Microcredit, Technology Adoption and Economic Development of Rural Households

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Abstract—**The main objective of this study is to investigate whether or not Amanah Ikhtiar Malaysia (AIM) microcredit has led to the technology adoption and increase of rural household economy, particularly in monthly household income of its participants. This study was conducted in Melaka on 200 participants. The findings of the study showed that the AIM microcredit had a significant impact on technology adoption and increased the participants' monthly household income in Melaka. The findings suggested that AIM microcredit remained relevant and played a vital role in increasing rural household monthly income, inculcated entrepreneurship among women and reduced poverty. Therefore, the Malaysian government should enact the relevant policies and provide support to enhance the effectiveness and outreach of microcredit.**

Keywords—Amanah Ikhtiar Malaysia (AIM), microcredit, technology adoption, economic growth, poverty reduction

I. INTRODUCTION

IN many countries, microfinance is a widely accepted instrument for increasing income and alleviating poverty around the world. It empowers the disadvantaged, rendering them economically independent. Microcredit provides financial aid, in particular to the vulnerable, due to their failure to receive financial aid from financial institutions. As a result, they can use the microcredit to become an entrepreneur and utilize modern technology that will generate income and improve their lives.

Historically, Professor Muhamad Yunus established a microcredit method in Bangladesh in 1976 that provided the poor with a valuable means of obtaining credit [1]. Professor Muhammad Yunus is one of the world's leading social entrepreneurs awarded with the Nobel Peace Prize for the establishment of the Grameen Bank in Bangladesh. This microcredit organization is the biggest to date, and it caters to 8 million borrowers [2]. In Malaysia, Amanah Ikhtiar Malaysia (AIM) is a well-known microcredit provider.

AIM was established in 1987 to provide small-scale financial services to the needy. AIM identifies its clients on the basis of household income that falls below the poverty line income [3] and is motivated by the effective Grameen Bank strategy to alleviate poverty in Bangladesh [4]. In 1986, Professor David S. Gibbons and Professor Sukor Kasim of the Center for Policy Research, Universiti Sains Malaysia (USM) conducted an action research program named Projek Ikhtiar as a trial project to explore the suitability and feasibility of the Grameen Bank strategy in Malaysia [5]. The effectiveness of Project Ikhtiar contributed to the creation of AIM in 1987 under the Trustee Incorporation Act 258 (revised in 1981). AIM became Malaysia's first microcredit organisation and the first Grameen Bank Replication outside Bangladesh [6].

Research has shown that microcredit promoted entrepreneurship, and technology adoption raised income-generating operation, thus, decreased poverty. For instance, Santana

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Félix & Belo [7] suggested that micro-credit had a substantial effect on poverty reduction in eleven developing countries in South East Asia by promoting self-employment or an entrepreneur. Furthermore, generating possibilities for stable employment at reasonable wages is the best way to bring people out of poverty. Studies has also shown that microcredit has a significant effect on household income of creditors, the development of personal assets [8] and the introduction of technologies capable of contributing to the rural economy and alleviating poverty [9]. Microcredit, thus, has a very positive impact on the creditors and the society, such as improving living standards, acquiring assets, adopting technologies, providing more employment prospects, being an entrepreneur or self-employed and enhancing family education. In other words, if the community is eligible to access financial assistance from the funding institutions that offer micro-credit, they might increase their household income, household consumption, assets, technology adoption, child education, empowerment, in addition to minimizing social inequality as well as a boost of quality of life.

Nevertheless, several researchers have concluded that there was no substantial effect between micro-credit and income growth or poverty reduction or even a marginal or unfavourable impact on the most underprivileged [10]. For example, the analysis by Donou-Adonsou & Sylwester[11] showed that there was no substantial correlation between micro-credit and poverty alleviation whereas Luan & Bauer[12] argued that microcredit only affected a particular income group. A study by Augsburg et al. [13] found that there was no evidence that the microcredit program in Bosnia and Herzegovina increased overall household income. In addition, Abdallah [14], , not only found a one-way relationship between microcredit and technology adoption but also indicated that inefficiency in the micro-credit industry might be a significant obstacle to the adoption of yield-enhancing technologies in sub-Saharan Africa. On the other hand, the research by Hazarika, Bezbaruah & Goswami [15] has shown that there was a positive relationship between access to micro-credit and the adoption of technology in India. It was, therefore, necessary to recognise the effect of the microcredit by AIM on the technology adoption and economic growth (income) of rural households in Melaka.

