



UNIVERSITÀ  
DI TORINO

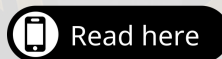
# EUROPEAN JOURNAL OF ISLAMIC FINANCE (EJIF)

ISSN 2421-2172

VOLUME 9 - ISSUE N°2 (2022)

A JOURNAL DEDICATED TO  
THE INVESTIGATION OF  
ISLAMIC BUSINESS AND  
MANAGEMENT, FINANCE AND  
BANKING STUDIES

FULLY OPEN-ACCESS AND  
AVAILABLE ONLINE AT:  
[HTTPS://WWW.OJS.UNITO.  
IT/INDEX.PHP/EJIF/INDEX](https://www.ojs.unito.it/index.php/ejif/index)





## **FOCUS AND SCOPE**

**The European Journal of Islamic Finance is an Open Access online journal that publishes quarterly (every four months) articles and papers that contribute to developing both the theory and practice of research methods employed across the whole field of Islamic Business and Management, Finance and Banking studies. The readers of this journal mainly include scientific workers, college teachers and PhD students and other practitioners.**



## **EDITOR-IN-CHIEF**

**Prof. Paolo Biancone, University of Turin, Italy**

## **ASSOCIATE EDITORS**

- **Prof. Burhan Uluyol, Istanbul Sabahattin Zaim University, Istanbul, Turkey.**
- **Prof. Kabir Hassan, University of New Orleans, USA.**
- **Prof. Irum Saba - Institute of Business Administration (IBA) - Karachi, Pakistan, Kuala Lumpur, Malaysia.**
- **Prof. Anwar Hasan Abdullah Othman - International Islamic University of Malaysia, Kuala Lumpur, Malaysia.**
- **Prof. Hishamuddin Abdul Wahab - University Sains Islam Malaysia (USIM), Kuala Lumpur, Malaysia.**



## **EDITORIAL BOARD**

- **Prof. Dian Masyita, University of Padjadjaran, Indonesia.**
- **Prof. Abdulazeem Abozaid, Qatar Faculty of Islamic Studies - Qatar.**
- **Prof. Ahmad Aref Almazari, King Saud University, Saudi Arabia.**
- **Prof. Bashar Malkawi, University of Sharjah, UAE.**
- **Prof. Marco Meneguzzo, Università della Svizzera Italiana, Switzerland.**
- **Prof. Nidal A. Alsayyed, Inayah Islamic Finance Research Institute, USA.**
- **Prof. Roberta Aluffi, University of Turin - Italy.**
- **Prof. Ghassen Bouslama, NEOMA Business School - Campus de Reims, France.**
- **Prof. Nazam Dzolkarnaini, Salford University, UK.**
- **Prof. Rusni Hassan - International Islamic University of Malaysia, Kuala Lumpur, Malaysia.**
- **Prof. Khaled Hussainey, University of Portsmouth, UK.**
- **Prof. Mansor Ibrahim - INCEIF, Kuala Lumpur, Malaysia.**
- **Prof. Rifki Ismal, University of Indonesia.**



## **EDITORIAL BOARD**

- **Prof. Tariqullah Khan, Hamad bin Khalifa University, Qatar.**
- **Prof. Ali Khorshid, ICMA Centre Reading University - UK.**
- **Prof. Amir Kia, Utah Valley University, USA.**
- **Prof. Laurent Marliere, Université Paris-Dauphine France.**
- **Prof. Federica Miglietta, University of Bari - Italy.**
- **Prof. Hakim Ben Othman, University of Tunis - Tunisia.**
- **Prof. Mohamed Ramady, King Fahd University of Petroleum and Minerals, Saudi Arabia.**
- **Prof. Mamunur Rashid, Nottingham University, Malaysia.**
- **Prof. Roberta Ricucci, University of Turin, Italy.**
- **Prof. Silvana Secinaro, University of Turin, Italy.**
- **Prof. Younes Soualhi, International Islamic University Malaysia.**
- **Prof. Metin Toprak - Istanbul Sabahattin Zaim University, Istanbul, Turkey.**
- **Prof. Laurent Weill, University of Strasbourg, France.**



## **JOURNAL MANAGERS**

- **Dr. Valerio Brescia, University of Turin, Italy.**
- **Dr. Davide Calandra, University of Turin, Italy.**
- **Mr. Federico Lanzalonga, University of Turin, Italy.**

## **COPYEDITING TEAM**

- **Mrs. Federica Bassano**
- **Dr. Federico Chmet**
- **Dr. Daniel Iannaci**

## **NATIONAL RESEARCH ACCREDITATION**

- **EJIF is listed in the ANVUR (The Italian National Agency for the Evaluation of Universities and Research Institutes) as a scientific journal in both AREA 12 - Legal sciences and AREA 13 - Economic and statistical sciences.**



## **INDEXING**

- **ACNP**
- **Arab World Research Source: Al-Masdar**
- **BASE**
- **DOAJ**
- **CiteFactor**
- **EBSCO Discovery Service**
- **Google Scholar**
- **Microfinance Gateway (World Bank)**
- **ROAD - Directory of Open Access Scholarly Resources**

## **PEER-REVIEW PROCESS CERTIFIED BY**

- **ReviewerCredits**

# Research Methods for Islamic Banking and Finance Law: Interdisciplinary Research Method

Sanaa Kadi<sup>1</sup>

<sup>1</sup> University of Helsinki, Finland

Contact Author: sanaa.kadi@helsinki.fi

**This study presents an original guideline for choosing valid research methods when analyzing Islamic banking regulations and Islamic finance laws. It presents a theoretical model that explains the complexity of the field of Islamic banking and finance, provides legal scholars with a brief analysis of the various issues and challenges that may arise while researching Islamic banking and finance law, and offers different possibilities and solutions to progress and supply high-quality research into Islamic finance. Research on Islamic finance in recent decades has produced extensive literature; however, most of it is descriptive and lacks standard research methods. This creates uncertainty for young scholars and graduate students about the method that should be adopted to address the legal approach to Islamic banking and finance. The outcome of the study leads to the fact that due to the complexity of the subject, multiple research disciplines may interfere with each other in answering different research questions. Accordingly, various solutions have been proposed to help researchers and students with their choices. The study offers an original and unique standard for legal scholars in approaching Islamic banking and finance law.**

**Keywords-research methods; methodology; Islamic finance law; Islamic banking law**

## I. INTRODUCTION

The research methodology of Islamic finance is different from the research methodology of conventional finance. Empirical research, however, shows that different research literature comparing the performance of both sectors gives different results depending on the research methods utilized during the studies [1]. Moreover, in 2022, Salami, Tanrivermiş, and Abubakar[2] recognize four categories of stakeholders in their research on the methodology of Islamic finance: the first category is classified as Islamic scholars having a relative understanding of Islamic finance from the Quran, *Hadith*, and other Islamic sources, including Islamic jurisprudence (*Fiqh*); the second group of stakeholders identified in Islamic finance research is scholars acquainted with research methodologies, and they are frequently researchers; the third group recognized is the market investors and persons seeking Islamic finance research outcomes to make the right investment choices. The fourth

group is unlike the others and comprises those who review or implement universal financial standards in the various states involved with Islamic finance. The results showed that the first three groups of stakeholders recognized are not combined, thus leading to the fact that most of the research outcomes in Islamic finance are redundant. Therefore, the standardization of methodology is a challenging mission.[2]

Islamic banking and finance law deals with rules that apply to the Islamic banking and finance system. This implies its consistency with the principles of Islamic law and engagement with Islamic economics. Islamic principles are interpreted differently due to the variances in the Islamic schools of jurisprudence.[3] After the financial crisis of 2008, the Islamic banking and finance sector started to attract more investors from its conventional counterpart.[4] Islamic financing has expanded due to its different benefits.[5] Besides, Ikra, Rahman, Wanke, and Azad stated in 2021 that research on Islamic banking has increased since 2008 with an annual growth rate of 12.5%.[6] Beik and Nursyamsiah (2022)[7] stated that this is seen as an aspect of opportunity for the sector.[7] Recently, Islamic finance professionals began to adapt and adjust theories to make Islamic finance an appropriate industry; this required the Islamic finance industry to convert from a Sharia-based system to a Sharia-compliant system.[8] In addition, the Islamic finance industry is witnessing diverse phases of development in different states.[3] While in modern times, conventional disciplines use standardized research methods and practices, research methods and techniques adopted in the Islamic disciplines, including Islamic economics and finance, are lacking standardization.[9] Besides, Islamic finance has attracted a huge scientific interest[10] although research on Islamic finance in European literature is not abundant.[11] On the other hand, statistics show that in the period between 2005 and 2017, 490 theses and dissertations on Islamic banking and finance have been approved worldwide, and 268 were accepted in different universities in the UK between 1980 and 2017.[12] Durham University in the UK launched the Durham Centre for Islamic Economics and Finance[13], and other European universities have established programs and courses on Islamic economics in their curricula. Hence, independent styles and varied mechanisms have been



developed by different Islamic institutions, experts, scholars, researchers, and instructors, mostly in the field of Islamic economics and finance; in the meantime, they have implemented methods and techniques that refer to conventional standards yet are adapted to Islamic thought; this is due to the fast growth of the Islamic finance industry, unlike the field of research and professional development of Islamic finance, which was left a long way behind.[9] When analyzing Islamic banking and finance from a legal standpoint, the first central instruction is to carefully choose what research methods are best suited to provide high-quality research and answer the research questions consistently. Previous literature in the field of Islamic banking and finance was more focused on historical and theoretical progress and descriptive examination.[14] There is an urgent need to explore research techniques and research methodology in Islamic banking and finance.[14] Furthermore, it is recommended to find research standards and mechanisms intended for Islamic banking and finance based on Sharia law.[9] Research should also avoid descriptive analysis and needs to focus on bringing new findings that add further value to the existing literature.

Legal researchers implement proper research methods that they have learned in faculties of law; however, Islamic banking and finance is a recent and unique field of research that has developed rapidly in different directions.

About this current debate, we need to inspect what the appropriate research methods that can be used by legal academics are. The purpose of this research is to fill the gap in the current literature by offering solutions and alternatives for research methods.

This study is important because previous literature on research methods in Islamic finance has concluded that Islamic finance studies have abusively used different research methods,[14] leading to contradictory results. Contrary to previous research on methodology, this study is exclusively original because it carries a whole analysis of several situations and issues and brings different alternatives and solutions to approaching Islamic banking and finance law even if the legal researcher has no solid background or has no previous knowledge at all in the field of Islamic finance. This will encourage and benefit law students wishing to study or examine Islamic banking and finance law.

The subsequent section debates the main academic theories on research methods; the following section presents the research methodology aimed at assessing the different research methods in Islamic economics and finance and their relationship with the legal field; the discussion section analyzes the main findings and discusses them according to the present literature. This is followed by the last section of this study that offers a summary of the conclusions.

## II. LITERATURE REVIEW

Research methodology in Islamic economics has several facets. There are many factors influencing it positively or negatively. For example, Beik and Nursyamsiah (2022) [7] consider research methodology as having strength aspects because research methods have a spiritual value; they are justified by Islamic jurisprudence and use different research methods; they also consider that the conventional theory is dominant and that there is a lack of research topics applied in Islamic theory.[7] Thus, different aspects are discussed in this part of the study.

### A. *The Need for Standardization in Research Methods for Islamic Banking and Finance Law*

All during the past centuries of Islamic jurisprudence, Muslim scholars tried to construct and plan solid, suitable, and valid Islamic research methods to bring out evidence from the primary sources of Islamic law.[15] Different methods and techniques are used when researching Islamic banking and finance; also, Islamic banking and finance and their conventional counterpart are different in ideologies, yet the same methodologies are implemented to research both sectors[14] and this can lead to different outcomes. Therefore, there is a need to use a unified method to research Islamic banking and finance and circumvent the misuse of position.[14] On the other hand, the number of universities worldwide offering programs in Islamic finance and economics is increasing, and teachers and lecturers of Islamic economics and finance who are involved in the industry can improve the quality of teaching in higher education.[16] In 2020, 21 among the universities offering Islamic finance programs are counted in the QS Global World Ranking University list; this is one of the key factors to success in developing standard research methods in the field of Islamic finance.[17] It is the market that determines the progress of standardization. So far, the focus of scholars and researchers on integrating classical legal interpretations complicates this central element.[18] Therefore, it was mistakenly stated that Islamic financial law echoes the resonances of traditional Islamic law in contemporary financial markets; Islamic financial law is a hybrid model of law which represents modern market activities and legal facts. The refusal to revise the law prevents the development of Islamic finance law.[18] Moreover, there is a need for further collaboration between legal researchers, Sharia scholars, and different Islamic financial institutions (IFIs) to develop guidelines and standards to achieve the social and economic goals and Islamic principles they follow.[19] This would support researchers and graduate students doing their research about Islamic finance and help them in choosing the correct research methods that they need to utilize in their work to develop Islamic banking and finance law.

### B. *History, Religion, Philosophy, Ethics, Society, and Economics To Understand the Law*

Islamic law (*Sharia*) started to develop after the beginning of Islam. Teaching and methodologies in Islamic studies have developed through several periods; the early period, consisting of the foundation of Islam, took place in both Mecca and Medina through discussion circles, a basic model called *halaqa*; then during the medieval period the seat of power was moved to Damascus and Islamic teachings had a great interactive exchange with Greek philosophy found in the new territories.[17] This influenced the development of the Islamic civilization, and more precisely the development of new teaching and research methods of Islamic philosophy, such as debate, lectures, correspondence, reading circles, and scientific trips.[17] At that time, Islamic economics started to flourish especially with the development of Islamic legal canons and the progress of the teachings and jurisprudence concerning the objectives of Islamic law (*Maqasid al-Sharia*) and the Islamic jurisprudence on commercial transactions (*Fiqh al Muamalat*). There is a precise methodology of Islamic law called *Usul Al-Fiqh*; the purpose of this methodology is the understanding and authentication of the legal sources and the extraction of the legal rulings.[15] Recently, Islamic finance started to attract global interest due to its ethical principles that are linked to the goals of sustainable development.[20] Gilani[21] stated that Islamic banking got a global increase because of the growth of ethical banking and that the Islamic banking and finance industry used this ethical label to attract clientele. Many other authors[22] have revealed that the Islamic finance sector is not directly interested in environmental and social sustainability policies even if economic sustainability practices are developed. Recent research has shown that the Islamic banking industry realizes only 35% of the ethical and moral goals of Islamic economics[23] However, in another study in 2021, Prandi and Colecchia[24] concluded that, notwithstanding the critiques, the Islamic financial model remains authentic and loyal to its ethical principles.[24] On the other hand, Biancone, Saiti, Petricean, and Chmet[25] demonstrated in 2020 that the literature on Islamic finance emphasizes the banking sector, comparisons with conventional banks, rates and portfolios, examination of governance and control structures; they ended up in their study with the fact that analyzing the ethicality of Islamic banking and finance has been relegated to a secondary position[25] This leads to interesting questions about the factors that influence the choices of Islamic finance researchers and scholars.

We can suggest that Islamic banking and finance as an economic system is comparable to its conventional counterpart; some of the financial instruments rely on the standardization and harmonization of Islamic securities with the general standards of global securities to flourish.[5] However, we cannot disagree about the fact that Islamic banking and finance has gotten its power from divine prescriptions and was also influenced by historical and philosophical developments. It has progressed through socioeconomic factors and been branded with ethical values. For that reason, there is a need to adopt

interdisciplinary research methods to make a legal analysis. However, a major point needs to be raised about the type of methods used to analyze these questions. It is important to remember that Islamic legal norms and their primary sources can easily be distorted from their real meaning if the research method is wrong or if it is inaccurately used.[15] Therefore, if the aim of the research is associated with the legal norms and rulings of Sharia law and Sharia principles, it is required to use *Usul al-Fiqh* methods.[15] Besides, if the purpose of the research is to analyze factual outcomes, behaviors, or reality practices, then it is better to use modern research methods that supplement the Islamic methodology.[15] The reason behind this choice of proceedings is that the practices of Muslims, the factual reality of specific Islamic systems or institutions cannot be constantly illustrative of what Islamic law is intended to be.[15] In consequence, researchers of Islamic studies have the responsibility to identify and acknowledge the aims of their research in order to provide sound and valid results with strong evidence.

Correspondingly, the economic analysis of law is a major research method that tries to find answers to elementary questions regarding the effects of legal norms on the behavior of the concerned stakeholders and how the effects of these legal norms are acknowledged by society (Sanchez-Graells, 2017). In that sense, Islamic jurisprudence and economics have different methodologies “*as the former is normative and the latter is descriptive*” [26, p. 120]; thus, using economic analysis of Islamic banking and finance law will support the research of the effects of Islamic banking and finance law and how the effects of these legal rules are necessary for the different stakeholders and the social order in general.

### C. Economics and Islamic Law

Theoretical economic understanding leads researchers to determine problems of legal decision-making and facilitates resolving these problems.[27] Firstly, because the economic theory affords methods to analyze the legal reality of the decision-making, and secondly it offers a normative outline and practical standards to select specific substitutes as solutions.[27] Additionally, Islamic banking and finance law is the result of different disciplines all interacting together and creating a unique framework that is worth profound analysis and an eventual assessment of how the legal norms of Islamic banking and finance are constructed, interpreted, and implemented. Thus, empirical research has shown that the resemblance between Islamic banking and its conventional counterpart is not beneficial to the former.[28] Moreover, the purpose of integrated knowledge research methods in economics and finance is to bring regulations and financial solutions and remedies that focus on human well-being rather than organization economic interests.[26] This will support the identification of the issues and challenges related to this financial sector and will help find justifiable remedies and sustainable solutions for the future.

As discussed above, literature on Islamic banking institutions has been using different research methods. To analyze the financial performance of banks, in 1979 a method called CAMEL was developed in the USA; the North America Bank has adopted this method to examine the consistency of financial lending establishments; CAMEL is a well-known method to analyze banking performance even though many other methods were developed later.[11] This is the case for the Islamic banking system; CAMEL was implemented by Islamic banking researchers and experts. It is commonly used for the ranking of Islamic banks based on their performance and used even in comparing Islamic banks and conventional banks; however, this method is not always effective because the data needed to analyze performance is not always available on the different platforms that supply databases of different Islamic banks.[11] Moreover, the methodology of positive economics is not neutral and has prejudiced Western economics during the last 100 years[26] Islamic finance is taking similar steps due to the dominance of the positivist paradigm.[26] The performance of the Islamic banking industry is constantly measured according to its resilience to financial crises and shocks;[29] it is measured according to its performance even during the crisis of the COVID-19 pandemic,[30] or in situations where the price volatility of energy resources and precious metals was notable.[4] Therefore, researchers should always try to find a suitable method to analyze Islamic banking performance in a way that supports the purpose of the research questions and does not create more prejudice or bias to the Islamic financial system by using the same criteria that are used for conventional banking since the two sectors are based on different ideologies. This is a challenge that researchers should always consider before deciding what research methods they employ when evaluating the Islamic banking and finance sector and what their purposes are. Another challenge is the free access to or availability of open data for research purposes concerning Islamic banking, as the banking sector is a sensitive sector, which makes the work of researchers complicated when dealing with a database, especially at the beginning of their career.

#### D. *International Business Research Methods*

Also, researching Islamic banking and finance from a legal standpoint includes analyzing international business regulations. To succeed in the international business field, scholars need to master high-quality research methods;[31] research quality in the field of Islamic finance is not of particularly high quality on the global level.[9] That is why it is important to think about the methods to use before starting a thesis. McKim[32] argued in 2017 that theses and dissertations nowadays more often include the concept of “mixed methods”; besides, there was also an increasing interest by graduate students in mixed methods because they help them understand the phenomena better than if there was only one specific method used. Students give value to mixed methods because they see the utility of using them; researchers need to adapt to the fact that they will instruct and tutor graduate students, so they need

to understand how their students perceive research.[32] Therefore, International Business (IB) Scholars are confronted with choosing specific research methods due to the special characteristics of international business studies.[31] Students who yet believe in their capacity to succeed in their studies with good grades, students interested in statistics, and those having a positive attitude about the field of statistics, are less anxious about learning how to deal with data analysis.[32] Consequently, we suppose that including mixed research methods will be valuable for graduate students and other researchers in the future. Moreover, when the researcher plans to continue working in the same field of research after graduating, it is essential to develop different skills of analysis by using different research methods. Besides, the internationalization of academia obliges legal researchers who want to succeed in their careers and publish in high-quality journals to learn new scientific skills and new research methods. This is an expected, if not inevitable, situation that every legal researcher should be aware of.

### III. METHODOLOGY

#### A. *Critical Legal Research as a Tool to Find Remedies for Legal Issues in Islamic Banking and Finance*

Research work at the doctoral level is expected to be critical.[33] Accordingly, examining Islamic banking and finance law must include critical legal thinking to improve the quality of the research.[12] The field of Islamic finance has a huge debate about whether Islamic financial instruments are effective tools for the challenges of the conventional financial system, and this remains one of the central legal research questions in this field.

However, as the juridical structure by which society is regulated is considered as valid and lawful, it is extremely hard for a researcher, especially at the beginning of his career, to bring a new idea that is completely against a valid positive law.[33] Moreover, even if the aim of the researcher’s criticism is to repair and find remedies to the issue, the subjective contribution might be distrusted by the legal orthodoxy.[33] Modern Islamic banking and finance have roots going back to the beginning of Islam when Islamic partnership contracts – *Mudaraba* and *Musharaka* – were common practices and lasted for many centuries as transaction tools; these contracts have ceased to develop, but came back to the surface again after the end of colonialism.[34] Grossly defined, two chief features of Islamic banking and finance are: firstly, capital deposit is guaranteed but interest is prohibited on deposits;[35] secondly, loans are interest-free, and speculation is prohibited,[36] but investing through Islamic partnership contracts applies the principle of profit-and-loss-sharing (PLS).[37] These principles – especially the interest-free principle – are, from a Western point of view, completely different from conventional banking rules. Islamic finance is a system using a specific form of legal and financial norms which are compliant with Islamic law

(Sharia), later developed to become Islamic economics[38] and Islamic finance law. In addition, the Islamic financial system is not governed only by Sharia law since Islamic finance is not necessarily situated in an area where Islamic law is the applicable law.[38] Islamic finance was introduced into many Western countries, and several conventional banks are opening Islamic windows that offer Islamic products. Furthermore, states in which Islam is the religion of the majority do have a conventional banking system as well and offer usury contracts that are not Sharia-compliant.

Minkkinen (2017) explains that the pure theory of law is not only to afford theoretical frameworks for decision-makers and lawyers on how to interpret the law; the only purpose of the pure theory of law is to recognize legal norms and to define them scientifically; in that way, the objects of research are also identified in a scientific method.

#### *B. Islamic Banking and Finance Law Methodology for Future Studies*

The core principles of Islamic banking and finance are taken from the Quran; their justification is based on morality and common sense. Morality as a Western legal norm, in the sense of critical legal method, more precisely from a Kantian perspective, is not a result of a cause[33] Morality is an autonomous will of the individual to do something, not an obligation coming from a specific consideration, but then again, from the point of view of Kelsen, the standardization of legal norms in the society allows undertaking the scientific description of that same society significantly, and that society is the normative order.[33] In that sense, the legal norms that regulate Islamic banking and finance will support addressing the normative order of Islamic business law that regulates Islamic banking and finance. In other words, using the critical legal method will help us analyze whether Islamic banking and finance as it is applied nowadays is complying with the normative order that Allah first ordered in the Quranic texts, or is just a deviation from the legal norm that ought to be in order to legalize banking and finance instruments for the Muslim society and to sell its products as moral and ethical by attracting the attention of a larger community worldwide. Also, it is important to understand the socioeconomic and political factors and their influence on improving Islamic finance.[39] Alotaibi, Helliar, and Tantisantiwong[40] have stated that the different stakeholders of Islamic finance expect the Islamic finance industry to comply with the religious rules and principles of Islamic economics; however, they found in their study that Islamic funds do not always respect business ethics and that they only partly follow these principles. On the other hand, the Islamic banking industry is more concerned with mitigating operational risks.[41] This is useful for verifying whether the Islamic financial industry is ethically complying with the principles of Islamic banking and finance that originate in Islamic law. In that respect, each researcher should utilize

different research methods that support the different research questions.

However, Aguinis, Ramani, and Cascio[42] argued in 2020 that the challenging issues reported in IB published articles consist of examining models of theories in a specific state with a particular legal system throughout a precise period, or through connections or variances between two different states, or investigating a specific commercial product type in a specific market in a specific area. Aguinis, Ramani and Cascio therefore suggest that instead of considering these particular challenges as insufficient evidence or limitations, they should reconceptualize these challenges and make from them new theoretical outcomes of further development [42, p. 1599]. Furthermore, research questions, statements, and shared knowledge can be strongly emphasized through pragmatism as this helps capture information when linking data with theory; this is specifically beneficial throughout the incorporation phase of mixed methods.[43] Therefore, the conclusions that will arise from this research will bring further theory development and will be beneficial to future researchers. Moreover, Salami, Tanrivermiş, and Abubakar (2022)[2] offer interesting solutions to make Islamic finance research more valuable for appropriate stakeholders such as business operators and ordinary people. One suggestion is that Islamic finance researchers should reduce their concentration on the econometric modeling characteristics and put more emphasis on explanation of results in a method that ordinary persons may well comprehend. Moreover, researchers in Islamic finance, particularly using accounting ratios in their research, should consider the rules of International Financial Reporting Standards (IFRS) implemented in the specific state where the research is conducted. Otherwise, the results, mostly in cross-border research, can be affected.[2] These suggestions are also valid from a legal research perspective, as legal scholars are not expected to have a solid background in econometric modeling research methods. They focus more on economic results to find sustainable solutions and remedies and facilitate decision-making.

