OPPORTUNITIES AND CHALLENGES OF USING FINTECH IN TAKAFUL FINANCIAL SERVICES

Rijalul Faqih
Postgraduate, UIN Sunan Ampel Surabaya
rijalul.faqih@uinsby.ac.id

Nurhayati
Postgraduate, UIN Sunan Ampel Surabaya
nurhayati@uinsby.ac.id

Abstract

Fintech is currently part of the development of takaful, the results of research and studies related to this problem are still very limited, on the other hand all financial services industries are starting to shift to fintech, including the Islamic financial services industry. So it is necessary to explore the potential use of fintech in the sharia insurance industry, especially in terms of opportunities and challenges in the future. In particular, big data analytics and robo-advisory are explored and how takaful operators can combine them for better customer experience and gathering competitive intelligence. To stay competitive in a rapidly changing business environment, takaful operators need to identify and adopt fintechs that can positively impact customer experience and optimize cost efficiency.

Keywords: Financial Technology; Islamic insurance industry, Takaful

Abstrak

Fintech saat ini menjadi bagian dari perkembangan takaful, hasil penelitian dan kajian terkait masalah ini masih sangat terbatas, disisi lain semua industri jasa keuangan mulai beralih ke fintech, termasuk industri jasa keuangan syariah. Sehingga perlu digali potensi pemanfaatan fintech di industri asuransi syariah, terutama dari sisi peluang dan tantangan ke depan. Secara khusus, analitik big data dan robo-advisory dieksplorasi dan bagaimana operator takaful dapat menggabungkannya untuk pengalaman pelanggan yang lebih baik dan mengumpulkan intelijen kompetitif. Agar tetap kompetitif dalam lingkungan bisnis yang berubah dengan cepat, operator takaful perlu mengidentifikasi dan mengadopsi fintech yang dapat berdampak positif terhadap pengalaman pelanggan dan mengoptimalkan efisiensi biaya.

Kata Kunci: Teknologi Keuangan; Industri Asuransi Syariah, Takaful

A. INTRODUCTION

Takaful is an insurance concept in which members of a certain scheme voluntarily agree to insure each other. Takaful is a contract "where a group of participants agree among themselves to support each other jointly to bear the losses incurred as a result of certain risks".[1] Each member contributes voluntarily in a forum that is used to help other members in the event of an unexpected disaster that causes economic loss.

The main distinguishing feature of takaful from conventional insurance is that takaful is based on the voluntary contributions of members to a set of risks from the funds collected to insure in order to fulfill claims.[2] Islamic scholars find that conventional insurance is the sale of risk protection to policyholders for two main reasons:

First, exchanging current premium payments for insurance payments at a later date is similar to exchanging a current amount of funds for a different amount of funds in the future. Such a model of money exchange is prohibited under Islamic jurisprudential law because it is considered usury (riba al-buyu'), namely a usury sales contract.[3] This rule is supported by various sayings (hadith) of the Prophet Muhammad. The complex reasons underlying this rule are beyond the scope of this study, but it can be argued that riba al-buyu' is prohibited from achieving fairer financial transactions. Muslim jurists argue that insurance premiums are exchanged for compensation, and this may involve usury because the two amounts are not the same.[4]

Second, the uncertainty (gharar) of insurance is considered excessive because of the ambiguous nature of future events and the likelihood of the perceived risk that may occur. Islamic scholars argue that a high degree of uncertainty in insurance policies leads to gambling (maysir) because of its structural similarity to gambling.[5] Basically, insurance is a risk transfer mechanism, in which a party trades its uncertainty for certainty. The concept of exchanging uncertain losses (claims) for

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[1] Adnan Malik and Karim Ullah, "Takaful and Its Shariah Compliance," in *Introduction to Takaful: Theory and Practice*, ed. Adnan Malik and Karim Ullah (Singapore: Springer, 2019), 33–43, https://doi.org/10.1007/978-981-32-9016-7_3.

[2] Abul Hassan and Sabur Mollah, *Islamic Finance: Ethical Underpinnings, Products, and Institutions* (Cham: Springer International Publishing, 2018), https://doi.org/10.1007/978-3-319-91295-0.