II. MICROCREDIT

Creditors typically utilise the loans they obtained from microcredit organisations to mitigate their economic (income) and social needs [3]. Microcredit systems offer a limited volume of financial resources to some focus populations in minimum conditions [16]. As the late Milton Friedman, recipient of the Nobel Prize in Economics in 1976, said: "the poor stay poor, not because they are lazy, but because they have no access to capital" [17]. This was viewed as a way of providing small loans to the needy or the less fortunate in society to enable them to produce their income [18]. Throughout this study, micro-credit is characterised as financial assistance that allows poor people to engage in income-generating activities that empower them to acquire capital and improve their standard of living.

In the 1970s, the word microcredit was commonly used and became prominent with the establishment of Grameen Bank. The origin of microcredit institutions in Malaysia can be traced back to the year 1987 following the establishment of the AIM under the Trustee Incorporation Act 258 (revised 1981). In 1988, 283 participants of AIM's pilot program were analysed on the effect on microcredit in poverty reduction and income growth. The research showed that 70% of participants substantially improved their monthly household income from an average of RM142 to RM220 [19]. In 1990, the second study on the internal impact of microcredit on the AIM participants' economy was conducted by AIM's research and development unit which indicated that total microcredit has a significant effect on household income. The study initiated by the Malaysian government by the Social Sciences and Economic Analysis Team (SERU) of the Prime Minister's Department reported that

the total household income of participants in the AIM microcredit scheme increased more than twice as much. In 1994, the third internal impact analysis also supported earlier results on the non-monetary effects of microcredit on disadvantaged households. The research has shown that the microcredit program often has a beneficial effect on non-monetary participants. For example, most participants reported an improvement in the percentage of the owner-occupied house to 85 per cent relative to 80 per cent before participating. There have also been several minor changes in the usage of household electrical products [19]. The rise in energy use was generally directly related to the improvement of people's standard of living, growing social well-being and changing lifestyles [20].

Moreover, the adoption of technology, especially in the agricultural sector, also plays an essential role in alleviating poverty [21]. It is aligned with the neoclassical economic theory of economic growth, in which economic production relies entirely on capital resources, labour and technological innovation. Higher capital accumulation will have a transient impact on development, whereas long-term development is driven by technical progress [9]. Therefore, the technology introduced in this study corresponded to the stage that the application or invention was chosen for usage by individuals (microcredit recipients) after obtaining microcredit from the AIM.

Currently, almost 99 per cent or approximately 300,000 AIM members are rural woman entrepreneurs. It projected to increase its membership to 400,000 by the end of 2019 [22]. Microcredit under the AIM scheme generally requires a short-term payback period of between 25 and 150 weeks. AIM is a government-linked organisation that has not only been active in increasing income among members but has also been effective in helping the government to minimise poverty in Malaysia. AIM identifies their clients on the basis of the client's gross average monthly household income. Households with a gross monthly household income below the poverty line income (PLI) measured by the Malaysian government on the basis of food prices and other essential needs) should be deemed to be absolutely inferior., households with a total monthly household income below half of the PLI will be classified as hardcore poor. AIM considers only those households whose gross monthly household income is below the PLI, which encompasses both poor and hardcore poor households [23].

In general, there are seven financing schemes (Table I) offered by AIM namely i-Mesra (targets to finance commercial ventures expected to garner attractive returns for clients), i-Srikandi (targeted for individuals with theoretically feasible and profitable ventures with funding varying from RM 12,000 to a maximum of RM 20,000). Among others, they are i-Wibawa which is specifically tailored for individuals subscribing to the i-Mesra or i-Srikandi scheme, providing soft loans to those who require extra funding to undertake seasonal ventures with a maximum disbursement amount of RM 5,000 to be paid within six months [24].

Besides that, AIM also provides i-Sejahtera which is a multipurpose loan for the acquisition of assets, purchasing of capital products, i-Bestari for education and training, including also personal expenditures such as Hajj Pilgrimage, i-Penyayang to assist the borrowers to revive or to re-start suspended projects, and lastly i-Emas is specially designed for the elderly or senior citizens.