## IV. DISCUSSION

#### *A. The Need for a Further Survey to Reveal New Research Methods*

Researchers need to supply evidence that supports their claims or arguments; as a result, their research outcomes will stand valid.[15] IB research turns out to be multifaceted and diverse; there is a need to be conscious of the challenges a researcher may face when deciding on what research methods should be implemented.[42] Shannon-Baker[43] argued that instead of being worried about whether a researcher selects the ultimate research method, it is more relevant to look at the reasons for this choice. The purposes of research on Islamic

banking and finance law are wide and complex, which makes it unique in its genre.[44] The uniqueness of each research plan and research question points toward the construction of a mixed-methods research design that fits with the plan and the questions of each research; thus, the construction of this design requires that the research methods be in interaction with the research questions.[44] Moreover, research methods are just a tool to support researchers in their investigation work, and tools can be developed to cope with modern research: artificial intelligence (AI) tools, for instance, developed by machine learning (ML), are constantly progressing in the field of Islamic finance.[45] Besides, the implementation of Fintech regulations in Islamic banking and finance will necessitate skillful legal scholars that are able to analyze regulations on the financial industry using computer-based technologies.[46] Therefore, academics and legal scholars in general and researchers in the field of Islamic finance must be concerned with learning the modern technologies of the 21<sup>st</sup> century to develop their research skills following the needs of the industry.

### B. Modern Laws vs. Islamic Law

Legal scholars can influence the Islamic financial sector in many ways; one example is that when an Islamic financial sector needs to develop new Islamic financial products, lawyers and jurists can participate with the bankers on the Sharia-board level in the creation and the marketing of new Islamic financial products. Their role is major when adjusting and amending a current conventional product, which is not originally Sharia compliant.[47] Then by replacing these non-compliant features with Islamic ones, in the end adding a traditional contract name from Islamic jurisprudence, it can be advertised as a Sharia-compliant product.[47] Lawyers that have participated in the creation of these Islamic financial products can influence research as well; as they are legal scholars, academics, panelists, and university professors, they can analyze the products as Islamic and Sharia compliant.

Also, from an Islamic law perspective, it is important to make the distinction about the aim of the research itself; if the research purposes are to analyze correct answers related to Islamic practices and performances, then the use of modern legal and socio-legal research methods is possible with reference to Sharia law. But if the purpose of the research is to analyze norms and principles of Islamic law, then, it is essential to use *Usul Al-Fiqh* methodology.[15] Furthermore, the epistemology of *Usul al-Fiqh* in the 20<sup>th</sup> century started to give more importance to universal ethical principles in contrast to the specific injunctions of the Islamic legal texts, such as the principle of public interest, *Maslaha*, which is a major standard for making new legal rules; this example can explain the process of the exertion (*ijtihad*) of the Islamic jurists and scholars to develop specific *Fiqh* rules by using the principles of *Usul al-Fiqh*.[48]

Another important issue is *Maqasid al-Sharia* or the goals of Islamic law; according to Beik, Swandaru and Rizkiningsih, *Maqasid al-Sharia* must be a crucial element when measuring Islamic values in Islamic economics and the finance industry.[49] For example, if the research is on *Maqasid al-Sharia* as an Islamic legal principle, the use of *Usul Al-Fiqh* is desirable. But then if the aim of the study is, for example, to measure the importance of *Maqasid al-Sharia* in improving the performance of the Islamic banking industry or the level of social reporting, then quantitative research methods, for example, can be utilized.[50] Also, Rafikov and Akhmetova[26] propose the solution of using the collective *ijtihad* method to solve the challenges of multidisciplinary approaches to Islamic finance. It is essential to approach Islamic banking and finance with an interdisciplinary research method. In other words, it is important to a) combine the research questions and the different sciences related to these questions, and to b) look to the purpose for which each specific research method is applied. This will give a background for the legal analysis and lead to coherent and reliable results.

### V. CONCLUSION

As an assumption of what was discussed above, standardization of research methods in Islamic banking and finance is a particularly challenging project. This is due to the complexity of the disciplines influencing Islamic banking and finance. Accordingly, legal research in the field of Islamic banking and finance is also complex; legal scholars specializing in that field are experts in different fields. Therefore, harmonizing Islamic banking and finance law methodology is difficult as well. However, central recommendations and instructions for choosing the right methodology are discussed in this paper. They can be resumed as follows: *A)* critical legal analysis of Islamic banking and finance law is a valuable methodological tool to find solutions and remedies to different laws and regulations concerning the Islamic financial sector; it can also help decision-making and enhance management and supervision of the different bodies and institutions of Islamic finance. Legal researchers should also avoid descriptive research since it does not bring new knowledge or add value to the Islamic financial sector. *B)* It is also appropriate to consider that the primary goals of Islamic banking and finance are different from the goals of its conventional counterpart; thus, using the same research methods for both sectors can lead to different results. This is effective from a legal standpoint because research results of legal scholars can also influence regulations, management, supervision, decision-making, and court decisions of the Islamic financial sector in diverse ways; hence, legal scholars studying Islamic banking and finance law need to avoid the abusive methodology used in conventional banking and finance law. *C)* Legal researchers need to familiarize themselves with new techniques and skills, especially data analysis and mixed methods, if they want to produce high-quality research. Moreover, artificial intelligence (AI) and machine learning are revolutionary tools that help the

research of metadata and accelerate developing legal learning to stay up to date with the fast-growing financial sector and the introduction of Islamic Fintech.

Finally, the solution that I recommend for each researcher planning to approach Islamic banking and finance law is to implement multidisciplinary approaches, especially when authoring a thesis or a dissertation in the legal field of Islamic banking and finance. However other considerations are necessary: Firstly, it is important to consider what the best research methods that suit the questions of the research itself are; accordingly, it is imperative to remember that when analyzing Islamic legal texts, norms, and rulings, *Usul Al-Fiqh* methodology is the right method because explicit analysis needs to be conducted to avoid the misuse of legal texts; besides, when analyzing Islamic legal practices, regulations, and behaviors of the Islamic finance industry, modern research methods can be utilized. Secondly, one should consider all the probable challenges related to the chosen methodology, such as the familiarity with the research method, access to information, specific skills, technical knowledge, and the limitations that can hinder the research. Thirdly, it is important to know how to associate the results of the conducted research with theory to capture information that can be beneficial to other researchers or that suggests additional future research. Finally, it is important to demonstrate that the selected research methods bring new, valuable, and valid results to Islamic banking and finance law. This is particularly because not much literature has been provided about the best research methods for Islamic banking and finance law as a part of Islamic business law studies, which is itself a combination of different disciplines and fields of law. Thus, this study brings novel and unique findings for legal studies in the field of Islamic banking and finance and contributes to developing legal methodology and legal learning. It also supports young researchers' understanding of the possible challenges and issues they may encounter in the future during their research, enabling them to make the right methodological choices.

#### REFERENCES

- [1] P. Abedifar, S. M. Ebrahim, P. Molyneux, and A. Tarazi, "Islamic banking and finance: Recent empirical literature and directions for future research," *Journal of Economic Surveys*, vol. 29, no. 4, pp. 637–670, Sep. 2015, doi: 10.1111/joes.12113.
- [2] M. A. Salami, H. Tanrivermiş, and M. Abubakar, "Challenges Faced in Adopting Standard Methodologies for Research in Islamic Finance and the Way Out," in *Teaching and Research Methods for Islamic Economics and Finance*, First Edition., M. M. Billah, Ed. London: Routledge, 2022.
- [3] A. Mohamad and A. Kashi, "Does an Islamic Finance Industry Need a Unification of Standards? A Qualitative Discussion," *Arab Law Quarterly*, vol. 31, pp. 336–362, 2017.
- [4] D. I. Godil, S. Sarwat, M. K. Khan, M. S. Ashraf, A. Sharif, and I. Ozturk, "How the price dynamics of energy resources and precious metals interact with conventional and Islamic Stocks: Fresh insight from dynamic ARDL approach," *Resources Policy*, vol. 75, Mar. 2022, doi: 10.1016/j.resourpol.2021.102470.
- [5] S. Khavarinezhad, P. Biancone, and V. Jafari-Sadeghi, "Financing in the Islamic System and Sustainable Economic Development of Selected Islamic Countries," *European Journal of Islamic Finance*, vol. 19, pp. 1–6, 2021, doi: 10.13135/2421-2172/6158.
- [6] S. S. Ikra, Md. A. Rahman, P. Wanke, and Md. A. K. Azad, "Islamic banking efficiency literature (2000–2020): a bibliometric analysis and research front mapping," *International Journal of Islamic and Middle Eastern Finance and Management*, vol. 14, no. 5, pp. 1043–1060, Nov. 2021, doi: 10.1108/IMEFM-05-2020-0226.
- [7] I. S. Beik and T. Nursyamsiah, "Swot Analysis on Research Methodologies and Techniques Adopted in Islamic Economics and Finance," in *Teaching and Research Methods for Islamic Economics and Finance*, Routledge, 2022, pp. 29–41. doi: 10.4324/9781003252764-5.
- [8] K. Hassan and M. Rashid, *Management of Islamic finance: principle, practice, and performance*. Bingley, UK: Emerald Publishing, 2019.
- [9] M. M. Billah, *Teaching and Research Methods for Islamic Economics and Finance*. London: Routledge, 2022.
- [10] L. Bollani and F. Chmet, "Bibliometric Analysis of Islamic Finance," *European Journal of Islamic Finance*, 2020, doi: <https://doi.org/10.13135/2421-2172/4936>.
- [11] J. Varga and G. Bánkúti, "Ranking methodology for Islamic banking sectors - Modification of the conventional CAMELS method," *Banks and Bank Systems*, vol. 16, no. 1, pp. 36–51, Feb. 2021, doi: 10.21511/BBS.16(1).2021.04.
- [12] S. N. Ali and B. A. AlQuradaghi, "Publishing Islamic economics and finance research: polemics, perceptions and prospects," *International journal of Islamic and Middle Eastern finance and management*, vol. 12, no. 3, pp. 346–367, 2019.
- [13] H. Hamza, "Methodological Structure in Designing Academic Programs for Islamic Economics and Finance," in *Teaching and Research Methods for Islamic Economics and Finance*, Routledge, 2022, pp. 17–28. doi: 10.4324/9781003252764-4.
- [14] M. K. Hassan and S. Aliyu, "A contemporary survey of Islamic banking literature," *Journal of Financial Stability*, vol. 34, pp. 12–43, Feb. 2018, doi: 10.1016/j.jfs.2017.11.006.
- [15] M. Zahraa, "Unique Islamic Law Methodology and the Validity of Modern Legal and Social Science Research Methods for Islamic Research' (2003) 18 Arab Law Quarterly 215. MLA 8th ed. Zahraa, Mahdi," 2003. [Online]. Available: <https://heinonline.org/HOL/License>
- [16] R. Hassan, N. I. Abdullah, A. A. Aziz, and S. Salleh, "Methods of Teaching, Learning, and Research in Islamic Finance," in *Teaching and Research Methods for Islamic Economics and Finance*, Routledge, 2022, pp. 71–89. doi: 10.4324/9781003252764-8.
- [17] I. S. Beik, A. A. Yahya Saoqi, and M. H. Zaenal, "A Critical Survey on Methodologies and Techniques Adopted in Teaching Islamic Economics and Finance Globally," in *Teaching and Research Methods for Islamic Economics and Finance*, London: Routledge, 2022, pp. 4–16. doi: 10.4324/9781003252764-3.
- [18] J. Ercanbrack, "The Standardization of Islamic Financial Law: Lawmaking in Modern Financial Markets," *The American Journal of Comparative Law*, vol. 67, no. 4, pp. 825–860, Dec. 2019, doi: 10.1093/ajcl/avz010.
- [19] A. M. S. Ali and F. Mansor, "Role of the Central Bank in implementation of Value-Based Islamic Banking and Reporting in Bahrain-Exploring the challenges," *European Journal of Islamic Finance*, vol. 19, pp. 54–62, 2021, doi: 10.13135/2421-2172/6114-Published.
- [20] F. Lanzara, "Islamic finance and Sustainable Development Goals. A bibliometric analysis from 2000 to 2021," *European Journal of Islamic Finance*, vol. 18, pp. 1–19, 2021, doi: 10.13135/2421-2172/5765.
- [21] H. Gilani, "Exploring the ethical aspects of Islamic banking," *International journal of Islamic and Middle Eastern finance and management*, vol. 8, no. 1, pp. 85–98, 2015, doi: DOI:10.1108/IMEFM-09-2012-0087.
- [22] V. Brescia, A. A. Sa'ad, R. B. Hassan, S. M. B. S. J. Alhabshi, and F. Lanzalunga, "Exploring sustainability from the Islamic finance perspective," *European Journal of Islamic Finance*, vol. 19, pp. 45–53, 2021, doi: 10.13135/2421-2172/6107-Published.

- [23] A. Meskovic, E. Kozarevic, and A. Avdukic, "Social Performance of Islamic Banks - Theoretical and Practical Insights," *European Journal of Islamic Finance*, vol. 19, pp. 1–17, 2021, doi: 10.13135/2421-2172/6199.
- [24] S. Prandi and D. Colecchia, "Pricing of Islamic Banking and Conventional Banking: An Empirical Study," *European Journal of Islamic Finance*, vol. 18, 2021, doi: 10.13135/2421-2172/5465.
- [25] P. Pietro Biancone, B. Saiti, D. Petricean, and F. Chmet, "The bibliometric analysis of Islamic banking and finance," *Journal of Islamic Accounting and Business Research*, vol. 11, no. 9, pp. 2069–2086, Jan. 2020, doi: 10.1108/JIABR-08-2020-0235.
- [26] I. Rafikov and E. Akhmetova, "Methodology of integrated knowledge in Islamic economics and finance: collective *ijtihad*," *ISRA international journal of Islamic finance*, vol. 12, no. 1, pp. 115–129, 2020.
- [27] A. Sanchez-Graells, "Economic analysis of law, or economically informed legal research," in *Research Methods in Law*, D. Watkins and M. Burton, Eds. Routledge, 2017. [Online]. Available: <http://cadmus.eui.eu/bitstream/handle/1814/>
- [28] S. K. Kok, C. Akwei, G. Giorgioni, and S. Farquhar, "On the regulation of the intersection between religion and the provision of financial services: Conversations with market actors within the global Islamic financial services sector," *Research in International Business and Finance*, vol. 59, Jan. 2022, doi: 10.1016/j.ribaf.2021.101552.
- [29] Z. Hasan, "Analysis of Factors Affecting Community Interest in Bengkalis Regency Riau Province Indonesia in Using Sharia Banking," *European Journal of Islamic Finance*, vol. 19, pp. 35–44, 2021, doi: DOI: <https://doi.org/10.13135/2421-2172/6108>.
- [30] A. A. Adewale, "ASSESSING THE EFFECTIVENESS OF COVID-19 POLICY RESPONSES IN THE ISLAMIC BANKING INDUSTRY," 2021. [Online]. Available: [www.ifsfb.org](http://www.ifsfb.org).
- [31] L. Eden and B. B. Nielsen, "Research methods in international business: The challenge of complexity," *Journal of International Business Studies*, vol. 51, no. 9, pp. 1609–1620, Dec. 2020, doi: 10.1057/s41267-020-00374-2.
- [32] C. A. McKim, "The Value of Mixed Methods Research: A Mixed Methods Study," *Journal of Mixed Methods Research*, vol. 11, no. 2, pp. 202–222, Apr. 2017, doi: 10.1177/1558689815607096.
- [33] P. Minkinen, "Critical legal 'method' as attitude," in *Research Methods in Law*, D. Watkins and M. Burton, Eds. Routledge, 2017.
- [34] E. Jackson-Moore, *Islamic banking and finance*. Hawkhurst, Cranbrook, Kent: Global Professional Publishing., 2009.
- [35] S. Q. Hashem and I. Abdeljawad, "Islamic Banks Resilience to Systemic Risks Myth or Reality.," in *Management of Islamic Finance Principle, Practice*, K. Hassan and M. Rashid, Eds. 2019.
- [36] A. Kanwal, "The prohibition of speculation in Islamic finance: fairness and framing," *International Journal of Islamic and Middle Eastern Finance and Management*, vol. 15, no. 1, pp. 146–157, Jan. 2022, doi: 10.1108/IMEFM-01-2021-0034.
- [37] A. L. M. Abdul Gafoor, "Islamic banking & finance: Another approach," Apptec Publications, The Netherlands, Sep. 2003.
- [38] I. G. Kurochkina, "Analysis of Newest Possibilities of Functioning of Islamic Finance in Europe," *SHS Web of Conferences*, vol. 110, p. 01020, 2021, doi: 10.1051/shsconf/202111001020.
- [39] A. Mergaliyev, M. Asutay, A. Avdukic, and Y. Karbhari, "Higher Ethical Objective (*Maqasid al-Shari'ah*) Augmented Framework for Islamic Banks: Assessing Ethical Performance and Exploring Its Determinants," *Journal of business ethics*, vol. 170, no. 4, pp. 797–834, 2019.
- [40] K. O. Alotaibi, C. Helliar, and N. Tantisantiwong, "Competing Logics in the Islamic Funds Industry: A Market Logic Versus a Religious Logic," *Journal of Business Ethics*, vol. 175, no. 1, pp. 207–230, Jan. 2022, doi: 10.1007/s10551-020-04653-8.
- [41] M. Sobarsyah, W. Soedarmono, W. S. A. Yudhi, I. Trinugroho, A. Warokka, and S. E. Pramono, "Loan growth, capitalization, and credit risk in Islamic banking," *International economics (Paris)*, vol. 163, pp. 155–162, 2020, doi: 10.1016/j.inteco.2020.02.001.
- [42] H. Aguinis, R. S. Ramani, and W. F. Cascio, "Methodological practices in international business research: An after-action review of challenges and solutions," *Journal of International Business Studies*, vol. 51, no. 9, pp. 1593–1608, Dec. 2020, doi: 10.1057/s41267-020-00353-7.
- [43] P. Shannon-Baker, "Making Paradigms Meaningful in Mixed Methods Research," *Journal of Mixed Methods Research*, vol. 10, no. 4, pp. 319–334, Oct. 2016, doi: 10.1177/1558689815575861.
- [44] J. Schoonenboom and R. B. Johnson, "How to Construct a Mixed Methods Research Design," *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, vol. 69, pp. 107–131, Oct. 2017, doi: 10.1007/s11577-017-0454-1.
- [45] A. M. Sarea, A. H. Elsayed, and S. A. Bin-Nashwan, *ARTIFICIAL INTELLIGENCE AND ISLAMIC FINANCE PRACTICAL APPLICATIONS FOR FINANCIAL RISK MANAGEMENT*. 2021. [Online]. Available: [www.routledge.com/](http://www.routledge.com/)
- [46] R. Hasan, M. K. Hassan, and S. Aliyu, "Fintech and Islamic Finance: Literature Review and Research Agenda," *International Journal of Islamic Economics and Finance (IJIEF)*, vol. 3, no. 1, 2020, doi: 10.18196/ijief.2122.
- [47] M. El-Gamal, *Islamic finance: law, economics, and practice*. Cambridge UK: Cambridge University Press, 2006.
- [48] Y. A. Alsawady, M. C. El Amri, and M. O. Mohammed, "Mainstream Methodologies for Analyzing Fiqh in Governing Islamic Economics and Finance," in *Teaching and Research Methods for Islamic Economics and Finance*, Routledge, 2022, pp. 56–70. doi: 10.4324/9781003252764-7.
- [49] I. S. Beik, R. Swandaru, and P. Rizkiningsih, "Methodologies and Smart Techniques Recommended in Analyzing Maqasid Al-Shari'ah for Islamic Economics and Finance," in *Teaching and Research Methods for Islamic Economics and Finance*, Routledge, 2022, pp. 42–55. doi: 10.4324/9781003252764-6.
- [50] K. R. Salman, "Islamic Governance, Maqashid Sharia Index, and Islamic Social Reporting: The Case of Islamic Banks in Indonesia," *European Journal of Islamic Finance*, vol. 19, 2021, doi: 10.13135/2421-2172/6158.

# Evaluation of some key features of Islamic finance in non-Islamic economies: Bulgarian perspective

Miroslav Kamdzhlov<sup>1</sup>

<sup>1</sup> Department of International Economic Relations, University of Economics Varna, Bulgaria

Contact Author: kamdzhlov@ue-varna.bg

**Abstract**— In recent years Islamic finance has steadily increased in popularity. In this respect, the research sets itself a task to evaluate some key features of Islamic finance in the Bulgarian financial market. To achieve this Fuzzy AHP method and deductive, inductive reasoning are used. The results show that the understanding of Islamic banking principles in Bulgaria has social banking characteristics. These characteristics are related to consumer expectations that can be defined as fundamental or basic such as the provision of a financial product or service, interest-free loans and securities with a social function for stakeholders. The results are unique and representative of the Bulgarian experts' opinions, processed scientifically to showcase the potential of Islamic finance in the local financial market. Hitherto, presumably, no other research concerning Bulgaria has done such an evaluation. The main limitation of this research is the lack of Islamic financial institutions operating in the Bulgarian market. The research relies on the knowledge of local banking experts on Islamic finance principles. The findings can be applied in the decision-making process in the Islamic finance context.

**Keywords**- *Islamic finance; Fuzzy AHP; social responsibility; social impact financing*

## I. INTRODUCTION

Islamic finance has caught the attention of scholars and experts all over the world. There is evidence showing continuing growth of the sector worldwide. There is a diverse range of Islamic financial institutions that are active not only in Islamic countries, but also in some European countries as well. The scope of the activities of financial institutions and banks offering Islamic financial services is expanding. Today, approximately 150 financial institutions in more than 45 countries are developing, expanding, and implementing various forms of Islamic financing [1].

One of the more popular paradigms of Islamic finance is the social impact which it has on society. Bearing this in mind, there are a few emerging questions. What are the perceptions towards the guiding principles of Islamic finance in non-Islamic economies? What are the key features of those principles and what are the preferences towards them on the Bulgarian market?

A study conducted to evaluate the interrelation between Islamic finance and sustainable development [24] demonstrates the academic world's initial interest in the relationship between Islamic finance and the Sustainable Development Goals. The author of the research also reveals that this contribution is not being systematically interpreted by different stakeholders and in different countries.

In this line of thought, the hypothesis that Islamic finance has the potential to be socially responsible finance in the Bulgarian financial market could be advanced. The practical implications of such an evaluation could be a possibility for future implementation of similar principles in the Bulgarian financial market.

In order to prove or disprove the raised hypothesis, the Fuzzy AHP method has been applied. The goal of applying the Fuzzy AHP method is to make measuring the arrangements in decision making easier for professionals in the field of finance. Whether to a lesser or greater degree, these individuals are familiar with the principles that govern the functions of Islamic finance. Because of this, the principles and methods of operation of Islamic finance serve as indicators and sub-indicators in accordance with Islamic terminology.

## II. LITERATURE REVIEW

A review of literature has been conducted to summarize the scientific research in the areas of Islamic finance and socially responsible finance and to specify the research gap and aim.

The Islamic law 'Shariah' is based on the mutual benefit of individuals and communities. Its mission is to protect human rights through the Prophet's guidance to bring mercy into people's lives on Earth. One of the concepts of maqasid al shariah (shariah underlying objectives) upholds the principle of serving the public interest. This should be done by maximizing benefit and minimizing harm to the community [25; 26; 27]. One of the main goals is poverty alleviation. From the maqasid al shariah perspective, the social constituent of Islamic finance is vital. Some authors [28] studied circular economy considering maqasid al shariah. The circular economy and the human well-being are closely tied to and are in the core of



social agenda. Circular economy goals include environmental sustainability, economic prosperity, and social equity [29; 30; 31]. Human, social, economic, and environmental development are all part of the circular economy model and are scientifically linked with Maqasid al-Shariah [28]. There is a significant overlap between socially responsible investment principles and Islamic principles or Maqasid-al-Shariah objectives [43].

Social finance is a new financial market that stems from the rise of the social economy and social entrepreneurship. It is linked to the limitations of government policy and the inability of markets to create efficient solutions to social and environmental problems. Several authors have linked Islamic finance to a social agenda. Such a relationship is researched in [32]. It is possible to improve the process of social innovation by combining Islamic and social finance instruments [33].

The Islamic banks, as a main pillar of Islamic finance and economy, should perform on a stable and increasing level. The maqasid al shariah index measures Islamic banks' activities [34; 35] and improves Islamic social reporting in terms of justice and benefits, requiring Islamic banks to design and implement programs that are in line with the index's rise. Furthermore, to expand Islamic social reporting, Islamic banks must increase profitability and firm size [36].

The appeal of Islamic finance to Western countries stems from the fact that it operates ethically, similar to socially responsible investments [37]. Islamic finance is not limited to Muslims but rather is available to everyone. This is supported by its ability to attract the attention of financial institutions, regulators and investors as a viable alternative to traditional methods.

With the introduction of environmental and social policies in recent years, sustainability has changed both the behaviour of the company and the approach of the adopted model [39]. Qoyum et al. [38] studied the effect of an Islamic label on environmental, social, and governance (ESG) performance. The research was conducted on the Indonesian and Malaysian financial markets. The conclusions show that Islamic firms perform better on environmental and social issues than non-Islamic firms. Some authors [42] studied corporate social responsibilities (CSR) in the Malaysian banking sector and discovered that stakeholders of two full-fledged Islamic banks in Malaysia have positive views on CSR. The findings indicate that CSR is accepted in Islamic banking because it is capable of promoting CSR in banks that conduct business in accordance with Shariah principles.

Over the last thirty years, Islamic banks have gradually been introduced alongside conventional banking institutions in a number of countries [40]. Conventional financial institutions have expanded their operations to offer Islamic financial products to Islamic investors. Bank-financed entrepreneurs have been gradually increasing in most of the countries where Islamic banks operate [25]. The potential for Islamic finance to grow in Europe is extremely high [31]. Research on the Ugandan market [44] shows, that the intention to use Islamic banking is heavily influenced by attitude, subjective norms,

and religiosity. Islamic banking is a much more prominent platform than conventional banking. It provides financial inclusion and leads to stronger market mechanisms, preventing the predominance of finance over the real value sector [45; 46].

A research study of Islamic finance in Russia [47] indicates that more than thirty projects in the field are underway, demonstrating stable growth and enlargement. Russia has a conventional economic system and around 10-17% of its population is Muslim. Nonetheless, the Islamic finance market in the country is still in its infancy. Due to fragmentation and geographical distortion, there is little internal competition.

There has been consistent scientific production on ethical banking, finance impact, and social impact in the literature. Following the theories and processes of the bank's development in parallel with finance, it is undeniably of utmost importance to investigate the social impact it creates in ethical banking [48]. Overall, it can be concluded that the papers place insufficient emphasis on sustainable and ethical development, which distinguishes Islamic Banking from its traditional counterpart [49].