[3] Renat Bekkin, "Islamic Insurance: National Features and Legal Regulation," *Arab Law Quarterly* 21, no. 1 (January 1, 2007): 3–34, https://doi.org/10.1163/026805507X197820.

[4] M. Iqbal, *General Takaful Practices: A Technical Approach to Eliminating Gharar (Uncertainty), Maisir (Gambling), and Riba' (Usury)* (Jakarta: Gema Insani, 2005).

[5] Bekkin, "Islamic Insurance"; M. Iqbal, *General Takaful Practices: A Technical Approach to Eliminating Gharar (Uncertainty), Maisir (Gambling), and Riba' (Usury)*; Djavlonbek Kadirov, "Marketing Islamic Services: Tackling Misconceptualisation of Commercial Insurance," *Journal of Islamic Marketing* 12, no. 2 (January 1, 2020): 264–79, https://doi.org/10.1108/JIMA-08-2019-0172; Jumadil Saputra, Suhal Kusairi, and Nur Azura Sanusi, "Modeling the Premium and Contract Properties of Family Takāful (Islamic Life Insurance)," *JKAU: Islamic Econ* 30, no. 2 (2017): 153–57.

certain losses (premiums) is considered unfair according to Islamic law, because one party gains at the expense of the other party.[6]

Takaful(Islamic insurance) offers an alternative form of insurance in which insurance companies help policyholders to provide loss protection services to each other.[7] By means of cooperative risk sharing. When a financial scheme does not impose bilateral obligations, the presence of usury and maysir mentioned above becomes irrelevant. That is, because parties engage in financial schemes by choice and out of good will, the notions of justice (related to usury) and friction due to uncertainty (related to maysir) are no longer of concern.

B. RESEARCH METHOD

The method in this research is descriptive qualitative. This type of research refers to research procedures that produce descriptive data, which is obtained from information in the form of written or oral data from informants and all observable behavior. Qualitative research is the focus of attention with a number of approaches, including naturalistic interpretive approaches to research topics.

C. RESULT AND DISCUSSION
1. Takaful Model

Takaful generally uses 3 models by paying attention to those governing takaful operations: (1) the mudharabah model, (2) wakalah, and (3) wakalah-mudharaba.[8] Takaful operators (TO) receive either a fixed agency fee or a share of the investment profits, depending on the type of the underlying contract.[9]

With the mudharabah model, TO is expected to generate profits only by ensuring that the total share of the investment profits it may receive is greater than the costs of managing takaful operations. Losses or deficits can occur in the event that the total contribution is lower than the total cost of the claim.[10] If there is a periodic deficit or shortfall that exceeds the amount of accumulated reserves, the shortfall will be borne by the shareholders who must provide adequate capital support in the form of an interest-free loan (qard facility), and the shareholders will be repaid. when there is a surplus in future investment.

On the other hand, TO with wakalah model receives wakalah fees. According to the IFSB (2009), the wakalah fee is usually a percentage of the contribution paid, and must be agreed in advance and clearly stated in the takaful contract. Wakalah costs consist of agent salaries, distribution costs, and administrative costs.[11] As well as operating profit margins to TO. Takaful

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[6] M. Iqbal, *General Takaful Practices: A Technical Approach to Eliminating Gharar (Uncertainty), Maisir (Gambling), and Riba' (Usury)*.

[7] Hala Abdul Kader et al., "Cost Efficiency and Board Composition under Different Takaful Insurance Business Models," *International Review of Financial Analysis* 32 (March 1, 2014): 60–70, https://doi.org/10.1016/j.irfa.2013.12.008.

[8] Malik and Ullah, "Takaful and Its Shariah Compliance."

[9] Hassan and Mollah, *Islamic Finance*.

[10] Malik and Ullah, "Takaful and Its Shariah Compliance."

[11] Hassan and Mollah, *Islamic Finance*.

operators can set high wakalah fees up front or can lower wakalah fees as membership increases over time.[12] One of the main disadvantages of using wakalah fees is, principal agent problems may arise because TOs may be motivated to earn more wakalah fees than to work in the best interests of the principal.[13] because TO does not directly bear the risk borne by takaful funds and TO is not responsible for investment. Moreover, the appointment of TO by shareholders and not by participants raises the issue of conflicts of interest.