Many measures need to be taken for an individual to be considered as a beneficiary or named an AIM 'sahabat'. Before interviewing the prospects, AIM must conduct due diligence to examine the background of the individual and to guarantee that they are genuinely under the PLI determined by AIM. If they succeeded in the pre-test and screening session, they would be interviewed again by the AIM branch Assistant Manager. If the session is successful, a group of five people will be identified. Members of the group will be of the same gender, have no biological relationship, responsible and have a good track record, trustworthy, consent to be members of the group and continue to support the members of the group while they are in difficulty to pay the loan.

TABLE I. AIM LOAN SCHEMES (AS OF 2019)

Loan schemes	Amount in RM	Instalment
Economic		
i-Mesra	1,000 – 5,000 5,001-10,000 (max)	12, 25, 35, 50 12, 25, 35, 50, 75, 100
i-Srikandi	10,000 – 20,000 20,000 – 30,000 (max)	12, 25, 35, 50, 75, 100, 125, 150 12, 25, 35, 50, 75, 100, 125, 150
i-Wibawa	5,000 (max)	12, 25 weeks or every month for six months or lump sum payment
Others		
i-Sejahtera	1,000 – 3,000 3,001 – 5000 (max)	12, 25, 35, 50 12, 25, 35, 50, 75, 100
i-Bestari	1,000 – 3,000 3,001 – 5,000 (max)	12, 25, 35, 50 12, 25, 35, 50, 75, 100
i-Penyayang	1,000 – 3,000 3,001 – 5,000 (max)	12, 25, 35, 50 12, 25, 35, 50, 75, 100
i-Emas	2,000 (max)	12, 25, 35, 50

Source: https://www.aim.gov.my/skim-pembiayaan-ikhtiar/

After approximately 30 years of operation, as in April 2019, AIM has established 136 branches from 30 regions all around Malaysia. After the establishment of AIM, there has been 377,380 beneficiaries and 304,596 current beneficiaries, with 98.71 per cent of creditors have settled their loan [25]. AIM has become well-known for its success stories of not just increasing income but also transforming the disadvantaged into productive entrepreneurs. Therefore, by the end of 2019, the Ministry of Rural and Regional Development of Malaysia announced an expansion in AIM membership to 400,000.

III. OBJECTIVE OF THE STUDY

AIM was the first microcredit organisation and one of the leading players contributing to income growth and also widely known for helping rural communities cope with the poverty issue in Malaysia. This study, therefore, chose AIM to assess the effect of microcredit on rural household income in Melaka as there has been limited research in those areas even though several surveys have been undertaken to assess the effect of AIM on rural household income in a variety of locations elsewhere.

Furthermore, some studies have concluded that the effect of microcredit was a range of positive, no impact and limited impact on income, and even negligible or negative impact on household income among the disadvantaged. For instance, the analysis by Donou-& Sylwester[11] reported that there was no substantial correlation between microcredit and poverty reduction. Luan & Bauer [12] claimed that microcredit only had an effect on a particular income group. Augsburg et al. [13] indicated that there was no proof that the microcredit system in Bosnia and Herzegovina has raised average household income. As far as technology adoption is concerned, Abdallah [14] noted that the relationship between microcredit and technology adoption is a one-way causal relationship, rather than a two-way relationship. On the other hand, the survey in Bangladesh confirmed that farmers were about 86 per cent technologically efficient (technology impact) and that, among them, creditors were more effective than non-creditors [26].

In view of the above, an attempt has been made to research the effect of microcredit on rural household income in Melaka with the following objectives:

- To study the socio-economic demographic profiles of 'sahabat' AIM in Melaka
- To analyse the impact of microcredit in changing the creditors' lives, and
- To investigate the relationship between microcredit on technology adoption and household income.

IV. METHODS AND DATA COLLECTION

This research was performed in Melaka, utilising a quantitative approach incorporating a collection of sequential data via a questionnaire survey. The questionnaires are developed employing the nominal scale and the Likert scale. All items were assessed using a five-point Likert scale varying from "Strongly Disagree" to 5 "Strongly Agree". A total of 200 respondents have enrolled in the AIM Microcredit Program for more than three months. Such identified respondents or "sahabat" may have a lot of

experience and awareness of the microcredit services offered by AIM, and experienced a significant impact on their income.

