A Proposed Assessment Tool for Sharia-Compliant Equity Crowdfunding Projects Utilizing TOPSIS

[1, a] Pandu Dwi Luhur Pambudi, [1, b]Afifah Nurrosyidah, [1,2,c]Army Justitia, [1,d]Cendra Devayana Putra,
[1]Institute of Information Management, National Cheng Kung University, Tainan, Taiwan
[2]Faculty of Science and Technology, Universitas Airlangga, Surabaya, Indonesia
[a]lwpandu@gmail.com, [b]r38097010@gs.ncku.edu.tw, [c]army-j@fst.unair.ac.id, [d]r76097020@gs.ncku.edu.tw

Abstract— On the market, the number of newly founded fintech companies that involve sharia-compliant businesses has increased recently, one of them being the sharia-crowdfunding company. The company targets countries with large Muslim populations, such as Indonesia and Malaysia. Since the sharia compliance is unique, and thus it influences decision-making in a business. Therefore, we are driven to propose and develop an assessment tool to assist the investment signaling process for the sharia-compliant equity crowdfunding projects on Platform X. Platform X is one of the pioneers of real estate Islamic crowdfunding platforms investing in sharia-compliant real estate projects in Southeast Asia's emerging countries. The firm must examine new projects locally for each newly created branch country as the firm aims to open new branches in some predominantly Muslim countries. However, each newly founded branch country lacks a mature and uniform assessment tool for sharia-based projects, resulting in glaring problems in the 'portability' and time-consuming problem of assessing the projects. Therefore, this research provides a technique for assessing sharia-equity crowd fundraising decisions using a multi-criteria decision analysis (MCDA), namely TOPSIS. We combine the concept of equity crowdfunding, Islamic principles, and Sharia compliance to develop a tailored assessment tool for sharia-based projects. As a result, we present both theoretical and managerial implications, and we find that the assessment tool is robust as the evaluation result for the portability aspect and the fast computational time were successfully examined through a simple experiment.

Keywords— Crowdfunding, Financial Technology, MCDA, Sharia, TOPSIS

I.   INTRODUCTION

Financial Technology, or Fintech, refers to computer programs and other forms of cutting-edge technology that companies utilize to deliver streamlined and advanced financial services to their customers [1]. Investments in financial technology have been rising ever since the most recent global financial crisis. The Fintech market is anticipated to be positively impacted by the increasing popularity of digital payments, more significant investments in technology-based solutions, and increased acceptance of Internet of Things devices. Moreover, growing technologies such as mobile wallets, digitized money, adoption of e-commerce platforms across economies, and increased smartphone penetration have opened the way for a rise in Fintech transactions. KPMG, in January 2022, reported that the financial technology industry had a significant increase in 2021, across the board in the key geographic areas [2]. It is anticipated that the level of investment will remain high because of this broadening reach, the increasing maturity of several Fintech subsectors, the growing investment in less developed jurisdictions, and the growing interest of corporations.

The flourishing growth of Fintech has an impact not only on the conventional finance industry but also on the Islamic finance industry, as the Islamic finance sector embraces Fintech as part of the financial revolution. Islamic Fintech is comparable to conventional Fintech, except that its business model adheres to Sharia law. They are also referred to as Shariah-compliant Fintech, Shariah Fintech, and Halal Fintech, conveying the same notion. Islamic Fintech falls under the same authority as Islamic finance products, which must be free of prohibited components such as *maysir* or gambling, *gharar* or uncertainty, and *riba* or interest [3]. The State of the Global Islamic Economic Report 2022 shows that Fintech sharia in Muslim-majority nations such as Malaysia, Indonesia, and United Arab Emirates are proliferating despite Islamic Fintech still establishing itself globally [4].

