Cryptocurrency Adoption in Malaysia: Does Age, Income and Education Level Matter?

Yoon-Chow Yeong, Khairul Shafee Kalid, Savita K Sugathan

Abstract:Dated back in 2008, the first blockchain-powered cryptocurrency-Bitcoin was introduced by Satoshi Nakamoto. Over the years, the types of cryptocurrencies available in the market amounted to more than 2,000. With the disruptive potential to revolutionize the traditional financial services, cryptocurrencies become a topic of interest among scholars, global regulators, investors, business operators, information technology enthusiasts and consumers. Nevertheless, the negative activities associated with cryptocurrencies such as money laundering and illicit trading, have resulted in the legality of cryptocurrencies remain controversial in the global context.As the worldwide regulators expressed different stance towards cryptocurrency acceptance and adoption, this study sought to gauge the individual's behavioral intention to use cryptocurrency. Recognizing the dearth of study in Asian countries, especially the developing country, this study addresses the literature gap by focusing the case of Malaysian individuals. Specifically, this study investigated the effects of age, education level and income level differences in an individual's behavioral intention to use cryptocurrency.The sample is made up of 176 Malaysian individuals who are equipped with cryptocurrency knowledge. The empirical data were gathered using online survey questionnaire via Google form. Subsequently, the data were analyzed using one-way analysis of variance (ANOVA) to understand the demographics effect on the intention to adopt cryptocurrency.Finally, the results revealed that the role of age, education and income level are not significant in influencing an individual's behavior towards cryptocurrency adoption.

Keywords: Age differences, Behavioral intention, Cryptocurrency, Education level differences, Income level differences,Malaysian individuals

I. INTRODUCTION

Sincethe inception of Bitcoin in 2008, the topics of blockchain technology and cryptocurrencies have been gaining widespread attention from the global regulators, IT applications developers, corporations and consumers.Despite blockchain technology started emerges in the field of financial technology, it can be applied across diverse industries. For instance, a blockchain-based electronic health record sharing system in healthcare industry [1-3], a peer-to-peer electricity model trading among plug-in hybrid electric vehicles using consortium blockchain in transportation sector[4], a blockchain-powered halal digital supply chain model in halal industry[5, 6], an e-scroll system on blockchain network to overcome the problem of counterfeit degree of certificates in the education industry [7], as well as a blockchain based agricultural products tracking model in the agricultural supply chain area [8].Blockchain technology is well-known as a disruptive technology and it has the potential to revolutionize the traditional processes and models in such way that a central authority is not required to verify transactions [9]. In general, the unique features of blockchain that attracted adoption could be attributed to theimmutable records of information, decentralized property and transparency[10, 11].

In the financial industry, the first ever blockchain application is Bitcoin[12], which appeared as the first cryptocurrency. As defined by [13], cryptocurrency is a token on a distributed consensus ledger that facilitates peer-to-peer exchange bypassing a third-party intermediary. A cryptocurrency unit can be obtained, stored and transacted electronically via the blockchain network [12, 14]. As of 2019, there are over 2,000 types of cryptocurrencies available in the market, which amounted to a total market capitalization of USD 276 billion [15]. Other popular cryptocurrencies included, but not limited to, Ethereum, Litecoin, Zcash and Ripple[16].

Despite the significant growth of cryptocurrency trend over the years, the global regulators embrace different attitudes and standpoints towards acceptingcryptocurrency as a legal tender in payments for goods and services. Such heated controversy could be attributed to the use of cryptocurrencies as a means for illicit transactions, for instance, money laundering as well as trade for drugsand weapons [17, 18]. In comparison with other countries'stern stance towards cryptocurrencies such as China, Malaysia regulators have relatively favorable and positive attitude towards the advent of cryptocurrencies. This is evident when the Malaysian government established regulatory framework to monitor cryptocurrency related activities and granted conditional approval to three local digital currency exchanges for their operations[19].Motivated by the recent explosion of interest towards cryptocurrencies among Malaysian individuals, this study aims to gauge their behavioral intention to use cryptocurrency. This study was based on the Unified Technology Acceptance and Use of Technology 2, developed by Venkatesh, Thong [20].