In addition to administering questionnaires to respondents, a personal interview was initiated to gather details and allow respondents to talk openly regarding the microcredit system they engaged. The pilot study was performed on 30 respondents at AIM branches in Selangor, Melaka and Pahang to verify the questionnaire suitability. Cronbach's alpha was 0.874 with a total of 27 items or questions that were more relevant to the socio-economic background of the respondents, their perception of the AIM system, their income, technology adoption and assets before and after being AIM's 'sahabat'. The alpha value of Cronbach was more than 0.7, suggesting that the study questionnaires were reliable [27].

A. Technology Adoption

The Modification Model introduced by Lawin, Tamini & Bocoum [28] was utilised to investigate the relationship between microcredit and technology adoption among AIM beneficiaries. Hypothesis and correlation tests have been performed. The analyses were performed on the basis of three components, and the overall findings were shown below.

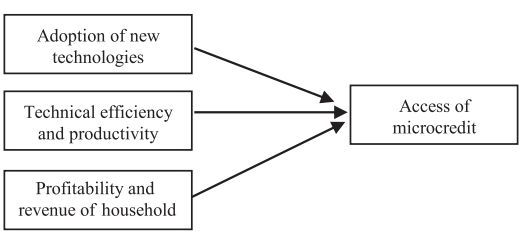

Figure 1: Modification of the theoretical framework

Adoption of Technologies

The lack of access to credit is often described as one of the constraints on technology adoption [29][9][30]. In the agriculture sector, for instance, vulnerable households lacking resources are threatened to seek formal or structured financial assistance and services. Hence, microcredit institutions will support farmers in particular and reduce the credit restrictions faced by them [31]. Furthermore, much empiric research has indicated that access to microcredit has a significant effect on technology adoption. As an example, research by Hazarika, Bezbaruah & Goswami [15] revealed that there was a positive relationship between access to microcredit and the adoption of technology in India. In addition, Anang, Bäckman & Sipiläinen [32] considered that credit has a positive effect on technological efficiency, which often referred to the adoption of technology. The first hypothesis suggested for this study was, therefore:

H_1: There is a significant relationship between microcredit and technology adoption.

B. Technical Efficiency and Productivity

Some empirical studies have examined the correlation between microcredit and technical efficiency and productivity. Studies such as by Zhao & Barry [33] in China, Girabi & Mwakaje [34] and Babu & Kulshreshtha [35] suggested that there was a definite connection between micro-credit and technical efficiency. Nonetheless, Quayes & Khalily [36] concluded that microcredit was counterproductive to performance. Rezitis, Tsiboukas & Tsoukalas [36] stated that the microcredit system had not increased the productivity of farms in Greece. The authors pointed out that even though microcredit helped the creditors or participants to utilise or acquire modern technologies in production, certain forms of inputs, such as access to information, better governance and better infrastructure, are required to increase technical efficiency. Therefore, the second hypothesis in this study was as follows:

H_2: There is a significant relationship between microcredit and technical efficiency.

C. Profitability and Revenue Household

the connection between microcredit and productivity, and household income attributable to the adoption of technology were examined. The findings do not, though, pointed in the same direction. Angelucci, Karlan & Zinman [37] reported that micro-credit did not impact income and profit in Mexico. Nonetheless, Kaboski & Townsend [38] has found that there

were substantial rises in the income of Thai farmers after receiving microcredit. Mghenyi [39] also acknowledged that access to credit substantially improved agricultural income by automation, utilising fertilisers and adequate labours. Therefore, the third hypothesis of this study was as follows:

H_3: There is a significant relationship between microcredit and profitability or revenue household.

V. RESULTS AND DISCUSSION

A. Demographic Profile

All respondents in this study were female. Based on the socio-economic demographic profile (Table II), the majority of respondents were Malay (96 per cent), 1 per cent Chinese and 3 per cent Indian. Most of the respondents fell within the age category 41 years and above. The Majority of respondents (57%) were married and homemakers. Challenges encountered by their spouses inspired them to support their spouses in raising their household income. Many of them came from families with family members of 5-6 people (35 per cent). The researchers also found that they had a deficient education level in which about 30 per cent of respondents studied up to primary level and 54 per cent completed secondary level.

However, 7 per cent of respondents were degree holders. This fact demonstrated that certificate level education and only a small percentage (9 per cent) with diplomas significantly impact on income level, and supported a significant and positive relationship between education and income [40]. It also found that most respondents at 67 per cent have entrepreneurship skill and experience before they became AIM creditors.

