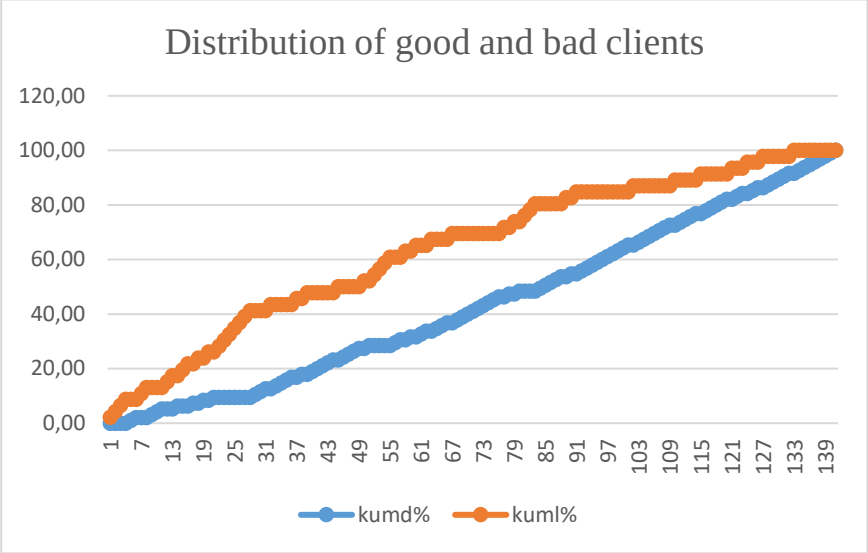
Although the result seems illogical, the fact is that the data are from the time of the Great financial crisis. Namely, clients sold stocks of goods at the cost price or under the purchase price to get money sooner and pay their due obligations. We assume that these irrational business steps led to bad financial results, and thus this result of the coefficients in the model can be logical.

The Retained Earnings to Total Assets (RE/TA) as negative estimate =-2,32871 presents an inverse correlation. This means that if *Retained Earnings to Total Assets* increases, the probability of default decreases significantly. In the model, higher income in relation to total assets reduces the likelihood of default due to logical reasoning.

However, the overall model with the specified variables in the validation was evaluated as fair as shown below. After defining the variables of the model for assessing clients' credit risk using logistic regression, its validation was performed**.** Validation consists of a graphic presentation of the distribution of healthy and distressed and Receiver Operating Characteristics (ROC), *Area Under the Curve* (AUC), hit rate, KS statistics and Gini coefficient.

Figure 9 shows the cumulative relative frequencies for really healthy and really distressed clients by the grouped model probabilities that the client will be 'distressed'. Really healthy clients are marked in blue (kumd%), and really distressed clients are marked in ochre (kuml%).

Figure 10. Distribution of Good and Bad



Source: Author´s work

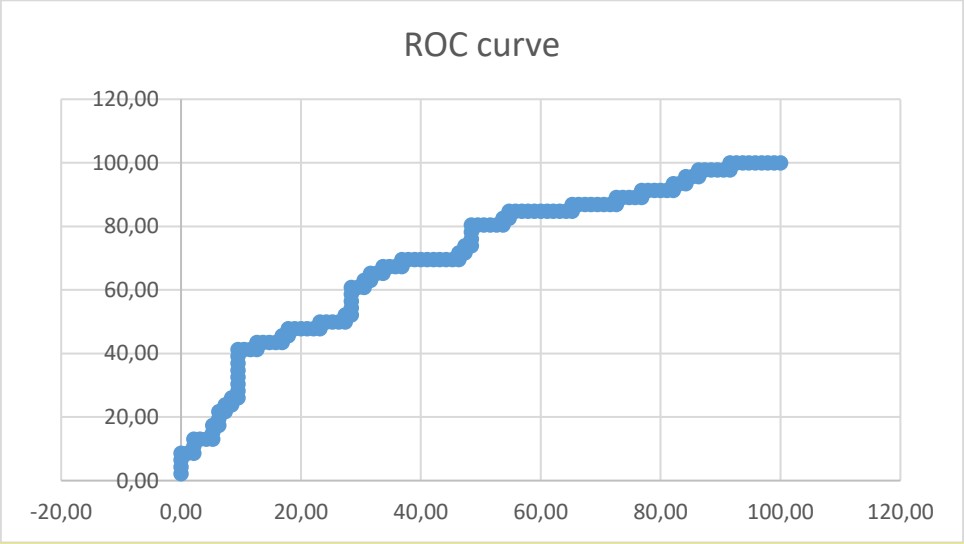
Key elements of the ROC curve:

True Positive Rate (TPR) is the part of actual positive cases that the model correctly identifies as positive. *True Positive Rate* is plotted on the y-axis.

