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INTERNAL FACTORS AFFECTING PERCEIVED IMPACT OF ICT ON RURAL BUSINESS POTENTIAL: THE MEDIATING ROLE OF PRODUCTIVE INTERNET USAGE

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ABSTRACT

This paper aims to find out the mediating effect of productive internet usage in the relationship between internal factors of internet adoption and perceived rural business potential impact of Information and Communication Technology (ICT). Internal factors investigated in this study are perceived ease of use of ICT, perceived usefulness of ICT, and ICT literacy. The expected outcome is perceived impact of ICT on rural business potential, while productive internet usage act as the mediator variable in this study. The findings show that productive internet usage mediates the effect of the three internal factors on the expected outcome. This study shows the important of creating more opportunity for the community members to get more exposure to the productive internet usage and its benefit, especially in increasing business potential. Besides that, through the mediation model analysis, this study helps to assess the effectiveness of internet usage for rural business potential and give an insight of how productive internet usage plays its role in mediating the impact of internal factors on the perceived impact of ICT on rural business potential.

Contribution/ Originality: This study contributes a mediation model of perceived rural business potential impact of ICT, which give a comprehensive perspective on examining the intervening effect of productive internet usage on the community's perception about the impact of ICT on rural business potential.

1. INTRODUCTION

The usage of internet for business purposes has currently become a trend among the entrepreneurs. The social media such as Facebook and Instagram for instance, has provide a platform for the entrepreneur to market their product through Facebook Marketplace, and enable them to create a business profile on these platforms. This expand the opportunity for the local entrepreneurs to reach their potential customer. This paper focus into the mediating role of productive internet usage in the relationship between the internal factors of internet adoption and the perceived impact of ICT on rural business potential. It takes into consideration perceived usefulness of ICT, perceived ease of use of ICT, and ICT literacy as the determinant, productive internet usage as the intervening variable, and rural community's perception on the impact of ICT on business potential in the rural community as the outcome.

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Productive Internet usage in this study refers to the extent to which an individual in the community uses the Internet in their daily lives productively. Rogers (2003) defines innovation diffusion as the decision of an individual to make use of an innovation as the best course of action available, which in this study, Internet adoption is the innovation. In this study, productive internet usage was measure by the usage of internet for work, business, education, e-government, e-banking, e-health, and news reading, while business potential refers to the production and sales of local product including agricultural product.

This study integrates productive internet usage as a mediator. According to Kenny (2018) a mediator variable explains the relationship between the dependent variable and the independent variable, in which the process of complete mediation is defined as the complete intervention caused by the mediator variable. A mediation effect will most probably occur when the relationship between the determining factor and mediator, as well as the relationship between the mediator and the dependent variable are established. Kenny (2018) Therefore, previous research on the determining factor and productive internet usage, as well as productive internet usage and its impact on cottage were referred to establish a new mediation model for this research Figure 1.

Numerous studies have been published in recent years about ICT or Internet diffusion (Adila, Nor'izah, & Habee, 2013; Huda et al., 2010). However, they were mostly focusing more on the impact and challenges of the Internet adoption. In contrast to that, through the mediation model analysis, this paper helps assessing the effectiveness of internet usage for rural business potential. See Figure 1.

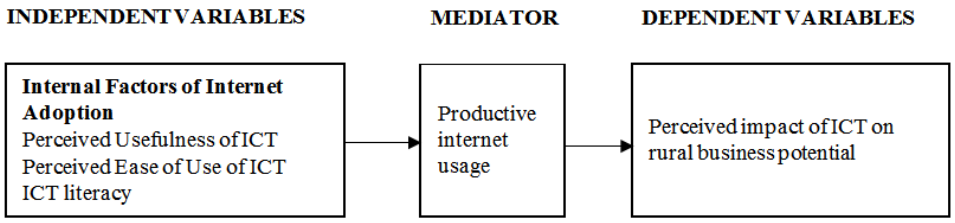

Figure-1. Conceptual framework

1.1. Objectives of the Study

1.1.1. Main Objective

To find out if productive internet usage mediates the relationship between internal factors of internet adoption and perceived rural business potential impact of ICT.