The conducted literature review also shows that such a topic has not been examined in the Bulgarian scientific field. So far, no one has studied key features of Islamic finance in the Bulgarian financial market. A few researches have been done internationally combining Islamic finance and the Fuzzy AHP method [2; 3; 4]. Meanwhile, the researches cited differs from that conducted here. The following research could be the basis for further studies in other non-Islamic markets.

### III. METHODOLOGY

People are guided and make decisions in many situations in life based on their attitudes and understandings. Decision-makers preferences are difficult to calculate due to their subjective nature. Accurate evaluation data collection can be difficult in some situations. In a number of management situations, the assessment is based on the decision makers' knowledge and experience. Fuzzy set theory and its associated fuzzy logic offer numerous opportunities in this regard.

The method applied is a double comparisons measurement, which relies on an estimate dictating the extraction of priority scales. In the process of applying AHP, the goal is first to construct a hierarchy, then to establish estimates or conduct measurements of pairs of elements according to the criteria for extracting preference scales, which are then synthesized in the overall structure so that a preferred alternative can be chosen [5].

Depending on the context of the decision-making, certain problems may arise as the process can often be hindered by the restricting and ambiguous nature of incomplete and unreliable data. The ambiguous and subjective information acquired from a reliance on the opinion of experts and their conveyance of linguistic variables could cause some distortions. In this regard the Fuzzy Logic method is suitable in such instances. There is sufficient research available, based on amendments to AHP in the context of FAHP.

In order to avoid uncertainty and inaccuracy Fuzzy AHP hybrid method has been developed. This method is characterized by a membership function [6] as is shown on Figure 1.

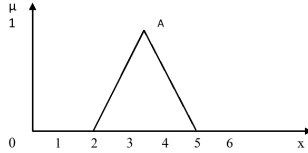


Figure 1. Fuzzy group A membership function.

A membership function characterizes the fuzziness and depicts the degree of truth to the fuzzy logic. Of course, the function can take on a form other than the one shown in Fig. 1, however, in most cases it is more convenient to use a simpler form depicted in the same figure - see Figure 2, 3, and 4 [7].

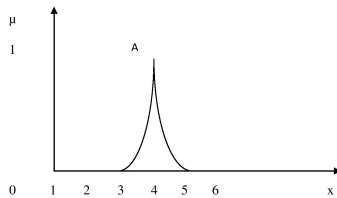


Figure 2. Fuzzy group A membership function.

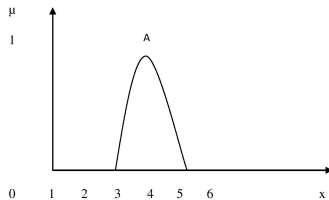


Figure 3. Fuzzy group A membership function.

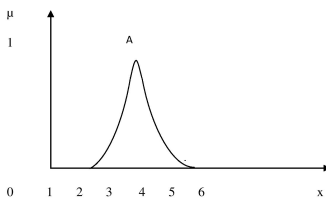


Figure 4. Fuzzy group A membership function.

According to Zadeh [8], “let  $X$  be a space of points (objects), with a generic element of  $X$  denoted by  $x$ . Thus,  $X =$

$\{z\}$ . A fuzzy set (class)  $A$  in  $X$  is characterized by a membership (characteristic) function  $f_A(x)$  which associates with each point in  $X$  a real number in the interval  $[0, 1]$ , with the value of  $f_A(x)$  at  $x$  representing the “grade of membership” of  $x$  in  $A$ . Thus, the nearer the value of  $f_A(x)$  to unity, the higher the grade of membership of  $x$  in  $A$ . When  $A$  is a set in the ordinary sense of the term, its membership function can take on only two values 0 and 1, with  $f_A(x) = 1$  or 0 according as  $x$  does or does not belong to  $A$ . Thus, in this case  $f_A(x)$  reduces to the familiar characteristic function of a set  $A$ ”.

#### IV. RESULTS

In view of the aforementioned postulates about fuzzy sets in an analytical hierarchy and with the intent of measuring the arrangements in professional decision-making in the field of Islamic finance, a unique model is developed, based on Fuzzy AHP (See Fig. 5), which is to be tested by Bulgarian experts. The experts interviewed were middle and high level bank employees from four different Bulgarian banks. Two of the financial institutions are held by Turkish entities, one by an Austrian entity and one by a Bulgarian entity. In order to process the received data, the R-program is used.

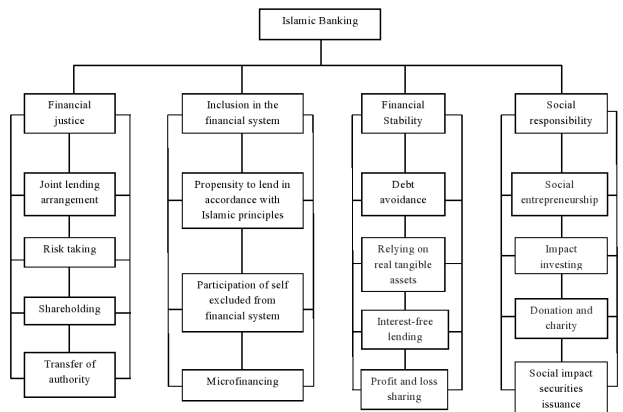


Figure 5. Model of fuzzy sets in the analytical hierarchy of Islamic banking by criteria and sub-criteria. Source: author

On Figure 5 there are four principal criteria for evaluation of Islamic banking suggested - Financial justice, Participation in the financial system, Financial stability, and Social responsibility - each of which is comprised of particular sub-criteria. An expert’s evaluation is used to prioritize the derived criteria and sub-criteria.

The criteria and sub-criteria presented further below in the text together with their corresponding latin denominations (in brackets) for the purposes of mathematical calculations, are as follows:

#### Criteria:

1. Financial justice (fsp)
2. Inclusion in the financial system (ufs)
3. Financial stability (fst)
4. Social responsibility (so)

**Sub-criteria:**

- 1.1. Partnership lending (kr)
- 1.2. Risk taking (pr)
- 1.3. Shareholding (du)
- 1.4. Transfer of authority (dp)
- 2.1. Propensity to lend in accordance with Islamic principles (si)
- 2.2. Participation of self excluded from financial system (us)
- 2.3. Microfinancing (mf)
- 3.1. Debt avoidance (id)
- 3.2. Relying on real tangible assets (zm)
- 3.3. Interest-free lending (bk)
- 3.4. Profit and loss sharing (spz)
- 4.1. Social entrepreneurship (sp)
- 4.2. Impact investing (iv)
- 4.3. Donation and charity (db)
- 4.4. Social impact securities issuance (zk)

The data used in the application of Fuzzy AHP is obtained using every respondent comparing sub-criteria and criteria as double comparisons, expressing relative significance with language configurations (just equal, equally important, weakly more important, moderately more important, strongly more important, extremely more important). As a result, the estimates are transformed into fuzzy numbers using Table 1.

TABLE I. TRIANGULAR FUZZY COLLOQUIAL SCALE.

| Linguistic scale          | Triangular fuzzy conversation scale | Triangular fuzzy reciprocal scale |
|---------------------------|-------------------------------------|-----------------------------------|
| just equal                | (1,1,1)                             | (1,1,1)                           |
| equally important         | (2/3,1,3/2)                         | (2/3,1,3/2)                       |
| weakly more important     | (1, 3/2, 2)                         | (1/2, 2/3,1)                      |
| moderately more important | (3/2, 2, 5/2)                       | (2/5, 1/2,2/3)                    |
| strongly more important   | (2, 5/2, 3)                         | (1/3, 2/5,1/2)                    |
| extremely more important  | (5/2, 3, 7/2)                       | (2/7, 1/3,2/5)                    |

Source: [9]

According to Chang's method [9], for each level in the constructed hierarchy the double language estimates are transformed into triangular fuzzy numbers and are organized into fuzzy relative matrices, as follows:

$$\tilde{A} = (\tilde{a}_{ij})_{n \times n} = \begin{bmatrix} (1,1,1) & \dots & (l_{1n}, m_{1n}, u_{1n}) \\ \vdots & \ddots & \vdots \\ (l_{n1}, m_{n1}, u_{n1}) & \dots & (1,1,1) \end{bmatrix} \quad (1)$$

where

$$(\tilde{a}_{ij}) = (l_{ij}, m_{ij}, u_{ij}) = \tilde{a}_{ji}^{-1} = \left( \frac{1}{u_{ji}}, \frac{1}{m_{ji}}, \frac{1}{l_{ji}} \right) \quad ij = 1, \dots, n; \quad i \neq j \quad (2)$$

represents the linguistic estimate for the variables  $i$  and  $j$ , while  $\tilde{A}$  is a square symmetrical matrix.

The initial verification for cohesiveness of the data gathered from the opinions of various experts shows a discrepancy in the acceptable limits. For this purpose, we use the following equations:

$$CI = \frac{(\lambda_{max} - n)}{n - 1} \quad (3)$$

$$CR = (CI - RI(n))100\% \quad (4)$$

where  $\lambda_{max}$  is the biggest own value of the matrix for comparison,  $n$  is the size of the matrix, and  $RI(n)$  is the random index depending on  $n$ . That is why we are continuing the process under the scheme in question [9]:

**Islamic banking** - Islamic banking is a suitable alternative form of banking for Muslims and non-Muslims alike. That is why it is considered a guiding principle in Islamic economics and finance. The demand on Islamic banking today is increasing constantly [10]. Therefore, it is important to evaluate this phenomenon in conjunction with the religious affiliation of the potential participants on the market.

| l   | fsp | ufs  | fst  | so   |
|-----|-----|------|------|------|
| fsp | 1.0 | 0.55 | 0.53 | 0.45 |
| ufs | 1.1 | 1.00 | 0.68 | 0.70 |
| fst | 1.2 | 0.90 | 1.00 | 0.53 |
| so  | 1.4 | 1.13 | 1.40 | 1.00 |

| m   | fsp | ufs  | fst  | so   |
|-----|-----|------|------|------|
| fsp | 1.0 | 0.78 | 0.76 | 0.59 |
| ufs | 1.5 | 1.00 | 0.90 | 0.81 |
| fst | 1.6 | 1.20 | 1.00 | 0.61 |
| so  | 1.9 | 1.40 | 1.80 | 1.00 |

| u   | fsp                 | ufs  | fst     | so   |
|-----|---------------------|------|---------|------|
| fsp | 1.0                 | 1.1  | 1.1     | 0.83 |
| ufs | 0.20 $\beta = \chi$ | 1.00 | (1) 1.2 | 1.00 |
| fst | 2.1                 | 1.6  | 1.0     | 0.77 |

so 2.4 1.7 2.2 1.00 mf 2.2 1.50 1.00

u

**Financial justice** - it is also among the basic principles of the Islamic model. Financial justice guarantees equal rights for the participants in a transaction. Islamic finance provides such opportunities so that the risk of engaging in a transaction can be allocated fairly among the partners. The result of a business project financed by an Islamic bank is then distributed according to the predetermined contract conditions [11; 12].

|    |     |      |      |
|----|-----|------|------|
|    | si  | us   | mf   |
| si | 1.0 | 0.97 | 0.67 |
| us | 2.3 | 1.00 | 1.00 |
| mf | 2.7 | 1.83 | 1.00 |

**Financial stability** - according to this principle, Islamic investment is approached with caution, and the decision-making process is carried out in-depth because of the bank's participation in entrepreneurship. If the business plan is too risky, the financial institution stays away from the project. Through careful audits and analyzes in recent years, Islamic financial institutions have been working to reduce risks and improve financial stability in the field of Islamic banking [16].

l

|    |     |      |      |      |
|----|-----|------|------|------|
|    | kr  | pr   | du   | dp   |
| kr | 1.0 | 0.47 | 0.36 | 0.44 |
| pr | 1.4 | 1.00 | 0.44 | 0.33 |
| du | 1.8 | 1.56 | 1.00 | 0.34 |
| dp | 1.6 | 2.00 | 2.00 | 1.00 |

m

|    |     |      |      |      |
|----|-----|------|------|------|
|    | kr  | pr   | du   | dp   |
| kr | 1.0 | 0.63 | 0.43 | 0.60 |
| pr | 1.8 | 1.00 | 0.60 | 0.40 |
| du | 2.3 | 2.00 | 1.00 | 0.41 |
| dp | 2.0 | 2.50 | 2.50 | 1.00 |

l

|     |     |      |      |      |
|-----|-----|------|------|------|
|     | id  | zm   | bk   | spz  |
| id  | 1.0 | 0.50 | 0.67 | 0.61 |
| zm  | 1.2 | 1.00 | 0.43 | 0.56 |
| bk  | 1.2 | 1.72 | 1.00 | 0.61 |
| spz | 1.3 | 0.89 | 0.78 | 1.00 |

u

|    |     |      |      |      |
|----|-----|------|------|------|
|    | kr  | pr   | du   | dp   |
| kr | 1.0 | 0.89 | 0.56 | 0.83 |
| pr | 2.3 | 1.00 | 0.83 | 0.50 |
| du | 2.8 | 2.50 | 1.00 | 0.52 |
| dp | 2.5 | 3.00 | 3.00 | 1.00 |

m

|     |     |      |      |      |
|-----|-----|------|------|------|
|     | id  | zm   | bk   | spz  |
| id  | 1.0 | 0.69 | 0.80 | 0.69 |
| zm  | 1.7 | 1.00 | 0.58 | 0.78 |
| bk  | 1.5 | 2.17 | 1.00 | 0.89 |
| spz | 1.7 | 1.33 | 1.17 | 1.00 |

u

**Inclusion in the financial system** – many Muslims avoid participation in the financial system for religious reasons. One of the sins for them is to deal with riba. Usury is strictly forbidden by Sharia. Some sources [13; 14; 15] indicate that for this reason, more than three-quarters of Muslims worldwide are left without suitable banks. Therefore, full-fledged Islamic banks or Islamic windows give that opportunity for many people to benefit from the financial system. Many entrepreneurs can find funding for their business this way.

|     |     |     |     |      |
|-----|-----|-----|-----|------|
|     | id  | zm  | bk  | spz  |
| id  | 1.0 | 1.0 | 1.0 | 0.83 |
| zm  | 2.2 | 1.0 | 0.8 | 1.17 |
| bk  | 1.8 | 2.7 | 1.0 | 1.33 |
| spz | 2.0 | 1.8 | 1.7 | 1.00 |

l

|    |     |      |      |
|----|-----|------|------|
|    | si  | us   | mf   |
| si | 1.0 | 0.48 | 0.39 |
| us | 1.4 | 1.00 | 0.67 |
| mf | 1.7 | 1.22 | 1.00 |

**Social responsibility** - the ethical and moral values of the Islamic banking system not only serve as guiding principles, but also as basic characteristics of the Islamic economy. Social responsibility is an important part of the Islamic economic environment. It plays an important role in promoting socially valuable investments, improving relationships and partnerships; gives a chance to many people at a better life and improves welfare [17; 18].

m

|    |     |      |      |
|----|-----|------|------|
|    | si  | us   | mf   |
| si | 1.0 | 0.67 | 0.49 |
| us | 1.8 | 1.00 | 0.80 |

l

|    |      |      |      |      |     |           |           |           |
|----|------|------|------|------|-----|-----------|-----------|-----------|
|    | sp   | iv   | db   | zk   | fsp | 0.1747498 | 0.1794381 | 0.1906005 |
| sp | 1.00 | 0.40 | 0.52 | 0.58 | ufs | 0.2578907 | 0.2522350 | 0.2506527 |
| iv | 1.50 | 1.00 | 0.58 | 0.43 | fst | 0.2440339 | 0.2426564 | 0.2454308 |
| db | 1.06 | 0.94 | 1.00 | 0.47 | so  | 0.3233256 | 0.3256705 | 0.3133159 |
| zk | 0.94 | 1.33 | 1.17 | 1.00 |     |           |           |           |

m The weight of each indicator (obtained through the application of equations 5, 6 and 7) (in relation to Islamic banking) shows a predominance of the criterion of social responsibility:

|    |     |     |      |      |   |      |
|----|-----|-----|------|------|---|------|
|    | sp  | iv  | db   | zk   | Financial justice (FinJustice)                      | 0.18 |
| sp | 1.0 | 0.5 | 0.72 | 0.83 | Inclusion in the financial system (InclusionFinSys) | 0.25 |
| iv | 2.0 | 1.0 | 0.83 | 0.56 | Financial stability (FinStability)                  | 0.24 |
| db | 1.5 | 1.3 | 1.00 | 0.61 | Social responsibility (SocResponsibility)           | 0.32 |
| zk | 1.3 | 1.8 | 1.67 | 1.00 |   |      |

u Now we continue with calculations at the level of the sub-criteria:

|    |     |      |     |      |  |
|----|-----|------|-----|------|--|
|    | sp  | iv   | db  | zk   |  |
| sp | 1.0 | 0.67 | 1.1 | 1.22 |  |
| iv | 2.5 | 1.00 | 1.2 | 0.78 |  |
| db | 2.0 | 1.83 | 1.0 | 0.89 |  |
| zk | 1.8 | 2.33 | 2.2 | 1.00 |  |

1. In relation to financial justice (columns 7-12)

|    |          |          |          |
|----|----------|----------|----------|
|    | l        | m        | u        |
| kr | 2.266667 | 2.666667 | 3.277778 |
| pr | 3.166667 | 3.833333 | 4.666667 |
| du | 4.728571 | 5.744444 | 6.855556 |
| dp | 6.555556 | 8.000000 | 9.500000 |

|    |           |           |           |
|----|-----------|-----------|-----------|
|    | l         | m         | u         |
| kr | 0.1355868 | 0.1317234 | 0.1348880 |
| pr | 0.1894227 | 0.1893524 | 0.1920439 |
| du | 0.2828523 | 0.2837541 | 0.2821216 |
| dp | 0.3921382 | 0.3951701 | 0.3909465 |

The first verification is for the individual leading areas (from the Criteria level) (from columns 1 through 6 of the raw data). It examines how much more significant from the point of view of Islamic banking the leading criteria of financial equity, Participation in the financial system, financial stability, and social responsibility are.

An intermediate result after applying the formulas is calculated thus:

$$w_i = S_i(\tilde{S}_i) = \frac{l_i + m_i + u_i}{3} \quad (5)$$

where

$$\tilde{S}_i = (l_{ij}, m_{ij}, u_{ij}) \quad (6)$$

and

$$W = (w_1, w_2, \dots, w_n) \quad (7)$$

[5]

|     |          |          |          |
|-----|----------|----------|----------|
| fsp | 2.522222 | 3.122222 | 4.055556 |
| ufs | 3.722222 | 4.388889 | 5.333333 |
| fst | 3.522222 | 4.222222 | 5.222222 |
| so  | 4.666667 | 5.666667 | 6.666667 |

l m u

The weight of each indicator (obtained through the application of equations 5, 6 and 7) shows that the most significant sub-criterion from the point of view of Financial justice is the one related to transfer of authority:

|                                   |      |
|-----------------------------------|------|
| Partnership lending (PartnLend)   | 0.13 |
| Risk taking (RiskTak)             | 0.19 |
| Shareholding (Share)              | 0.28 |
| Transfer of authority (TransfAut) | 0.39 |

2. In relation to Inclusion in the financial system (columns 13-15)

|    |          |          |          |
|----|----------|----------|----------|
|    | l        | m        | u        |
| si | 1.873016 | 1.155556 | 2.633333 |
| us | 3.055556 | 3.633333 | 4.333333 |
| mf | 3.888889 | 4.666667 | 5.500000 |

|    |           |           |           |
|----|-----------|-----------|-----------|
|    | l         | m         | u         |
| si | 0.2124212 | 0.2061637 | 0.2112299 |
| us | 0.3465347 | 0.3475027 | 0.3475936 |
| mf | 0.4410441 | 0.4463337 | 0.4411765 |

The weight of each individual indicator (obtained through the application of equations 5, 6 and 7) shows that the most significant sub-criterion from the point of view of Participation in the financial system is the one related to microfinancing:

|  |      |
|--|------|
| Propensity to lend in accordance with Islamic principles (PropenIsl) | 0.21 |
| Participation of self excluded from financial system (PartSelfExcl)  | 0.35 |
| Microfinancing (MicroFin)  | 0.44 |

### 3. In relation to financial stability (columns 16-21)

|    | l        | m        | u        |
|----|----------|----------|----------|
| id | 2.777778 | 3.177778 | 3.833333 |
| zm | 3.206349 | 4.022222 | 5.133333 |
| bk | 4.555556 | 5.555556 | 6.833333 |
| sp | 4.000000 | 5.166667 | 6.500000 |

|    | l         | m         | u         |
|----|-----------|-----------|-----------|
| id | 0.1910480 | 0.1773094 | 0.1718984 |
| zm | 0.2205240 | 0.2244265 | 0.2301943 |
| bk | 0.3133188 | 0.3099814 | 0.3064275 |
| sp | 0.2751092 | 0.2882827 | 0.2914798 |

The weight of each individual indicator (obtained through the application of equations 5, 6 and 7) shows that the most significant sub-criterion from the point of view of financial stability is the one related to interest-free lending:

|   |      |
|---|------|
| Debt evasion (DebtEv)                           | 0.18 |
| Pledging of real tangible assets (PledgTangAss) | 0.23 |
| Interest-free lending (IntrestFree)             | 0.31 |
| Profit and loss sharing (ProfLostSh)            | 0.28 |

### 4. In relation to social responsibility (columns 22-27)

|    | l        | m        | u        |
|----|----------|----------|----------|
| sp | 2.500000 | 3.055556 | 3.944444 |
| iv | 3.511111 | 4.388889 | 5.500000 |
| db | 3.466667 | 4.444444 | 5.722222 |
| zk | 4.444444 | 5.833333 | 7.333333 |

|    | l         | m         | u         |
|----|-----------|-----------|-----------|
| sp | 0.1795690 | 0.1724138 | 0.1753086 |
| iv | 0.2521947 | 0.2476489 | 0.2444444 |
| db | 0.2490024 | 0.2507837 | 0.2543210 |
| zk | 0.3192338 | 0.3291536 | 0.3259259 |

The weight of each individual indicator (obtained through the application of equations 5, 6 and 7) shows that the most significant sub-criterion from the point of view of social responsibility is the one related to issuance of securities with social impact.

|   |      |
|---|------|
| Social entrepreneurship (SocEntr)                     | 0.18 |
| Impact investing (ImpactInv)                          | 0.25 |
| Donation and charity (DonChar)                        | 0.25 |
| Issuance of securities with social impact (SecSocImp) | 0.32 |

## V. DISCUSSION

As is evident from the resulting data, according to Bulgarian experts, Islamic banking has a certain potential for development. That potential is undoubtedly subject to the criterion of "Social responsibility". The empirical study corroborates the conclusions outlined in other studies conducted in the European banking market [19; 20], according to which the goals of Islamic banking coincide with those of Corporate Social Responsibility. This creates a serious prerequisite for a better managerial banking system, which is subject to certain stable rules. In our case the key rules outlined by Bulgarian banking experts are connected to four main sub-criteria intended to make embracing the principles of Islamic banking in Bulgaria easier, which are as follows: transfer of authority, interest-free lending, the practice of microfinancing and issuance of securities with social impact. All four sub-criteria outline clearly the relationship between the Islamic practice of microfinancing, the decrease in social inequality, and the development of the economy. These conclusions are in line with a published study by the banking sector of Kyrgyzstan as well as the role of the maqāsid al-shari'a as a factor for the well-being of society [21].

The analysis shows that the topic of corporate social responsibility (CSR) is relevant in the field not only of conventional but also of Islamic finance. The one integral element which stands out between conventional corporate social responsibility and its Islamic counterpart is the role of philanthropy. The Sharia law encourages charity and philanthropy by preaching very specific acts in the performance of these obligations - both at the individual and institutional levels: zakat, an obligatory financial act meant to promote charity towards those in need; sadaqah, a voluntary act of charity of varying forms; and others [22].

CSR refers to the companies' obligation to preserve and contribute to the well-being of the society in which they operate. That is why CSR is considered a crucial principle in Islamic business. From the empirical data we can see that there is a correlation between the local and international attitudes of the corporate entity concerning social responsibility.

From among the sub-criteria of social responsibility, according to the data from the research on fuzzy sets, the criterion with the greatest weight is "Issuance of securities with social impact". Experts favour this tool, which is in direct relation to the attitudes of a wide range of global investment and public organizations.

According to a study by OECD [23], the growing interest among investors, institutions and individuals with a blended

value or investments with double the lowest value - which means doing good while benefiting from a moderate return on investment - stimulates them to engage in impact investing. Investment institutions have an additional incentive as they are obliged to represent the interest of their investor-clients in the social return on investment. Investors, such as foundations or other organizations that provide grants as part of their CSR or community participation programs, consider investments with social impact as an opportunity to transform grants after the end of the project or to weigh social benefits.

## VI. CONCLUSION

The results support the initial hypothesis. It is also evident that the Fuzzy AHP shows potential for evaluation of key features of Islamic finance. Transforming verbal variables into numerical ones is a promising method for evaluating perceptions and attitudes.

In the context of increasing interest in Islamic finance and economics, similar researches are important in order to evaluate possible outcomes for society. The fundamental principles of Islamic finance could be implemented in non-Islamic economies. Moreover, some of them already exist in the conventional economic environment. Corporate Social Responsibility has already had a positive impact on people's wellbeing.

The way the principles of Islamic banking are perceived in Bulgaria has the characteristics of social banking. These characteristics are related to consumer expectations that can be defined as fundamental or basic such as the provision of a financial product or service, interest-free loans and securities with a social function for stakeholders. But there is room for further development. The potential for this development it should be associated with some more innovative aspects of social banking. However, this can only be expected in the long term as social responsibility is more closely linked to ideas such as green Islamic banking and the use of smart IT tools and networks in Islamic banking. To this end, knowledge of the social aspects of Islamic banking in Bulgaria must be continuously enriched.

Meanwhile, due to the current legal schemes, there are several difficulties and complex profiles that impede the spread of Islamic banks in Europe in general [50]. Bulgaria in particular faces the same obstacles in implementing Islamic finance. In such purely secular jurisdictions, changes in legislation are being made to ensure a level playing field for Islamic financial products without necessarily incorporating elements of Muslim religious law into the country's commercial law [51].

The findings of the research could be taken into account in the decision-making process. Policymakers and practitioners in the financial sector of the economy usually rely on such data.

