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THE IMPACT OF FINTECH ON THE SUSTAINABILITY OF ISLAMIC ACCOUNTING AND FINANCE EDUCATION IN MALAYSIA

Nurul Nazlia Jamil[1]
Junaidah Abu Seman[2]

[1]Senior Lecturer, Faculty of Economics and Muamalat, Universiti Sains Islam Malaysia (Email:nurulnazlia@usim.edu.my)
[2]Senior Lecturer, Faculty of Economics and Muamalat, Universiti Sains Islam Malaysia (Email:junaidah@usim.edu.my)

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Abstract: *In a recent survey conducted by PricewaterhouseCoopers (PwC) on Global Banking and Capital Markets (BCM), a vast majority of CEOs (93%) identified technology changes as a key contributor to transforming the sector over the next five years. The financial services sector must be able to respond to this transformation and therefore, will require labour talent that combines strong financial and digital skills. Through this report, the study explore the financial technology (Fintech) industry to understand how the industry and educational institutions have responded to the increasing need for sustaining the Islamic finance curriculum and improving the talents. The objective of this research is twofold; first, the research turns to highlight Malaysia responses on the role of fintech in sustaining the education and the issues of talent shortages. The responses have been categorized into three primary themes: (1) Educational Interventions, (2) Incubators and Extra-Curricular Events; and (3) Government and Policy Interventions. Secondly, the research consolidates and reframes the discussion by acknowledging that multiple opportunities for improvement exist within Malaysia's Islamic Fintech ecosystem, helping to identify a series of suggestions that could be considered by the local industry and education institutions.*

Keywords*: Fintech, Islamic Finance, Education, Talent, Malaysia*

Introduction

Financial technology or fintech is fast gaining traction in the financial services and products industry, as both start-ups and traditional finance companies such as banks or insurance companies proactively incorporate methods to stay in the lead. Meanwhile, KPMG defines Fintech as technology-based businesses that compete against, enable, and or collaborate with financial institutions. According to 'Fintech and Financial Services: Initial Considerations', a

report prepared by the International Monetary Fund (IMF) staff team, fintech leverages the explosion of big data on individuals and firms, advances in artificial intelligence (AI), computing power, cryptography, and the reach of the internet (EY, 2016a). The strong complementarities among these technologies are giving rise to an impressive array of new applications touching on services from payments to financing, asset management, insurance, and advice.

This paper focuses in Malaysia as part of the ASEAN region as well as its unique mix of rural, suburban and urban population, is what makes it the ideal environment for the testing and even launching of the Fintech solutions that targets the global Islamic Finance market. The chief executive officer of Malaysia Digital Economy Corp (MDEC) called Datuk Yasmin Mohamood, readily opened Malaysia's doors to Fintech's companies and startups. Malaysia Digital Economy Corp (MDEC) can be defined as a government institution that is charged with the responsibility of pushing forward the country's technology-forward agenda. A huge percentage of the country's population are Muslims, this is because Islam is recognized as the official religion for the country. In fact, approximately 61% of its people or even more are Muslims i.e. 18.4 million people in numerical form. This fact is what offers a great opportunity for all the financial technology solutions which are fully compliant with Islamic law prevalent in the country. Talent development solutions may go beyond the circle of the financial services community, to include other business communities, such as legal fraternity, Government officials and IT solution providers. The advancement of the industry is also dependent on these parts of the private and public sector. Their training needs must also be met through structured training programmes to facilitate their understanding of the specifics of Islamic finance and its value propositions. Malaysia is such one prime example in leading the 'talent' charge. This has culminated in a thriving Islamic finance environment, with numerous institutions catering to a wide range of industry needs. These institutions, such as the International Centre for Education in Islamic Finance (INCEIF) and the International Shariah Research Academy for Islamic finance (ISRA) are gaining worldwide recognition in producing talent and research needs to support the growth of the vibrant industry. In putting in place talent development strategies, the vision moving forward for human capital development in Islamic finance is to ensure a steady stream of competent and versatile talent to support greater innovation and dynamism of the Islamic finance industry.