In practice takaful operators (TO) manage participant risk funds, funds used to cover claims, and also investment funds where shareholders provide initial capital, appoint management and benefit from underwriting. These funds are then put into Sharia-compliant investments, and the surplus from those investments is given to the participants.[14] The separation of the fund allows TO to withdraw money from the risk fund to support its insurance operations, while leaving the investment fund intact unless it incurs investment losses (Kader et al., 2014). However, the lack of representation for takaful participants and information asymmetry can cause TO to benefit shareholders at the expense of takaful participants' interests.

2. Takaful operational costs

The takaful financial services industry is relatively young and competitive with conventional insurance companies. Islamic insurance operators need to be more creative and strategic in order to remain competitive. The relatively limited Islamic investment opportunities, in addition to the relatively low market liquidity for Islamic securities when compared to conventional financial markets, may add pressure to reported annual earnings.[15] For example, takaful operators are not allowed to invest in illicit industries such as alcohol, pork-related food manufacturing, and gambling activities. Therefore, it is not easy for takaful operators to maximize profits by increasing the return on invested assets or increasing the premium rate,[16] because the premium is predetermined in the contract.

One possible reason for the high costs lies in marketing, namely in compensating intermediaries and educating potential customers. Intermediaries are paid high commissions.[17] Especially in the early stages of TO formation, which ultimately trickle down to participants who pay high premiums to accommodate those costs.[18] Furthermore, if TO bears the losses

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[12] Malik and Ullah, "Takaful and Its Shariah Compliance."

[13] Malik and Ullah.

[14] Hassan and Mollah, *Islamic Finance*.

[15] Kader et al., "Cost Efficiency and Board Composition under Different Takaful Insurance Business Models."

[16] Kader et al.

[17] Malik and Ullah, "Takaful and Its Shariah Compliance."

[18] Simon Archer, Rifaat Ahmed Abdel Karim, and Volker Nienhaus, "Conceptual, Legal, and Institutional Issues Confronting Takaful," in *Takaful Islamic Insurance* (John Wiley & Sons, Ltd, 2009), 1–5, https://doi.org/10.1002/9781118390528.ch1.

incurred, the compensation for intermediaries will be affected mainly due to TO's investment performance.[19]

Malaysia Takaful Association (MTA) Annual Report 2020 shows that there are more than 97,400 registered takaful agents. No aggregate figures are provided by MTA or Bank Negara Malaysia of the total takaful fees and commissions paid to intermediaries. While it is difficult to quantify the total amount of contributions paid in commissions to intermediaries, the level of commissions paid to intermediaries is quite high according to Bank Negara Malaysia (2019). The following table, for example, shows the maximum rate at which an agent can be compensated for selling a policy according to BNM.

Table 1: Percentage of maximum annual premium/contribution Policy Year   Basic commission for ordinary/corporate agents Main commission for agency leader Total commission.

1	40%	25%	65%
2	30%	10%	40%
3	20%	6%	26%
4	15%	5%	20%
5	10%	-	10%
6	10%	-	10%
Total	125%	46%	171%

Source: BNM (2019, p. 13)

Table 1 illustrates the share of dues taken only by the commission to intermediaries, excluding other operational and management costs. Fintech can potentially help reduce operating costs, especially for marketing and sales purposes, and that will be discussed in detail in Section 3.

3. Fraud claim fee

Referring to the Insurance Fraud Task Force (2016), for example, the value of detected fraud insurance claims exceeds £1 billion and undetected insurance fraud is estimated to cost the UK economy more than £2 billion annually. Therefore, claim management for both conventional and Islamic insurance is a difficult task as it requires timely processing of claims and avoiding overpayment of claims or fraud at the same time.[20] Licensed surveyors engage experts to assess financial losses related to vehicle, machinery and property damage when processing takaful claims. The author will discuss how fintech can help with the claims process in Part 3.

4. The Role of Fintech in Takaful

Fintech stands for financial technology and is defined as "computer programs and other technologies used to provide banking and financial services" This is done through the use of special software and algorithms used on different devices. This last definition does not limit fintech to back-end

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[19] Kader et al., "Cost Efficiency and Board Composition under Different Takaful Insurance Business Models."