Specific objectives:

1. To find out if productive internet usage mediates the relationship between perceived usefulness of ICT and perceived rural business potential impact of ICT.
2. To find out if productive internet usage mediates the relationship between perceived ease of use of ICT and perceived rural business potential impact of ICT.
3. To find out if productive internet usage mediates the relationship between ICT literacy and perceived rural business potential impact of ICT.

2. LITERATURE REVIEW

2.1. World Overview

The role of the internet has reached a new dimension in our lives. Globally, the internet user has increased 2.4 per cent over the past year, amounted 124 million users in overall (Kemp, 2020) and 59 per cent online penetration rate (Clement, 2020). The internet has become a fundamental pillar of the modern information society, with its potential in connecting billions of people worldwide (Clement, 2020). The largest number of internet users is recorded in Asia Region, which amounted to 2.3 billion.

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2.2. Internet Adoption in Malaysia

The internet adoption rate in Malaysia has been increasing over the years (Malaysian Communications and Multimedia Commission, 2018). In 2018, Malaysia recorded increases in the percentage of internet users at the national level from 76.9% in 2016 to 87.4% (Malaysian Communications and Multimedia Commission, 2018). By considering an individual as an internet user if the individual accessed the internet at least once in three months, the Internet User Survey conducted by the MCMC found out that the percentage of the internet user in Malaysia in 2018 is 87.4%, recorded an increase of 10.5% from 2016, which is 76.9% (Malaysian Communications and Multimedia Commission, 2018). This percentage shows more than three-fourths of the entire national population is using the internet.

The survey also found out that most of the users accessed the internet from mobile broadband, following by free Wi-Fi. Apart from that, it was also reported that the most common online activities of the users are communication by text (96.5%), visit social networking platform (85.6%), getting information (85.5%), entertainment such as video streaming (77.6%), for work-related purposes (61.9%). The result shows low usage of the internet for maintaining blogs/homepage (9.8%), selling goods or services (16.9%), and for online job applications (27.5%). Additionally, the number of internet user has increased in between 2019 and 2020 by 3.6%, making 26.69 million internet users in Malaysia as in January 2020.

In the effort to increase the usage of internet and to bridge the digital divide between rural and urban area, National Broadband Initiative (NBI) was implemented to bring broadband to the whole country, targeting that by the end of 2010, 50% household broadband penetration, through 5 initiatives, which includes:

i. Rakyat internet Centers and Mini Community Broadband Centers.
ii. 1 Million Netbook Initiative to distribute notebooks to poor students nationwide.
iii. Setting up of E-Kiosks.
iv. CBC to the Home.
v. Expansion of Cellular Coverage.

To assess the extent to which this initiative meets its purposes in Sarawak Malay rural areas, the population selected for this study is the communities that were provided with those facilities. The focus of this study is the usage of the internet for working, business or online marketing, education, e-government, e-banking, e-health, and news reading, and set aside the unproductive usage of the internet such as for entertainment (video streaming, music, games) and social networking.

2.3. Internal Factors of Internet Adoption in the Rural Community

This study highlighted three (3) internal factors of internet adoption, known as perceived ease of use of ICT, perceived usefulness of ICT, and ICT literacy. Perceived usefulness of ICT and perceived ease of use of ICT is discussed in Technology Acceptance Model (Davis, 1989) and Rural Technology Acceptance Model, RUTAM (Islam, 2011) in which these factors influence an individual to adopt the technology, which is in this study refer to the internet. These factors were also related to the relative advantage, and complexity aspects in Perceived Attributes Theory developed by Rogers (1995).

ICT literacy was known as the other internal factor of internet adoption. ICT literacy refers to the ability to understand, operate, and use or exploit the ICT facilities (Adila et al., 2013). As determined by Adila et al. (2013) lack of ICT knowledge is a part of the reason for not using ICT. This finding was also supported by the Rogers (1983) diffusion of innovation theory, in which this theory mentioned that, at different places, the time needed for them to adopt the new idea in their social system is different, depending on how they perceive the idea and knowledge on the innovation.