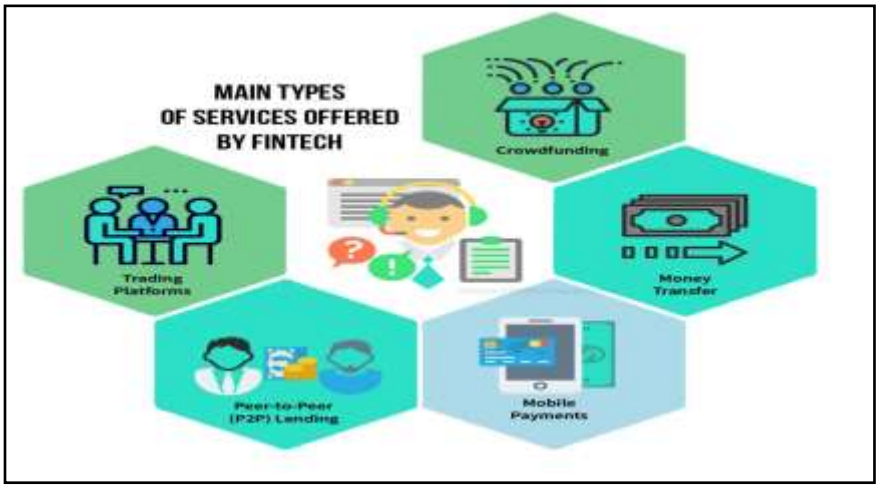
Problem Statement

While interest in the global fintech landscape has expanded at pace in recent years, propelled by the ubiquity of smartphones, sharia-compliant fintech has lagged behind, as potential investors remain cautious. Yet those involved in the sector believe it offers strong opportunities and that steps being taken to develop fintech ecosystems in key markets will help to grow the industry. According to consultancy Accenture, of the more than $50bn that has been invested in fintech globally since 2010, just 1% has gone to companies in the Middle East and north Africa region, which is home to one-quarter of the world's Muslim population. Globally, the number of institutions offering Islamic finance degrees has risen from 141 in 2014 to 191 in 2016, according to ICD-Thomson Reuters Islamic Finance Development reports. Some employers are demanding that graduates have specialist knowledge of sharia-compliant finance, according to Celia de Anca, the director of IE's Saudi-Spanish Center for Islamic Economics and Finance. In addition, employers have identified skill gaps to the experiences and training of graduates whom likely to be employed in fintech organization. This create issues of shortages among the graduates especially from social sciences field such as finance and business and information technology background. The integration of advanced technology skills is required

by the financial services industry. The clear gap can be seen here is the absence of balance educational curriculum combining the integration of skills that can fulfill the demand of industries.

Thus, the study discusses the role of Fintech in Islamic Finance to understand how the industry and have responded to the increasing need for the talents and sustaining the education. The objectives of this study is twofold; first examines the current challenges industry stakeholders are facing and secondly the paper compiles and reframes the discussion by acknowledging that multiple opportunities for improvement exist within Malaysia's Fintech ecosystem, helping to identify a series of suggestions that could be considered by the local industry and educational institutions.

Figure 1: Main Types of Services Offered by Fintech



Sources: Fintech Survey Report CFA Institute 2016

Literature Review

The growth of Fintech in Islamic Finance

Fintech's penetration into Islamic finance is still in its infancy with a relatively small number of participants. However, the potential disruptions to traditional Islamic finance should not be underestimated. The disruptions can swing both ways. From the Islamic finance consumer perspective, fintech disruptions are largely positive. Fintech innovation provides choices which are more aligned to individual needs. With more options, consumers enjoy more competitive financial services cost. Latest technology embraced by fintech leveraging on Internet, mobile devices and social media integrations make financial transactions more automated, user-friendly and more convenient, thus a superior customer experience.

Ghazali and Yasuoka (2018) mentioned in their study that crowdfunding and P2P financing options from fintech are also a blessing for individuals or SMEs (small and medium enterprises) that require financing but do not qualify for financing from traditional Islamic financial institutions (IFIs). Investors are also entitled to higher potential returns by investing directly into the business ventures that they finance via the online financing marketplace. Furthermore, one of the best things that has happened with fintech is that it is able to provide access to financial solutions for the roughly two billion adults who are currently unbanked, as reported by World Bank. On the flip side, traditional Islamic finance providers face more intensified

competition with fintech sharing their pies. In order to remain competitive, they have to reduce financing profit margins and service fees.

The rise of Fintech has opened up a world of possibilities for Islamic Financial Institution (IFIs). It is a win-win for both parties whereby IFIs can leverage on their ATM Network, Branch Infrastructure and integrate with Fintech's platform to increase their offerings and services. IFIs will have to be at the forefront of the latest development in Fintech financial business models and collaborate with them to grow the products and services offerings. There is also potential for IFIs to have their own venture capital funding initiatives under equity financing (Musharakah or Mudharabah) to potential Fintech and make them part of their internal innovation team. On the other hand, Fintech can also leverage on ethical banking offered by IFIs to scale up their offerings using collaboration approach and can tap wider markets including Muslims and Non-Muslims.

It provides an amazing platform and opportunity for banks to promote financial inclusion by serving underbanked and unbanked communities. Fintech is also associated with disrupting traditional models by creating services with or without intervention of financial intermediaries. In order to remain competitive, financial sectors and especially banks should be proactive in adopting Fintech. A recent Boston Consulting Group study showed that over the next five years, corporate banks that remain digital laggards could see profits drop by as much as 15-30 per cent relative to their digitally fast-moving competitors. Islamic fintech companies are also appearing in Muslim-majority countries in Asia, and in more established fintech hubs in Europe and beyond, with areas such as crowdfunding, peer-to-peer (P2P) lending and digital wealth management considered the most promising. Despite this, so far overall numbers with regards to Islamic fintech are small, with limited investment in the sector.