## REFERENCES

- [1] Khavarinezhad, S., Biancone, P., & Jafari-Sadeghi, V. "Financing in the Islamic System and Sustainable Economic Development of Selected Islamic Countries". *European Journal of Islamic Finance*, (19), 2021, 18-23.
- [2] Afshari, A.R., Saeidi, H. and Hatami, P. "Identifying and Ranking Financial Parameters of Banks Using FUZZY AHP Method". *Journal of Engineering Management and Competitiveness (JEMC)* vol. 11, no. 1, 2021, 3-12.
- [3] Hachami, K. E., Alaoui, Y. L. and Tkiouat, M.. "Sectorial evaluation of Islamic banking contracts: a fuzzy multi-criteria-decisionmaking approach". *Investment Management and Financial Innovations*, 16(2), 2019, 370-382. doi:10.21511/imfi.16(2).2019.31
- [4] Ishizaka, A. and Hoang, N. "Calibrated Fuzzy AHP for current bank account selection". *Expert Systems with Applications*, 2013.
- [5] Shapiro, A. and Koissi, M-C. „Fuzzy logic modifications of the Analytic Hierarchy Process“, *Insurance: Mathematics and Economics* 75, 2017, pp. 189–202.
- [6] Ishizaka, A. and Nguyen, N.H. "Calibrated fuzzy AHP for current bank account selection", *Expert Systems with Applications* 40, 2013, 3775–3783.
- [7] Klir, G and Bo Yuan. "Fuzzy sets and fuzzy logic: theory and applications", Prentice Hall PTR, 1995.
- [8] Zadeh, L. A. "Fuzzy sets", *Information and Control* 8, 1965, pp. 338-35.
- [9] Calabrese, A., Costa, R., and Menichini, T. "Using Fuzzy AHP to manage Intellectual Capital assets: An application to the ICT service industry", *Expert Systems with Applications* 40, 2013, pp. 3747–3755.
- [10] Brekke, T. "Halal Money: Financial inclusion and demand for Islamic banking in Norway". *Research & Politics*, 2018. <https://doi.org/10.1177/2053168018757624>
- [11] Jan, S., Khan, Z. and Ullah, K. "Institutionalising Justice in Islamic Finance". *Journal of Islamic Economics, Banking and Finance (JIEBF)*, Vol. 14, No. 1, 2018, Available at SSRN: <https://ssrn.com/abstract=3182306>
- [12] Dzulkepli, S. and Barom, M. N. "Financial Inclusion and the Goal of Distributive Justice in Islamic Economics". *The Journal of Muamalat and Islamic Finance Research*, 18(1), 2021, 66-77. <https://doi.org/10.33102/jmifr.v18i1.330>
- [13] Mirakhor, A., and Iqbal, Z. "Financial Inclusion: Islamic Finance Perspective". *Journal of Islamic Business and Management*, 2(1), 2012, 35-64.
- [14] Mahmood, H. "Impact of Islamic Microfinance on borrower's Income in Pakistan- A Case Study of Akhuwat". *European Journal of Islamic Finance*, 2020.
- [15] Nabi, M. G., Islam, M. A., Bakar, R., and Nabi, R. "Islamic microfinance as a tool of financial inclusion in Bangladesh", 2018. <https://doi.org/10.12816/0051154>
- [16] Belouafi, A., Bourakba, C. A. and Saci, K. "Islamic Finance and Financial Stability: A Review of the Literature". *Journal of King Abdulaziz University: Islamic Economics*, Vol. 28, No. 2, 2015, Available at SSRN: <https://ssrn.com/abstract=3063842>
- [17] Franzoni S, Ait Allali A. "Principles of Islamic Finance and Principles of Corporate Social Responsibility: What Convergence?", *Sustainability*. 2018; 10(3):637. <https://doi.org/10.3390/su10030637>
- [18] Platonova, E. "Corporate Social Responsibility from an Islamic Moral Economy Perspective: A Literature Survey" . *Afro Eurasian Studies* 2, 2013, 272-297 <https://dergipark.org.tr/en/pub/afes/issue/44783/557009>
- [19] Forte, G. and Miglietta, F. "A comparison of socially responsible and islamic equity investments", *Journal of Money, Investment and Banks*, Issue 21, 2011, pp. 116-132
- [20] Ait Allali, A. "Corporate governance and Corporate Social Responsibility in Islamic Banking: The case of the Moroccan banks in Italy". *European Journal of Islamic Finance*, (4), 2016.

- [21] Alkhan, A.M. and Hassan, M.K. "Does Islamic microfinance serve maqāsid al-shari'a?", *Borsa Istanbul Review* Volume 21, Issue 1, March 2021, pp. 57-68.
- [22] Litardi, I., Fiorani, G. and Harb, D. „Corporate Social Responsibility in Islamic Culture. Comparison between Western CSR and Islamic CSR: Focus on Islamic Reporting Initiative and Islamic Financial Institution”, *European Journal of Islamic Finance*, 2019.
- [23] OECD “Understanding Social Impact Bonds”, 2016. Available from: <https://www.oecd.org/cfe/leed/UnderstandingSIBsLux-WorkingPaper.pdf>. Accessed at 15th Aug 2021.
- [24] Lanzara, F. “Islamic finance and Sustainable Development Goals. A bibliometric analysis from 2000 to 2021”. *European Journal of Islamic Finance*, (18), 2021. <https://doi.org/10.13135/2421-2172/5765>
- [25] Biancone, P., & Radwan, M. “ Social Finance and Financing Social Enterprises: An Islamic Finance Prospective”. *European Journal of Islamic Finance*. 2019. <https://doi.org/10.13135/2421-2172/3176>
- [26] Sulayman, H. "Values-based Curriculum Model: A Practical Application of Integrated 'Maqasid Al-Sharia' for Wholeness Development of Mankind", *Procedia - Social and Behavioral Sciences* 123. 2014. Pp. 477 – 484.
- [27] Alkhana, A.M. and Hassan, M.K. "Does Islamic microfinance serve maqāsid al-shari'a?". *Borsa Istanbul Review* Volume 21, Issue 1, 2021, Pages 57-68
- [28] Campra, M., Brescia, V., Jafari-Sadeghi, V., & Calandra, D. “Islamic countries and Maqasid al-Shariah towards the circular economy. The Dubai case study”. *European Journal of Islamic Finance*, (17), 2021. <https://doi.org/10.13135/2421-2172/4560>
- [29] Sileryte, R., Sabbe, A., Bouzas, V., Meister, K. Wandl, A. and Arjan van Timmeren, A. "European Waste Statistics data for a Circular Economy Monitor: Opportunities and limitations from the Amsterdam Metropolitan Region", *Journal of Cleaner Production*, 2022, 131767, <https://doi.org/10.1016/j.jclepro.2022.131767>.
- [30] Castro, C.G., Trevisan, A.H., Pigosso, D. and Mascarenhas, J. "The rebound effect of circular economy: Definitions, mechanisms and a research agenda", *Journal of Cleaner Production*, Volume 345, 2022, 131136, <https://doi.org/10.1016/j.jclepro.2022.131136>.
- [31] Kris Hartley, K., van Santen, R., and Kirchherr, J. "Policies for transitioning towards a circular economy: Expectations from the European Union (EU)", *Resources, Conservation and Recycling*, Volume 155, 2020, 104634, <https://doi.org/10.1016/j.resconrec.2019.104634>.
- [32] Andrikopoulos, A. “Delineating social finance”. *International Review of Financial Analysis* 70. 2020.
- [33] Iannaci, D., & Gideon Mekonnen, J. “Islamic finance and social finance, an opportunity for social enterprises”. *European Journal of Islamic Finance*. 2020. <https://doi.org/10.13135/2421-2172/4242>
- [34] Hartono, S. and Sobari, A. "Sharia Maqashid Index as a Measuring Performance of Islamic Banking: a more holistic approach". *Corporate Ownership & Control* / Volume 14, Issue 2, 2017.
- [35] Asutay, M. and Harmingtyas, A.F. "Developing Maqasid al-Shari'ah Index to Evaluate Social Performance of Islamic Banks: A Conceptual and Empirical Attempt". *International Journal of Islamic Economics and Finance Studies*, 2015, Year:1, Volume:1, Number:1
- [36] Salman, K. “ Islamic Governance, Maqashid Syariah, and Islamic Social Reporting: The Case of Islamic Banks in Indonesia”. *European Journal of Islamic Finance*, (19), 2021, 24-34. <https://doi.org/10.13135/2421-2172/6116>
- [37] Hamed, M. “The Role of Islamic Social Finance in Mitigating Humanitarian Crises”. *European Journal of Islamic Finance*, (16), 2020. <https://doi.org/10.13135/2421-2172/4937>
- [38] Qoyum, A., Sakti, M., Thaker, H. and AlHashfi, R. "Does the islamic label indicate good environmental, social, and governance (ESG) performance? Evidence from sharia-compliant firms in Indonesia and Malaysia". *Borsa Istanbul Review* 22-2, 2022, 306-320.
- [39] Campra, M., Pucci, S., & Brescia, V. “Can the Dow Jones Sustainable Index be useful for evaluating Dow Jones Islamic Market companies?”. *European Journal of Islamic Finance*. 2020. <https://doi.org/10.13135/2421-2172/4156>
- [40] Radwan, M., & DRISSE, S. “ANALYSIS OF THE TRANSMISSION ASYMMETRY OF MONETARY POLICY IN A DUAL BANKING SYSTEM: ECONOMETRIC MODELLING (CASE OF TURKEY)”. *European Journal of Islamic Finance*. 2020. <https://doi.org/10.13135/2421-2172/4227>
- [41] Biancone, P., & Radwan, M. “EUROPEAN COMPANIES: EVALUATION FOR SHARIA COMPLIANCE “OPPORTUNITIES AND CHALLENGES””. *European Journal of Islamic Finance*, (5), 2016. <https://doi.org/10.13135/2421-2172/1803>
- [42] Darusa, F. Shukrib, N. H. A., Yusoffa, H., Ramlia, A., Zaina, M. and Abu Bakarc, N. A. "Empowering social responsibility of Islamic organizations through Waqf". *Research in International Business and Finance* 42, 2017, 959–965.
- [43] Yesuf, A. J. and Aassouli, D. "Exploring synergies and performance evaluation between Islamic funds and socially responsible investment (SRIs) in light of the Sustainable Development Goals (SDGs)". *Heliyon* 6 , 2020, e04562.
- [44] Bananuka, J., Kaawaase, T. K., Kasera, M. and Nalukenge, I. "Determinants of the intention to adopt Islamic banking in a non-Islamic developing country The case of Uganda". *ISRA International Journal of Islamic Finance*, 2019. DOI 10.1108/IJIF-04-2018-0040
- [45] Hunjra, A. I., Islam, F., Verhoeven, P. and Hassan, M. K. "The impact of a dual banking system on macroeconomic efficiency", *Research in International Business and Finance*, Volume 61, 2022, 101647, <https://doi.org/10.1016/j.ribaf.2022.101647>.
- [46] Kamdzhlov, M. “Islamic Finance and the New Technology Challenges”. *European Journal of Islamic Finance*. 2020. <https://doi.org/10.13135/2421-2172/3813>
- [47] Kalimullina, M. "Islamic finance in Russia: A market review and the legal environment". *Global Finance Journal*, 46, 2020. <https://doi.org/10.1016/j.gfj.2020.100534>
- [48] Secinaro, S., Calandra, D., Petricean, D. and Chmet, F. "Social Finance and Banking Research as a Driver for Sustainable Development: A Bibliometric Analysis". *Sustainability*, 2021, 13, 330. <https://doi.org/10.3390/su13010330>
- [49] Bollani, L., & Chmet, F. "Bibliometric Analysis of Islamic Finance". *European Journal of Islamic Finance*. 2020. <https://doi.org/10.13135/2421-2172/4936>
- [50] Antoniazzi, S. "Islamic Banks and the European Banking Union: An Overview of Critical Issues and Perspectives". *European Journal of Islamic Finance*, 9(1), 2022, 37-55. <https://doi.org/10.13135/2421-2172/6424>
- [51] Kamdzhlov, M. "Legal aspects in implementing Islamic finance in conventional banking systems". *The Law and the Business in the Contemporary Society*, Varna, 2019, 270-279. ISSN 2603-5073



# Smart Cities and Sustainable Finance: The Islamic Perspective

Claudia Papa<sup>1</sup>, Noemi Rossi<sup>2</sup>

<sup>1,2</sup> Faculty of Economics, University of Rome Tor Vergata, Italy

Contact Author <sup>1</sup>: Clapapa95@gmail.com

Contact Author <sup>2</sup>: noemirossiroma@yahoo.it

**Abstract—** In the current global context, policymakers are called to face complex and numerous challenges in achieving sustainable development with rapid urbanization and industrialization. The world's population is growing, and cities will be increasingly condensed in the future. Nowadays, cutting-edge technologies and digitalization are radically changing urban life and how cities are planned, financed, and managed. A new urban model, known as a “smart city”, is being developed throughout Europe and elsewhere worldwide. In a smart city, all the infrastructures are interconnected and integrated in an efficient and functional way through ICT by optimizing resource consumption, enhancing the quality of public services (Government services) through participatory governance, and increasing citizens' security. Indeed, urban transformation requires multiple stakeholders to come together toward shared and common goals. City leaders face challenges in enacting changes in balancing the needs of citizens, government, businesses, NGOs, and others: smart city development requires a strategic, long-term vision to create inclusive, fully integrated and synergistic systems. Technological progress is a fundamental requirement for the development of smart cities, but it must be supported by sustainable financial instruments. This paper aims to conduct a comparative analysis of the smart cities' projects and financial instruments used for implementing those models, traditional as well as innovative and sustainable. In particular, the analysis aims to highlight the ethical financial approach - having in mind the European and Islamic models- that characterizes some of these smart city models and the underlying idea of sustainability.

**Keywords-** Smart cities, Islamic finance, Green Sukuk

## I. INTRODUCTION

During the last ten years, the topic of smart cities has been thoroughly analysed by pointing out diverse urban context which diverges economically socially and politically. Different cultures, categories of governance and management methods affect interactions among policymakers citizens and

stakeholders involved in the decision-making process, especially in relation to green and sustainable policies. In such context, policy makers must move towards new urban eco-social model by promoting sustainable investments in urban areas.

Moreover, the phenomenon of sustainable financial tools aimed at developing green and sustainable projects is widely discussed in literature [1-4] but what is missing is a unified vision from the financial point of view of the smart city concept, and a full funding system of these new urban realities. The overall rationale of this gap is extremely varied but, to completely overcome these barriers, it would be necessary to increase public awareness of the importance of sustainability to raise awareness of the use of sustainable financial instruments for financing these new entities.

## II. METHODOLOGY

Through the existing literature, this paper aims to contribute to the current debate considering the most advanced smart city models in Europe and the Islamic world from a management financial and cultural perspective. Moreover, the following analysis has been carried out by combining the concept of sustainable and innovative cities with the Islamic objectives (*Maqasid al -Sharī'a*) to define a holistic model of sustainable cities based on an integrated and ethical approach to urban management financed by sustainable and Islamic financial instruments.<sup>1</sup> Based on *Maqasid al -Sharī'a* [5] [26-

---

<sup>1</sup> According to Kamali, *Maqasid al -Sharī'a*, profoundly rooted in Qur'an and Sunnah, are designed to promote social wellbeing and to repeal harms. As such, these objectives aim to establish justice, eliminate unfairness and alleviate poverty. Thus, *Maqasid al -Sharī'a* aim to o protect religion (*din*), life (*nafs*), intellect (*aql*), lineage(*nasl*) and their property (*maal*). Moreover, these objectives provide guidelines to ensure the realization of Maslahah (social wellbeing) and the prevention of Mafsadah (harm) in everyday life as well as in the financial market.

29], Islamic green finance, play indeed a key role in promoting innovation while preserving natural resources, and this study provides a comprehensive framework of the actualizing *Maqasid al -Shari'a* in smart, sustainable and innovative cities.

### III. SMART CITIES: ONE CONCEPT, DIFFERENT VISIONS?

The ongoing digital transformation, which is expected to rise rapidly, is radically changing economies, societies, and our daily life. Today, cutting edge technologies are indeed profoundly changing urban life and how cities are planned, financed, and managed. Digitalization is certainly becoming a powerful tool to stimulate paradigmatic shifts in urban development-related visions, strategies, and implementation. Therefore, digitalization has a strong impact also on the urban environment making cities more liveable, sustainable, and energy efficient. Cities have indeed a crucial role for the future because are the key to addressing societal challenges since they have the critical mass of different people and influences that come together to spark innovation and new ideas [6].

In this context, a new urban model known as *smart city* is being developed throughout Europe as well as around the world including Islamic countries, where innovative technology meets tradition. OECD defines these new urban realities as “initiatives or approaches that effectively leverage digitalisation to boost citizen well-being and deliver more efficient, sustainable and inclusive urban services and environments as part of a collaborative, multi-stakeholder process”.<sup>2</sup> According to the literature, in a smart city, all the infrastructures are efficiently interconnected and integrated by optimizing resource consumption, improving the quality of public services, and increasing citizens’ security as well. In such context, innovative technologies and connected solutions - such as IoT, Big Data, ICT, AI, etc. - are the drivers of economic growth, social wellbeing, and sustainable development, by enhancing quality of life and preserving social inclusion [7-13]. Making cities more sustainable, safe, and liveable is a complex issue in the process of sustainable and inclusive growth, which requires to design and manage cities with an innovative and holistic approach (involving investments in infrastructure, mobility, buildings, separate collection systems, roads, health etc.) to pursue the path towards a greener future. Achieving this goal presents complex and significant challenges which concern not only an ever smarter, greener, and sustainable world view, but also the strategic choice of ethical and sustainable financial modes. This is the crux of the matter. Despite the growing awareness of the importance of supporting sustainable policies in line with the Agenda 2030 (such as the decisions taken and the commitment made by the G20 leaders – *inter alia* by

---

<sup>2</sup>[https://www.oecd.org/cfe/cities/OECD\\_Policy\\_Paper\\_Smart\\_Cities\\_and\\_Inclusive\\_Growth.pdf](https://www.oecd.org/cfe/cities/OECD_Policy_Paper_Smart_Cities_and_Inclusive_Growth.pdf) (OECD, smart cities and inclusive growth p.8, 2020)

designing greener safer and smarter cities-) apart from a few exceptions<sup>3</sup>, there has so far been no corresponding strong and incisive comprehensive policy to promote compatible financial instruments for implementing such projects. Financing smart cities is indeed one of the main challenges which policy makers and local authorities are bound to face. Across different countries, financing smart cities requires indeed various financial tools and models including both public and private actors as well as "hybrid" models known as public-private partnership (PPP) which can be fully exploited for creating greener, smarter, and sustainable cities. According to the *Recommendation on Effective Public Investment Across Levels of Government* elaborated by the OECD, it is necessary to “mobilise private actors and financing institutions to diversify sources of funding and strengthen capacities”<sup>4</sup> at national and subnational levels. Therefore, the issue of financing smart cities is of paramount importance for the development of these new urban models which are in the vanguard of environmentally friendly urban living, technologically advanced and socially inclusive.<sup>5</sup>

To this regard, there are many structural and managerial differences between European smart city models and those of Islamic countries. While in Europe the development of sustainable cities is supported by the European structural and investments funds<sup>6</sup>, or by the

---

<sup>3</sup> Such as Göteborg, Amsterdam, Masdar City, Dubai, Tianjin Eco-city, Singapore, etc.

<sup>4</sup> Recommendation of the Council on Effective Public Investment Across Levels of Government, OECD, p.10, 2014

<sup>5</sup> Financial and economic barriers may indeed hinder the development of energy-efficient and eco-friendly cities based on low carbon economies, renewable energies, and innovative technologies. However, to promote the development of *smart cities*, there are numerous obstacles which need to be overcome such as institutional and administrative barriers, data integration barriers, the lack of right competences to successfully manage *smart cities*, the lack of an efficient shared communication network among numerous stakeholders and limited funding. These and other hurdles can be overcome through numerous strategies such as innovative governance models by revising administrative abilities as well as involving citizens in policy decisions by promoting social inclusion and the development of Public Private Partnership (PPP). [35-38]. The recommendations previously set out are necessary to overcome various hinder to build fully functioning, integrated, and interconnected smart city models. These recommendations should be implemented both in Europe, with its multilevel and advanced governance structure, and in Islamic countries, where, at least on paper, these tools should be more easily accepted and should obtain the favourable opinion of the local authorities and entities interested in financing *smart cities*.

<sup>6</sup> Even though there is not a specific European structural fund dedicated exclusively to the development of *smart cities*, The

implementation of innovative programmes (such as Horizon2020, LIFE, Jumper, etc.), to date in the Islamic world the need to finance smart cities is perceived not (only) as a requirement in compliance with *Shari'a* objectives but rather as the result of political strategies aimed at accrediting a modern and efficient image of the State at an international level.<sup>7</sup>

#### IV. SUSTAINABLE DEVELOPMENT AND SMART CITIES: THE ISLAMIC PERSPECTIVE

From the sixties onwards, the industrial field has experienced an unpredictable and unprecedented development, which led to a misbalance between available supply and expected demand. The world's population is growing and with it the demand for resources and products. The growing shortage of natural resources over the short, medium, and long term, will lead to a steady increase in the cost of obtaining and using the worldwide demand. There are no endless resources in the world, and to ensure enough resources for future generations, it is necessary to promote new measures toward sustainable development such as climate change strategies, resource efficiency, social inclusion, and sustainable urban planning<sup>8</sup> [7], [14-19] [33].

From an Islamic perspective, sustainable development is the perfect balance between economic-social progress and the effective and efficient exploitation of resources [20-25]. From an Islamic point of view, sustainable development means achieving the ideal balance (*mizan*)

---

European Structural and Investment Funds are known to be one of the main financial instruments used by the European Union within its economic and social cohesion policy for the development of *smart cities*.

<sup>7</sup> About the Gulf countries, and in particular to the Saudi Arabia, where a wide innovative reform programme is currently underway, - in order to change the widespread perception of the country as the emblem of a radical, conservative Islam, resistant to any form of modernisation- the development of *smart cities* contributes to affirming the country's leadership not only in the Islamic world but also at international level. Thus, Saudi Arabia confirm the image of a technologically advanced and cutting-edge country. In this context, there is therefore a growing need for a greater awareness of the actual effectiveness of an all-round sustainable system.

<sup>8</sup> The most common definition of sustainable development is the one given by the United Nations in 1987, introduced in the Brundtland Report, also known as Our Common Future. This report defines the sustainable development as the "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Furthermore, it states that "sustainable development has evolved as the guiding principle for global long-term development". It specifies that sustainable development consists of three pillars interrelated to each other: economic, social, and environmental one.

between economic and social progress and the effectual and efficient exploitation of natural resources. Indeed, unsustainable consumption and production and wastage of resources violate *Shari'ah* fundamental and general objectives (*Maqasid al -Shari'a*). The social aspect of sustainability requires an equal and fair distribution of resources in a way to ensure equal opportunities for all by promoting social inclusion and integration, economy development and poverty reduction and reducing environmental risks (*maslaha*). In such a system, based on environmental protection, equal distribution of resources and sustainable finance, work opportunities are created to improve living standards, and social cohesion, promote sustainable development and support human and social needs. *Islām* gives indeed a great emphasis on environmental preservation, which plays a key role in human life and towards the ecological transition path. Therefore, according to *Islām*, people must adopt moderate and responsible behaviour (*wasatiyya*) in production and consumption to ensure an effective and efficient allocation of resources considering the needs of every member of society [26-29].

In doing this, people work towards increasing the sustainable consumption and production pattern through better allocation of resources, based on eco-friendly investments and fair distribution of resources. Considering the above-mentioned principles some of the most developed Islamic Countries, such as the United Arab Emirates, Qatar, and Saudi Arabia, have elaborated a strategic path for achieving sustainable development in compliance with Islamic tradition.

The concept of *sustainable development* is strictly related to the concept of *smart cities* which promote interactions between citizens and innovative technologies for a sustainable urban living environment. Therefore, *smart cities* are seen to create a sustainable urban development with citizen's engagement in policy decisions by harnessing innovative technologies [6-13]. Moreover, a smart city often requires effective collaboration and support across different stakeholders, both private and public [30-34]. The development of *smart cities* models requires indeed a right policy mix, which allows an efficient coordination and interaction between different stakeholders to overcome conflicts in decision-making process. Although cities are becoming even-smarter and more sustainable, these new urban realities require a new data management system which should be integrated and interconnected by providing access to information and exchange of data among private and public stakeholders [8,11] [31,35-38]. Hence, in the implementation of a sustainable urban development model, *smart cities* represent an ideal solution and play a central role in promoting the image of moderate and modern Islamic cities, open to innovation, progress, and technology.<sup>9</sup> Nevertheless, local

---

<sup>9</sup> Moreover, in an ever changing world, thanks to their peculiarities, Smart Cities can be a catalyst for the development of Halal tourism. For more details please see: P. Biancone, S. Secinaro, S. Islamic

authorities should develop appropriate objectives and strategies to face the challenges and address climatic, urbanization, energetic and financial issues. *Smart cities* are not an unattainable utopia anymore, but they are still a new concept with new technologies and require a new infrastructure investment model.

In this context, the main question is how to finance the development of *smart cities*. According to the literature, the financial instruments used to promote the development of *smart cities* differ widely among different countries and may include both public and private funding as well as hybrid financing modes, known as a public-private partnership (PPP) [30], [32] [35-38]. Technological progress is indeed a key driver for the development of smart cities, but it must be supported by sustainable financial instruments. Among different sustainable financial instruments, social impact investments are one of the most effective and efficient for achieving the UN SDGs as well as for promoting the development of *smart city* projects which are completely eco-friendly, technologically advanced, and socially inclusive. Sustainable investments generate both socio-economic and environmental benefits such as reduction of pollution and greenhouse gas (GHGs) emissions, energy efficiency, and tackle climate change while increasing public awareness of the importance of sustainable development. [39] While sustainable and responsible investment (SRI) are increasingly rising worldwide, the growing trend of green finance should be seen as an opportunity to explore the Islamic financial instruments as compatible tools to promote the development of *smart cities* both in Islamic countries and elsewhere around the world.