[20] Malik and Ullah, "Takaful and Its Shariah Compliance."

activities but generalizes its use to cases across all financial services. Commonly used fintechs include P2P lending, crowdfunding, blockchain and bitcoin, robo-advising, mobile payments, and insurance. Each of these cases provides unique disruptive capabilities. In terms of increasing cost efficiency for takaful companies,

There is a lack of fintech adoption among Islamic financial intermediaries in general, and by takaful operators in particular. Similarly, there are limited studies conducted with the aim of uncovering the potential use of big data and robo- advisory in the context of cost efficiency for takaful. Therefore, the main objective of this study is to outline the ways in which big data and robo-advisors can reduce TO costs. This study applies a basic qualitative methodology in explaining the relevant details about the potential cost savings of big data and robo-advisors using literature research.

5. Artificial Intelligence and Robo Advisor

Brenner and Meyll (2020) define robo-advisors as "automated financial advisors" while Baker and Dellaert define robo-advisors as "automated investment services, which compete with financial advisors by claiming to offer equally good, if not better, financial advice and services at a lower price."[21] The idea behind using a robo-advisor is about automating the financial advisory process and making it faster, more accessible, flexible, convenient and more importantly, cost- effective. Other advantages of robo-advisory include objectivity and the reduction of human error which can lead to substantial legal/regulatory costs for an organization. This level of efficiency is what TO requires.

Robo-advisor can be an effective cost-effective tool for TO. Due to their availability to scale at a global level, AI-driven robo-advisors have the potential to provide higher quality and more accessible financial advice to more people at a lower cost than human financial advisors.[22] In addition, robo-advisors can respond to changing behavior and adapt to new needs based on algorithms that allow them to adapt.

6. Advantages of AI and robo-advisors

Objectivity: Since these are computer programs, robo-advices have no hidden personal interests, desires or agendas, therefore the recommendations and decisions they make are considered objective and impartial. The use of algorithms allows investment recommendations to be based on financial techniques and free from bias in advisory behavior, resulting in objective recommendations for clients. Since automated advisors are based on complex algorithms, they can develop a suitable insurance policy based on each customer's risk tolerance and financial background. This can not only benefit potential customers in finding the most suitable takaful plan but also takaful operators in reaching customers in different locations at the same time,

Convenience:Robo-advisory is perfect for clients who have little time or no access to fund managers who are usually charged high fees for creating

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[21] Tom Baker, "Regulating Robo Advice Across the Financial Services Industry," *SSRN Electronic Journal*, 2018, https://doi.org/10.2139/ssrn.2932189.
[22] Baker.

investment portfolios. Unlike human agents, who are usually only available during their business hours, robo-advisors can respond to customer inquiries in real time. Robo- advisory is provided to consumers with little or no human intervention and takaful operators rely on computer-based algorithms. Based on the financial information and investment objectives provided by the prospective customer, the robo-advisor can then create an investment portfolio.[23] Or takaful plans that are appropriate for the customer. For existing customers, robo-advisors, who manage their portfolios, may even reinvest the surplus.[24] In case of risk or adverse changes in the market or other factors, robo-advisors keep clients updated on takaful and other financial plans. Therefore, customers can develop a more practical approach when using a robo-advisor.

Accessibility: robo-advisors can be accessed via electronic devices, allowing potential and existing customers to access them 24/7 as long as they have access to the Internet. Brenner and Meyll report on the use of robo-advisors among US investors, and conclude that technological sophistication and good accessibility of technology financial advisors are fundamental reasons for users seeking financial advice from robo-advisors.[25] This can be very helpful for takaful customers, especially in cases where the customer is looking for an immediate response when making a claim.

Efficiency: The way insurance agents interact with clients is time consuming. In a traditional face-to-face setting, each financial advisor is responsible for a number of clients. Robo-advisors, on the other hand, can serve multiple clients at the same time. Unlike human agents which are capable of handling only one communication at a time, robo-advisors can perform in multitasking mode, which in the case of takaful can lead to increased efficiency as they can handle multiple tasks such as product inquiries, setup/claim inquiries, product consulting (FAQ), support requests, policy updates and more.