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2.4. Impacts of Internet Adoption on Business Activity

One of the advantages of the information technology is its capability to process and spread information widely and make it possible to the users to access any kind of information at any time anywhere. One of the common economic activities in the rural area is agriculture. In the recent years, IT has a great influence on agricultural development as it provides access to information on agricultural activities (Jones, 1997; Syed Reza & Seyed Morteza, 2016). The access to this information can contribute to the development of agricultural activities and encourage the younger generation to venture in this activity. Other than that, ICT adoption in the rural community is one of the strategies that provides possible opportunity to overcome some of the barriers in the entrepreneurial activity (Hollifield & Donnermeyer, 2003). The internet access also enables better and timely access to the market prices, consumer information (Mangtsl, 2008) and provides information related to updated agricultural issues at any place and time (Hussan, Musa, Bahaman, Ismail, & Shaffri, 2008) which extends the competencies of farmers to engage in agri-business.

3. METHODOLOGY

A cross sectional survey was conducted in three villages based on the types of ICT facilities provided. See Table 1. The quantitative questionnaire was adapted and modified from previous studies (Davis, 1989; Huang, Lu, & Wong, 2003; OECD, 2015; Virtual System Processing Company ICT Professional Group, 2006) conducted in Malaysia and other countries. Few changes were made on the items in the questionnaire to make sure of the suitability of its content with the situation in the local community. Therefore, pre-test and pilot test were conducted to test the reliability of the instrument. Pre-test was conducted in Kampung Telaga Air with 5 local people, in which they were asked to answer the survey and critique the questionnaire to make sure that the questionnaire was understandable by the local community. The pilot test was also conducted in Kampung Telaga Air with 70 data collected.

Table-1. Sample distribution by location.

Sample	No. of Sample
Kampung Niup, Samarahan	48
Kampung Pinang, Samarahan	93
Kampung Kolong, Kuching	79

A power analysis was conducted using G*Power to determine the sample size for the mediation analysis. The analysis was based on the linear multiple regression used in this study. With a large effect size (f2) of .15, an alpha of .05, a standard power level of .80, and a total of 7 predictors, the results of the power analysis showed that a minimum of 153 participants was needed to achieve an appropriate power level for this study. The actual data collected was 240 data, but only 220 data was analyzed which exceed the requirement of the sample size.

The validity and reliability of the instrument was evaluated using internal consistency reliability test, indicator reliability test, convergent validity test and discriminant validity test See Table 2. Composite reliability (CR) values exceeded 0.8 in all construct, demonstrating internal consistency of the instrument. All items loaded more than 0.7, indicated reliability except for two items in the productive internet usage construct which scores 0.662 and 0.627. These two items were retained since deleting it did not change the AVE values significantly. Convergent validity is demonstrated by the AVE values which are more than 0.5, and the discriminant validity was demonstrated by the square root of AVE showed in the Fornell Larcker table which are greater than the intercorrelation See Table 3.

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Table-2. Measurement model assessment.

Item		Loading	CR	AVE	Convergent Validity (AVE>0.5)
Perceived Usefulness					
PU1	Using ICT in my job would enable me to accomplish tasks more quickly.	0.983	0.995	0.968	YES
PU2	Using ICT would improve my job performance.	0.987			
PU3	Using ICT in my job would increase my productivity.	0.983			
PU4	Using ICT would enhance my effectiveness on the job.	0.982			
PU5	Using ICT would make it easier to do my job.	0.99			
PU6	I would find ICT useful in my job.	0.98			
Perceived Ease of Use					
PEOU1	Learning to operate ICT would be easy for me.	0.982	0.993	0.96	YES
PEOU2	I would find it easy to get ICT to do what I want it to do.	0.982			
PEOU3	My interaction with ICT would be clear and understandable.	0.973			
PEOU4	I would find ICT to be flexible to interact with.	0.981			
PEOU5	It would be easy for me to become skillful at using ICT.	0.982			
PEOU6	I would find ICT easy to use.	0.977			
ICT Literacy					
ICTL1	Using word processing software. (Microsoft Word)	0.913	0.984	0.818	YES
ICTL2	Using basic arithmetic formulas in a spreadsheet. (Microsoft Excel Basic)	0.886			
ICTL3	Using spreadsheet advanced functions to organize and analyze data, such sorting, filtering, using formulas, creating charts. (Microsoft Excel Advanced)	0.897			
ICTL4	Using software for electronic presentations (slides) (Microsoft PowerPoint)	0.922			
ICTL5	Using copy and paste tools to duplicate or move information within a document.	0.946			
ICTL6	Sending e-mails with attached files (document, picture, video)	0.882			
ICTL7	Posting messages (e.g. to chat rooms, newsgroups or forums)	0.937			
ICTL8	Transferring files (e.g. digital camera, mobile phone, m-player)	0.837			
IC	Using social networking sites.	0.918			