## V. ISLAMIC FINANCE AND *ŞUKŪK*

The Islamic financial system is based on moral and ethical objectives and therefore it is structured to converge socio-economic needs by supporting *Sharī'ah* compliant financial instruments to foster sustainable economic growth, social wellbeing, and the protection of the environment [24] [41-43] [49-52]. The Islamic finance aims indeed at promoting sustainable development in its multiple dimensions such as economic growth, poverty reduction and wealth distribution, financial and social inclusion, and preservation of the environment. Therefore, Islamic finance enhance the promotion of sustainable development through the principles of fairness, equality and ethics which are profoundly rooted in the above-mentioned objectives of *maqāṣid al-sharī'ah*. This makes Islamic finance an alternative financial system to promote sustainable development globally [5] [44-48]. [51-54]. Indeed, due to the large scale of the needed financial resources, policy makers are turning away from conventional financial instruments, and are heading towards alternative

financial tools to achieve sustainable goals and safeguard profit. While *zakāt* and *awqāf* represent useful financial tools to support small-medium projects, the Islamic (i.e., *Sharī'ah* compliant) bonds, known as *şukūk*, (sing. *şakk*) can be successfully used to finance bigger projects [53-59] [71]. In the international capital market, *şukūk* are indeed becoming as one of the main Islamic financial instruments used by Governments and private institutions to raise finance.

The Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) defines *şukūk* as “certificates of equal value representing undivided shares in the ownership of tangible assets, usufructs and services or (in the ownership of) the assets of particular projects or special investment activity”<sup>10</sup>. More in details, AAOIFI defines *sukuk* as “proportional undivided ownership right in tangible and intangible assets, monetary assets, usufructs, services, debts or a pool of these assets, or a business venture such as a *Mudārabah* or *Mushārakah*”.<sup>11</sup> The fundamental principle is that of a strict correspondence of a financial bond to its underlying material asset. Based on Islamic Profit and Loss Sharing principle (PLS), the main difference between *şukūk* and traditional bonds lies in the fact that *şukūk* grant investors a share of an asset instead of an ownership of debt. Additionally, *şukūk* are based on different Islamic contracts to generate obligations and mutual relations between issuers and investors. Depending on the underlying contract, *şukūk* can be classified as: *Ijarah şukūk* (leasing), *Mudārabah şukūk* (entrepreneurship), *Murābaha şukūk* (cost plus mark-up), *Salam şukūk* (sale with prepayment - *anticipato pretio* -, or late delivery), *Istisnā' şukūk* (manufacturing contract), *Musharakah şukūk* (partnership), *hybrid şukūk* (convertibles and tradeables). Regardless of the legal nature, *şukūk* are issued to finance *Sharī'ah* compliant projects by paying profits instead of *Sharī'ah* forbidden interests of loans [58], [60-62]. Parties involved in the process of issuance of *şukūk* are the Originator, who is the person/company who wishes to raise funds, the Special Purpose Vehicle (SPV) - namely the issuer of *şukūk* -, and the *şukūk* holders who hold ownership rights on the underlying asset and its cash flows. Issuing *şukūk*<sup>12</sup> is like a Western law securitization process, given (that) the *şukūk* structure relies on the creation of a SPV.

The latter is a separate legal entity with no part in the borrower's liabilities. The SPV issues *şukūk* certificates in consideration of certain goods underwritten by the investors. The Originator subsequently buys the required asset using the gains of the sale of the certificates. Moreover, the SPV protects the underlying assets from creditors if the originator faces financial problems.

<sup>10</sup> AAOIFI Shari'a Standard No.17, p. 468

<sup>11</sup> AAOIFI IFSB-15 – Revised Capital Adequacy Standard for Institutions Offering Islamic Financial Services, p. 106,2013

The capital raised must be used for investments in specific assets rather than for undetermined purposes. The funds raised by the investors are later used by the SPV to buy assets from the originator who, in turn, uses the capital raised to finance *Shari'ah* compliance projects. In this way, the investors become pro-quota owners of the originator's goods, which can be the object of specific contracts made by the SPV (such as *Mudāraba*, *Musharakah*, *Ijarah* etc.). In the end, the originator can purchase the asset back from the Special Purpose Vehicle at its normal value and distributes the revenues to the *shukūk* holders [59] [63, 65]. Even though the global *shukūk* market is smaller than the bond one, it has been growing rapidly since the economic-financial crisis, and its future looks bright. Because of the specificities of the *shukūk* market, the private sector is becoming increasingly interested in the market, which is expected to preserve high levels of liquidity, which will continue to raise interest among financial institutions.

#### VI. GREEN *SHUKŪK*: SUSTAINABLE ETHICAL AND FINANCIAL INSTRUMENTS

The Islamic green finance market represents an opportunity for economic social and political integration, through which several roles, information and competencies come together. Anyway, under different contexts, both private and public actors contribute to fostering the promotion of Islamic green finance which can be a driver for the growth of green investment at the global level. [44-46]. To support green and sustainable projects, Islamic financial institutions have been issuing a particular kind of *Shari'ah* compliance bonds, called green *shukūk*. Green *shukūk* are Islamic green bonds which provide funds for sustainable projects and climate change solutions such as renewables energies sources, low carbon technologies and other environmental assets [66-71]. Therefore, eligible asset for these kinds of *shukūk* are identified by Climate Bond Standards Certification Scheme such as renewable energies, smart mobility and infrastructures, energy efficiency, light rail, electric vehicles etc. This scheme is used by investors, bond issuers and Governments at a global level to ensure that investments contribute to addressing climate change and developing *smart cities*. From a financial point of view, green *shukūk* are likewise traditional *shukūk* (expecting that the proceeds of green *shukūk* can only finance eco-friendly projects) and therefore the issuing process includes the same steps of the conventional one [61,65]. For the revenues to be admissible for sustainable projects, investors need to take into account that the mobilized capital will not finance activities forbidden by *Shari'a*. Hence, a better understanding of *Shari'a* objectives and rules is required to promote the diffusion of the green *shukūk*, and the development of the market.

As the following examples demonstrate, green *shukūk* provide not only economic benefits but also social and environmental ones while integrating the concept of social

Maslaha through sustainable financial instruments. By issuing green *shukūk*, investors have indeed the chance to combine financial aims with wider societal impact in their investment activity since their specific assets produce both financial returns and positively impact the environment (such as renewable energies and infrastructure projects, smart mobility projects, waste management resources and so on).

Moreover, green *shukūk*, in addition, to generating social wellbeing and economic returns, enable investors (the *shukūk* holders) to benefit from sustainable projects. Green *shukūk* can link indeed socially aware investors with companies that want to deliver social outcomes driven by an overall aim of improving social welfare as well as sustainable development which is perfectly in line with *Shari'a* main objectives. Hence, green *shukūk* raises awareness among different investors about how green and innovative projects – which are the basis of smart cities- can face current challenges such as climate resilient growth. For these reasons, green *shukūk* are becoming increasingly popular in the investment strategy of numerous Islamic countries and cutting-edge companies working in these fields. Thus, green *shukūk* allow the –increasing- development of the global *Shari'a* compliant capital market to raise fund for environmentally friendly projects with socially meaningful impact such as smart and sustainable cities.

According to Bashar Al Nator Malaysia, Indonesia, and the United Arab Emirates are one of the main drivers for *shukūk* issuance and are therefore the main countries most active in the market of green *shukūk*. Historically, the Tadau Energy Sdn Bhd, issued the first green *shukūk* in 2017 in cooperation with the World Bank and with the Central Bank of Malaysia. The underlying contract of this green *shukūk* were *isti sna' shukūk* and *Iğāra shukūk* issued to finance the construction of a 50MWac solar plant in Kudat Sabah, for a total amount of 250 million RM. Numerous issuers followed the footprints of Tadau and in the same year, the first green sovereign *shukūk*, (based on *iğāra shukūk*) was issued in Indonesia to finance eco-friendly and sustainable projects, for a total amount of approximately \$1, 25 billion. Thanks to new and sustainable economic development strategies, there is also a strong push for green *shukūk* in the United Arab Emirates, where the first Middle East green *shukūk* was issued by the National Bank of Abu Dhabi (now First Abu Dhabi Bank) in 2017. Moreover, in the United Arab Emirates, there are also numerous "Green" initiatives -which require significant investments- supported by sovereign funds and which could be the driver for the development of the Middle East Green Bond and Green *shukūk* market.<sup>13</sup>

<sup>13</sup> Among these initiatives, "The Abu Dhabi Vision 2030", a long-term economic vision, developed by the government in consultation with the private sector, aims at reducing the emirate's oil dependency by achieving a 64 per cent contribution to GDP from non-oil sectors by 2030

The emerging market of green *ṣukūk* is a self-regulating market despite several guidelines and different principles such as the Green Bond Principles developed by the International Capital Market Association (ICMA). According to the latter, the Green Bond Principles “*are voluntary process guidelines that recommend transparency and disclosure and promote integrity in the development of the green bond market by clarifying the approach for issuance of a green bond. The GBP are intended for broad use by the market: they provide issuers guidance on the key components involved in launching a credible green bond; they aid investors by promoting availability of information necessary to evaluate the environmental impact of their green bond investments; and they assist underwriters by moving the market towards expected disclosures which will facilitate transactions*”<sup>14</sup> However, these guidelines, concerning both the green bond issuance and the terms of insurance, might not be compatible with Islamic principles<sup>15</sup>. Additionally, the Islamic Development Bank is strongly committed to widely promote the development of green *ṣukūk*<sup>16</sup>. The Bank is mainly focusing on non-sovereign infrastructure projects to foster economic development, job creation, social inclusion and the transfer of skills and competencies to achieve sustainable growth in its member countries.

The use of green *ṣukūk* for the development of smart cities is doubly advantageous since, in addition to being financial instruments based on principles of transparency and social responsibility, green *ṣukūk* are a means to achieve a tangible, determined end, closely linked to the real economy such as sustainable projects. Over the last years, green *ṣukūk* have indeed become more popular for funding sustainable and eco-friendly projects including smart mobility, infrastructure projects, energy-efficient buildings, sustainable waste management, renewable energy projects and other projects aimed at mitigating the effects of climate change, which are fundamental for the development of the *smart cities*<sup>17</sup>. The

<sup>14</sup> <https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/green-bond-principles-gbp/>, p.8

<sup>15</sup> Indeed, according to Shari‘a, the insurance contract is unlawful, and it is regarded as unjustified enrichment based on the prohibition of *Ġarar* (uncertainty) in financial transactions.

<sup>16</sup> [https://www.isdb.org/sites/default/files/media/documents/202101/Annual%20Impact%20Report%20on%20IsDB%20Debut%20Green%20Sukuk%20%28Dec%202020%29\\_0.pdf](https://www.isdb.org/sites/default/files/media/documents/202101/Annual%20Impact%20Report%20on%20IsDB%20Debut%20Green%20Sukuk%20%28Dec%202020%29_0.pdf)

<sup>17</sup> After the Tadau Energy which issued the first green *ṣukūk* in 2017, Quantum Solar Park Malaysia has issued the world’s largest green *ṣukūk* (RM1 billion) to finance the biggest solar photovoltaic plant project in Southeast Asia which is located in Pendang. (The company partnered with the Norwegian Statec, CIMB, and Maybank). Concerning The Gulf Countries, even though Saudi Arabia is the largest issuer of *ṣukūk*, the GCC’s first green *ṣukūk* was issued by the National Bank of Abu Dhabi in 2017 and in 2019 by the UAE-based real estate developer Majid Al-Futtaim which raised \$600m to fund green buildings and energy efficiency projects. In the same year, the

reason why the issuance of green *ṣukūk* is gaining ground is that green *ṣukūk* have not only economic and environmental advantageous but also social ones. Indeed, as previously set out unlike the green bonds, the *ṣukūk* holder is the owner of some undivided share of underlying assets and therefore he/she will benefit from the management of the underlying assets. Thus, the eco-friendly project financed with these instruments contributes to both reducing the environmental impact and improve community life while increasing social wellbeing.

Therefore, green *ṣukūk* among all others financial instruments Shari‘a compliant, can play a crucial role in addressing threats faced by the environment and have the potential to promote the development of affordable, reliable, sustainable, and modern cities. Indeed, according to the literature, there are numerous eco-friendly projects that have been financed with green *ṣukūk* (such as photovoltaic systems, electric vehicles, waste management systems, etc.), as in the Gulf countries or in Malaysia and Indonesia. What is missing, however, is an overall vision of the *smart cities* from a financial perspective. Exploiting the peculiarities of the Islamic financial system, and in particular the green *ṣukūk* could therefore be the keystone for the development of these new urban realities not only in Islamic countries but throughout the world. Green *ṣukūk* have indeed the potential to attract a wider pool of investors, both green and Shari‘a compliant ones (both conventional and Islamic ones) since there are notable shared values and aims between green and Islamic finance in terms of advocating certain principles such as ethical and moral ones.

Therefore, for conventional (green) investors green *ṣukūk* are a viable financial alternative able to meet their goals for green investments and could result in bringing in more investors from western countries with sustainable investment mandates into *ṣukūk* markets. Moreover, Green investors are particularly interested in issuing green *ṣukūk* for two main reasons: The first one lies in the fact that green *ṣukūk* provide investors that their money are used to finance green and sustainable projects, and the second one is that there are many greener financial tools on the equity side of the capital market instead of on the fixed income side. Additionally, since *ṣukūk* are similar to a conventional fixed income security, these financial instruments can bridge the fixed income supply gap for green investors because money are reserved for specific green purpose.

The development of smart cities requires significant investments and that is the reason why the public sector has traditionally provided sustainable funds for urban planning.

---

Saudi-based Islamic Development Bank issued its first green €1 billion *ṣukūk* to finance climate change, renewable energies, and sustainable projects across its 57 member countries, as an instance for the potential of financial institutions in promoting sustainable finance.

Indeed, private investors have only recently started to invest in green projects since an inadequate risk-return profile was one of the major hurdles to attracting private investors for infrastructure projects. Since sustainable urban infrastructure projects of smart cities have a cost premium and carry more risks than conventional projects, there was the need to overcome this and other hurdles to develop financially viable, smart and sustainable projects in cities. In light of this, Islamic finance, through innovative financial tools such as green *shukūk* helped to overcome these barriers (e.g., the risk-reward profiles of sustainable investments). Using green *shukūk* to implement smart cities projects can mitigate initial costs and project risks by balancing the real or perceived risk of investments with a limited commercial track record but strong sustainable development impact and effects. Therefore, financing sustainable projects -such as sustainable infrastructure projects- with Islamic green *shukūk*, has the potential to raise money from both public and private investors while ensuring climate-smart design standards. In addition, as stated above, with green *shukūk*, investors do not have to opt between financial returns and environmental benefits and can be issued to finance sustainable projects by various investors including municipalities, banks, companies and any other private investors.

Therefore, given the social ethical principle and emphasis on risk sharing and asset-backed financing, green *shukūk* can play a crucial role in financing smart, green and innovative projects and enhancing public and private collaboration for juster, low-carbon and sustainable cities. Nonetheless, to ensure continuous progress in this field, steady innovations and new ways of thinking are needed. For example, one such innovation is to use crowdfunding as one of the fundraising options for green *shukūk* by allowing investors to finance innovative and sustainable projects alternatively. These projects such as solar park, renewable energies projects, sustainable infrastructure etc. have good participation rates and excellent prospects for long-term development indeed. Lastly, the establishment of a comprehensive legal framework, joined with financial technology revolution such as crowdfunding etc, can be a catalyst in promoting the overall growth of the green *shukūk* market.

As stated above, Islamic finance can play a crucial role in supporting economic and social development indeed. However, the Islamic Development Bank has to spread the knowledge of these instruments while exploring relevant policy, legal and regulatory framework as well as institutional interventions needed to promote Islamic green finance. In doing so, the implementation of *Shari'a* standards and rules to simplify the creation of a more stable, efficient, and international financial system is paramount of importance. On top of this, the current global pandemic not only has significant health effects but also socio-economic ones. Nevertheless, the COVID-19 pandemic is heightening public awareness of sustainability issues with a growing global recognition that law carbon economy, sustainable development, innovative and (sustainable) financial

instruments as well as *smart cities*, is the only way forward. Hence, COVID-19 is leading to global awareness of the importance of a greener future based on the efficient and effective exploitation of resources since there is no room to develop unsustainable projects. In such a context, the dissemination of the knowledge of the Islamic financial instruments (particularly the green ones such as green *shukūk*) can be crucial and inevitable for achieving this objective worldwide.

## VII. CONCLUSION

When technological innovation, policy makers, and citizens come together to improve the quality of life by creating an efficient shared information network, with a long-term strategic vision, that is when cities truly become smart and sustainable. Achieving this goal presents complex and significant challenges which concern not only an ever smarter, greener, and sustainable world view, but also the strategic choice of ethical and sustainable financial modes. Building sustainable and resilient cities, requires indeed significant investments, most of which take place at national as well as at subnational level and managed by local authorities. Both public and private investments are therefore needed to make cities smart, sustainable, inclusive and climate resilient. However, access to finance represents one of the main hurdles to implementing an efficient smart city strategy, and policymakers need, therefore, to develop original strategies to differentiate funding as well as strengthen citizens' access to finance and involve them in decision-making processes (as agents of change).

In this context, the Islamic financial system based on moral and ethical objectives (*Maqasid al-Shari'a*) can play a crucial role in promoting social equilibrium, innovation, and sustainable economic growth which is the very basis of the concept of *smart cities*. Islamic finance provides indeed sustainable financial instruments known as green *shukūk* capable of reducing environmental impact by allocating funds to eco-friendly projects (e.g., renewable energies, electric vehicles, smart mobility) while increasing social wellbeing. Moreover, financing eco-friendly projects by issuing green *shukūk* can mitigate initial costs and project risks by balancing the real or perceived risk of investments with a limited commercial track record but strong sustainable development impacts and effects. Therefore, given the social ethical principle and emphasis on risk sharing and asset-backed financing, green *shukūk* can be the keystone for enhancing public and private collaboration and for creating more just, low carbon, and sustainable cities throughout the world. However, if on one side Islamic financial instruments – first of all, the green *shukūk* – represent an alternative to conventional tools in achieving SDGs, on the other side the bigger problem is related to the lack of a global, comprehensive vision of the cities which includes economic, social and environmental issues.

In terms of policy implications, this requires new policy practices based on smart and inclusive decision-making processes which promote the development of innovative and sustainable financing strategies. Policymakers should therefore diversify the financing mix by fostering sustainable and ethical financial instruments and eventually moving away from financing tools that do not promote the transformative vision of the 2030 Agenda.

#### REFERENCES

- [1] E. Agliardi, R. Agliardi, "Financing environmentally-sustainable projects with green bonds", *The Economics of Climate Change and Sustainability in Environment and Development Economics* Vol. 24, pp. 608-623, Cambridge 2019
- [2] F. T. Hesary, N. Yoshino, "Sustainable Solutions for Green Financing and Investment in Renewable Energy Projects" *Energies* Vol. 13, issue 4, 788, MDPI 2020
- [3] M. Kutsevych, O.Yara, L. Golovko and V. Terpeliuk, "Sustainable Approaches to Waste Management: Regulatory and Financial Instruments" *European Journal of Sustainable Development*, Vol 9, Issue 2, pp 163-171, 2020
- [4] T. Bieliński, M. Mosionek-Schweda, "Green Bonds as Financial Instrument for Environmental Projects Funding" *Unia Europejska.pl; Warsaw* Vol. 248, Fasc. 1, 2018
- [5] A.T.M. Monawer, N.N.A. Rahman, A.A.A. Qasem Al-Nahari, Luqman Haji Abdullah, A.K. Ali, A. Meguellati, "The actualization of maqasid al-Shari'ah in Islamic finance:a conceptual framework" *International Journal of Islamic and Middle Eastern Finance and Management, Emerald*, 2021
- [6] Boulanger et al. "Rethinking the Smart City". *European Journal of Creative Practices in Cities and Landscapes*, Vol. 1, Issue 1, Cosmopolitan Practices, 2018
- [7] V. Albino, U. Berardi, R. M. Dangelico, "Smart Cities: Definitions, Dimensions, Performance, and Initiatives", *Journal of Urban Technology* Vol. 22, Issue 1, pp. 3-21, Taylor & Francis Online, 2015
- [8] H. Yeeh, "The effects of successful ICT-based smart city services: From citizen's perspectives" *Government Information Quarterly*, Vol. 34, Issue 3, pp. 556-565 Amsterdam, Elsevier, 2017
- [9] H. Yeeh, R.P. Damieri, "Using ICT in Smart City", *Smart City Implementation, Creating Economic Value in Innovative Urban System*, pp. 45-65 Cham, Springer, 2017
- [10] M. G. Morand, D. Schaumann, E. Zinger P. O. Plaut, Y. E. Kalay, "How Smart is the Smart City? Assessing the Impact of ICT on Cities", *Agent Based Modelling of Urban Systems*, pp. 189-207 Cham, Springer, 2017
- [11] M. Cesana, A.E.C. Redondi, "IoT Communication Technologies for Smart Cities", *Designing, Developing, and Facilitating Smart Cities* pp. 139-162, Cham, Springer, 2016
- [12] A. A. Batabyal, H. Beladi, "The optimal provision of information and communication technologies in smart cities", *Technological Forecasting and Social Change*, Vol. 147, pp. 216-220, Elsevier, Amsterdam, 2019
- [13] B. Hammi, R. Khatoun, S. Zeadally, A. Fayad, L. Khoukhi, "IoT technologies for smart cities", Vol. 7, Issue 1, pp. 1-13; *IET Digital Library*, 2018,
- [14] L. G. Anthopoulos, A. Vakali, "Urban Planning and Smart Cities: Interrelations and Reciprocities" *The Future Internet: Future Internet Assembly: From promises To Reality*, pp. 178-189 Berlin, Springer 2012
- [15] T. Yigitcanlar, S. Teriman, "Rethinking sustainable urban development: towards an integrated planning and development process" *International Journal of Environmental Sciences and Technologies*, Vol. 12, pp. 341-352, Berlin 2015
- [16] T.Lützkendorf, M. Balouktsi, "Assessing a Sustainable Urban Development: Typology of Indicators and Sources of Information", *Procedia Environmental Sciences*, Vol. 38, pp.546-553 Amsterdam, Elsevier, 2017
- [17] X. Bai, A. Surveyer, T. Elmqvist, F. W. Gatzweiler, B.Güneralp, S.Parnell,A. H. Prieur-Richard, P. Shrivastava, J. G. Siri, M. Stafford-Smith, J.P. Toussaint, R. Webb, "Defining and advancing a systems approach for sustainable cities", *Current Opinion in Environmental Sustainability*, Vol. 23, pp. 69-78, Amsterdam, Elsevier, 2016
- [18] A.D. Basiago, "Economic, social, and environmental sustainability in development theory and urban planning practice", *The Environmentalist*, Vol. 19, pp.145-161, Cham, Springer, 1998
- [19] O. Basiri, A. Zeynali, A. M. Farrokhi, "Smart City Solution for Sustainable Urban Development", *European Journal of Sustainable Development*, Vol 6, Issue 1 European Center of Sustainable Development, 2017
- [20] A. Azil, A. Alias, D. Norimah "The concept of sustainability from the Islamic perspectives" *International Journal of Business, Economics and Law*, Vol. 9, Issue 5, ISSN 2289-1552, 2016
- [21] N.Y. M. Sayedahmed, S.A. Abuznaid, "Sustainable Development and Social Responsibility from an Islamic Perspective", *Journal of Social and Political Sciences*, Vol.2, No.4, pp. 977-989, 2019
- [22] Asyraf Hj Ab Rahman, Syahrin Said, Hailan Salamun, Hamdan Aziz, "Sustainable Development from Islamic Perspective", *International Journal of Civil Engineering and Technology*, Vol. 9, Issue 4, pp. 985-992, IAEME Publication, 2018
- [23] Atih Rohaeti, Dariah, M. Syukri Salleh, H.M. Shafiai, "A New Approach for Sustainable Development Goals in Islamic Perspective", *Procedia - Social and Behavioral Sciences*, Vol. 219, pp. 159-166, Amsterdam, Elsevier, 2016
- [24] Daud, F., Zulfan S., Sukendi I., Samsul N., "Islam and the Environment: Education Perspective." *Al-Ta'lima Journal*, Vol. 22, Number 2, Page 96-106, 2015
- [25] Z. Hasan, "Sustainable Development from an Islamic Perspective: Meaning, Implications, and Policy Concerns" *Journal of King Abdulaziz University: Islamic Economics*, Vol. 19, No. 1, 2006
- [26] Chapra, M.U. *The Islamic Vision of Development in The Light of The Maqasid alShariah*. The International Institute of Islamic Thought (IIIT), London, 2008
- [27] M. O. Mohammad and S. Shahwan, "The objective of Islamic economic and Islamic banking in light of Maqasid Al-Shariah: A critical review," *Middle East Journal of Scientific Research*, vol. 13, no. 13, pp. 75-84, 2013
- [28] D. Asyraf Wajdi, A. Nurdianawati Irwani, "Maqasid al-Shariah, Maslahah and Corporate Social Responsibility" *The American Journal of Islamic Social Sciences*, Vol.24 Issue 1, pp. 25-45, 2007
- [29] A.A. Shinkafi, N. Ali "Contemporary Islamic economic studies on Maqasid Shari'ah: a systematic literature review" *Humanomics*, Vol.33, Issue 3 pp. 315-334, Emerald, 2017
- [30] [29] K. Paskaleva, I. Cooper, P. Linde, B. Peterson, C. Götz, "Stakeholder Engagement in the Smart City: Making Living Labs Work", *Transforming City Governments for Successful Smart Cities, Public Administration and Information Technology*, Vol. 8, pp. 115-145 Cham, Springer, 2015
- [31] N.S. Jayasena, H. Mallawaarachchi, K.G.A.S. Waidyasekara "Stakeholder Analysis for Smart City Development Project: An Extensive Literature Review", *MATEC Web of Conferences* 266, EDP Sciences, 2019
- [32] G. Viale Pereira, M.A. Cunha, T.J. Lampoltshammer, P. Parycek, "M. Gregianin Testa 'Increasing collaboration and participation in smart city governance: a cross-case analysis of smart city initiatives'" *Information Technology for Development*, Vol. 23, Issue 3, pp. 526-553 Taylor& Francis Online, 2017
- [33] S. Allwinkle, P.Cruickshank, "Creating Smarter Cities: An Overview" *Journal of Urban Technology*, Vol. 18, Issue 2, pp.1-16 Taylor& Francis Online, 2015