According to Digital Finance Institute (2016), attracting and retaining high quality talent is very significantly give most prevalent challenges for the Fintech companies. This is because from the financial services view leveraging technology is critical in creating sustainable advantage in distribution, efficiency of business processes and sales and marketing. Therefore, this create a systemic challenges as current literature indicates that the shortage of technical talent is directly associated with the growing demand for diverse and increasingly complex software system and the demand for technical talent is growing much faster than the educational capacity of current institution (Digital Finance Institute, 2016). In addition, Wolfe (2016) and Nordicity (2012) mentioned one of the most challenging and underlying issues to address is whether a sufficient supply of graduates is interested in pursuing education that will train them to work within the digital technologies across the economy.

Challenges in Sustaining Islamic Finance Education and Talent in Malaysia

In Malaysia, the growing momentum of IFSI suggests that a significant portion of the remaining workforce of 56,000 to be employed by the Financial Services Industry (FSI) by 2020 will comprise Islamic Finance professionals. Through the Economic Transformation Programme (ETP), student enrolment in Islamic Finance will increase from the current 6,000 students to 54,000. The ETP also targets to increase the number of employable Islamic Finance graduates from 64.8% to 80% by 2015. The recent establishment of the Financial Services Talent Council will be pivotal in developing, attracting and retaining talent in the sector through engagements with the FSI, the private sector, as well as education and training institutes.

A report on Global Islamic Finance Education 2013 (Yurizk Academy, 2013) indicates that, whilst the Asian region hosts about 43% of the global Islamic Finance education and knowledge service providers, Malaysia ranks behind Pakistan as the second highest Islamic Finance education provider with over 86 institutions offering Islamic Finance education, of which 48 are academic institutions. Malaysia ranks highest amongst 38 providers for professional development programmes including certification, training, seminars and workshops. These notable institutions include Islamic Banking and Finance Institute Malaysia (IBFIM), International Islamic University Malaysia (IIUM) and the International Centre for Education in Islamic Finance (INCEIF). Besides academic programmes, a number of professional-based and certification programmes are offered to cater to the needs of the IFSI. Malaysia is also recognised to be at the forefront of research with the setting up of the International Shariah Research Academy to promote applied research in the area of Shariah and Islamic Finance. The Academy acts as a repository of knowledge for Shariah views and undertakes studies on contemporary issues in the IFSI. Attempts have been made to professionalise the Islamic Finance practitioners through the setting up of The Association of Chartered Islamic Finance Professionals (ACIFP). Besides serving as a professional membership body, ACIFP also aims to conduct Continuous Professional Development programmes for its members.

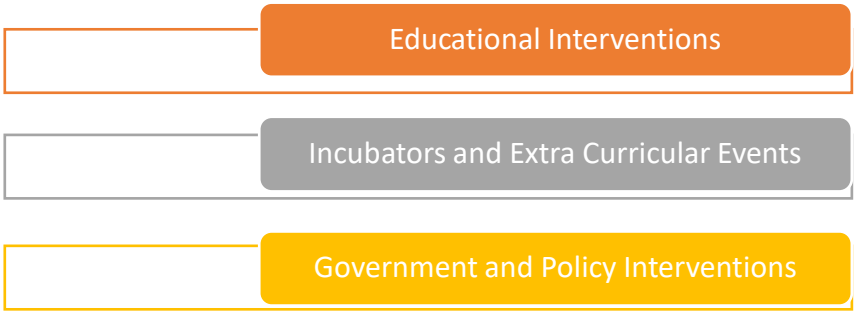
Human capital development best practice begins at the education level. Despite over 378 institutions providing Islamic finance education globally, there is a lack of consistency in the delivery of courses; in academic information and definitions; in assessments, curriculum and even the competencies candidates acquire. Many courses from reputable universities are heavy on the Islamic finance knowledge, but lack the practical knowledge needed to work in the industry and innovate through technology. It is essential for the industry to address this mismatch between education and skills, and to work with educators to formulate, develop and agree on professional standards, and the use of Fintech and digital expertise to raise competencies. Thus the problem requires a more structured approach towards establishing a feeder education system for the industry. There needs to be greater collaboration between academia and industry to define the types of research and curricula that will produce the skills and expertise that the industry would need. Professional associations for Islamic bankers and Shariah experts need to be established with a certification system to encourage continuous professional development in the industry. The human capital managers of Islamic banks would also need to define and enforce the specific technical competency requirements for Islamic bankers.

Methodology

Data Collection

In determining the scope of this study, the focus is on reviewed articles that central and relevant to the context of Fintech and Islamic Accounting and Finance education. The majority of the resources leveraged in this paper were found through online research and publicly available documents, including but not limited to academic peer reviewed literature, government (local, regional and national) publications and papers, university websites, financial sector reports and leading industry program websites. Based on an extensive literature review of the Islamic Fintech talent shortage and the industry strategies that have been employed in response to the talent shortage, the following three strategies categories were developed and employed as framework for investigation in this study.