TABLE II. RESPONDENTS PERSONAL PROFILE

Respondents' profile	*No of respondents*	*Percentage (%)*
Race:		
Malay	192	96
Chinese	2	1
Indian	6	3
Age:		
20-25	26	13
26-30	16	8
31-35	28	14
36-40	42	21
41 and above	88	44
Marital Status:		14
Single	28	57
Married	114	24
Widowed	48	5
Divorced	10	
Education Level:		
Primary	60	30
Secondary	108	54
Certificate	14	7
Diploma	16	8
Degree	2	1
Experience in Business:		
Yes	134	67
No	66	33
A Family Members:		
1-2	16	8
3-4	46	23
5-6	70	35
7-8	40	20
9-10	14	7
11 and above	14	7
Type of Business:		
Production	136	68
Trading	54	27
Services	10	5

In general, the economic practices of the AIM members chosen for this study were categorised into production, trade and services. In this study, the majority of them were involved in trade. They operated small companies that market grocery supplies, night market, beauty and health items, and direct selling. The second and third economic activities the respondents were engaged in include production (agriculture, fisheries, food and beverage and livestock breeding) and services (sewing, babysitting, nursery, food stall and insurance or takaful agent) among others.

In this study, 54 percent of participants borrowed less than RM5,000, 32 percent borrowed between RM5,001 and RM10,000, and only 14 percent borrowed more than RM10,000.

Most of the respondents used the loans to establish or expand their business.

B. Monthly Household Income

Borrowers were also questioned regarding their household income before and after participating in the AIM microcredit scheme. The researchers have included a selection of choices for respondents: "income before" reflects the total monthly family profit before they borrow from AIM, and "income after" corresponds to profits at the point of data collection or their current income.

According to Table III, microcredit gives a positive impact on borrowers' monthly household income. The analysis of data affirmed this fact. As described in Table III, it is found that the majority of the monthly household income of the borrowers before taking microcredit was 34 percent below RM1000 and after having a loan, most of their income increased to RM2001-RM3000 which is 47 percent of the respondents. This indicates that the microcredit program provided by AIM gives a positive impact on the per capita household monthly income. However, only 5 percent shows that their income increases to more than RM4000 per month after their participation in AIM's microcredit programs. These results indicated that the majority of respondents are still in the poverty and B40 group.

TABLE III. MICROCREDIT EFFECT ON MONTHLY HOUSEHOLD INCOME

My monthly household income increases after participating in the AIM's microcredit program	***Frequency***	***Percent***
Strongly disagree	0	0
Disagree	11	11
Moderate	5	5
Agree	64	64
Strongly agree	20	20

Respondents were requested to provide input on their perception of the microcredit system provided by AIM whether or not it increased their monthly income. 64 per cent agreed that microcredit would help them raise their monthly household income. 20 per cent of respondents responded that they strongly agreed that AIM microcredit helped them raise monthly household income. Only 11 per cent of respondents replied otherwise. In this case, they mostly participated in AIM's microcredit program for less than one year. This result supported the finding that the longer they were involved in the scheme, the more expertise they had that enabled them to increase earning or income from business [40] ultimately.

C. Relationship between Microcredit and Technology Adoption

Hypothesis and correlation tests were conducted to investigate the relationship between microcredit and technology adoption. Analyses were performed based on the three main components of modification adaption technology, as explained previously, and the overall results were shown in Table IV below.

TABLE IV. CORRELATION OF TECHNOLOGY ADOPTION

Factors	Pearson Correlation	Multiple Regression		
	Results	Beta	P-Value	Hypothesis
Technology Adoption H_1: Technology adoption has a significant relationship between microcredits.	.721	.459	.000	Accepted
Technical Efficiency and Productivity H_2: Technical efficiency and productivity have a significant relationship between microcredits.	.422	.132	.002	Accepted
Profitability and Revenue Household H_3: Profitability and revenue household have a significant relationship between microcredits.	.683	.375	.000	Accepted

D. Technology Adoption

Table IV illustrates that technology adoption has had a substantial affected on access microcredit among AIM creditors that the p-value was 0.000, and the Beta value was 0.59.

The null hypothesis (H_0) was rejected, whereas the alternative hypothesis (H_1) was accepted as a p-value was lesser than 0.5. In brief, it can be clarified and concluded that the acceptance of the technology factor was greatly affected by micro-credit among AIM borrowers.