When compared to the other business fields that are a part of the Fintech sector, crowdfunding and other forms of alternative finance hold the highest proportion of investment capital [5]. Crowdfunding enables businesses and other organizations to raise money through investments from numerous individuals and willing investors who provide financial support and real-time feedback on these firms. In Fintech sharia, crowdfunding invests in halal and socially responsible enterprises, raises capital and funds, and donates to socially oriented organizations, particularly in the equity crowdfunding concept. Existing studies mainly focus on identifying the criteria of general equity crowdfunding. The previous finding identifies the equity crowdfunding success drivers consist of human, social, intellectual capital, equity share, and financial projections[6]. Human capital is considered the essential and significant intangible asset for a venture and describes as the total of an individual's knowledge, skills, experiences, and capacities [7], [9]. The details of human capital factors consist of team size and experience, entrepreneurs' education, and work experiences. Previous research also highlights structure capital's importance, such as intellectual property rights, technology, infrastructure assets, organizational models, culture, and procedures [6], [8]. The other component is referred to as relational capital, and it is derived from the network of external relationships that are maintained by the venture [10]. However, the tools for evaluating Sharia crowdfunding that combines between equity crowdfunding concept, Islamic principle, and Sharia compliance have not been available yet.

To identify Sharia crowdfunding, the tool of the equity crowdfunding concept must be aligned with Islamic principles and Sharia compliance. For the basic equity crowdfunding, we adopt the tool that already summarizes the vital aspect of equity crowdfunding assessment, including human capital, structured capital, and relational capital, to propose the funding success [11]. Even though Muslims are regarded as the pioneers of profit and loss-sharing investments in businesses via contractual agreements, which predate the concept of stock markets, the current form of the stock market prevents the devout among them from seeking economic benefits from it due to several provisions of Islamic law [12]. The sharia compliance adopts the Islam theory of Prophet Mohammad, saying about 1/3 of the rules in Islamic finance. On the market, the number of newly created fintech firms involving sharia-compliant businesses has surged recently, with the sharia-crowdfunding company being one of them. The company targets primarily Muslim countries, such as Indonesia and Malaysia, and Sharia compliance is distinctive and impacts company decision-making. In order to facilitate the investment signaling process for sharia-compliant equity crowdfunding projects on Platform X, we are compelled to suggest and construct an assessment tool. Platform X is among the first Islamic real estate crowdfunding platforms to invest in sharia-compliant real estate projects in growing Southeast Asian countries. As the company intends to develop new branches in predominantly Muslim countries, it must review new projects in each country where a new branch has been established. Nonetheless, each newly established branch

nation lacks a developed and standard review tool for sharia-based projects, resulting in conspicuous 'portability' and time-consuming challenges in assessing the projects. From the background and motivation, the purpose of this study is threefold: (1) Provide an assessment tool as the standard assessment of sharia-equity crowd funding decision-making for Platform X. (2) Examine the theoretical and managerial level implications of the assessment tool for Platform X. (3) Evaluate the robustness of the assessment tool by taking a practical case for 15 projects from various companies in Platform X using multi-criteria decision analysis (MCDA. Since we have many aspects in the tool to decide on the Sharia equity crowdfunding project, we use the concept of MCDA. We use The Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), a multi-criteria decision analysis method, to identify which project is suitable for sharia-based funding due to its simplicity of the mathematical formulation. The contribution of this study is to support and provide a state-of-the-art sharia-compliant equity crowdfunding projects assessment using a proposed MCDA tool.

II. METHODS

We evaluate the robustness of the assessment tool by taking a practical case from Platform X into the proposed assessment tool. Our research method was conducted in 3 stages: define criteria assessment, evaluate funding assessment using TOPSIS, and evaluate TOPSIS performance. The architectural design of our methodology can be seen in Figure 1.
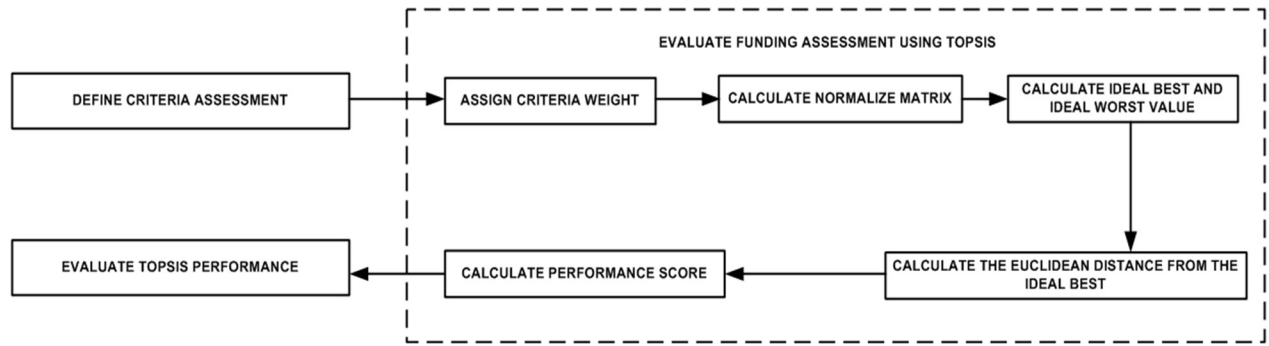