Figure 2: Strategies to Overcome Talent Shortage



Note: The three strategies are the suggestions for overcoming the talent shortage.

Educational Interventions

The educational institutions have taken multiple approaches towards increasing the interest and competency of students in Islamic Fin Tech related skills. Universities and colleges are strongly considering the industry need with respect to employable skills to ensure that the education being delivered is directly assisting students in gaining the appropriate skills needed to find employment within the Islamic Fintech sector. Common university responses to the Fintech skill shortage, which are examined further in this study curriculum reviews, Fintech courses and various policy provided by the Ministries of Education and universities.

Incubators and Extra Curricular Events

Educational institutions, government and industry partners have responded to the Fintech talent shortage and sustaining the education by financing and promoting various forms of programs and extra curricular activities to students. These can include hackathons, mentorship programs, independent course offerings for specific skill enhancement, conferences, and both privately-funded and publicly-funded events. Additionally, recent trends in attracting and developing financial technology talent include the establishment of incubators and seed accelerator programs. These programs are meant to accelerate successful venture creation by providing specific incubation services, focused on education and mentoring, during an intensive program of limited duration (Cohen and Hochberg, 2014; Miller and Bound, 2011). This report discusses several incubator programs that have been created in an effort to grow the Fintech industry and reduce the current talent shortage. Each program is diverse in format and purpose, differing greatly based on which sector finances the program. This ranges from private industry, to government, and universities. More specifically, universities have introduced progressive incubator programs and promote them as a means to facilitate student entrepreneurship, provide industry with a direct connection to student start-up innovation and talent, and give recruitment agencies a way to identify employable talent (Pauwels et al., 2016).

Government and Policy Interventions

The rise of recent government and policy interventions has become a prominent response to closing the talent shortage within the Fintech sector. One of the biggest challenges facing the Malaysia Fintech ecosystem is the lack of ability to engage with the government and to collaborate at a national level (Digital Finance Institute, 2016). Therefore, purpose-based interventions have been recommended and introduced to directly address the skills gap. These interventions include financial incentives for new graduate start-up networks, streamlined immigration processes meant to attract foreign talent, and various policy papers that illustrate the many opportunities that local, national and regional governments could implement to support the Fintech sector.

Result and Finding

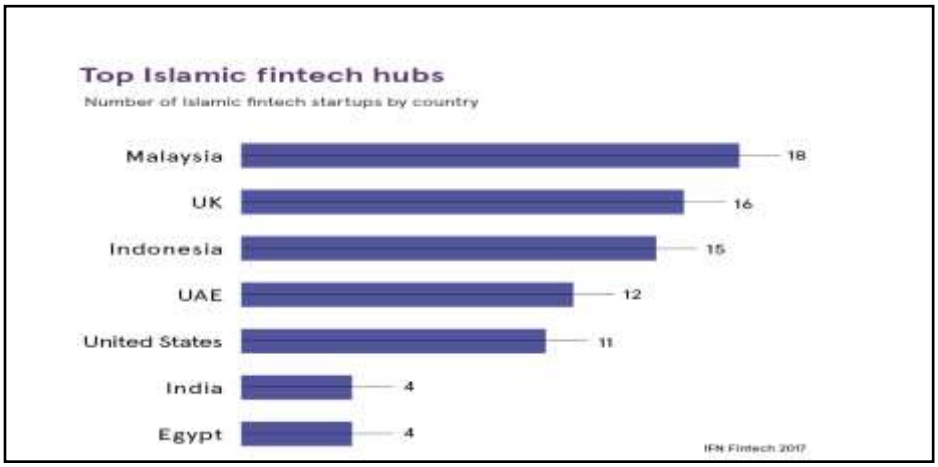
In this section, the study provides an overview of Malaysia to examine the contribution that the country has made towards sustaining Islamic Finance education and lessening the talent shortage within its respective Fintech system. This will also help identify where gaps currently exist and how industry, educational institutions and level of government can collaborate to produce well equipped and suitable employees for the emerging Fintech sector.

Malaysia Responses in Sustaining the Islamic Finance Education and Talent Shortage

Islamic banks and financial service providers in Malaysia, which is currently riding out a slowdown in global growth of the sector, have been told they should develop more new products and embrace innovative tools from financial technology (fintech) startups in order to better navigate through the current disruptive phase the global financial sector is experiencing. Islamic finance fintech has indeed already found influential supporters.