7. Lack of AI and robo-advisors

Lack of personalization: Robo Advisor uses automated algorithms and "one size fits all" questionnaires to make recommendations that lead to financial decisions; however, these questionnaires and algorithms assume that individuals with similar financial backgrounds will have similar risk-taking behaviors or provide the same answers to the same questions sought in the questionnaire, which may not necessarily be true. In addition, the algorithm may be based on incorrect assumptions or parts of the data that will affect the

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[23] Lukas Brenner and Tobias Meyll, "Robo-Advisors: A Substitute for Human Financial Advice?," *Journal of Behavioral and Experimental Finance* 25 (March 1, 2020): 100275, https://doi.org/10.1016/j.jbef.2020.100275; Dominik Jung, Florian Glaser, and Willi Köpplin, "Robo-Advisory: Opportunities and Risks for the Future of Financial Advisory," in *Advances in Consulting Research: Recent Findings and Practical Cases*, ed. Volker Nissen, Contributions to Management Science (Cham: Springer International Publishing, 2019), 405–27, https://doi.org/10.1007/978-3-319-95999-3_20.
[24] Brenner and Meyll, "Robo-Advisors."
[25] Brenner and Meyll.

accuracy and relevance of the recommendations. Trust tends to weaken in the event of an automation error and may never fully recover.[26]

No personal contact: One of the biggest challenges of robo-advisory is the lack of human touch and/or emotion. Because robo-advisors are programmed, they tend to be objective and therefore they often lack aspects commonly found in client- advisor relationships such as sharing emotions during market turmoil, counseling or helping customers cope with grief. A trusting client- advisor relationship is especially important for traditionally high net worth clients who value the personal contacts and trustworthiness of financial advisors.[27]

Manipulation: Robo-advisors are a product of the human mind and are thus vulnerable to manipulation if their developer is allowed to. After relying on robo- advisory for a long time, operators may experience a lack of necessary skills to intervene in system controls when necessary or ignore machine errors.[28] The challenge for regulators is to facilitate an enabling environment that promotes a variety of robo-advisors who can provide scalable quality financial advice and related services to consumers.[29] As previously mentioned, robo-advisors are based on a "one size fits all" questionnaire that contributes to partial advice based on partial information. This questionnaire may not cover questions such as future obligations or financial condition of the spouses as they are not deemed relevant by the underlying algorithm or its developers. As a tool, robo-advisory is not completely free from machine errors. Users may not be able to pay attention and correct inadequate decisions made by robo-advisors.[30]

In short, takaful operators should consider the advantages and disadvantages of robo-advisory when making long-term strategic planning. Although robo-advisory is still in its infancy, it has high potential in strengthening the operational efficiency of TO. As Brenner and Meyll (2020) highlight, financial institutions should see robo-advisors as a complement rather than a substitute for human financial advice.[31]

8. Big Data Analytics

Referring to IBM (nd), "Big data analysis is the use of advanced analytical techniques against very large and diverse data sets that include structured, semi- structured, and unstructured data, from different sources, and in different sizes from terabytes to zettabytes -- such as hidden patterns, unknown correlations, market trends, and customer preferences -- that can help organizations make informed business decisions." According to EIOPA (2019), most insurance companies use Big Data-based algorithms in product

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[26] Megan L. Bartlett and Jason S. McCarley, "Human Interaction with Automated Aids: Implications for Robo-Advisors," *FINANCIAL PLANNING REVIEW* 2, no. 3–4 (2019): e1059, https://doi.org/10.1002/cfp2.1059.
[27] Jung, Glaser, and Köpplin, "Robo-Advisory."
[28] Bartlett and McCarley, "Human Interaction with Automated Aids."
[29] Baker, "Regulating Robo Advice Across the Financial Services Industry."
[30] Bartlett and McCarley, "Human Interaction with Automated Aids."
[31] Brenner and Meyll, "Robo-Advisors."

development, insurance pricing and underwriting stages, followed by claims management, and sales and distribution. The use of historical and behavioral data allows insurers to better understand the needs of their customers and thereby enable them to tailor customer needs and offer a more personalized service. Accordingly, insurance companies can accurately determine customer loyalty and organize marketing campaigns accordingly.