False Positive Rate (FPR) is the part of actual negative cases that the model incorrectly identifies as positive. *False Positive Rate* is plotted on the x-axis.

Different *Threshold Values* are used to calculate the TPR and FPR, which are then plotted to form the ROC curve.

Figure 11. ROC Curve



***Source**: Autor's work*

Area Under the Curve (AUC) measures the entire two-dimensional area underneath the entire ROC curve. It is the area under the ROC curve. In our model, AUC = 0.7043848, so we can conclude that the model is good because its value is greater than 0.5. Thus, this measure confirms the ability to distinguish between healthy and distressed clients.

In addition to the aforementioned measures, the review of the model's accuracy in assessing the riskiness of clients in the lending process, in our case the Cut-Off Point was calculated using the results of KS statistics, i.e., Kolmogorov-Smirnov statistics. In our case, Cutt-Off Point is defined by the highest value of KS statistics, where KS=33.70709.

Considering the results, we can conclude that the presented model is "fair".

The Gini coefficient is another measure that is often used to assess the discriminating ability of a credit model. It is calculated as double the area between the ROC curve and the diagonal (random guess line) on the ROC plot.

In the context of credit scoring, the Gini coefficient is often the preferred measure because it offers a clearer interpretation of the model's discriminating power than the AUC or KS statistic. A higher Gini coefficient means a better discrimination ability of the model. In the case of the obtained model, the GINI coefficient of 0.4087 indicates fair discrimination of the model.

Within the area of classification models, the assessment of their performance is important for understanding and enhancing the model's efficacy across diverse real-

world frameworks. An effective method for measuring a model's performance is by analysing its hit rate for both positive (healthy) and negative (distressed) classifications. The hit rate serves as a straightforward metric, exploring the model's frequency of correctly identifying instances as 'healthy' or 'distressed'.

The total hit rate for the credit scoring model created in this research is 65.96%. The hit rate for healthy clients is 66.3% and for distressed clients 65.2%. In practical terms, this means that when the model encounters a 'healthy' case, it has a 66.3% chance of correctly classifying it as 'healthy'. When the model encounters a "distressed" case, it correctly classifies it as 'distressed' in 65.2% of cases.

When the results for both sets are combined, the overall success rate is 65.96% which means that the model has a similar ability to recognize both 'healthy' and 'distressed' cases, with a slight advantage towards recognizing 'healthy'.

Chapter 7: Discussion and Conclusions and Guidelines for Future Research

7.1 Discussion

The objective of this research was to create a model for predicting the creditworthiness of SMEs as clients of an Islamic bank in Bosnia and Herzegovina in order to facilitate credit risk management and approval of financing for this type of company, not only in B&H but also globally.

Considering the first thesis presented in this paper, *"H1: The use of internal rating models in Islamic banks contributes to a better quality of risk management",* a review of previous research highlights a significant gap in the literature regarding internal rating models in Islamic finance. Despite the growing trends in Islamic banking and its unique business principles, there has been some limited research into credit risk management tools specifically tailored to the characteristics of Islamic banks.

There are several reasons for the limitations in the research of credit ratings through credit risk management, as follows:

Relatively recent history is important because Islamic finance has gained considerable popularity in the last few decades but is still a relatively young industry compared to conventional banking. As a result, research in this field of Islamic finance is not developed enough.

The specificity and uniqueness of Islamic finance impose the uniqueness of risk management, especially credit risk, with special reference to *musharaka* and *mudharabah* products.