II. REVIEW OF RELATED WORK

In terms of the effects of demographics on technology adoption, Morris and Venkatesh [21]examined the effect of age on an individual's adoption of a

Revised Manuscript Received on September 03, 2019

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new software system at workplace. The results revealed that there are obvious differences with age in the adoption of a new technology in workplace. At the initial phase of innovation diffusion, the favorable attitude of younger workers towards accepting the new software was more salient than that of the older workers [21]. Later in 2005, the authors extended the Theory of Planned Behavior (TPB) by incorporating the age variable as moderator[22].A review study conducted byGoswami and Dutta [23] concluded that gender differences cannot be witnessed in minor cases such as interaction via social media and electronic commerce. As contrary, the role of gender differences was more salient in IT usage such as email-services, computers and electronic data management systems.Abu-Shanab [24] investigated the role of education level in affecting an individual's perception of adopting Internet banking. As expected, the results demonstrated that education significantly moderate the relationships between behavioral intention to use Internet banking and four variables (i.e. performance expectancy, social influence, self-efficacy, perceived trust and locus of control).

In the cryptocurrency literature, Hutchison [25] found that demographics variables including gender, age, income and education play a salient role in an individual's intention to use Bitcoin.Surprisingly, the findings of Silinskyte [26]is completely contradictory with that of Hutchison [25], in such way that the age and gender differences did not matter in the context of Bitcoin adoption behavior. In a study by Gunawan and Novendra [27],the age and gender differences were also found insignificant in influencing Indonesian individuals to use cryptocurrency. Overall, there seems a lack of study investigating of the demographic effects on an individual's behavioral intention to use cryptocurrency in the case of Malaysian individuals.

Meanwhile, there is a dearth of literature on investigating the effects of income level and education level on an individual's behavioral intention to adopt a technology, especially in the context of cryptocurrency. Recognizing that cryptocurrencies involve value, the price volatility of cryptocurrency unit somehow affects the way an individual perceive its value. In turn, an individual's income level plays an important role in affecting their decision to use cryptocurrency which is volatile in nature. In view of that cryptocurrency is a relatively new innovation leveraging on the novel blockchain technology, it requires a certain level of financial and technical knowledge for its usage and price monitoring. Despite a thorough understanding on the algorithm underlying the cryptocurrency and blockchain wallet is not necessary, there exists misconceptions among the public on the complexity of using cryptocurrency [28]. Therefore,the individuals with lower education level tend to hesitate and refuse to use cryptocurrency as it appears as a challenge for them.In addition to education level and income level, this study also examines the age differences in cryptocurrency adoption. Considering that fiat currency has been the means for payment for a long time, older generations tend to refuse accepting new innovations as they may have a more difficult time to adapt the changes and new features of the new payment means. In short, this study sought to explore the between-groups differences in the Malaysia individuals' intention to use cryptocurrency, in terms of age, education level and income level.This study aims to address the following research question:

RQ1: Is there a statistically difference on behavioral intention to use cryptocurrency for young, middle-aged and old respondents?

RQ2: Is there a statistically difference on behavioral intention to use cryptocurrency for secondary school certificates, diploma, bachelor's degree and master's degree holder?

RQ3: Is there a statistically difference on behavioral intention to use cryptocurrency for low-, medium- and high-level income respondents?

III. RESEARCH METHODOLOGY

This section describes the methods and tools used along the process of instrument development, survey data examination and data analysis. This study intends to gauge the between-groups age, income level and education level differences in an individual's intention to use cryptocurrency in the case of Malaysia. To achieve this research aim, this study follows a deductive quantitative approach to design research activities. As for data collection tool, this study utilizes an online survey questionnaire because it is effective in terms of time consumption and cost. The link to the survey questionnaire was disseminated to various Malaysian virtual cryptocurrency communities via social media platforms such as Facebook, Whatsapp, LinkedIn and Telegram. Meanwhile, the link was also personally sent to the potential respondents who were identified from the respective groups, in order to increase the response rate.

In regard to the questionnaire development, the measurement items were retrieved from the literature of technology adoption, blockchain and cryptocurrency[20, 29-31]. The respondents were prompted to rate their responses on a 5-point Likert scale, in which value 1 represents "strongly disagree", value 2 represents "disagree", value 3 represents "neutral", value 4 represents "agree" and value "5" represents "strongly agree". The content of questionnaire is made up of two sections, in which the first section asked about the demographic information and the second section included the question related the measurement items for behavioral intention to use cryptocurrency and other constructs.

This study employs purposive sampling approach to select respondents who are Malaysians and equipped with at least a basic understanding about cryptocurrency.Recognizing that cryptocurrency-based transaction records are stored on a decentralized network, the real identity of the users are unable to be retrieved. In turn, a complete list of cryptocurrency users is unavailable for complete sampling frame development. Therefore, this study does not aim to achieve sample generalization via probabilistic sampling, instead, non-probabilistic sampling was carried out systematically to achieve theory generalization[32]. In the meantime, Gpower software was used to calculate the minimum sample size [33]. Subsequently, the calculation result revealed that the required sample size for this study is 160.