Big data can be broadly characterized by the availability of large amounts of various types of data from various sources that can be processed quickly. The Big Data phenomenon leads to the development of more sophisticated use of data analytics; it combines different digital technologies, such as artificial intelligence, to process and analyze aggregated data to estimate and support optimal decision making based on these estimates. Data processing has traditionally been at the core of the insurance industry as insurers need to make price quotes, evaluate policyholder claims and benefits, based on datasets such as demographic data and behavioral data. In the digital age, these datasets are slowly but increasingly being merged with new datasets (eg TOs have the option, as in the case of robo-advisory, to develop their own in-house solution for big data analytics, outsource, or purchase a third party from a technology company such as Statistical Analysis System (SAS). TOs need to consider the resources required to invest in algorithms and storage capacity that goes beyond their expertise. Purchasing an off-shelf solution from a third party or outsourced claims management to a third party is not uncommon in the insurance industry, especially in cases where the insurer is trying to handle less administration and more of the core business. Insurance companies that seek to keep everything in-house typically build extensive duplication and redundancy across markets and businesses.

As with any industry, takaful operators need to continue to understand new technologies and understand how technological innovation can reshape the way operators do business. The potential use of big data in the takaful industry will be discussed in the following section.

9. Big Data for marketing

To remain competitive in the market, takaful operators must understand and take advantage of the opportunities presented by technological change. In the past, technological advances have slowly but significantly changed the way insurance companies reach their customers and consequently, how customers interact with insurance companies and maintain their loyalty. From electronic payments, to mobile apps, and "insurtech" (a combination of insurance and technology), insurance businesses and their clients are constantly changing and adapting to new technologies.

Takaful operators can take it one step further ahead of social media marketing by using social media analytics or actively engaging customers in the shared value creation process.[32] Insurance companies have used social media

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[32] Manuel Castriotta et al., "Disentangling the Strategic Use of Social Media in the Insurance Industry: A Value Co-Creation Perspective," in *Social Media in Strategic Management*, vol. 11, Advanced Series in Management (Emerald Group Publishing Limited, 2013), 63–86, https://doi.org/10.1108/S1877-6361(2013)0000011008.

for marketing purposes.[33] and pricing and underwriting purposes. Customers create value for companies when they promote a particular company or product through word of mouth, as well as provide their feedback on new services or identify possible improvements to existing offerings through social media.[34] Companies, in turn, benefit from word-of-mouth advertising as well as customer engagement.

Social media analytics will enable takaful operators to gather competitive intelligence such as understanding the effectiveness of marketing campaigns, customer perceptions of existing and new products. EIOPA (2019) reports that insurance companies mostly use social media analytics for counter-fraud services, in addition to normal fraud detection and processing, to help identify hidden links between claims. Another application area is user behavior analysis for pricing and underwriting purposes (EIOPA, 2019).

10. Big Data for claims management

EIOPA (2019) reports that most insurance companies are already using big data analytics for claims management, especially in the areas of automated payment processing, claims segmentation, invoice verification, and most importantly, fraud detection. The use of big data analytics is growing in popularity not only for insurance companies but also in law enforcement. For example, Durham Police in the UK cracked a "cash for accident" scam that defrauded insurance companies using big data intelligence analytics.[35]

Takaful (TO) operators can prevent, detect, log and report fraud more effectively using big data analytics tools. Most insurance companies have leveraged their historical data, internal resources and expertise in processing claims to develop their own big data analytics tools used in claims management (EIOPA, 2019). For example, machine learning algorithms are trained to look for fraud patterns and flag potentially fraudulent claims for analysts to examine further.[36] Big data analytics tools support the detection of fraudulent claims in two general ways: first, insurance companies can cross-check the information provided by potential customers before the contract expires to avoid scammers or fraudsters; second statistical Analysis Systems (SAS), a leading data analysis company conveniently summarizes the problem of claims fraud in the following diagram. Diagram 1 illustrates that fraud claims can be broadly categorized into two: premeditative and opportunistic. Big data analysis uses text mining based on social network analysis, predictive models, and anomaly detection. Organized crime is premeditative and causes great harm; for example, the previously mentioned case in which Durham Police arrested a criminal gang responsible for an estimated £500,000 million "cash for accident" fraud.[37]