According to Marzunisham Omar, the assistant governor of Malaysia's central bank, the growth of fintech provides "innovative opportunities" within the entire financial sector and thus cannot be ignored by the Islamic finance industry, particularly in Malaysia, where Islamic banking assets are at close to 30% of the entire banking system and where the number of digitally knowledgeable consumers and mobile banking users is rapidly growing in line with most other Southeast countries. Omar, who spoke at the Islamic Fintech Dialogue 2017 held on October 10 in Kuala Lumpur, said that the Islamic finance industry in Malaysia should invest more in financial technology and support fintech startups and talent, while, at the same time, they would have to reassess and re-engineer their traditional business models and open up to digital transformation as a new strategy on all company levels, be it operational, structural or cultural. This could best be done by entering digital partnerships and alliances with fintech, like many conventional banks in Europe, America and Japan are doing, Omar said.
He noted that while the number of Islamic fintech startups, innovation labs and incubators are generally on the rise they are not as visible in the Islamic finance world as their conventional counterparts. This would underline the necessity of established Islamic finance institutions supporting the upcoming segment and help develop solutions that make Islamic banking quicker, cheaper, simpler, more efficient and more convenient. This would enable them to open up new digital markets that were barely thinkable just a few years ago by deploying digital financing platforms for small and medium companies or robot advisory for Islamic investors or online takaful, just to quote a few examples of what would be possible.

Figure 3: Number of Islamic fintech startups by country



Educational Interventions

Malaysia has a high density of top ranked education institutions which including to be listed in top ranked universities in the world (World University Rankings, 2016). Efforts are underway to develop a blueprint for an lslamic finance (IF)-based investment technology platform, marking yet another effort for Islamic financial technology (fintech). As technology is playing an increasing role in the banking and financial world, businesses, universities and organizations have started offering seminars, masterclasses, and courses covering the emerging fintech ecosystem. For instance, to strengthen the Fintech talent pipeline, many universities have promoted Science, Technology, Engineering, Mathematic (STEM) programs as well as specific Fintech education within universities through specialized course programs, apprenticeships, and sponsored work placements (EY, 2016b). The Malaysia expressed similar support towards STEM education as the United States, actively integrating web development and coding into curricula as part of national innovation programs (EY, 2016b). Among the first steps to strengthen STEM education is through the Malaysia Education Blueprint (2013-2025), namely to increase the interest of students and teachers awareness of STEM education.

STEM Integration elaborate definition, Johnson et al. (2016) details the six core STEM integration, namely:

1. Using meaningful learning context and relate to student real life
2. Challenge student potential using design approach Engineering to develop critical and creative thinking through activities that be related
3. Student aided design technology can learn from failure in designing solutions in engineering design with existing design.
4. Implementing teaching and learning that is integrated with science and mathematics and subjects relevant like Literature, Humanities, and Social Studies
5. Implementing teaching and learning activities that are student centered so that students are actively involved in teaching and learning
6. Train students to collaborate and communicate in conducting educational activities

According to Bahrum et al. (2017) curriculum transformation refers to efforts to improve the learning program to improve student outcomes to achieve six student aspirations namely knowledge, thinking skills, leadership skills, bilingual proficiency, ethics and spirituality and

national identity as recommended in the Malaysian Education Blueprint (MEB) 2013 -2025. this transformation is performed on content, pedagogy and assessment as follows:

1. Content restructured and improved to ensure students are provided with the knowledge, skills and values that are relevant to the current needs for the challenges of the 21st century.
2. Pedagogical emphasis on learning in depth approach to teaching and learning based on higher order thinking skills (HOTS). Focus is given to the inquiry-based learning, problem solving, contextual learning, collaborative learning, project-based learning and STEM approach.
3. Assessment is carried out continuously to ensure the progress and achievement of student learning. Assessment in teaching and learning is conducted in the form of summative and formative. Teachers assess the extent to which students master the learning standards with reference to the prescribed performance standards. Development and actual achievement level of students recorded and reported descriptively to students and parents

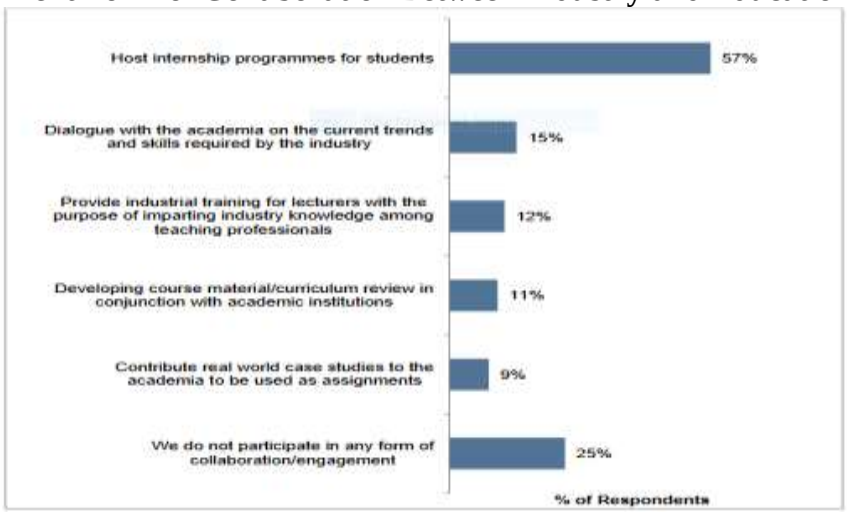
On the other hand, at higher education institutional level, Global Islamic university International Centre for Education in Islamic Finance (INCEIF), and national research and development (R&D) centre in information and communications technology (ICT) Mimos Bhd will collaborate in R&D of ICT, in particular the big data analytics, deep learning and fintech. Both institutions would seek to exchange personnel for purposes that include teaching, research, training, study visits, internships or attachment. Furthermore, INCEIF and MIMOS may also cooperate in undertaking other activities such as field-testing, technology transfer and commercialisation of technological products, according to a statement released by INCEIF. INCEIF president/CEO Prof Datuk Dr Azmi Omar said the collaboration was a fine example of like-minded partners budding on each other's strengths and strategic focus.