Prior to the main data analysis phase, preliminary data analysis was conducted to address data collection issue in order to reduce measurement error [34].The primary data collection issues such as straight lining and outliers were addressed using IBM SPSS Statistics 25 software [35].From a total of 208 survey responses collected, 24 non-Malaysian responses, 5 straight lining cases and 3 outlier cases were removed. As a result, 176 responses were retained for further analyses.Since the empirical data were collected using Google form, the settings were adjusted to restrict respondents from submitting incomplete forms, and thus no missing values were found from the gathered survey questionnaires. Moreover, the reliability and validity of measurement items and constructs were confirmed using structural equation modeling approach with SmartPLS software [36]. To examine the demographic effects on the behavioral intention to use cryptocurrency, SPSS software was used to conduct one-way ANOVA.

IV. RESULTS AND DISCUSSION

This section presents the findings on investigating the differences on the behavioral intention to use cryptocurrency among groups based on age, education level and income level. The statistical technique (i.e. one-way ANOVA) was employed to test the significant differences between groups. As the demographic variables (i.e. age, education and income) have more than two groups, one-way ANOVA is appropriate to be used to compare the mean scores of more than two groups and assess if the mean differences exist on the continuous variable (i.e. behavioral intention to use cryptocurrency) by an independent variable.

Prior to one-way ANOVA, the tests for homogeneity of variance were conducted to examine whether the variances in the mean scores is similar for each of the groups. As a result, the Levene's test for homogeneity of variance results revealed that the assumption of homogeneity of variances for all the groups within each demographic variable were not violated. This is evident when all the significance values were greater than 0.05, as depicted in Table I.

Table I. Levene's test for homogeneity of variances results

Factor	Levene statistic	df1	df2	Sig.
Age	0.986	2	173	0.375
Education level	0.713	3	166	0.545
Income level	0.899	2	173	0.409

A. Age differences

The age groups were categorized into three groups: young, middle-aged and old respondent. For the age group ranged below 20 to 30 was coded with a value '1' and labeled as 'young', those who aged between 31 and 50 was coded with a value '2' and labeled as 'middle-aged', as well as for those who aged above 50 was coded with a value '3' and labeled as 'old'. The null hypothesis and alternative hypothesis on age differences were formulated as below:

H_0: There is not a statistically significant difference on the behavioral intention to use cryptocurrency by age.
H_a: There is a statistically difference on the behavioral intention to use cryptocurrency by age.

The one-way ANOVA results showed that the p-value is 0.833, which is greater than 0.05. This indicates the null hypothesis of equal means between different age groups cannot be rejected. In another words, there was not significant difference in the mean for behavioral intention to use cryptocurrency between the young, middle-aged and old respondents.Table IIdisplays the descriptive statistics of the age groups and Table IIIpresents the one-way ANOVA result on age differences.

Table II: Descriptive statistics of age groups

Age category	Frequency	Mean	Standard deviation
Young	73	1.66	0.612
Middle-aged	90		
Old	13		
Total	176		

Table III. One-way ANOVA result on age differences

Age	Sum of squares	df	Mean square	F	p
Between groups	0.279	2	0.139	0.183	0.833
Within groups	131.719	173	0.761		
Total	131.997	175			

B. Education level differences

The education groups were categorized into four groups: secondary school certificates, diploma, bachelor's degree and master's degree.For those respondents who have attained secondary school level were coded with a value '1' and labeled as 'secondary school', those with diploma certificate were coded with '2' and labeled as 'diploma', those with bachelor's degree were coded with '3' and labeled as 'bachelor', as well as those who are master's degree holder were coded with '4' and labeled as 'master'. The null hypothesis and the alternative hypothesis on education level differences were postulated as below:

H_0: There is not a statistically significant difference on the behavioral intention to use cryptocurrency by education level.

H_a: There is a statistically significant difference on the behavioral intention to use cryptocurrency by education level.

The one-way ANOVA results revealed that the p-value is 0.231, which is greater than 0.05, indicating a lack of evident to reject the null hypothesis of equal variances between the education level groups. Likewise, this means that the respondents have the same level of intention to use cryptocurrency regardless of the education level they have attained. Table IV displays the descriptive statistics of education level groups and Table Vpresents the one-way ANOVA result on education level differences.

Table IV: Descriptive statistics of education level groups

Education category	Frequency	Mean	Standard deviation
Secondary school	16	2.85	0.901
Diploma	32		
Bachelor	96		
Master	26		
Others	6		
Total	176		

Table V. One-way ANOVA result on education differences

Education	Sum of squares	df	Mean square	F	p
Between groups	3.26	3	1.087	1.448	0.231
Within groups	124.597	166	0.751		
Total	127.857	169			

C. Income level differences

The income level groups were categorized into three groups: low, middle and high-level income.The respondents who have income ranged below RM 2,000 to RM 4,000 were coded with value '1' and labeled as 'low', those whose income ranged between RM 4,001 to RM 8,000 were coded with value '2' and labeled as 'medium', as well as those who earn above RM 8,000 were coded with value '3' and labeled as 'high'. The null hypothesis and alternative hypotheses were developed as below:

H_0: There is not a statistically difference on the behavioral intention to use cryptocurrency by income level.