Diagram 1: Anti-fraud techniques to combat opportunistic and organized fraud SAS anti-fraud Source: SAS (2012, p. 3)

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[33] Castriotta et al.
[34] Castriotta et al.
[35] M. Ward, "Crime Fighting with Big Data Weapons," *BBC News*, March 18, 2014, sec. Business, https://www.bbc.com/news/business-26520013.
[36] Kadirov, "Marketing Islamic Services."
[37] Ward, "Crime Fighting with Big Data Weapons."

Traditional methods of claim investigation rely primarily on human factors and human judgment. Big data analytics, through the use of AI and machine learning algorithms will enable technology to accelerate the investigation process. For example, big data analytics tools can flag suspicious transactions or exaggerated claims.

In addition to traditional approaches to detecting fraudulent claims (e.g. anomaly detection and business rules), big data analytics can enable higher levels of data accuracy with the use of social network analytics, text mining, and predictive modeling. The use of social network analytics and text mining allows insurance companies to cross-check evidence provided by customers during claim processing. Text mining uses large amounts of unstructured text, whereas social media analytics processes text and non-textual data such as photos and videos published on social media platforms.

Like robo-advisory, big data analytics is useful to complement, not replace, human analysts. Claims management often requires careful human investigation and examination of the entire situation. In some cases, claim processing will require a physical investigation to analyze the situation, take pictures, question anyone involved, assess police or medical reports, as well as retain contact information for any individuals who have witnessed the accident; all of this will require human involvement.

11. Ethical concerns using Big Data

The use of big data analytics has raised several ethical and legal issues related to the disruption of data handling and consumer rights. Entrusting computer systems or AI with sensitive data can be risky. Data may become vulnerable to abuse and cybersecurity attacks. An ethical framework must be created to ensure consumer rights are protected.

Like other non-profit and social enterprises, takaful operators must always protect consumer rights and be able to demonstrate compliance with the principle of accountability, namely treating consumers fairly and transparently when processing personal data. In short, customers must be provided with proper information and takaful operators need to explain to their customers openly how data is collected and processed. The takaful operator-regulator relationship must be more collaborative in the digital era when taking advantage of the benefits of big data.

D. CONCLUSION

This paper explores the opportunities and challenges of using Fintech in the takaful sector. More specifically, this paper analyzes the potential use of big data analytics and robo-advisory in assisting takaful operators. TOs can use big data analytics and robo-advisory for customer service including complaint management, post-sales service, pre-sales assistance, handling consumer inquiries, and consumer authentication. Big data analytics can help address the problem of fraudulent claims that are hurting the insurance and takaful industries. More importantly, TO will benefit from including AI in the decision-making process, from assessing claims to strategically allocating resources.

However, the use of big data analytics in insurance can cause legal and ethical issues due to data security and privacy. Takaful operators must have adequate governance measures in place to ensure that consumer data is protected and must be able to demonstrate their compliance with personal data protection regulations.

Fintech can play a beneficial role for the takaful ecosystem, especially in equipping its workforce and strengthening Shariah governance. In particular, the authors of this paper recommend:

Adopting robo-advisors will ensure that existing and potential customers value the services available around the clock. Takaful operators will benefit from increased efficiency and reduced operational costs over the long term compared to traditional methods of providing face-to-face advice. However, there may be technical errors or functional limitations in the design of the robo-advisor, especially in the context of takaful and the complexities surrounding Shariah compliance.

Develop and build big data analytics algorithms: Big data analytics tools can be used as support for regular analytical work, such as flagging potentially fraudulent claims, with all output reviewed by human analysts as part of claims processing. Nonetheless, developers and users of big data analytics tools need to ensure that big data analytics is implemented in a manner that meets ethical standards and regulatory frameworks.