Due to the very recent development of the field, the skills pertaining to the fintech sector have not yet been organised in a widely-recognised supporting body of knowledge to be used by taught programmes. The natural first step in the development of academic fintech programmes pertains to efforts for the integration of the distinctive disciplines into comprehensive applied programmes. This development can again be seen as an opportunity to enhance the domains of interdisciplinarity, industry-relevance, knowledge exchange, and social impact by the academic programmes of business schools. A large number of existing non-fintech programmes stems from a single background, i.e. ICT, engineering, finance, accounting, business, economics, management or law. The finance and business curriculum is largely unknown in ICT disciplines and an integrated ICT curriculum is largely absent or limited in most finance programmes and business schools. The study found that the approach needed is a synthesis of the educational curriculum in finance and ICT, bringing the two strands together in a more cohesive way. This involves a greater emphasis by business schools on the planning, integration and delivery of courses related to data processing and analytics, programming languages, along with new elements regarding the digital transfer of value, such as blockchain and distributed ledger technologies. Hence, this synthesis of a curriculum must rely on multidisciplinary collaboration between academic experts. In addition, there are various initiative to form industry collaboration with education institutions through hosting internship programmes for students.

The study have been conducted by Zaidi et al. (2017) also revealed that fintech firms find talent shortages an acute issue, with over half (60 per cent) saying that there was a lack of start-up or fintech talent in the markets they operate in skills gaps are in technology and software, product management, and sales and marketing. Most of the fintech firms are still relying on personal

connections (57 per cent) and recommendations (48 per cent) to hire talent. Respondents also believe that the government can do more to enable the growth of the sector, in particular, increasing tax incentives for angel investors in early stage investment (78 per cent) and introducing policy reforms to make it easier to hire employees (78 per cent). Locally, all the Malaysian Fintech firms surveyed say they have trouble hiring the talent to meet the needs and growth of the industry, with 73 per cent saying that there is a shortage of fintech talent in the country. The top three areas of talent shortage for Malaysian fintech are in technology and software (73 per cent), sales (27 per cent) and compliance (27 per cent). Unfortunately, skills are in short supply in the local banking industry 94 per cent of banks find that the lack of competent talents is affecting the productivity of their business, according to a survey by the Asian Institute of Finance (AIF) last year.

Figure 4: Current Form of Collaboration Between Industry and Education Institution



Source: Frost and Sullivan (2018) Analysis Based On Demand Side Survey Data

Incubators and Extra Curricular Event

In order to attract and grow the skills of available talent within the Malaysia Fintech ecosystem, multiple institutions and organizations have developed Fintech related programs and events. In Malaysia, there is an association so called Fintech Association of Malaysia (FAOM) which aspires to be the key enabler and a national platform to support Malaysia to be the leading hub for Fintech innovation and investment in the region. The association also help facilitate ecosystem collaboration between Fintech stakeholders in Malaysia with the key objectives to support the Malaysian Fintech community, build awareness and trust in Fintech start-ups to advocate for better policy on behalf of the members. Founding members of FAOM included companies like payment solution services GHL System Bhd and SoftSpace, online insurer GetCover, financial comparison services Jirnexu and GoBear. The association, which launched in conjunction with the Fintech Payment Conference on Saturday, was approved by the Registrar of Societies (ROS) on October 24, and consisted of members 57 members so far. The FAOM's formation comes on the heels of the Equity Crowd Funding (ECF) and Peer-to-Peer (P2P) Lending operators announcing their own association, the Registered Digital Markets of Malaysia.