FIGURE 1. METHODOLOGY

A. Define Criteria Assessment

To find the proper criteria for any type of financial technology and sharia, we reviewed several articles on financial technology and sharia domain. We find those articles in Web of Science and Google scholar databases ranging from 2020 to 2021. The criteria were validated by expertise from the finance and technology department and stakeholders. According to the literature, five areas were identified. Each macro-area is subdivided into a set of criteria. Specifically:

a) Human Capital area: it refers to the characteristics of workers, such as their habits, knowledge, social attributes, and personality, which manifest in their ability to produce economic value through their labor. Selected criteria for Human Capital area are the following:
   1. Prior industry experience: the average industry experience of the founders (the sum of the years of related industry experience for each founder, divided by the founding team size).
   2. Prior start-up experience: the percentage of the founding team who created a start-up.
b) Structural Capital area: It pertains to the enterprise's internal assets. These resources include intellectual property rights, technology, infrastructure assets (e.g., organizational models,

culture, and processes), R&D, innovation activities, and new products/services, among others. Selected criteria for structural capital are the following:

1. Product innovation: the company offers innovations (such as products, services, strategies, technology, etc.) in the following years.
2. Intellectual property: the company owns intellectual property rights. i.e., dummy variables, patents, copyright, etc.

c) Relational Capital macro-area: It refers to all relationships - market relationships, power relationships, and cooperation - established between firms, institutions, and individuals, which stem from a strong sense of belonging and a highly developed capacity for cooperation characteristic of culturally similar individuals and institutions. Selected relational capital is following:

1. Partnership: only recognizes official partnerships, evidenced by a written agreement with industrial, commercial, or technological partners.
2. Third-party Endorsement: the company has cooperation with the official endorsement of incubators and/or big companies.

d) Shariah Criteria macro-area:
e) Company Profile macro-area: It pertains to an introduction to the firm that describes what it sells, how it was started, its mission, how it manufactures or sources its products, and why it serves customers.

1. Founders: it refers to the founding size.
2. Team Size: it refers to the total team in the company (including staff and founders)
3. Service Industry: whether the company belongs to the service industry or not
4. Years: how long the company has been active since its establishment
5. Big City: The company is in a big city or not
6. Start-up Size: What is the scale of the start-up business?
7. Platform: It describes the number of campaigns on large platforms

B. TOPSIS

Real-world decision-making problems are usually too complex and ill-structured to be considered through the examination of a single criterion that will lead to the optimum decision. MCDA refers to deciding the presence of multiple and usually conflicting criteria [13]. MCDA involves "making preference decisions (such as evaluation, prioritization, selection) over the available alternatives that are characterized by multiple, usually conflicting attributes. The main role of the techniques is to deal with the difficulties that human decision-makers have been shown to have in handling a large amount of complex information consistently. MCDA occurs in a variety of actual situations, for example, assessment [14]. Many research has developed to obtain the relative value of the alternatives, one of the popular and traditional methods is TOPSIS [15].