- [34] R. Wilhelm S. Ruhlandt "The governance of smart cities: A systematic literature review" *Cities, The International Journal of Urban Policy and Planning*, Vol. 81, pp. 1-23, Amsterdam, Elsevier, 2018
- [35] N.S. Jayasena, D.W.M. Chan, M.Kumaraswamy, "A systematic literature review and analysis towards developing PPP models for delivering smart infrastructure", *Built Environment Project and Asset Management*, Emerald Publishing Limited, Online, 2020
- [36] M. Sarmento, 'Reforming traditional PPP models to cope with the challenges of smart cities', *Competition and Regulation in Network Industries* Vol. 18, Issue 1-2, pp. 94-114, Sage Journals, Online, 2017
- [37] S.Secinaro, V. Brescia, D.Calandra, P. Biancone, Towards a hybrid model for the management of smart city initiatives, *Cities*, Vol.116, pp. 1-13, Emerald 2021
- [38] T.Liu, S.Mostafa, S. Mohamed, T.S. Nguyen, "Emerging themes of public-private partnership application in developing smart city projects: a conceptual framework", *Built Environmental Project and Asset Management*, Emerald Publishing Limited, Online, 2020
- [39] L.Corvo, L. Pastore, "The challenge of Social Impact Bond: the state of the art of the Italian context" *European Journal of Islamic Finance*, 2019
- [40] P. Biancone, S. Secinaro, S. Islamic Finance and Globalisation through Halal Tourism. *Quaderni di Diritto e Politica Ecclesiastica*, 131-142, 2021
- [41] A. Saniotis, "Muslims and ecology: fostering Islamic environmental ethics" *Contemporary Islam*, Vol. 6, pp. 155-171, 2012
- [42] Sayed Sikandar Shah Haneef, "Principles of Environmental Law in Islam" *Arab Law Quarterly* Vol. 17, No. 3, pp. 241-254, Brill, 2002
- [43] Al-Damkhi A.M. "Environmental ethics in Islam: Principles, violations, and future perspectives" *International Journal of Environmental Studies*, Vol. 65, Issue 1, pp. 11 - 31, 2008
- [44] Mansor H. M., Abbas "Islamic finance: an overview", *Pacific-Basin Finance Journal*, Vol. 28, pp- 2-6, Amsterdam, Elsevier, 2014
- [45] A. Hassan, S Mollah, "Islamic Finance: A Global Alternative" *Islamic Finance*. Palgrave Macmillan, Cham, pp. 19-30, 2018
- [46] R. Wilson, "Islamic finance and ethical investment", *International Journal of Social Economics*, Vol. 24 No. 11, pp. 1325-1342, MCB UP, emerald, 2017
- [47] M. L. Tabash, R.S. Dhanakar, "The Relevance of Islamic Finance Principles in Economic Growth" *International Journal of Emerging Research in Management & Technology*, Vol.3 Issue 2, pp. 49-54
- [48] G. Rexhepi and N. Ramadani, "Ethics and Social Responsibility in Islamic Finance," *Entrepreneurship and Management in an Islamic Context*, Springer, 2017, pp. 133-142
- [49] L. Bollani, F. Chmet, "Bibliometric analysis of Islamic finance." *European Journal of Islamic Finance*, 2020
- [50] D. Iannaci, G.M. Jonathan, "Islamic finance and social finance, an opportunity for social enterprises". *European Journal of Islamic Finance*, 2020
- [51] Paresb Kumar Narayan, Dinh Hoang BachPhan, "A survey of Islamic banking and finance literature: Issues, challenges and future directions" *Pacific-Basin Finance Journal*, Vol. 53, pp. 484-496, Amsterdam, Elsevier, 2019
- [52] P.P. Biancone, B Saiti, D. Petricean, F. Chmet "The bibliometric analysis of Islamic Banking and Finance", *Journal of Islamic Accounting and Business Research*, Vol 11, pp.2069-2086 Emerald, 2020
- [53] N. Schoon, "Islamic Finance - An Overview" *European Business Organization Law Review*, Vol.9, pp. 621-635, Springer, 2008
- [54] Mansor H.Ibrahim, "Issues in Islamic banking and finance: Islamic banks, Shari'ah-compliant investment and sukuk" *Pacific-Basin Finance Journal*, Vol. 34, pp. 185-191, Amsterdam, Elsevier, 2015
- [55] M. Abdullah "Waqf, Sustainable Development Goals (SDGs) and Maqasid al-Shariah" *International Journal of Social Economics*, Vol. 45, Issue 1, pp 158-172, Emerald, 2018
- [56] L. Raimi, A.Patel, I. Adelopo, I. "Corporate social responsibility, Waqf system and zakat system as faith-based model for poverty reduction", *World Journal of Entrepreneurship, Management and Sustainability*, Vol. 10 No. 3, pp. 228-242, 2014
- [57] T. Al-Mubarak, "The Maqasid of Zakah and Awqaf and Their Roles in Inclusive Finance" *Islam and Civilisational Renewal Journal (ICR Journal)* Vol.7 Issue 2. pp. 217- 230, 2016
- [58] S. Azmat, M. Skully, K. Brown, "Issuer's choice of Islamic bond type" *Pacific-Basin Finance Journal*, Vol. 28 pp. 122-135, Amsterdam Elsevier, 2014
- [59] Mansor H.Ibrahim "Issues in Islamic banking and finance: Islamic banks, Shari'ah-compliant investment and sukuk" *Pacific-Basin Finance Journal* Vol. 34, pp.185-191, Amsterdam, Elsevier, 2015
- [60] Jikon Lai, Lena Rethel, Kerstin Steiner "Conceptualizing dynamic challenges to global financial diffusion: Islamic finance and the grafting of sukuk" *Review of International Political Economy*, Vol. 24, Issue 6 pp 958-979, Taylor & Francis Online, 2017
- [61] Safari, Meysam, "Contractual Structures and Payoff Patterns of Sukuk Securities" *International Journal of Banking and Finance*, Vol. 10, Issue 2, pp 81-110, SSRN, Elsevier, 2013
- [62] A.Lahsana, M.K.Hassan, R. Ahmad "Types of Sukuk, Their Classification and Structure in Islamic Capital Market" In: *Forward Lease Sukuk in Islamic Capital Markets*, pp. 49-85 Palgrave Macmillan, Cham, 2018
- [63] Siti Sarah Razak, BuerhanSaiti, Yusuf Dinç "The contracts, structures and pricing mechanisms of sukuk: A critical assessment" *Borsa Istanbul Review* Vol. 19, Supplement 1, pp. 21-33, 2019
- [64] O. Salah, "Islamic finance: the impact of the AAOIFI Resolution on equity-based sukuk structures" *Law and Financial Markets Review* Vol. 4, Issue 5, pp. 507-517, Taylor & Francis Online, 2015
- [65] R. Wilson, 'Innovation in the structuring of Islamic sukuk securities' *Humanomics* Vol. 24 Issue 3, pp. 170-181 Emerald, 2008
- [66] A. Aziz, "Green Sukuk, Financing the Future", *IIFM-BI Session on Islamic Finance*, World Bank, Surabaya, 2017
- [67] N.Alam, M.Duygun, R.T. Ariss, "Green Sukuk: An innovation in Islamic capital markets" *Energy and Finance: Sustainability in the Energy Industry*, pp- 167-185, 2016
- [68] A. Tabassum, M. Diengdoh, D.G. Vincent, "Green Sukuk: Challenges and potential". *International journal of Social Science and Economic Research*, Vol.4 Issue 2, pp.1461-1470, 2019
- [69] C. T. Brahim "The Role of green Islamic sukuk to the promotion of sustainable development objectives" *Journal of the New Economy*, Vol. 1, pp. 186-207, 2018
- [70] M. Y. Khouldi Salina Hj. Kassim, "An innovative financing investment to promote the development of Islamic microfinance through socially responsible investment Sukuk", *Journal of Islamic Monetary Economics and Finance*, Vol. 4, Issue 2, 2018
- [71] A. Sekreter, "Green Finance and Islamic Finance". *International Journal of Social Sciences & Educational Studies*, Vol. 4, Issue 3, pp. 115-121, 2017

# The Impact of Macroeconomic and Fundamental Ratios Against Sharia Stock Returns at JII

Muhammad Jihad Rusnanda Sya'bani<sup>1</sup>, Muhammad Anwar Fathoni\*<sup>2</sup>

<sup>1</sup> Islamic Economics Department, Faculty of Economics and Business, Universitas Pembangunan Nasional Veteran, Jakarta

<sup>2</sup> Islamic Economics Department, Faculty of Economics and Business, Universitas Pembangunan Nasional Veteran, Jakarta

Contact Author <sup>1</sup>: muhamadjihad4@gmail.com

Corresponding Author <sup>2\*</sup>: mfathoni@upnvj.ac.id

**Abstract—** This research aims to explain the correlation between macroeconomics and company fundamentals on the returns from the placement of funds in Islamic stocks against the Jakarta Islamic Index (JII) from 2011 to 2020. The method used in this study is quantitative. The sample used considers eight sharia issuers using the purposive sampling method. The data analysis technique used is panel data regression analysis. The results of this study indicate that macroeconomic factors and company fundamentals simultaneously influence sharia stock returns. Meanwhile, this study partially found mixed results, including inflation and ROA having a significant effect on Islamic stock returns. In contrast, GDP and DER don't significantly affect Islamic stock returns.

**Keywords:** *Corporate Fundamentals, Sharia Capital Market, Macroeconomics, Return*

## I. INTRODUCTION

In Islam's teaching, rejecting excessive wealth accumulation and not using wealth is wrong and is not recommended. Because of this, Islam teaches us to carry out investment activities under sharia rules and laws [1]. Investments can be used for the construction and development of new things in the future and to get maximum benefits for investors or fund owners [2].

In Indonesia, investment nowadays requires media and the means to place investment funds. Currently, Indonesia has two market classifications, namely the conventional capital market and the sharia capital market [3]. Investors in the capital market carry out investment activities to gain returns or profit in the form of dividends or profit sharing and capital gains. Dividends, , are profits owned by investors from the results of profit sharing. Meanwhile, the capital gain is the acquisition of

the purchase price less the selling price in the form of a positive difference [4].

Of the many benefits and results that will be obtained by the community when carrying out investment activities, it is unfortunate that the public's interest in investing in the capital market is minimal. The Central Statistics Agency (BPS) released the total population of Indonesia in 2021 as many as 271.34 million people. However, according to data released from the Indonesian Central Securities Depository (KSEI) in 2021, the total number of investors in the Indonesian capital market is only 3.88 million investors. This means that the number of investors in the capital market is only 2.11% compared to the total productive population in Indonesia [5].

To support and assist the Indonesian people in investing in the Islamic finance sector, the Indonesia Stock Exchange (IDX) created a sharia stock index, including the Jakarta Islamic Index (JII) [6]. With the presence of this index, it is hoped that it can serve as a guideline and benchmark for obtaining the performance of listed stocks as the basis for Indonesian sharia shares to develop the Islamic capital market further. Investors who invest funds in the Islamic capital market are currently limited to the Muslim community and non-Muslim communities who have placed their funds because they believe that Islamic stocks can be more resilient to economic changes. This is supported by the growth of sharia shares in 2015-2019, which is considered to have increased significantly [7].

Return is an essential part for fund owners or investors. The rate of return that tends to be unstable shall raise doubts among investors in placing their funds. However, every investment instrument has different return and risk characteristics [8]. In the context of investment returns, there is no conclusion agreed upon by the researchers regarding the determining factor.

Research conducted [9] and [10] shows that Return on Assets (ROA) has a significant positive effect on the rate of return obtained by companies listed on the Indonesia Stock Exchange. That is, if there is an increase in ROA, the return obtained will also increase and vice versa. Different from the research results [11], ROA did not affect the return investors would receive. While on research [12] shows that the debt-to-equity ratio (DER) indicator has no significant effect on the return received by investors. But study [13] states that the DER significantly affects the return that investors will receive.

Not only ROA and DER are still debatable about investment returns, but researchers are also still debating the relationship between gross domestic product (GDP) and inflation with investment returns. Study [14] states that GDP and inflation have a negative and significant effect on the stock returns of banking companies. Analysis [15] also concluded that inflation affects stock returns because it is related to government policies that maintain monetary stability. Another contradictory research was conducted [16] that states that inflation has no effect on stock returns, but GDP has a significant impact on stock returns obtained by investors. Due to the influence of those variables on stock return, we also believe that they can explain stock return predictability [39].

This paper aims to examine and estimate the correlation between external and internal factors represented by the variables GDP, Inflation, ROA, and DER on Islamic stock returns in Indonesia during the 2011-2020 timeframe.

Based on the explanation above, it is seen that there are still gaps in phenomena and theories, as indicated by the absence of previous research consensus regarding the determinants of return in Islamic stock investment. Therefore, researchers are interested in investigating internal and external factors affecting the recovery of sharia shares listed on the Jakarta Islamic Index (JII). The novelty contained in this study is stated in the object of research, namely sharia shares registered in JII and the research period, which is in the 2011-2020 period. Through this research, it is hoped that it can contribute to strengthening the results of previous studies related to the determinants of sharia stock returns in Indonesia.

The limitation of this study is that it cannot accommodate all of the factors contained in the financial statements or macroeconomic factors; the researcher only takes a few samples that are considered to represent internal and external factors in stock price returns.

## II. LITERATURE REVIEW

### A. Signalling Theory

Signalling theory explains that parties are senders and owners of information, acting as givers of a signal or signal in the form of certain information that describes the condition of a company, whether it is beneficial or not for the recipient or investor [17]. There is a signal for a process step taken by the company's management. The signal is given as a guide for

investors to know and understand how management sees and analyses the perspective of the company's prospects [18]. Signalling help each other to resolve the known puzzle in the data [38]

The information conveyed and published can ultimately influence the decisions of the fund owner or investor [11]. The data can be in financial reports, company insider information or other relevant information. Signalling theory can be used as a reference in research because the signals can influence action and decision taken by investors, especially in determining the target return of capital market investors. Information disclosure will affect stock price rise and fall depending on whether the signal is classified as good news or bad news [19].

### B. Sharia Capital Market

A capital Market is a forum in which transactions and purchases of investment instruments can be made, such as units of equity ownership or share, debentures or bonds, and other tradable securities. a real and concrete place where there are parties who make offers, and there are parties who want to buy these instruments and can trade their securities with each other [20].

One of the legalities of the Sharia Capital Market is based on the DSN-MUI fatwa No.40/DSN-MUI/X/2003 concerning the Capital Market and General Guidelines for the Implementation of Sharia Principles in the Capital Market Sector. Basically, there is no difference between the capital market and the Islamic capital market. The difference is that the instruments traded in the Sharia Capital Market must comply with sharia principles and rules [21].

The Islamic capital market has principles that should be fulfilled and obeyed by all parties, from the financiers (investors) and companies that list on the stock exchange. Several things that must be complied with include, among others, securities traded in the capital market must come from goods and services, which is "*halalan toyiban*", as well as the prohibition of short selling transactions and margin trading [22].

One of the investment instruments in the Islamic capital market is Islamic stock. Sharia stocks can be seen in one of the Indonesia Stock Exchange indexes, the Jakarta Islamic Index (JII). This index is one of the stock indices whose calculation basis is the average stock price and market capitalisation of stocks included in the sharia shares criteria. With the presence of this index, it is hoped that it can be the first step in measuring the performance of stocks that are included in the sharia classification to develop the Islamic capital market [23].

Based on the DSN Fatwa No. 40/DSN-MUI/X/2003 concerning Capital Markets and General Guidelines for the Implementation of Sharia Principles in the Capital Market Sector, there are provisions and criteria for issuers whose shares can be included in the Jakarta Islamic Index based on financial ratios, including:

1. If the company obtains financing or funding assistance from debt, the ratio is not more than 30 percent per cent compared to capital.
2. If the company has interest-based income, that income does not exceed 15 per cent of the total revenue.
3. Companies with cash assets or receivables with the total accumulation of all receivables at their trading posts or the number of receivables less than 50 per cent.

### C. Stock Return

Return is the acquisition of profits on the investment process by investors or fund owners. Thus, return is a payment obtained and received for each owner of the funds owned, plus changes in the market price which has been reduced by the initial purchase price [24].

Return is the ultimate goal of an investor in carrying out investment activities in the capital market [16]. Investors can carry out various processes to obtain returns, either through self-analysis and decision-making based on investment behaviour or through professional advice that will guide them to get the maximum expected return [12]. However, it is essential to consider that to get a high return; it is also necessary to be aware of the increased risk [25]. So, it can be said that return and risk have parallel lanes.

### D. Gross Domestic Product (GDP)

GDP is the summation of various products into one instrument realised based on domestic factors and property of foreign nationals in a country, which will later measure the value of these economic activities [26]. GDP is one indicator that can be said as a determinant of a country's health factors [27].

GDP is the acquisition of the value of goods and services in a country that produces production within one year, which is taken based on the production factors in the last timeframe, both originating from that country or originating from foreign countries. There are two methods for calculating GDP: current and constant prices [28].

### E. Inflation

Inflation is a continuous increase in prices. According to [26], Inflation is an increase in costs due to demand that continues to increase but is not balanced by the supply of goods in the market instead. This thought is also in line with Taqyudin Ahmad Ibn Al-Maqrizi (1361-1441) stated that inflation occurs when the prices of goods in general experience an increase that takes place continuously over a certain period.

Inflation might occur temporary (noise inflation), which is part of the inflation rate whose cause is an occasional disturbance (one timezone-time shock). Based on the cause, inflation can occur due to an increase in the cost of production and distribution chains, an increase in funds spent on energy and transportation, and other economic factors such as riots or even natural disasters [29].

### F. Return On Asset (ROA)

Return on Assets (ROA) is one of the profitability analyses. ROA is a ratio that compares the return on the overall value of the company's wealth or assets that can generate future profits [30]. Return on assets (ROA) is assessed as the ratio between a firm's net income and the book value of total assets [40].

Profitability ratios aim to obtain knowledge about the capability of the company or issuer in getting profits in specific periods, which will be compared with the total assets of the related company. ROA is a ratio that can show the ability of a company to use the total assets owned to earn profits after tax breaks [10].

This ratio is advantageous for company management to monitor and evaluate and analyse the effectiveness and efficiency of the issuer to maximise the use of all assets owned. The higher the value of the ROA owned, it can be said that the company is more efficient regarding using these assets, and with the same number of support, it can generate more significant profits [31].

### G. Debt to Equity Ratio (DER)

DER is the ability of a company to pay all of its debts and shows the company's solvency. A business is said to be solvable if the company has sufficient total assets and wealth to make payments on all its debts [32].

DER is a ratio that can be used to assess debt to be compared with equity. This calculation compares the company's overall debt with all of its equity. It can be said that this ratio serves to obtain knowledge about how much each rupiah of capital owned is to be pledged as debt. Therefore, this ratio is called the leverage ratio [33].

This leverage ratio or solvency is a ratio that can measure a company's capacity and capability to fulfil its obligations, be it long-term or shorter-term. [34].

## III. RESEARCH METHODOLOGY

This research is quantitative, where the data obtained comes from the second level or secondary data. This study uses data on the movement of Islamic stock prices registered at JII30, macroeconomic data such as national income and inflation rates, and financial report data consisting of ROA and DER ratios with an observation period from 2011 to 2020.

This research uses the panel data regression technique, which is processed using evIEWS9 software. this is supported because the type of data studied consists of time series and cross-section data, evIEWS9 software is also available workfile to estimate panel data regression with accurate results

The method used in selecting the sample is the purposive sampling method with several predetermined criteria, namely that it is consistently listed in JII from 2011 to 2020 and always issues financial reports regularly. From these criteria, it was found that eight sharia issuers were the samples of this study, as shown in Table 1 below.

Table 1. List of JII 30 Sharia Shares the research sample

| No | Stock Code | Company                           |
|----|------------|-----------------------------------|
| 1  | ASII       | PT Astra Internasional Tbk        |
| 2  | ADRO       | PT Adaro Energy Tbk               |
| 3  | AKRA       | PT AKR Corporindo Tbk             |
| 4  | ICBP       | PT Indofood CBP Sukses Makmur Tbk |
| 5  | KLBF       | PT Kalbe Farma Tbk                |
| 6  | TLKM       | PT Telkom Indonesia (Persero) Tbk |
| 7  | UNTR       | PT United Tractor Tbk             |
| 8  | UNVR       | PT Unilever Indonesia Tbk         |

Source: Indonesia Stock Exchange 2021

#### IV. RESULT

##### A. Chow Test

Table 2. Result *F Restricted (chow test)*

| Effect Test              | Statistic | df     | Prob   |
|--------------------------|-----------|--------|--------|
| Cross-section F          | 0.116681  | (7,68) | 0.9970 |
| Cross-section Chi-square | 0.955177  | 7      | 0.9955 |

Source: Eviews9, author's elaboration

Based on the results above, the probability value of the Cross-Section Chi-Square in this study is  $0.09955 > 0.05$ . So it can be concluded that  $H_0$  is accepted and  $H_1$  is rejected, so a suitable model to be used and continued in further research based on the chow test between the common effect model and the fixed effect model is the common effect model. Because the result is the Common Effect Model, then it was continued to carry out the Langrange Multiplier test.

##### B. Langrange Multiplier Test

Table 3. Result Langrange Multiplier Test

| Effect Test              | Cross-sec | df     | Prob   |
|--------------------------|-----------|--------|--------|
| Cross-section F          | 0.116681  | (7,68) | 0.9970 |
| Cross-section Chi-square | 0.955177  | 7      | 0.9955 |

Source: Eviews9, author's elaboration

By table 14 above, the overall Breusch-Pagan probability value in this study is  $0.0627 > 0.05$ , so it can be explained that if  $H_0$  and  $H_1$  are acceptable, the suitable model in this study is the Common Effect Model.

##### C. Coefficient Determination Test

Table 4. Result R-Squared Test

|           |          |
|-----------|----------|
| R-Squared | 0.302344 |
|-----------|----------|

Source: Eviews9, author's elaboration

Based on the data above, it is found that the value of R-squared is the result of the  $R^2$  test, which has a value of 0.302344 or 30.23%. It can be concluded that the value of 30.23% can represent that the variables Gross Domestic Product, Inflation, Return on Asset, and Debt to Equity Ratio

affect the rate of return and contribute to the rate of return of 30.23%. And for the 69.77% rest, which can be explained and influenced by other factors and variables that are not listed or included in this research series.

##### D. Simultaneous Test

Table 5. Result F Test

|                    |          |
|--------------------|----------|
| F-Statistic        | 8.125708 |
| Prob (F-Statistic) | 0.000017 |

Source: Eviews9, author's elaboration

The value of F-statistics is a value of 8.125708 with values from the F table:  $df_1(k)$ , and  $df_2(nk-1)$  which means that  $df_1(5)$ ,  $df_2(80-5-1) = 74$  is 2,338. This means that the F statistic is  $8.125708 > 2.338$ ; other things can be reviewed through the Prob (F-Statistics), which is 0.000017 and has a smaller value than the alpha of 0.05. From the output issued above, it can be seen that the results of this simultaneous test can be concluded that  $H_0$  is rejected, which means that all variables Gross Domestic Product, Inflation, Return On Asset, and Debt to Equity Ratio have a simultaneous influence on the return of Sharia shares at JII.

##### E. Partial Test

Table 6. Result in Partial Test

| Variable | Coefficient | t-Statistic | Prob.  |
|----------|-------------|-------------|--------|
| GDP      | 0.523939    | 0.854979    | 0.3953 |
| Inflasi  | 3.207817    | 2.826807    | 0.0060 |
| ROA      | 0.632485    | 3.996462    | 0.0001 |
| DER      | 0.153507    | 1.569526    | 0.1207 |
| RETURN   | -0.071484   | -1.298447   | 0.1981 |

Source: Eviews9, author's elaboration

##### 1) Effect of Gross Domestic Product (GDP) on Return

Based on the results or output generated through the E-Views application in table 6, it can be analysed and interpreted that the Gross Domestic Product (GDP) variable partially does not have a significant effect on Sharia Stock Return in Jakarta Islamic Index 30. It can be seen from the prob. value,  $0.3953 > 0.05$  with a t-statistic of 0.854979, and the t-count value is smaller than the t-table value of 1.99254, with  $df=80-5-1 = 74$ , and the significance level is 5%. So from these results, it can be seen that Hypothesis 1 of this study is rejected, which means that Gross Domestic Product does not have a significant effect partially on Sharia Stock Return.

This can be indicated because the return value of Islamic stocks indexed by the Jakarta Islamic Index 30 is diverse. In this study, eight issuers were always in the JII index during the observation period from 2011 to 2020, which had a very fluctuating rate of return every year.

It differs from the macroeconomic variable the researcher chose, namely Gross Domestic Product (GDP), which continued to increase during this research period and can be said to be significant and constant every year. Indonesia's GDP has continuously recorded a high value, and 9 out of 10 years of observation of this research always obtained a positive growth value. In contrast to Islamic stock returns, which fluctuate up and down every year.

The results of the analysis of this output can be concluded that changes in the value of Gross Domestic Product (GDP) can provide a positive but insignificant contribution to changes in stock returns. However, it is since an increase in GDP will increase the value of consumption and investment, which of course, can affect the company's performance. So, this is in line with research conducted by Mayfi and Rudianto states that this GDP can only affect the consumption of its products which increases the company directly, but this does not have an impact on the effect of rising stock prices now.

## 2) *Effect of Inflation on Return*

Based on the results or output generated through the E-Views application in table 6, it can be analysed and interpreted that the inflation variable partially has a significant influence on Sharia Stock Returns in the Jakarta Islamic Index 30. The sig value is 0.0060 < 0.05 with t-statistic, which is 2.826807, and the t-count value is greater than the t-table value of 1.99254, with  $df=80-5-1=74$  and the significance level is 5%. So it can be concluded that the presence of the inflation variable in this study can significantly affect the return of Islamic stock.

Then based on the value of the regression coefficient, it is known that this inflation variable has a value of 3.207817, so it can be ascertained that the influence that inflation has on the rate of return is positive. So from these results, it can be seen that Hypothesis 2 of this study is accepted, which means that inflation has a partially significant effect on Sharia Stock Return.

So it can be said that the contribution of inflation with its increase or decrease in the value can significantly impact increasing or decreasing stock returns on the Jakarta Islamic Index 30. According to Mayfi and Rudianto, the value of inflation that is recorded to be very high tends to have a low rate of return on investment, and vice versa with a low inflation rate, the rate of return contribution of a stock investment will be higher.