This finding was consistent with Mariyoni [9] that microcredit has had a significant direct effect not just on household prosperity but also on the willingness of borrowers to implement the technology. The majority of borrowers in this study were farmers or those who were involved in the agriculture field. Access to microcredit financing allowed them to gain access to state-of-the-art technologies in the production process, which ensured that AIM creditors were able to implement the technologies.

Table IV also demonstrates the overall impact of microcredit on technical performance and productivity. The findings suggested that technological efficiency and performance have been greatly affected by access to microcredit. The p-value was 0.002, and the beta-value was 0.132. Therefore, the null hypothesis (H_0) was rejected, while the alternate hypothesis (H_2) was accepted on the basis that p-value was lesser than 0.5. It can be concluded that the AIM creditors' technological efficiency and productivity have significantly been affected by access to microcredit.

The result, thus, indicated that there was a clear access to microcredit offering technical efficiency and productivity. Credit can be considered as a critical component of all production aspects because with the credit, the borrowers or farmers were able to adapt to technology which substantially influenced the production. For instance, Chaovanapoonphol et al. [41] found that credit can reduce the technical inefficiency of rice farmers in Thailand. Ayaz & Hussain [42] found that credit to have a positive impact on the production efficiency of Pakistani farmers. Abdallah [14] posited that the technical efficiency of maize farmers in Ghana was due to a positive effect of credit on efficiency. Other than adopting technology, credit also helps producers or farmers to buy other production inputs or hire labor that may enhance their technical efficiency and productivity.

For the last hypothesis, the findings indicated that household productivity and income were substantially affected by access to micro-credit. The p-value was 0.002, and the beta-value was 0.375. The null hypothesis (H_0) was rejected, whereas the alternative hypothesis (H_3) was accepted as p-value was lesser than 0.5. In brief, it can be clarified and concluded that the AIM borrowers' profitability and household income were significantly influenced by microcredit.

Most empiric research has shown that microcredit has a significant effect on the productivity and income of households. Nonetheless, Alhassan, Hoedoafia & Braimah [43] studied the Tamale Metropolis of Ghana and noticed that access to micro-credit significantly improved the productivity of woman entrepreneurs. Gyimah & Boachie [44] have claimed that all microfinance products have a positive influence on small business growth and that microcredits have a tremendous influence.

VI. CONCLUSION

In conclusion, it can be concluded that the proposed objectives have been achieved. The first objective is to study the socio-economic demographic profiles of 'sahabat' AIM in Melaka. The findings revealed that the majority of the respondents were Malay women who were between the ages of 41 and above.

The second objective of this study is to examine the effect of microcredit on transforming their lives. The results showed that participation in the AIM microcredit did not just increase household income but also motivated women to become an entrepreneur. The majority of respondents were women, and the findings suggested that the availability of microcredit will help them launch their small business. The results of this report further confirmed and extended the literature, as other effect research on AIM's micro-credit schemes have already shown that the micro-credit programs improved the income and economic growth of rural households.

Finally, the third objective of this study is to explore the connection between technology-

based microcredit and household income. The findings indicated a strong effect of microcredit on the implementation of technology, technical performance and profitability of the respondents. According to Mariyoni [9], microcredit not only has a beneficial effect on household prosperity but also influences creditors to embrace and adopt the technology. Technology adoption offers higher output and efficiency of production as well as generates more income. It indicates that the availability of microcredit indeed allows them to adopt technologies and increase their income.

Nonetheless, based on input from the respondents, the adoption of technology in this study was mostly restricted to simple machines or unsophisticated technology because the more advanced technologies needed a significant sum of credit or loan. Unlike commercial banks, AIM only offers a cap of RM30, 000 for micro-credit and does not need to have collateral. Microcredit will also be a perfect choice and a more convenient way for small and rural households to access credit.

From the findings of the study, the researchers conclude that the microcredit offered by AIM is still relevant and plays an essential role in boosting rural household income. It also has a significant direct influence not just on household prosperity but also on borrowers' willingness to implement the technology. AIM is also capable of inculcating women's empowerment and reducing deprivation. The study also recommends AIM creditors to embrace and adopt the technology by taking advantage of credit that comes with micro-insurance or takaful offered by AIM. The protection or takaful scheme not only eliminates the risk on borrowers if their initiative fails but also removes the financial pressure on microcredit entities from unpayable loans.

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