TOPSIS, one of the most well-known classical MCDA methods, was created by Hwang and Yoon in 1981 [16]; Chen and Hwang further refined it in 1992 [17]. Two "reference" points are introduced by the TOPSIS method: a positive ideal solution and a negative ideal solution [18]. Positive ideal solutions maximize benefit criteria and minimize cost criteria, while negative ideal solutions maximize cost criteria and minimize benefit criteria. TOPSIS identifies the optimal solution by minimizing the distance to the optimal solution and maximizing the distance to the optimal negative solution. This method assumes that each attribute increases or decreases monotonically. TOPSIS utilized Euclidean distances to determine the alternatives' positive and negative optimal solutions. By comparing Euclidean distances, the preference ranking of

alternatives can be determined. Using a comparison of Euclidean distances, the preference order of alternatives is determined. The TOPSIS method is executed as follows:

Step 1: Construct a normalized decision matrix

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum x_{ij}^2}}; for\ i \in \{1, 2, \cdots, m\};\ j \in \{1, 2, \cdots, n\} \tag{1}$$

$x_{ij}\ and\ r_{ij}$ are original and normalized score of decision matrix, respectively.

Step 2: Calculate the weighted normalized decision matrix:

$$v_{ij} = w_j \cdot r_{ij}, i = 1, \dots, m; j = 1, \dots, n \tag{2}$$

where w_j is the weight of the j-criterion.

Step 3: Determine the positive ideal and negative ideal solutions:

$$A^+ = \{v_1^+, \dots, v_n^+\};\ where\ v_j^+ = max\{v_{ij}, i = 1, \dots, m\} \tag{3}$$

$$A^- = \{v_1^-, \dots, v_n^-\};\ where\ v_j^- = min\{v_{ij}, i = 1, \dots, m\} \tag{4}$$

Step 4: Calculate the distance from each alternative to a positive ideal solution and a negative ideal solution.

$$D_i^+ = \sqrt{\sum_{j=1}^n \left(v_{ij} - v_j^+\right)^2}, i = 1, \dots, m \tag{5}$$

$$D_i^- = \sqrt{\sum_{j=1}^n \left(v_{ij} - v_j^-\right)^2}, i = 1, \dots, m \tag{6}$$

Step 5: Calculate relatives' closeness to the ideal solution.

$$C_i = \frac{D_i^-}{D_i^+ + D_i^-} \tag{7}$$

This TOPSIS process yields an ordinal scalar value as its output. The output value of TOPSIS ranges from zero to one. A value of zero indicates that an alternative has the lowest potential, while a value of one indicates that an alternative has the highest potential. This output is used to determine the optimal alternative.

III. RESULTS AND DISCUSSION

We collected the company data and profile from Company X, a crowdfunding platform that provides shariah compliance and Islamic principle. Some company data can be seen through the Platform X website. Confidential and sensitive information from the company is obtained from the company profile submitted to Platform X when applying for an investment loan. Platform X evaluates these alternative companies to see if they are eligible for funding from Platform X platform investors. We examine 15 companies' projects of Platform X's Indonesia branch to evaluate the proposed crowdfunding assessment tool. These companies come from various kinds of business, ranging from types (F&B, retailers services, online gaming, contractor, or mining company), size-company (state-owned enterprise, public company, small-medium enterprises, or start-up company) location-based (big city, small city, or rural area) and shariah criteria (shariah principal or non-sharia principal). Table 1 explains the detailed information about these companies.

TABLE 1. LIST OF COMPANY

Company Name	Type	Size Company	Location-Based	Shariah
Company #1	Online Gaming	start-up companies	Small City	Shariah
Company #2	Retailers	Public Company	Small City	Shariah
Company #3	F&B	small medium enterprises	Big City	No Shariah
Company #4	Mining	state-owned company	Big City	Shariah
Company #5	Mining	state-owned company	Big City	Shariah
Company #6	F&B	small medium enterprises	Rural	No shariah
Company #7	Retailers	Public Company	Big City	Shariah
Company #8	Services	Start-up company	Big City	Shariah
Company #9	F&B	small medium enterprises	Rural	No shariah
Company #10	Mining	state-owned company	Big City	Shariah
Company #11	Contractor	Public Company	Small City	No Shariah
Company #12	F&B	small medium enterprises	Small City	No Shariah
Company #13	Services	small medium enterprises	Rural	Shariah
Company #14	Retailers	Public Company	Big City	Shariah
Company #15	Services	Start-up company	Rural	No shariah