Likewise, it was conveyed by Wulandari that a considerable inflation value can reduce a company's actual income level and will impact what investors get. With a low level of income from the existence of high

inflation, it can be said that the returns owned by investors will be lower if it is compared when the inflation value is at a small number. When the inflation rate is low, it will increase the company's income, undoubtedly contributing to the return returns investors receive.

## 3) *Effect of Return On Assets (ROA) on Return*

Based on the results or output generated through the E-Views application in table 6, it can be analysed and interpreted that the Return on Assets (ROA) variable partially has a significant influence on Sharia Stock Returns in the Jakarta Islamic Index 30. It can be known from the significance value of 0.0001 < 0.05 with the t-statistic, which is 3.399462, and the t-count value is greater than the t-table value of 1.99254, with  $df=80-5-1=74$  and the significance level is 5%.

So, it can be concluded that in this study, the presence of the Return On Assets (ROA) variable can significantly influence the return on Islamic stocks. Then based on the value of the regression coefficient, the result is that this inflation variable has a value of 0.632485, so it can be ascertained that the influence of ROA on the rate of return is positive. So from these results, it can be seen that Hypothesis 3 from this study is accepted, which means that Return on Assets (ROA) has a significant influence partially on Sharia Stock Return.

This research is in line with the study conducted by Mayfi and Rudianto state that an increase in return on assets can have a positive and significant on changes in stock prices which are proxied to investment returns. A higher ROA value will have an effect by increasing the investment value of the returns made by investors and vice versa. If the ROA is low, the return value owned by investors will be lower.

According to Indah Puspitadewi and Rahyuda, a company will continually improve and strive for ROA to continuously increase and record positive numbers because the higher the ROA value, the more influential the company is in utilising its assets to generate net profit after tax. In other words, the higher the ROA value, the better the company's profitability.

The company's ability to manage assets and generate profits is undoubtedly a unique attraction for investors. It can influence investors to buy shares and place their funds in companies with a high ROA value. And this is what causes the company's stock price to rise, so it positively impacts the returns on the investment return.

## 4) *Effect of Debt to Equity Ratio (DER) on Return*

Based on the results or output generated through the E-Views application in table 6, it can be analysed and interpreted that the Debt to Equity Ratio (DER) variable partially has a significant influence on Sharia Stock Return in the Jakarta Islamic Index 30. It is

known from the sig value, which is  $0.1207 > 0.05$  with the t-statistic, which is 1.569526, and the t-count value is smaller than the t-table value of 1.99254, with  $df=80-5-1=74$ , and the significance level is 5%.

So it can be concluded that the Debt to Equity Ratio (DER) variable does not significantly affect the return of Sharia shares. Then, based on the regression coefficient, the variable Debt to Equity Ratio (DER) results are worth 0.153507, so it can be ascertained that the effect obtained on the rate of return is a positive influence. So from these results, it can be seen that Hypothesis 4 of this study was rejected, which means that the Debt to Equity Ratio (DER) does not significantly affect the Sharia Stock Return.

According to Basalama, the Debt to Equity Ratio value should have a negative value on investment returns in stocks. Still, this study found that the DER value has a positive value on investment returns. So, this can indicate that various types of considerations differ from one investor to another in assessing this DER.

Another thing the view of Indah Puspitadewi and Rahyuda states that as long as the debt owed by the company is needed to increase capital from the company's operations and if the use of the debt can be optimised and utilised as best as possible by the company, of course, it can increase sales figures, with increased sales it will result in high profits so that it gets a positive response from investors.

## V. CONCLUSION

Based on the data analysis that has been carried out, the results of hypothesis testing led to the following results. GDP does not affect sharia stock returns; GDP growth only increases product consumption and does not mean directly affecting stock price movements. Inflation significantly affects Islamic stock returns because, with high inflation rates, there is a tendency for low return values and vice versa. With low inflation rates, the desire to invest will increase and affect high returns. ROA has a significant effect on sharia stock returns, increasing the efficiency of the use of assets which will have an impact on increasing company profits, which can affect investor returns. DER does not have a significant effect on Islamic stock returns because investors consider different views regarding the debt owed by the company and whether the debt can be said to be productive.

With the conclusions above and the limitations the authors convey in the introduction, it is necessary to conduct further research to complement and validate this research with various other factors. Researchers hope that if an investor pays attention to multiple ratios and supporting analysis, it can increase the returns obtained from the investment process he has and is expected to directly impact the development of the Indonesian capital market in Indonesia.

## REFERENCES

- [1] Rodoni, A., & Fathoni, M. A. (2019). *Manajemen Investasi Syariah* (S. Diniyah (Ed.)).
- [2] Sudirman, S., Economics, M. A.-E. J. of, & 2018, U. (2018). Pengaruh Konsumsi Rumah Tangga, Investasi Terhadap Pertumbuhan Ekonomi di Provinsi Jambi. *Ekonomis.Unbari.Ac.Id*. <http://ekonomis.unbari.ac.id/index.php/ojsekonomis/article/view/33>
- [3] PT Bursa Efek Indonesia. (n.d.). *Produk Syariah*. Retrieved September 10, 2021, from <https://www.idx.co.id/idx-syariah/produk-syariah/>
- [4] Asyik, N. F. (2020). Pengaruh Free Cash Flow, Leverage, Dan Profitabilitas Terhadap Kebijakan Dividen. *Jurnal Ilmu Dan Riset Akuntansi*, 9(5), 2–10.
- [5] CNN Indonesia. (2020). *Investor Retail di Pasar Modal Melonjak 1,68 Juta Orang*. <https://www.cnnindonesia.com/ekonomi/20201022105720-92-561433/investor-retail-di-pasar-modal-melonjak-168-juta-orang>
- [6] Salihin, A. (2019). Pengaruh "Dow Jones Islamic Market Indeks," "Dow Jones Islamic Market Indeks China," Dan Indeks Harga Saham Gabungan Terhadap Jakarta Islamic Indeks Priode 2014-2018. *Fe.Ummetro.Ac.Id*, 10. <http://fe.umm metro.ac.id/ejournal/index.php/JA/article/view/131>
- [7] Wulan, A. N. (2020). Analisis Pengaruh Indikator Makroekonomi Terhadap Indeks Harga Saham Syariah di Indonesia Tahun 2011-2020. *Syiar Iqtishadi : Journal of Islamic Economics, Finance and Banking*, 4(2), 59–84. <https://doi.org/10.35448/JIEC.V4I2.9844>
- [8] Zarman, N. (2017). Kinerja Portofolio Saham pada Perusahaan Makanan, Property dan Pertambangan di Bursa Efek Indonesia. *Esensi: Jurnal Bisnis Dan Manajemen*, 7(2). <https://doi.org/10.15408/ESS.V7I2.5354>
- [9] Basalama, I. ., Murni, S. ., & Sumarauw, J. S. B. (2017a). Pengaruh Current Ratio, Der Dan Roa Terhadap Return Saham Pada Perusahaan Automotif Dan Komponen Periode 2013-2015. *Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis Dan Akuntansi*, 5(2). <https://ejournal.unsrat.ac.id/index.php/emba/article/view/16395>
- [10] Putra, F. E., & Kindangen, P. (2016). Pengaruh Return On Asset (ROA), Net Profit Margin (NPM), Dan Earning Per Share (EPS) Terhadap Return Saham Perusahaan Makanan Dan Minuman Yang Terdaftar Di Bursa Efek Indonesia (Periode 2010-2014). *Jurnal Riset Ekonomi, Manajemen, Bisnis Dan Akuntansi*, 4(3), 235–245.
- [11] Setiyono, E., Riset, L. A.-J. I. dan, & 2016, U. (2016). Pengaruh kinerja keuangan dan ukuran perusahaan terhadap return saham. *Jurnal mahasiswa.Stiesia.Ac.Id*. <http://jurnalmahasiswa.stiesia.ac.id/index.php/jira/article/view/329>.
- [12] Gunadi, G., & Kesuma, K. (2015). Pengaruh Roa, Der,

- Eps Terhadap Return Saham Perusahaan Food and Beverage Bei. *E-Jurnal Manajemen Universitas Udayana*, 4(6), 250234.
- [13] Purnama, E. T., Asnawi, S. K., & Puji Lestari, E. (2018). Pengaruh Faktor Fundamental Perusahaan Terhadap Return Saham. *Jurnal Organisasi Dan Manajemen*, 14(1), 67–81. <https://doi.org/10.33830/jom.v14i1.149.2018>
- [14] I Nyoman Sidhi Adiyadnya, Luh Gede Sri Artini, & Rahyuda, H. (2016). Pengaruh Beberapa Variabel Ekonomi Makro Terhadap Profitabilitas dan Return Saham Pada Industri Perbankan Di BEI. *E-Jurnal Ekonomi Dan Bisnis Universitas Udayana*, 5(8), 2579–2608.
- [15] Chasanah, A. N. (2018). Pengaruh Makroekonomi Terhadap Return Saham Pada Perusahaan Perbankan. *Jurnal Fokus Ekonomi*, 13(2).
- [16] Wiradharma, M. S., & Sudjarni, L. K. (2016). *Pengaruh Tingkat Suku Bunga, Tingkat Inflasi, Nilai Kurs Rupiah Dan Produk Domestik Bruto Terhadap Return Saham*. 5(6), 3392–3420.
- [17] Connelly, B. L., Certo, S. T., Ireland, R. D., & Reutzel, C. R. (2011). Signaling theory: A review and assessment. *Journal of Management*, 37(1), 39–67. <https://doi.org/10.1177/0149206310388419>
- [18] Sadewo, I. B., Suparlinah, I., & Widianingsih, R. (2017). Pengaruh Ukuran Perusahaan dan Keputusan Pendanaan terhadap Nilai Perusahaan dengan Profitabilitas sebagai Variabel Mediasi. *Jurnal Akuntansi Dan Sistem Teknologi Informasi*, 13(3), 126–145.
- [19] Rokhlinasari, S. (2016). Teori-teori dalam Pengungkapan Informasi Corporate Social Responsibility Perbankan. *Academia.Edu*. [https://www.academia.edu/download/53500676/Teori - Teori dalam Pengungkapan Informasi CSR.pdf](https://www.academia.edu/download/53500676/Teori_-_Teori_dalam_Pengungkapan_Informasi_CSR.pdf)
- [20] Pangestu, R. D., Husaini, A., & Sulamsiyati, S. (2019). Pengaruh Indikator Makroekonomi Terhadap Indeks Saham (Studi Pada Jakarta Islamic Index, Periode 2014–2018). *Jurnal Administrasi Bisnis (JAB)*, 73(2).
- [21] DSN MUI. (2003). *FATWA DEWAN SYARIAH NASIONAL NO: 40/DSN-MUI/X/2003*. <https://dsnmu.or.id/kategori/fatwa/page/10/>
- [22] Ali, F. (2016). Pasar Modal Syariah. *Academia.Edu*. <https://www.academia.edu/download/44830696/Pasar-Modal-Syariah.pdf>
- [23] Yanty, R. (2016). Analisis Pengaruh Jakarta Islamic Index, Indeks Saham Syariah Indonesia, dan Jumlah Reksadana Terhadap Kinerja Reksadana Syariah Periode 2014–2016. *Sumber*, 136, 14–914
- [24] Van Horne, J. C., & Wachowicz, J. M. (1988). *Fundamentals of Financial: Management Prinsip-Prinsip Manajemen Keuangan*. Prentice-Hall of India. <https://opac.perpusnas.go.id/DetailOpac.aspx?id=34481>
- [25] Suriyani, N., & Sudiarta, G. (2018). *Pengaruh tingkat suku bunga, inflasi dan nilai tukar terhadap return saham di Bursa Efek Indonesia*. 7(6), 3172–3200. <https://doi.org/10.24843/EJMUNUD.2018.v7.i06.p12>
- [26] Sukirno, S. (2016). *Makro ekonomi teori pengantar: Vol. Vol 3*. Raja Grafindo Persada. [https://scholar.google.co.id/citations?view\\_op=view\\_citation&hl=en&user=3wQdAXgAAAAJ&citation\\_for\\_view=3wQdAXgAAAAJ:WF5omc3nYNoC](https://scholar.google.co.id/citations?view_op=view_citation&hl=en&user=3wQdAXgAAAAJ&citation_for_view=3wQdAXgAAAAJ:WF5omc3nYNoC)
- [27] Karlina, B., Dan, - Jurnal Ekonomika, & 2017, U. (2017). Pengaruh Tingkat Inflasi, Indeks Harga Konsumen Terhadap PDB di Indonesia Pada Tahun 2011–2015. *Journal.Budiluhur.Ac.Id*, 6(1). <https://journal.budiluhur.ac.id/index.php/ema/article/view/335>
- [28] Silaban, P., Niagawan, R. R.-, & 2020, undefined. (n.d.). Pengaruh Inflasi, Ekspor Dan Impor Terhadap Pdb Di Indonesia Periode 2015–2018. *Jurnal.Unimed.Ac.Id*. Retrieved September 3, 2021, from <https://jurnal.unimed.ac.id/2012/index.php/niagawan/article/view/17656>
- [29] Kristinae, V. (2018). Analisis Pengaruh Indeks Harga Konsumen Terhadap Inflasi. *Jurnal Aplikasi Manajemen, Ekonomi Dan Bisnis*, 3(1), 1–11. <http://jameb.stimlasharanjaya.ac.id/JAMEB/article/view/66>
- [30] Kasmir. (2008). *Analisis laporan keuangan*. Rajawali Pers. <http://www.rajagrafindo.co.id/produk/analisis-laporan-keuangan/>
- [31] Sarasanti, N., & Shofawati, A. (2018). PERBANDINGAN KINERJA KEUANGAN BPRS DAN BPR KONVENSIONAL DI SURABAYA. *Jurnal Ekonomi Syariah Teori Dan Terapan*, 5(4), 291–306. <https://doi.org/10.20473/VOL5ISS20184PP291-306>
- [32] Riyanto, B. (1999). *Dasar-Dasar Pembelajaran Perusahaan*. *Dasar-Dasar Pembelajaran Perusahaan*, 1–85.
- [33] Purwanti, D., & Sawitri, P. (2018). Dampak Rasio Keuangan terhadap Kebijakan Deviden. *BISMA (Bisnis Dan Manajemen)*, 3(2), 125. <https://doi.org/10.26740/bisma.v3n2.p125-134>
- [34] Saragih, M. (2021). *Pengaruh Likuiditas, Solvabilitas dan Profitabilitas Terhadap Harga Saham Pada Perusahaan Pertambangan di Bursa Efek Indonesia Tahun 2017–2019*. 2013, 186–199.
- [35] Indah Puspitadewi, C., & Rahyuda, H. (2016). Pengaruh Der, Roa, Per Dan Eva Terhadap Return Saham Pada Perusahaan Food and Beverage Di Bei. *E-Jurnal Manajemen Universitas Udayana*, 5(3), 253567.
- [36] Mayfi, F., & Rudianto, D. (2014). *Analisis Pengaruh Faktor Internal dan Eksternal Perusahaan Terhadap Return Saham*. IV(3), 634. <https://hsgm.saglik.gov.tr/depo/birimler/saglikli-beslenme-hareketli-hayat-db/Yayinlar/kitaplar/diger-kitaplar/TBSA-Beslenme-Yayini.pdf>
- [37] Wulandari, W., Suhono, & Manda, G. S. (2021). *Pengaruh Tingkat Suku Bunga dan Inflasi Terhadap*



- Return Saham pada Perusahaan Manufaktur Terindeks LQ 45 Periode 2016-2020*. 5(2), 1043–1049.
- [38] Bulbulia, J., & Sosis, R. (2011). *Signalling theory and the evolution of religious cooperation*. *Religion*, 41(3), 363-388.
- [39] Phan, D. H. B., Sharma, S. S., & Narayan, P. K. (2015). *Stock return forecasting: Some new evidence*. *International Review of Financial Analysis*, 40, 38-51.
- [40] Secinaro, S., Brescia, V., Calandra, D., & Saiti, B. (2020). *Impact of climate change mitigation policies on corporate financial performance: Evidence-based on European publicly listed firms*. *Corporate Social Responsibility and Environmental Management*, 27(6), 2491-2501.

# A deep learning approach to risk management modeling for Islamic microfinance

Klemens Katterbauer<sup>1</sup>, Philippe Moschetta<sup>2</sup>

<sup>1,2</sup> Euclid University, Central Africa Republic

Corresponding Author <sup>1\*</sup>: katterbauer@euclidfaculty.net  
Contact Author <sup>2</sup>: philippe.1@euclidfaculty.net

**Abstract**— Islamic Microfinance rides two recent growing trends: conventional microfinance and Islamic banking. It offers financial flexibility to the poorest strata of the population in different Muslim countries by borrowing and mixing techniques from these two sources. In particular, risk management and loan qualifications tend to be similar to those operating inside conventional and Islamic financial institutions. The loan approval process heavily relies on scoring applicants mostly on their financial criteria. This paper aims to demonstrate that an alternative framework based on artificial intelligence improves traditional financial techniques. This framework also resonates more with the fundamental and specific values of Islamic Microfinance as it captures some non-financial attributes of the applicant that are informationally rich. We first present the critical components of this novel approach. Then, we apply it to a business case (approximately 30,000 applications to a microfinancing institution in the Central African Republic) to demonstrate its usefulness.

**Keywords**-component; Islamic microfinancing, artificial intelligence, risk management, Shariah law, data-driven study

## I. INTRODUCTION

### A. The Islamic Microfinance Context

Microfinancing has been a growth area of modern finance in developing countries. It provides individuals with modest financing options. It allows them to escape poverty and overcome some of the restrictions encountered in conventional banking based on strict demand for collateral and strong credit history. Deprivation continues to be a significant challenge in many Muslim communities: more than 500 million individuals live on less than 2 US Dollars per day in Indonesia, Pakistan, India, Bangladesh, Egypt, and Nigeria. These individuals struggle given the lack of sufficient liquidity, savings

management, and ability to transfer and receive money [1]. Islamic microfinance has been posited as an innovative instrument for poverty alleviation.

In contrast with traditional microloans, Shariah-compliant financing options offer a more suitable answer for Muslim borrowers [2]. We often see a recourse to a blend between conventional high-interest microfinancing and their Islamic version, but both rely on the existence of collateral.

The first advantage of the Islamic option with collateral (e.g., jewelry or gold) is the continual roll-forward of the loan with a flexible repayment schedule that allows the monetization of the collateral by following the cash inflow/outflow borrower's profile. This option is open without the need to re-enter a loan application process every time the borrowing re-starts [3]. The second advantage of the Islamic microfinancing option is the safekeeping of the collateral by the lender at a very low cost [4]. Finally, the overall cost to the lender tends to be more competitive than the conventional option.

The limitation of this Islamic financing option is two folds. First, the lender usually restricts these loans to the acquisition of an asset and prohibits discretionary spending. Second, the absence of financial interest on the microloan prevents the significant growth of the loan book for the lender, particularly when the financial interest is computed to cover the risk of late payment or even of a write-off.

Due to the importance of managing late payment and default risk in the context of riba-free loans (i.e., absence of financial interest), assessing the overall financial risk associated with Islamic microfinance is paramount for the sustainability of this market.

## B. Financial risk in Islamic Finance

Risk management for financial institutions includes several broad risk categories: market risk, credit risk, operational risk, and liquidity risk. Market risk arises from changes in market prices (e.g., interest rates, commodity prices). Credit risk derives from the possibility that the debtor does not repay the debt in total, and the recovery on the net value of the pledged asset does not cover the unpaid balance. Operational risk covers negative situations caused by failed internal processes, fraud, collusion with the debtor, mere incompetence of the credit officer, or inadequate collection processes. Another critical risk is the liquidity risk, which implies that there is not sufficient liquidity in the market to buy or sell assets. These risks are present in Islamic finance, so conventional risk techniques used to manage them are also relevant.

A difference with conventional risk analysis arises with the quantum of risk that the institution should allow: “it [*gharar*] is not as well defined as *riba*, and a ruling of permissibility based on *gharar* could take into account a cost-benefit analysis.” [5]. It explains why the level of risk acceptable in Islamic finance can differ from one institution to another. On the one hand, one could consider risk as intrinsic to any financial transaction, hence not a reason to exclude from a pure loan a risk element. On the other hand, one could be willing to eliminate any trace of this notion on a loan. The risk is then transferred to an ancillary Islamic transaction that takes place simultaneously as the loan transaction.

We observe an analogous Islamic debate about the degree of risk inclusion with the concept of ‘haram’ food. For example, the Shafie school seeks to eliminate any *najis*-components in ‘halal’ food to avoid potential contamination. In contrast, other schools may accept a minute percentage of non-halal ingredients. Similarly, uncertainty related to the price is equally prohibited in Islamic finance [6]. Therefore, risk modeling techniques in Islamic finance institutions should filter only permissible risks. Consequently, risk modeling should specify whether the variation in asset quality or reimbursement price is part of the risk model.

These techniques are particularly relevant for regulators. Their importance has been generally increased with each financial crisis. The Basel Accords, set up in the 1980s, tried to establish for financial institutions an international standard for minimal capital requirements with a particular focus on credit risk. The Basel II agreement (viz. the Revised Capital Framework) broadened these terms in the aftermath of the 2007-08 financial crisis and incorporated, besides minimal capital requirements standards related to supervision and discipline in financial markets [7]. Similar to the Basel Accords, in case an Islamic financial institution faces unexpected losses, partners /shareholders are required to forgo a portion of the profit or, in the worst case, provide additional equity.

For Islamic microfinance institutions, these remedies are more difficult to implement. These institutions are not usually run for profit. They cannot absorb through their gains the credit losses. In addition, the lack of future profitability limits the

recourse to fresh funds charitable sources. Hence the heightened need to control for risk to minimize the amount of risk that the institution's management can take [8].

In this paper, we will first review the current practice that conventional financial institutions use to assess the borrower's suitability. Then, we will present a novel framework based on Artificial Intelligence (AI) techniques that will extract from the borrower's profile an informational advantage compared to conventional techniques. We will show that this advantage optimizes the risk/reward equilibrium of the financial institution and also chimes with the Islamic values that are the cornerstones of these institutions. Finally, we will test this possibility through a business case of approximately 30,000 applications to a microfinancing institution in the Central African Republic.

## II. THREE LEVELS OF FINANCIAL RISK MODELS

### A. Conventional Risk Model

To manage the overall risk of a financial institution, the Basel regulations impose a minimum coverage ratio of 8% defined by:

$$\frac{\text{regulatory capital}}{\text{risk-weighted sum}} \geq 8\%$$

The denominator in this model is computed by multiplying a pre-defined risk factor (specific to each class of loans) by the nominal value of the loan. The main advantage of this model is its simplicity. The regulator can easily audit the computation and track the evolution from one reporting period to the other. The main drawback is the absence of the covariance effect between loans. This absence can work in two different directions. For example, the benefit of a diversification strategy with negatively correlated loans is not reflected in this ratio. The potential negative impact of having correlated loans in different classes is not translated either. Furthermore, the effectiveness of this ratio is heavily dependent on the methodology used to determine the risk factor associated with each class of loans.

A different approach is the utilization of a factor sensitivity measure. This measure can be expressed for the value of a portfolio

$$V_n = f(t_n, Z_n)$$

at time  $n$ , as

$$f_{z_i}(t_n, Z_n) = \frac{\partial f}{\partial z_i}(t_n, Z_n)$$

The factor sensitivity approach is important to analyze the portfolio's robustness with respect to a change in risk-factor. However, it is difficult to aggregate all sensitivities together to determine the overall riskiness of the loan portfolio [9].

The most conventional approach to risk modeling is utilizing a loss distribution approach. The main objective is to estimate the loss  $L_{n+1}$  given a probability distribution  $F_L$  that is estimated

from historical data. The challenge that arises from this is to determine the distribution and its parameters [10].

A widely used parameter used for risk assessment is the standard deviation. However, this depends on the context, and the standard deviation may be inadequate for several applications. Specifically, the standard deviation is only defined for distributions that fulfill  $E(L^2) < \infty$ . Probability distributions with fat tails (i.e., kurtosis  $> 3$ ) do not fulfill this criterion. Additionally, the standard deviation does not distinguish between positive and negative events as it sums the absolute deviation from the mean equally.

A critical alternative measurement criterion is the Value-at-Risk (VaR) quantifier. The VaR is defined as

$$VaR_{\alpha}(L) = \inf \{l \in \mathbb{R}: P(L > l) \leq 1 - \alpha\}$$

which implies that for each confidence level  $\alpha \in ([0,1])$  the probability that the loss  $L$  exceeds  $l$  is less than  $1 - \alpha$ .

While the VaR is an important measurement criterion and has attracted the attention of regulators, it has considerable limitations [7]. Specifically, it does not provide any information on the magnitude of the expected loss. The shape of the loss curve after the VaR point does not impact the VaR calculation. The computation of the expected loss is necessary. It is defined as

$$ES_{\alpha}(L) = E(L|L \geq VaR_{\alpha}(L))$$

These computations present a statistical challenge due both to their limited number of degrees of freedom and to specific probability distribution assumptions on the data that underlie them [9].

In summary, most regulators prefer the ethical transparency and auditability of such established statistical models primarily based on a limited number of frequently used statistical assumptions. Therefore, understanding the model becomes more important than understanding the data. Financial institutions are then tempted to make the data fit the statistical model they use, or that has been prescribed by the regulator rather than developing a fit-for-purpose alternative [11]. The great financial crisis of 2008-2009 has amply demonstrated that most risk models did not sufficiently capture capital risks. They were not comprehensive enough to include extreme events and underestimated their true frequency, particularly the sharp increase of covariance between loans at times of general financial stress.

Nevertheless, we posit it is possible to reconcile regulators' needs and improved outcomes in risk management. We hypothesize that techniques derived from AI offer an efficacious alternative in building an adequate risk model. These models will support better decision-making for financial institutions while allowing regulators to monitor risk policies.

### B. Artificial Intelligence Risk Model

AI has gained considerable traction in a variety of different industrial and business applications. It allows novel insights

from semi-structured data. It facilitates automatized decisions at a lower cost compared to a human-only process.