The current legislation is just the basis, policy guidelines and governance mechanisms are needed to do more to meet higher ethical standards to protect consumers in this evolving area. Policymakers need not only to consider the longitudinal impact of big data analytics on consumer rights, but also to provide a conducive environment for AI development, especially where technology advances are slowly but increasingly being adopted by large enterprises. Takaful regulators, likewise, need to monitor AI developments and establish an enabling environment to create trustworthy AI.

REFERENCE

Archer, Simon, Rifaat Ahmed Abdel Karim, and Volker Nienhaus. "Conceptual, Legal, and Institutional Issues Confronting Takaful." In *Takaful Islamic Insurance*, 1–5. John Wiley & Sons, Ltd, 2009. https://doi.org/10.1002/9781118390528.ch1.

Baker, Tom. "Regulating Robo Advice Across the Financial Services Industry." *SSRN Electronic Journal*, 2018. https://doi.org/10.2139/ssrn.2932189.

Bartlett, Megan L., and Jason S. McCarley. "Human Interaction with Automated Aids: Implications for Robo-Advisors." *FINANCIAL PLANNING REVIEW* 2, no. 3–4 (2019): e1059. https://doi.org/10.1002/cfp2.1059.

Bekkin, Renat. "Islamic Insurance: National Features and Legal Regulation." *Arab Law Quarterly* 21, no. 1 (January 1, 2007): 3–34. https://doi.org/10.1163/026805507X197820.

Brenner, Lukas, and Tobias Meyll. "Robo-Advisors: A Substitute for Human Financial Advice?" *Journal of Behavioral and Experimental Finance* 25 (March 1, 2020): 100275. https://doi.org/10.1016/j.jbef.2020.100275.

Castriotta, Manuel, Paola Barbara Floreddu, Guardo Maria Chiara Di, and Francesca Cabiddu. "Disentangling the Strategic Use of Social Media in the Insurance Industry: A Value Co-Creation Perspective." In *Social Media in Strategic*

Management, 11:63–86. Advanced Series in Management. Emerald Group Publishing Limited, 2013. https://doi.org/10.1108/S1877-6361(2013)0000011008.

Hassan, Abul, and Sabur Mollah. *Islamic Finance: Ethical Underpinnings, Products, and Institutions*. Cham: Springer International Publishing, 2018. https://doi.org/10.1007/978-3-319-91295-0.

Jung, Dominik, Florian Glaser, and Willi Köpplin. "Robo-Advisory: Opportunities and Risks for the Future of Financial Advisory." In *Advances in Consulting Research: Recent Findings and Practical Cases*, edited by Volker Nissen, 405–27. Contributions to Management Science. Cham: Springer International Publishing, 2019. https://doi.org/10.1007/978-3-319-95999-3_20.

Kader, Hala Abdul, Mike Adams, Philip Hardwick, and W. Jean Kwon. "Cost Efficiency and Board Composition under Different Takaful Insurance Business Models." *International Review of Financial Analysis* 32 (March 1, 2014): 60–70. https://doi.org/10.1016/j.irfa.2013.12.008.

Kadirov, Djavlonbek. "Marketing Islamic Services: Tackling Misconceptualisation of Commercial Insurance." *Journal of Islamic Marketing* 12, no. 2 (January 1, 2020): 264–79. https://doi.org/10.1108/JIMA-08-2019-0172.

M. Iqbal. *General Takaful Practices: A Technical Approach to Eliminating Gharar (Uncertainty), Maisir (Gambling), and Riba' (Usury)*. Jakarta: Gema Insani, 2005.

Malik, Adnan, and Karim Ullah. "Takaful and Its Shariah Compliance." In *Introduction to Takaful: Theory and Practice*, edited by Adnan Malik and Karim Ullah, 33–43. Singapore: Springer, 2019. https://doi.org/10.1007/978-981-32-9016-7_3.

Saputra, Jumadil, Suhal Kusairi, and Nur Azura Sanusi. "Modeling the Premium and Contract Properties of Family Takāful (Islamic Life Insurance)." *JKAU: Islamic Econ* 30, no. 2 (2017): 153–57.

Ward, M. "Crime Fighting with Big Data Weapons." *BBC News*, March 18, 2014, sec. Business. https://www.bbc.com/news/business-26520013.