H_a: There is a statistically difference on the behavioral intention to use cryptocurrency by income level.

The one-way ANOVA resultsdemonstrated that the p-value is 0.492, which is greater than 0.05. This implies that the null hypothesis of equal means between difference levels of income is failed to reject. Table VI shows the descriptive statistics of the income level groups and Table VIIoutlines the one-way ANOVA result on income level differences.

Table VI. Descriptive statistics of income level groups

Income category	Frequency	Mean	Standard deviation
Low	59	1.97	0.803
Medium	63		
Hight	54		
Total	176		

Table VII. One-way ANOVA result on income differences

Income	Sum of squares	df	Mean square	F	p
Between groups	1.079	2	0.539	0.713	0.492
Within groups	130.919	173	0.757		
Total	131.997	175			

In a nutshell, the study concluded that the age difference, education level difference and income difference do not have an effect on an individual's intention to use cryptocurrency in the case of Malaysian individuals. The insignificant role of age difference implies that Malaysian youngsters, adults and elderly people behave the same towards cryptocurrency adoption. As the elderly individuals are expected to be non-tech savvy, this study found a surprising finding that they are actually open to innovations and willing to explore the new means of payment. According to the demographic profile of the respondents, 4% of them are retiree and they may incline to try new innovations to stir up their retirement journey.

As the conventional belief suggested that those with higher education have better access to information and knowledge about new innovations, this study found that the level of education the respondents have attained does not affecttheir behavioral intention to use cryptocurrency. This could be attributed to the respondents' realization of the simplicity of using cryptocurrency for payments.

Last but not least, this study found that the behavioral intention to use cryptocurrency does not vary across different levels of income. This implies that the respondents intend to use cryptocurrency regardless their level of income. One possible reason is that the value of cryptocurrency involves speculation that might benefit investors. In fact, there are people refer cryptocurrency as a 'quick-rich' scheme as its price is highly volatility over the recent years. For those who have lower income level, they may use cryptocurrency as an investment tool and hoping for monetary gain. Whereas, for those who belong to the middle- and high-income level groups, it is deemed that they can bear the financial costs associated with the price fluctuations of cryptocurrency.

V. CONCLUSION

In a nutshell, this study conducted one-way analysis of variance (ANOVA) to investigate on the differences of behavioral intention to use cryptocurrency based on age, education level and income level. The results revealed that the aforementioned demographic variables do not play a role to influence an individual's behavioral intention to use cryptocurrency.

There are several limitations in this study that could be addressed in the future research. Firstly, the unit of analysis is limited to the Malaysian individuals who have joined virtual cryptocurrency communities exist on social media platforms. Hence, the survey questionnaire was unreachable at the individuals who do not active on those groups, yet theyare actual users of cryptocurrency. Future research could be expanded to reach these individuals by sending out hardcopy survey questionnaire during blockchain and cryptocurrency related events. This could provide new insights by analyzing the empirical data of respondents from different demographic profile and backgrounds.

Secondly, this study limited the exploration to age, income and education level differences, as there may be other contributing variables that explain the observed individual's intention to use cryptocurrency. For instance, the potential factors that affect an individual's intention to use cryptocurrency include information technology proficiency and gender. Existing studies found that males are more inclined to adopt new technology as compared to females [22, 23]. Hence, this study can be extended to conduct independent-samples t-test in order to examine the gender differences in the intention to adopt cryptocurrency.

Furthermore, this study was conducted in the case of Malaysia, which is a developing country.This might not reflect a holistic view on the behavioral differences in terms of difference countries. For future work, a comparative analysis could be done by investigating the differences between developed country and developing country. As developed country is distinct from developing country in terms of technological

infrastructure and average household income, the degree of cryptocurrency acceptance may vary across countries. Meanwhile, the legality stance on cryptocurrency are different among developing countries, thus, future research could examine on the effect of political stance towards an individual's intention to use cryptocurrency. Overall, this study contributes to the technology acceptance and adoption literature, as well as provides meaningful insights on the cryptocurrency adoption trend to the global regulators, IT enthusiasts and blockchain practitioners.

ACKNOWLEDGMENT

This research was funded by University Research Internal Fund (URIF), grant number 015LB0-047.

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