TABLE 2. ASSESSMENT CRITERIA

Area	Criteria	Origin Criteria Weight(s)	Normalized Criteria Weight
Human Capital	Prior Industry Experience	7	0.093
	Prior Startup Experience	7	0.093
Structural Capital	Product Innovation	6	0.080
	Intellectual Property	5	0.067
Relational Capital	Partnership	7	0.093
	Third Party Endorsement	6	0.080
Sharia Capital	Islamic Principal	6	0.080
	Shariah compliance	7	0.093
Company Profile	Founder	2	0.027
	Team Size	3	0.040
	Years	5	0.067
	Service Industry	1	0.013
	Big City	1	0.013
	Startup-Size	6	0.080
	Platform	6	0.080
Sum		75	1

We applied five intellectual capital (IC) criteria that affect the company's success in obtaining funding from Platform X. There are 15 criteria assessments we have explained in the previous section. Several expert judgments assigned the weight of each assessment criteria used in the TOPSIS algorithm. Then, we normalized the assigned score, so the sum of the weight score equals one. This normalization is used to calculate the weighted normalized matrix. The origin criteria weight scores and normalized weight scores can be seen in Table 2. We took the six highest Pi value companies because of the policy of the Platform X company, which considers only six companies to be selected and proceed to the funding process. The following results were computed using a Microsoft Excel application, which increases the portability of the assessment tool given that most Platform X branch companies use the Windows operating system. This portability also makes this tool ready to use and reduces the time-consuming preparation and project assessment. Based on our observations, this assessment tool can be computed quickly (in less than 3 seconds) utilizing portable devices (4 laptops) under a simple experiment, indicating that it meets the speed aspect. The main limitation of this study is the difficulty in finding literature on the assessment of sharia-based equity crowdfunding platforms, mainly owing to the novelty of the topic. This constraint makes it challenging to analyze specific criteria that might be assessed more effectively if decision-makers had access to data and analysis from the scientific literature. To overcome this limitation, the decision-makers in the domain must have more significant preparation and expertise knowledge.

IV. CONCLUSION

Many Muslim countries support and permit equity crowdfunding with regulations that can assist investors in evaluating sharia-compliant projects. Platform X, the growing sharia-based crowdfunding platform, requires a tailored assessment tool that can be used to evaluate the sharia projects, which can be implemented for all new branches' countries of its company. Therefore, our study successfully builds an assessment tool to tackle the issues of a unique sharia market. While presenting a tailored tool that addresses these crucial challenges, this study also provides micro-level decision-makers with methodological guidance that applies to all sharia-based projects.

Theoretically, this research completes the literature on signaling in equity crowdfunding [6, 11] and proposes a unique MCDA assessment method for signaling in sharia-based ventures. To the best of the authors' knowledge, this is the first time the MCDA has been used to examine sharia-based projects. Second, this MCDA tool for equity crowdfunding sharia-based projects is managerially practical. Building on pre-defined criteria and being easily implementable in actual scenarios permits decision-makers in each newly-branch country to avoid time-consuming processes. This tool uses fewer person-hours than others (headquarters officers do not need to travel abroad frequently to establish a new managerial tool). Moreover, the crowdfunding campaigns of evaluated projects on Platform X can quickly generate investors. Local branches can spend less time building ad-hoc tools, reducing opportunity costs. Therefore, resources are freed up. This solves a major managerial problem for Platform X, whose local subsidiaries in other countries may start operations immediately. Third, this approach can hasten the integration of sharia-based project evaluation into local institutions, supporting consistent operational standards in low- and middle-income countries. Furthermore, we found that the assessment tool is robust as the evaluation result for the portability aspect and the fast computational time was successfully examined through a simple experiment.

Our future directions are as the followings: (1) Building the web-based software with the graphical user interface (GUI) to increase the user-friendliness aspect for the users in newly branches companies to use the assessment tool. (2) And examining different project cases from different branch companies of Platform X in countries like Malaysia and Brunei Darussalam.