In the Islamic microfinance context, it considers a variety of different quantitative and qualitative factors germane to the specificity and originality of that industry. We can identify at least four areas of relevance: 1) the loan decisions in microfinance are numerous and repetitive, 2) the Islamic finance construct of these pure loans put pressure on the cost structure of the financial institutions and requires a high level of automation, 3) Shariah law promotes the avoidance of specific types of uncertainties 4) the tracking of the coverage ratio collateral/loan must be done frequently to minimize the default risk. [12]. At the same time, AI can draw inferences from a large and evolving database of user data. It can be optimized continuously. Therefore, it can train itself in adequate conditions. Nevertheless, as it is frequent with AI-driven decision processes, machine learning models provide little explainability. It may cause uncertainty in the final go/no go result [13]. So, financial institutions may be at a loss to explain to loan applicants why they have rejected the loan request. It may also require constant monitoring to avoid embedded biases that could run contrary to the notion of fair and equal treatment, a value highly promoted by Islamic Finance for the Umma at large.

If we examine now the steps followed by conventional machine learning models, they start out with a pre-processing step to analyze and filter the data.

The first step comprises data filtering and data imputation, as well as the management of data outliers. This phase is critical for ensuring that the machine learning model is robust and extracts the core features in the data [14].

The second step is the choice between regression and classification, representing a significant differentiation between AI models. Whether to utilize a classifier or regression model depends on whether one wants to estimate the potential loss or value depreciation or aims at classifying the risk incurred. Concerning classifiers, one can distinguish either 1) heterogeneous, 2) individual or 3) homogeneous classifiers.

Heterogeneous classifiers combine the predictions from various types of models and involve stacking, averaging, and hill-climbing algorithms. Individual classifiers conventionally incorporate logistic regression, support vector machines, neural networks and decision trees. Finally, homogeneous classifiers combine the predictions from multiple similar models and achieve diversity through sampling. Such models are called bagging, random forest and boosting. Researchers can also use these algorithms similarly for regression purposes. They also exploit hyperparameter optimization to optimize model performance [15].

In the third step, data scientists, when faced with a large number of parameters, follow a nonlinear optimization approach to achieve adequate optimization results. They determine a globally optimal set of hyperparameters via genetic optimization. The optimization relies on the principles of natural selection to find a globally optimal solution. A critical aspect of

genetic programming is the importance of the initial solution and the evolution of the population to find the most optimal solution. While the framework's performance depends on the measurement criterion used, a considerable improvement may be achieved from intelligent optimization [15].

After that step, they face the challenge of explainability. Transparency about the factors influencing decision-making is crucial in Islamic finance, given that risk sharing is a crucial feature of Islamic finance instruments. Most machine learning models have an inherent but rudimentary form of explainability. While this may not be in the form of a single equation with a few parameters, the impact of the various input data on the model may be conventionally determined by a feature analysis. Tree-based models enable with relative ease to measure the impact of each model feature and how these features interact with each other. Quantified as feature importance, the impact on the model evaluation metric is determined via changing a single variable in the tree. This subsequently allows the determination of the model quality. To test the importance of a variable, data scientists perform a sensitivity analysis on the quality of the model. The most relevant variables generate the most important changes in quality. Therefore, they can address from these most influential variables the explainability challenge [9] and provide in layman's terms a simplified causal explanation to loan applicants.

A final consideration generally absent from the classic risk management model for financial institutions flows from a compulsory Environmental, Social and Governance (ESG) assessment. Certain elements of the ESG schema have been included *ab initio* in the Islamic finance conceptual framework. For example, environmental sustainability is a crucial component of Islamic finance as Shariah law stipulates that financing projects detrimental to the environment are forbidden [7]. Islamic finance forbids other sectors detrimental to a safe environment for humankind like pornography, gambling, or the military industry. In terms of governance, equality between the financial partners is another component of Islamic finance. Given these ESG concerns, AI is particularly well-suited to comprehensive risk modeling that promotes an inclusive approach by combining numerical with non-numerical data. While the conventional models focus on the financial profitability of the loan, Islamic microfinance must incorporate other ethical considerations that are often more difficult to measure in a purely numerical way.

### C. Islamic Microfinance AI Risk Model

We have developed a novel AI Islamic risk management framework for assessing credit risk for Islamic microfinancing institutions. The framework determines both individual and overall credit risk for the Islamic microfinancing market. Furthermore, the framework incorporates a recommendation engine that enables individuals without formal financial qualifications to review Islamic microloans. It also contains the value risk of the underlying asset [7].

To develop the framework, we have utilized a random forest approach. Random forest methods belong to the class of

ensemble learning techniques [16]. In these techniques, the random forest consists of multiple decision trees where the trees are trained by either bagging or bootstrapping. Bagging is an advantageous ensemble technique for enhancing accuracy. Individual decision trees are combined into different bags. From these bags, we select the bag with the highest accuracy to be further branched out. Then, increasing the number of trees that are incorporated leads to an increase in the precision of the estimates or classification. A critical benefit of random forest trees is the reduction of the limitations of the decision trees, specifically when it comes to overfitting [17].

Our framework benefits from the effective way that random forest algorithms handle missing data. In addition, they do not need excessive hyperparameter tuning to achieve reasonable predictions. We illustrate in Figure 1 the various types of nodes are encountered in a random forest algorithm [17]. We start with the root node, followed by the decision nodes and then the leaf nodes. Each decision node may have multiple leaves or decision nodes. A decision node with multiple leaves represents a subtree.

Information theory provides insights into the way decision trees and random forests operate. Specifically, the critical objective for a decision tree is to maximize its entropy or information gain, which is a measure of uncertainty [18]. Given a set of independent variables, entropy increases when the uncertainty is reduced. Higher entropy means that a higher degree of uncertainty has been removed during the training of the decision trees. The main advantage of the random forest method is that the segregation of the nodes is performed randomly through bagging. This process allows the use of different samplings for the training phase.

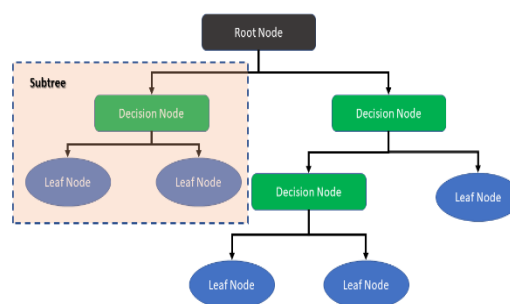


Figure 1: Graphical illustration of random forest algorithm.

Our framework separates the risk management model into three sub-models: 1) the estimation of the individual credit risk, 2) the classification of risk and, 3) the maximum acceptable loan amount. Furthermore, the sub-models also estimate the expected value at risk for the entire Islamic microfinance institution. It also offers alternative recommendations for loan applicants in case they do not qualify for a conventional microloan.

### III. CASE STUDY

#### A. Data sources and structure

To evaluate the AI-driven Islamic Risk Model for microfinancing, we collected from an Islamic microfinancing institution a dataset of approximately 30,000 loan takers and applicants in the Central African Republic. The dataset was augmented with data based on general demographic, income, and societal norms when the data was not complete. The reference data were taken from a variety of sources, such as the European Country of Origin Information Network, the World Bank, the International Monetary Fund, and the United Nations statistics [19, 20].

Table 1: Dataset parameters categorized according to personal data, Islamic values, and financial data.

| Data Columns                         | Type                  |
|--------------------------------------|-----------------------|
| Gender                               | <b>Personal Data</b>  |
| Age                                  |                       |
| Job                                  |                       |
| Marital Status                       |                       |
| Number Children                      |                       |
| Wife is working                      |                       |
| Number of mobile phones              |                       |
| Number of children studying          |                       |
| Zakat Amount Paid per Year           |                       |
| Participates in Islamic volunteering |                       |
| Committed crimes                     |                       |
| Number of crimes committed           |                       |
| Went to an Islamic school            |                       |
| Monthly Salary                       | <b>Financial Data</b> |
| Monthly Overall Income               |                       |
| Monthly Loan repayment               |                       |
| Monthly expenditure                  |                       |
| Number successfully repaid loans     |                       |
| Number defaulted loans               |                       |
| Value of collateral                  |                       |

For the risk modeling framework, we analyzed initially the dataset to discern potential correlations and relationships within the data. The structure of the collected data for each individual loan applicant is outlined in Table 1. The collected data were

categorized into three different types: personal data, data related to Islamic values, and financial data.

#### B. Data visualisation

In this section, we describe the data distributions and composition of the initial dataset. In Figure 2, we outline the dataset's age distribution and marital status. The histogram values are all indicated in per cent. The distribution shows that most of the applicants were married, with a few being single (less than 5 % for each age group) and a lesser number (less than 2 %) being divorced or widowed.

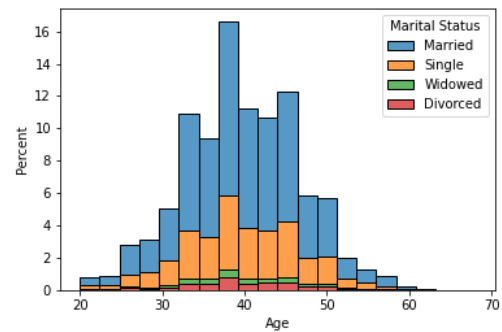


Figure 2: Histogram of the age distribution and marital status.

The data outline that almost 38 per cent of the women are married, while around 17 per cent are single. The overall statistics outline that the dataset contains more women as compared to men in the dataset. Given that the average income of men is typically higher than women's, with many Islamic microfinance businesses primarily being run by women, this is mirrored in the dataset. This situation is outlined in Figure 3 that clearly outlines that men have a shifted and flatter salary distribution as, which clearly outlines that men have a gone and flatter salary distribution compared to women. Another interesting statistic is the comparison between overall monthly income and the attendance of an Islamic school. Figure 4 outlines the statistics, which do not seem to significantly impact. To understand gender-induced effects on marital status, we visualise the distribution of the data in Figure 5 their distribution and colour each by their marital status. 60 per cent of the dataset is made up of women. In comparison, the remaining 40 per cent constitute men. Most of the individuals are married, with a further 33 per cent being single.

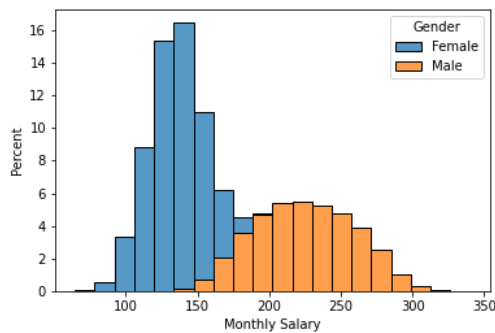


Figure 3: Histogram of the salary distribution for different genders.

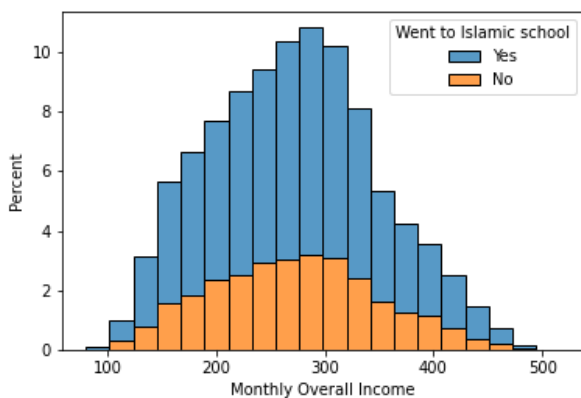


Figure 4: Histogram comparison of overall monthly income versus attendance of Islamic school.

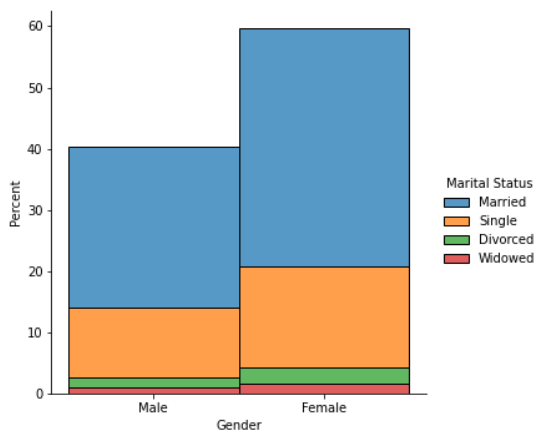


Figure 5: Comparison of the distribution of males and females according to their marital status.

### C. Data interpretation

To analyze the data in greater detail, we performed hypothesis testing to ascertain visually observed trends. The first visual observation is that the salary levels of the male is

considerably higher than those of women. To analyze this, we performed a statistical 2-sampled Z-test. The T-test is an inferential statistical test to assess whether two groups exhibit a significant difference in their respective means. Given that we know from the dataset the two groups' population variances and a large sample size, the Z-test is more adequate to determine the difference. To statistically prove that the distributions for men and women are not equal, we utilise the null hypothesis that the means of the two groups are identical and aim to reject the null hypothesis. Performing the analysis and calculating the p-value, we could easily reject the null hypothesis that the two means are identical. Analysing the histograms in Figure 3, we can observe that the earnings for males are considerably higher as compared to women. Furthermore, we perform statistical analysis with the null hypothesis that the income shall be independent for women whether they operate a business or not. This hypothesis could be rejected, indicating our previous results.

Finally, we evaluated whether the attendance of an Islamic school affects the income level. The null hypothesis is that there is a difference in income level between those who attended and those who did not participate in. The idea was rejected, implying that there is no difference.

### D. AI-driven loan application model

Having analysed the data and its validity, we then aimed to develop an Islamic AI-driven risk model to determine whether an individual qualifies for an Islamic microfinancing loan. In addition, the model utilises a risk rating approach driven by deep learning to indicate a maximum loan amount. That maximum corresponds to a high probability of repayment.

To evaluate the performance of the framework for the loan qualification of individuals, we performed a confusion matrix comparison. The framework performs on the training and testing dataset well, achieving perfect accuracy scores (Figure 6). This strong estimation performance is due to a variety of reasons. First, there is a strong correlation between the monthly income and collateral value in determining an individual's qualification for a loan. Higher-income individuals with sufficient collateral easily qualify for an Islamic microfinance loan due to the increased probability of repayment. Furthermore, the criminality score of the individual may also impact the estimates significantly. Figure 6: Confusion Matrix plot for the qualification of individuals for an Islamic microfinance loan.

To evaluate which features have the most substantial impact on the estimation, we determined the feature importance based on: 1) the mean decrease in impurity and 2) feature permutation. The former calculates the mean and standard deviation of the accumulation of the impurity decrease within each tree. Then, the mean and the standard deviation are used to measure the impact. For the latter, the features are computed based on a left-out test set. Their advantage is that they are less susceptible to a bias towards high cardinality features.

To ensure robust calculation of the feature importance, we compared the results for both versions and displayed the results in Figure 7. The results indicate that the number of crimes and

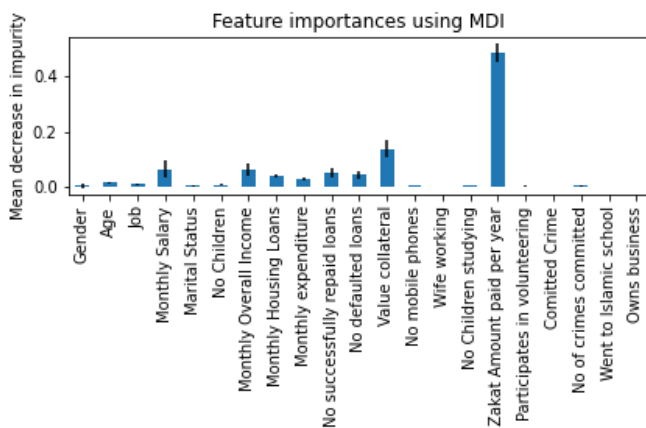
whether a crime was committed are the essential features determining whether someone qualifies for a loan in addition to their Islamic credentials, such as the amount of Zakat they pay per year. The amount of Zakat plays a critical role as it is an implicit factor correlated to honesty and commitment to the well-being of others. Following religious prescriptions and being a law-abiding citizen fits well with the objectives of Islamic finance. This would contrast with conventional risk management models that primarily focus on income levels to assess the qualification for a loan. The amount Zakat paid is a handy parameter as more significant amounts of Zakat paid also implies that the individual aims to benefit society to support those less well-off.

Figure 7: Feature importance for both mean decrease in impurity and feature permutation for the qualification of individuals for an Islamic microfinance loan.

Once completing the loan qualification step, we turned to the evaluation of the credit default risk of the applicant. We created five risk categories, from shallow risk (A) to severe (E). Figure 8 the confusion matrix for both the training and testing dataset. The credit default risks are consistent with a high classification score for both the training and testing dataset. Figure 8: Confusion Matrix plot for the credit default risk of individuals for an Islamic microfinance loan.

To evaluate the feature importance impact on the various risk categories (Figure 9), we can observe that the value of Zakat is the most important before the value of the collateral. These Islamic results are aligned with conventional microfinance data that utilise Islamic values and contribution to society as a critical parameter for evaluating creditworthiness and risk.

## MDI



## Feature Permutation

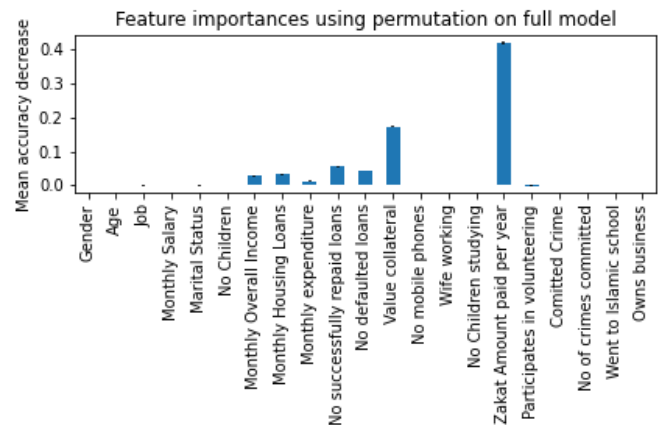


Figure 9: Feature importance for both mean decrease in impurity and feature permutation for the credit default risk for an Islamic microfinance loan.

As a final step, we estimate the maximum loan an individual can support for a low level of risk. We developed a random forest framework to estimate the maximum loan amount. The estimation results for the training and testing dataset are presented in Figure 10. For the maximum loan amount, it outlines the target vs predicted result. Both summarise strong estimation results with a coefficient of determination of 0.9 and 0.85, respectively. The main objective of the model is to take into account Islamic factors such as Zakat payments and the number of committed crimes. While the number of committed crimes and the attendance of an Islamic school only marginally affects the maximum overall amount, the amount of Zakat paid represents a key parameter in determining the ability to pay back the funds.

Figure 10: Regression plot for the maximum number of individuals for an Islamic microfinance loan.

In summary, the most important parameters to the model are the amount of Zakat paid, number of committed crimes and the value of collateral.

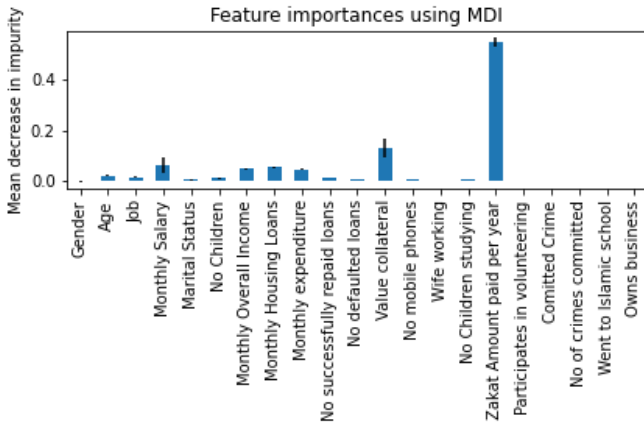
Interestingly, by using the difference between the MDI and feature importance based on permutation, the amount of Zakat paid as well as value of collateral, in addition to the number of crimes committed are the most critical parameters.

Comparing this to conventional risk management, the model outlines the stronger focus on Islamic values and behavioral parameters as compared to solely numerical and income derived parameters. While these parameters are taken into account, contributions to the society in the form of Zakat are utilized as benchmarks in order to assess the qualification. Thereby, the financial institution aims to correlate factors such as honesty and high charity contributions with a better credit rating and likelihood of repayment. This has been observed in multiple



instances where individuals tried to take advantage of situations and lacked honesty, and in the end aimed to severe and take advantage of the business environment [21]. While treachery may pay off for the loan taker that may gain an unfair advantage from dishonesty, the microfinance institution may experience considerable losses. Hence, a stronger focus on social parameters, such as charity contributions and faith may be key parameters to enhance microfinance efficiency and overcome the challenges of conventional risk management models.

## MDI



## Feature Permutation

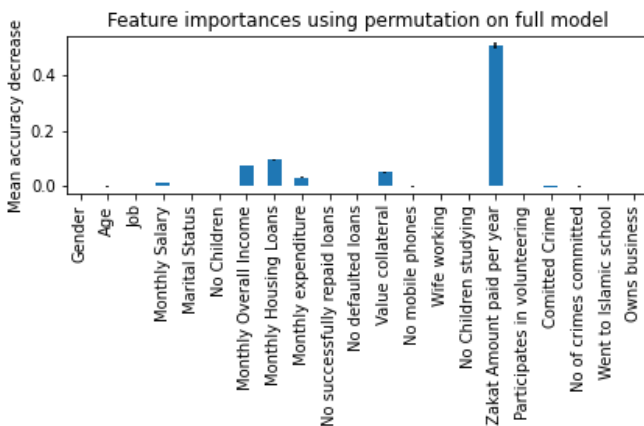


Figure 11: Feature importance for both mean decrease in impurity, and feature permutation for the maximum loan value for an Islamic microfinance loan.

## IV. CONCLUSION

We have presented in this paper a novel AI-driven approach to financial risk management for Islamic microfinancing. The data-driven framework overcomes a key challenge in incorporating Islamic values in the provisioning of Islamic microfinancing for determining eligibility for loans, credit risk, and the maximum overall amount. The results from the

framework represent a critical step towards strengthening loan governance and evaluating loan applicants fairly. A distinctive feature is to capture the loan applicant's attitude vis-à-vis Islamic values. This value element is generally absent from conventional microfinance that primarily focuses on income levels and collateral. An additional benefit of this model is the absence of a loan officer's personal views on the individual who applies for a loan, reducing biases against the most disadvantaged and processing costs. This approach represents a positive step toward enhancing access to Islamic microfinancing.

## V. REFERENCES

- [1] B. Kustin, "Islamic (Micro)finance - culture, context, promise and challenges," Bill & Melinda Gates Foundation, 2015.
- [2] M. Uddin, "Determinants of Loan Default of Low-Income Borrowers in Urban Informal Credit Markets: Evidence from Dhaka City.," *European Journal of Business and Management*, vol. 11, no. 26, pp. 105-114, 2019.
- [3] M. El-Komi and R. Croson, "Experiments in Islamic microfinance," *Journal of Economic Behavior & Organization*, vol. 95, pp. 252-269, 2013.
- [4] H. Begum, M. R. Alam, A. S. A. Alam and A. H. Awang, "Islamic microfinance as an instrument for poverty alleviation.," *Advanced Science Letters*, vol. 21, no. 6, pp. 1708-1711, 2015.
- [5] B. Shanmugam and Z. R. Zahari, A primer on Islamic Finance, New York: Research Foundation of CFA Institute, 2009.
- [6] C. Paldi, "Understanding riba and gharar in Islamic finance.," *Journal of Islamic Banking and Finance*, vol. 2, no. 1, pp. 249-259, 2014.
- [7] N. Al Rahahleh, M. I. Bhatti and F. N. Misman, "Developments in risk management in Islamic finance: A review.," *Journal of Risk and Financial Management*, vol. 12, no. 1, p. 37, 2019.
- [8] M. K. Hassan and R. N. Kayed, "The global financial crisis, risk management and social justice in Islamic finance.," *Risk Management and Social Justice in Islamic Finance*, 2009.
- [9] P. Christoffersen, Elements of financial risk management., Academic Press, 2011.
- [10] S. Byoun, J. Kim and S. S. Yoo, "Risk management with leverage: Evidence from project finance.," *Journal of Financial and quantitative analysis*, vol. 48, no. 2, pp. 549-577, 2013.
- [11] H. Gazali, J. Jumadi, N. Ramlan, N. Rahmat, S. Uzair and A. Mohid, "Application of Artificial Intelligence

- (AI) in Islamic Investments," *Journal of Islamic Finance*, pp. 70-78, 2020.
- [12] T. Lin, "Artificial intelligence, finance, and the law," *Fordham Law Review*, p. 531, 2019.
- [13] M. Nasri, "Application of artificial neural networks (ANNs) in prediction models in risk management.," *World Applied Sciences Journal*, vol. 10, no. 12, pp. 1493-1500, 2010.
- [14] P. Giudici, "Fintech risk management: A research challenge for artificial intelligence in finance.," *Frontiers in Artificial Intelligence*, vol. 1, p. 1, 2018.
- [15] N. Bussmann, P. Giudici, D. Marinelli and J. Papenbrock, "Explainable AI in fintech risk management.," *Frontiers in Artificial Intelligence*, vol. 3, p. 26, 2020.
- [16] L. Tang, F. Cai and Y. Ouyang, "Applying a nonparametric random forest algorithm to assess the credit risk of the energy industry in China.," *Technological Forecasting and Social Change*, vol. 144, pp. 563-572, 2019.
- [17] M. Schonlau and R. Y. Zou, "The random forest algorithm for statistical learning.," *The Stata Journal*, vol. 20, no. 1, pp. 3-29, 2020.
- [18] N. Ghatasheh, "Business analytics using random forest trees for credit risk prediction: a comparison study.," *International Journal of Advanced Science and Technology*, vol. 72, pp. 19-30, 2014.
- [19] Austrian Red Cross, "Central African Republic - SSPTW 2019," European Country of Origin Information Network, Vienna, 2019.
- [20] W. A. K. Kouame, H. T. Edjigu, N. Ouattara and S. Tomi, "Central African Republic Economic Update : The Central African Republic in Times of COVID-19 - Diversifying the Economy to Build Resilience and Foster Growth," World Bank Group, Washington, 2020.
- [21] A. Bhide and H. Stevenson, "Why Be Honest If Honesty Doesn't Pay," *Harvard Business Review*, 1 October 1990. [Online]. Available: <https://hbr.org/1990/09/why-be-honest-if-honesty-doesnt-pay>. [Accessed 11 December 2021].