The Malaysian central bank governor has been extremely vocal and proactive in fintech initiatives. The conducive environment for fintech development and Malaysia's proven track record in Islamic finance make Malaysia a good candidate to lead Islamic fintech movement. As one of the "big-four" global centers in Islamic finance, Malaysia is well positioned to take

advantage of the opportunities. Malaysia's vibrant Islamic finance industry, which has been attributed to the strong government and regulatory support, could be leveraged further to push for Islamic fintech agenda. With the rising importance of Islamic Finance in the global financial services industry, the University of Reading Malaysia is positioning itself to be a leader in the delivery of higher education programmes centred on the discipline. Henley Business School at the University of Reading Malaysia acknowledges the growing demand from financial institutions worldwide for specialist professionals trained in Islamic finance practices. In February 2017, it signed a Memorandum of Understanding (MoU) with International Centre for Education in Islamic Finance (INCEIF), paving the way for the two organisations to offer a Master's degree in Investment Banking and Islamic Finance, along with INCEIF's Professional Certificate in Islamic Finance, specialising in Islamic Capital Market. In April, the university formed a similar partnership with Islamic Banking and Finance Institute Malaysia (IBFIM) to collaborate on tertiary level training programmes on Islamic finance. The partnership aimed to produce graduates accustomed to developments in the Islamic financial services sector, equipped with strong foundations and good basic skill sets, with the ability to meet current industry needs and trends. In line with the university's aim in promoting education on Islamic Finance, Associate Professor in Finance at Henley Business School at the University of Reading Malaysia, Dr Nafis Alam was invited as a workshop director on Fintech and Islamic Finance at the 2018 Gulf Research Meeting, hosted at the University of Cambridge.

Meanwhile, a Memorandum of Understanding (MoU) was signed by MIMOS Bhd (MIMOS) and the International Centre for Education in Islamic Finance (INCEIF), to develop a blueprint for an Islamic finance-based investment technology platform. INCIEF was established in 2005 by Bank Negara Malaysia, the Central Bank of Malaysia to develop and nurture talents and expertise in the area of Islamic finance under the MIFC (Malaysia International Islamic Finance Centre). MIMOS, a strategic agency under the Ministry of Science, Technology and Innovation (MOSTI), is Malaysia's premier Applied Research and Development Centre in Information and Communications Technology, Industrial Electronics Technology and Nano-Semiconductor Technology. The MOU was signed by INCEIF President & CEO Prof. Dato' Dr Azmi Omar and MIMOS President & CEO, Mr Ahmad Rizan Ibrahim. The collaboration is expected to drive greater Islamic Finance development and facilitate exploration of its potential. Under the MOU, INCEIF and MIMOS will collaborate in research and development of information and communications technology (ICT), in particular the areas of Big Data Analytics, Deep Learning and Fintech. The two institutions would seek to exchange personnel for a range of purposes including teaching, research, training, study visits, internships or attachment. Further, INCEIF and MIMOS may also cooperate in undertaking other activities such as field-testing, technology transfer and commercialisation of technological products.

Government and Policy Interventions

In June 2016, BNM established Financial Technology Exposure Group (FTEG), which would serve as the focal point on fintech-related queries that include matters related to regulation and adoption of fintech by the FSI (financial services industry) sector. The momentum continued with a discussion paper on fintech regulatory sandbox framework issued on July 29, 2016. "Regulatory sandbox" is a concept where businesses can test innovative products, services, business models and delivery mechanisms in a live environment without immediately incurring all the normal regulatory consequences of engaging in the related activities. The discussion paper sets out the key principles and the proposed approach in operationalising the so-called sandbox. The central bank had invited written comments on the specific questions set out in the paper as well as any general comments. Finally, after incorporating public feedback on the

discussion paper, BNM issued Financial Technology Regulatory Sandbox Framework (FTRSF) on Oct 18, 2016, which took effect immediately. The sandbox framework is applicable to all financial institutions licensed under Financial Services Act (FSA) 2013, Islamic Financial Services Act (IFSA) 2013, Money Services Business Act (MBSA) 2011 and Development Financial Institutions Act (DFIA) and all fintech companies intending to carry out businesses defined in all the Acts stated above. Applicants to participate in the sandbox programme can be a financial institution on its own, a fintech company on its own or a collaboration of a financial institution with a fintech company.

One of the key objectives of the FTRSF is for BNM to provide a regulatory environment that is conducive for fintech innovations to be deployed and tested in a live environment within specified parameters and timeframes. To participate in the sandbox programme, interested parties must fulfil the eligibility criteria and submit the required documents as specified in the framework. In addition, the applicants must identify risks that may arise from the testing of the product, service or solution in the sandbox and propose the necessary safeguards. For Islamic financial services, it is stated that in assessing the risks and evaluating the proposed safeguards, BNM will give due regard to ensuring innovative solutions for Islamic financial services are consistent with prevailing Shariah standards. Fintech companies that collaborate with Islamic financial institutions (IFIs) could leverage on the respective IFIs' existing Shariah governance processes. Fintech companies that intend to provide services within the purview of IFSA 2013 need to ensure that they are well versed with the prevailing Shariah standards, either by employing people with the required knowledge or by engaging services from Shariah consultants. A group of eight fintech companies operating across eight different countries had already recognised this prospect when they chose Malaysia to launch Islamic Fintech Alliance, a reference point for knowledge and advice, and facilitate business matching between entrepreneurs and investors to develop a Shariah-compliant fintech ecosystem. Malaysian startup companies and IFIs should collaborate to seize the opportunity and help to accelerate the development of Islamic fintech ecosystem.