The development of internal rating models usually requires access to a large amount of historical data to validate the model's accuracy. However, the relatively short history of this Islamic bank and the limited availability of data may affect the results of the research.

On the other hand, this fact can also have its advantages, considering that the model is intended to assess the creditworthiness of small and medium-sized enterprises, which otherwise have different challenges in their work. This model should help Islamic banks

in their decision to provide access to financing for this type of enterprise and contribute to better risk management in Islamic banks.

If a bank were to use the model that was formed and validated in this research, it would contribute to the quality of risk management in the following ways, especially concerning the situation when such a model is not used:

1. Assessing the creditworthiness of clients:

The model would enable a more accurate and objective assessment of the creditworthiness of clients using historical data and prediction algorithms. This would include analysing financial indicators historically. The improved analysis helps reduce the risk of financing customers who may not be able to repay the debt, which is especially important in Islamic banks that rely on profit margins instead of interest.

2. Identification of qualified SME clients:

The model can help the bank identify SME clients who best meet the credit policy criteria and have the lowest risk of default. The bank can use the model to segment SME clients based on different levels of risk and financial stability, which allows the bank to develop specialized financial products that are tailored to specific needs and risk profiles, thereby providing flexibility within the limits of its policy. By implementing this model, an Islamic bank can improve its ability to effectively develop the SME segment and support economic development.

3. Improvement of credit policy:

By using this model, the bank can develop more sophisticated credit policies that reflect the real risk of clients. For example, the model can identify customer segments that show more stable financial behaviour, allowing the bank to offer more flexible financing terms or lower profit margins for those groups.

4. Creation of marketing activities:

With more extensive and better information about the creditworthiness and risks associated with individual clients, the bank can design marketing campaigns in a

targeted manner. Also, the bank can develop special offers for clients with high creditworthiness or create products that are adapted to the specific needs of clients with certain risks.

5. Portfolio Management:

The model enables better monitoring and management of the overall loan portfolio, identifying potential problems before they become serious. Analysing data using models can help identify early trends that could indicate increased risk in some segments of a portfolio. By using the model, the bank can anticipate potential financial difficulties for SME clients and offer solutions before the situation worsens and leads the client into default.

H_2: The internal rating model for SME customers in Islamic banks can be based on the same type of information as in conventional banks, considering the principles of Islamic finance.

The results of our research support the hypothesis (H2) that these models for SME customers in Islamic banks could be based on the same type of data used in conventional banks while respecting the principles of Islamic finance.

Namely, as stated in this paper, financial ratios from the following groups were used to create the model: Liquidity, Leverage, Activity, Efficiency and Profitability. For their calculation, regular annual financial reports were used, from which different parts of the balance sheet and income statement were taken. In the same way, financial indicators are calculated for the needs of conventional banks.

Specifically, taking into account the balance sheet records legally used by companies in Bosnia and Herzegovina, the calculation of financial indicators was made based on data used by commercial banks and Islamic banks. Also, deciding on the financing of clients in an Islamic bank is a process in which the *Shari´ah* board participates, which ensures the application of Islamic business principles to both the bank and the clients. This role of the *Shari¨ah* board presents a unique addition to the evaluation in the approval process.

The overall success rate is 65.96% can be considered acceptable - fair, but it also indicates space for improvement. Taking into account that the hit rate for ʾhealthyʾ and ʾdistressedʾ clients is approximately a similar percentage, which in practical terms means for a 'healthy' case, it has a 66.3% chance of correctly classifying it as 'healthy' and for a "distressed" case, it correctly classifies 65.2% of cases. Therefore, we can confirm that the model is fair because the model has no significant differences in the classification of both.

Regularly updating the model with new data and feedback from approved financial applications can significantly contribute to its improvement. The introduction of machine learning, deep learning, and AI technology, then the recognition of risks that affect the behaviour of the model are factors that can improve the accuracy and quality of the model. Given that Islamic financial institutions are developmental and operate according to the principle of profit and loss sharing, it contributes to the assessment of the satisfactory quality of the model.

H_3: *Decisions made by using internal rating models are more precise compared to the decisions made by a judgemental system.*

Relying on the findings of previous research, as well as on the findings of this work, we conclude that the classification of clients into healthy and distressed, based on real business indicators over time, can be more accurate in assessing the client's creditworthiness than the judgement method itself.