REFERENCES

[1] Deloitte, "Five fintech trends : What ' s happening now, and the promise ahead," *Deloitte Advis.*, p. 4, 2015.

[2] K. International, "Pulse of Fintech H2'21," 2022.

[3] N. F. Rahim, M. H. Bakri, and S. N. Yahaya, *FinTech as a Disruptive Technology for Financial Institutions*. Malaya: IGI Global, 2019.

[4] State of the Global Islamic Economy, "State of the Global Islamic Economy Report 2020/2021," *Dubai Int. Finance. Cent.*, p. 112, 2021.

[5] P. Griffiths, "Advances in Crowdfunding," *Adv. Crowdfunding*, 2020, DOI: 10.1007/978-3-030-46309-0.

[6] G. K. C. Ahlers, D. Cumming, C. Günther, and D. Schweizer, "Signaling in Equity Crowdfunding," *Entrep. Theory Pract.*, vol. 39, no. 4, pp. 955–980, 2015, doi: 10.1111/etap.12157.

[7] A. Lukkarinen, J. E. Teich, H. Wallenius, and J. Wallenius, "Success drivers of online equity crowdfunding campaigns," *Decis. Support Syst.*, vol. 87, pp. 26–38, 2016, DOI: 10.1016/j.dss.2016.04.006.

[8] E. Piva and C. Rossi-Lamastra, "Human capital signals and entrepreneurs' success in equity

crowdfunding," *Small Bus. Econ.*, vol. 51, no. 3, pp. 667–686, 2018, DOI: 10.1007/s11187-017-9950-y.

[9]   C. Troise, D. Matricano, E. Candelo, and M. Sorrentino, "Entrepreneurship and fintech development: comparing reward and equity crowdfunding," *Meas. Bus. Excell.*, vol. 26, no. 1, pp. 52–63, 2022, DOI: 10.1108/MBE-11-2020-0157.

[10]   N. Bontis, W. C. C. Keow, and S. Richardson, : "A Review of the Models Used to Measure Intellectual Capital," *KM World*, 2000.

[11]   C. Troise, D. Matricano, M. Sorrentino, and E. Candelo, "Investigating investment decisions in equity crowdfunding: The role of projects' intellectual capital," *Eur. Manag. J.*, no. January, 2021, DOI: 10.1016/j.emj.2021.07.006.

[12]   M. M. Alam, C. S. Akbar, S. M. Shahriar, and M. M. Elahi, "The Islamic Shariah principles for investment in the stock market," *Qual. Res. Finance. Mark.*, vol. 9, no. 2, pp. 132–146, 2017, DOI: 10.1108/QRFM-09-2016-0029.

[13]   C. Kahraman, S. C. Onar, and B. Oztaysi, "Fuzzy Multicriteria Decision-Making: A Literature Review," *Int. J. Comput. Intell. Syst.*, vol. 8, no. 4, pp. 637–666, 2015.

[14]   P. Wang, Z. Zhu, and Y. Wang, "A novel hybrid MCDM model combining the SAW, TOPSIS andGRA methods based on experimental design," *Inf. Sci. (Ny).*, vol. 345, pp. 27–45, 2016.

[15]   A. R. Mishra, P. Rani, A. Raj Mishra, P. Rani, and D. Jain, "Information Measures Based Topsis Method For Multicriteria Decision Making Problem In Intuitionistic Fuzzy Environment," *Iran. J. Fuzzy Syst.*, vol. 14, no. 6, pp. 41–63, 2017, DOI: 10.22111/ijfs.2017.3497.

[16]   K. Yoon and C. L. Hwang, "TOPSIS (a technique for order preference by similarity to ideal solution)–a multiple attribute decision making, w: Multiple attribute decision making–methods and applications, a state-of-the-art survey," *A state-of-the-art Surv.*, pp. 128–140, 1981.

[17]   S.-J. Chen and C.-L. Hwang, "Multiple attribute decision making—An overview," *Fuzzy Mult. Attrib. Decis. Mak.*, pp. 16–41, 1992.

[18]   K. P. Yoon and C.-L. Hwang, *Multiple Attribute Decision Making*. 1995.