Gap Analysis: Opportunities for Improving Islamic Fintech Ecosystem in Malaysia

Upon consideration of the global industry and responses to the Fintech talent shortage, this research identified various opportunities that could be considered for improving Islamic Fintech ecosystem in Malaysia. To amend inconsistencies and build upon demonstrated strategies in developing and attracting high quality talent, this study presents the following suggestion for strengthening Malaysia's position as a global leader in Islamic Fintech.

Table 1: Suggestions for Opportunities in Improving Islamic Fintech in Malaysia

Suggestions for Educational Intervention	**Suggestions for Incubators and Extra Curricular Events**	**Suggestions for Government and Policy Interventions**
.Malaysia universities may consider developing and introducing an Islamic Fintech specialization or more clearly integrate Fintech specific content within university programs such as a Master of Business Administration (MBA)	1.Malaysia's stakeholders may consider developing and disseminating online education programs that are designed to build program members' awareness of Fintech related skills. These courses should be	Malaysia's Government may investigate the impact of regulatory requirements on the growth of the sector, and review outdated policies that directly obstruct local Fintech entrepreneurship.

program. These programs could include courses and topics such as: Fintech Analytics, Financial Information Systems, Robo Advisors and Systematic Trading, Dealing with Data, Risk Management for Fintech, Application in Entrepreneurial Finance, Fintech Personal Finance and Payments, and lastly, Digital Currencies, Blockchains, and the Financial Services Industry.	appropriate for both adult learners and current students, and could potentially be recognized as a credible career-enhancing certificate	
2. Malaysia universities may need to take specific steps (such as improving collaboration and partnership with Fintech organizations) towards improving education curriculum (especially in STEM fields) to align more closely with the needs of Fintech employers	2. Malaysia stakeholders should continue to establish and develop more Islamic Fintech-specific incubator programs and integrate more financial content into current technology incubator programs	Malaysia's Government may consider developing/improving government-funded initiatives that promote skills development and incentivize universities to integrate STEM-related education into curricula, and develop/improve Fintech incubators
3. Malaysia stakeholders (government, educational institutions and industries) may need to establish a STEM task force that is mandated to develop teaching material and resources to improve education, foster a STEM education network, and organize STEM promotion campaigns.	3.Malaysia's stakeholders should determine and maintain a central 'voice' for the local Fintech ecosystem, ensuring the identified leading organization is vibrant, relevant, and committed to actively growing the industry. The organization may, for example, facilitate civic Fintech hackathons, as well as promoting national and/or regional career and networking fairs for students.	3.Malaysia's Government should encourage the federal government to maintain and improve a flexible and accelerated visa application process to attract foreign skilled talent

Source: Compiled by Author

Conclusion

This study is an analysis of industry and education institutions' response towards the current Islamic Fintech education and talent shortage. The findings provide an overview of how global Fintech programs are innovating and leveraging expertise to attract and train high quality talent, revealing multiple opportunities for improvement for the Malaysia region. To analyze the situation, the study categorized the multiple response strategies into three major themes: (1) Educational Interventions, (2) Incubators and Extra-Curricular Events and (3) Government and Policy Interventions.

Within Educational Interventions, the findings demonstrate how educational institutions have taken progressive steps towards enhancing the technical skill set of students. Noteworthy strategies included curriculum reviews, promotion of STEM-related education and careers and the integration of Islamic Fintech into university programs like MBA programs. The second theme, Incubators and Extra-Curricular Events, outlines how Fintech stakeholders have developed skill enhancement programs for postsecondary students, adult learners, and start-up entrepreneurs. Multiple programs aimed at growing local technical and financial talent, and encouraged students to pursue Fintech related careers. These programs include: hackathons, start-up accelerators, independent course offerings, and industry/university conferences. The last theme addressed Government and Policy Interventions. Notable strategies from the case studies included financial incentives for new graduate start-up networks, immigration process reform, and mobilizing policy papers directly addressing the chronic skill shortage.

As Fintech is a relatively new phenomenon, and the talent shortage is only beginning to gain international attention, response and interest, limitations to this research include a lack of peer-reviewed sources and a heavy reliance on recent reports that were written by private sector companies. This research offers multiple suggestions for improving and developing Malaysia's Fintech ecosystem. This research also pinpoints particular opportunities that local stakeholders could adopt in order to attract and develop high quality Fintech education and talent. To validate these suggestions, stakeholders (Malaysia's government, the industry and educational institutions) should conduct a rigorous assessment of each and provide feedback regarding the suitability towards the Malaysia Islamic Fintech ecosystem.

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