Namely, the client's operations expressed in their balance sheets show their financial stability and ability to repay their financial debt, as well as their trends over a period of time. Applied in the model, they give a higher precision of estimation than expert estimation without a model.

Internal rating models are based on quantitative data for assessing creditworthiness, which reduces subjectivity and potential biases that can arise when relying only on the opinions of experts. Each client is evaluated according to the same criteria, which ensures consistency in the approval process.

These models are often developed and adjusted based on historical customer performance data, which can improve accuracy in predicting default risk. In Islamic

banks, this is particularly relevant due to the specificity of products based on risk and profit sharing.

Also, the automated systems of these models can process large amounts of requests in a short period, which is significantly more effective compared to traditional assessment methods that require detailed analysis by experts. This approach enables faster responses of banks to requests for financing.

H_4: Internal rating models for SMEs lead to financing a larger number of SMEs.

Internal rating models for SMEs contribute to the financing of more SMEs for several reasons. Namely, these models enable banks to assess the creditworthiness of small and medium-sized enterprises more efficiently and objectively.

Based on the quantitative data and predetermined criteria inside the models, internal rating models help Islamic banks mitigate the subjectivity and potential bias associated with traditional judgement-based assessments.

The use of internal rating models permits banks to simplify their credit risk assessment procedures. This fact enables a more efficient evaluation of the creditworthiness of SMEs, decreasing the time and resources needed for final decision-making. As a result, financial institutions can process a greater number of SME financing applications in a shorter time and with fewer resource costs.

This increased accuracy provides financial institutions with more confidence in financing a larger number of SMEs, including those that might have been considered too risky without using this tool.

The development of models for evaluating the creditworthiness of clients in Islamic banks while reflecting the unique risks of the Islamic finance industry is a significant part of improving credit risk management. Namely, taking into account the *Sharia´ah* principles, profit and loss sharing and the other elements mentioned in this research should be incorporated into the internal rating models. Given that we aim to increase the percentage of participation in equity-based products and future research, we recommend creating a model with extended qualitative variables. The design and use

of these models would contribute to the overall stability and competitiveness of Islamic banks in the global financial market.

7.2 Guideline for Future Research

For future research, we recommend conducting an analysis that compares the performance of models for an internal rating of clients in relation to traditional decision-making methods, especially expert assessment.

In this regard, the introduction of *Shari'ah* rules into the model would additionally upgrade it for the needs of the Islamic financial industry.

Improve the model for the ability to adapt to the regulatory and market environment, perhaps with machine learning and AI technology.

Integrate qualitative factors into the model, which would increase the accuracy of client assessments, but also include principles such as ESG (Environmental, Social, and Governance), which are in full accordance with Islamic moral economy and Islamic principles and views of the world.

Explore the possibility of adapting the model to be used to assess the health of clients for individual products within Islamic banks.

It should certainly be evaluated through comparative studies between Islamic banks in different geographic regions in order to understand the specific needs and challenges they face and adjust the application of the internal rating model.

7.3 Conclusion

With this research, we wanted to contribute to a more efficient and high-quality decision-making process in Islamic banks regarding the financing of small and medium-sized enterprises through the formation of a creditworthiness assessment model based on the data of the only Islamic bank in Bosnia and Herzegovina. Considering the regulatory limitation of the operations of these banks in B&H, we obtained a model with a satisfactory percentage of hits.

The earlier practice of relying on expert assessment without using historical analysis of financial operations through the formation of models could be less accurate in assessing the client's future ability to repay obligations under the financial support agreement.

Also, this research should contribute to a better understanding and application of the scorecard model in Islamic banks in such a way as to better understand the risks of financing SME customers, and through the decision-making process bring the specificity of SMEs closer to Islamic banks, facilitate the decision-making process and increase their market competitiveness.

Although the data on which the preparation of financial indicators is based are similar to the data of commercial banks, with this model, the application of Islamic principles in decision-making through the Sharia board completes the decision-making process and ensures a better picture of client requests.

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