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TL9					
ICTL10	Finding information.	0.942			
ICTL11	Reading/downloading online newspaper/ news magazines.	0.926			
ICTL12	Looking for a job or sending a job application.	0.884			
ICTL13	internet banking.	0.872			
ICTL14	Selling of goods and services.	0.891			
ICTL15	Using service related to travel or travel accommodation.	0.913			
Productive internet Usage					
PIU1	Working	0.666	0.901	0.535	YES
PIU2	Business	0.612			
PIU3	Education	0.813			
PIU4	E-Government	0.759			
PIU5	E-Banking	0.759			
PIU6	E-Health	0.681			
PIU7	News	0.807			
Perceived internet Usage Impact on Rural entrepreneurship					
RBP1	ICT have positive impacts on producing local product	0.93	0.972	0.855	YES
RBP2	ICT have positive impacts on local product sales	0.881			
RBP3	ICT have positive impacts on entrepreneurship activities	0.945			
RBP4	ICT have positive impacts on the increase in business product sales	0.923			
RBP5	ICT have positive impacts on the increase in agricultural product	0.935			
RBP6	ICT have positive impacts on agricultural product sales	0.931			

Table-3. Intercorrelation matrix (Fornell & Larcker's criterion).

Construct	ICTL	PEOU	PU	PIU	RBP
ICTL	0.904				
PEOU	0.605	0.980			
PU	0.661	0.841	0.984		
PIU	0.683	0.532	0.550	0.731	
RBP	0.200	0.266	0.210	0.169	0.924

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4. FINDINGS

The demographic findings show that most of the participants in this study were female (61.8%); generation Y or post-millennials which refers to individual with age between 15 to 35 years old (45.9%), SPM or certificate holders (38.2%); and had income in a range of RM1500 and RM3000 (35.5%) See Table 4. These three villages show low to moderate level of productive internet usage, which is from 46.1% to 53.2% See Table 5.

Table-4. Participant's characteristic.

Variable	Group	Frequency (N)	Percentage (%)
Gender	Male	84	38.2%
	Female	136	61.8%
Age	14 years old and below	5	2.3%
	15 - 25 years old	43	19.5%
	26 - 35 years old	58	26.4%
	36 - 45 years old	42	19.1%
	46 - 55 years old	29	13.2%
	Above 55 years old	43	19.5%
Education	UPSR	35	15.9%
	PMR/ SRP	38	17.3%
	SPM/ Certificate	84	38.2%
	STPM/ Diploma/ Pre-U	30	13.6%
	Bachelor's degree	11	5.0%
	Did not finish primary school	8	3.6%
	No formal education	13	5.9%
	Sekolah Dewasa 1970-an	1	0.5%
Income	Less than RM590	22	10.0%
	RM591 - RM910	7	3.2%
	RM911 - RM1500	47	21.4%
	RM1501 - RM3000	78	35.5%
	RM3001 - RM4500	45	20.5%
	RM4501 - RM6000	15	6.8%
	RM6001 - RM7500	6	2.7%

Table-5. Internet adoption rate.

Location	ICT facility provided	Year	Level of internet Adoption (Productive internet usage)
Kampung Niup, Samarahan	Internet Centre and WiFi Community	2009-Present	53.2%
Kampung Pinang, Samarahan	Internet Centre and WiFi Community	2014-Present	46.1%
Kampung Kolong, Kuching	WiFi Community	2011-2017	48.0%

The mediation effect was analyzed using the bias-corrected bootstrapping procedure in which mediation is said to occur if the confidence interval does not contain zero. The findings show that productive internet usage mediates the relationship between two cultural dimensions (uncertainty avoidance and collectivism) and the perceived cottage industry impact of the internet adoption. After that, tests for mediating effect size and effect size (f2) were conducted using the Bootstrapping procedure, while predictive relevance for the reflective endogenous latent variable (Q2) were conducted using Blindfolding procedures.

RQ1: Does productive internet usage mediates the relationship between perceived usefulness of ICT and the perceived impact of ICT on rural business potential?

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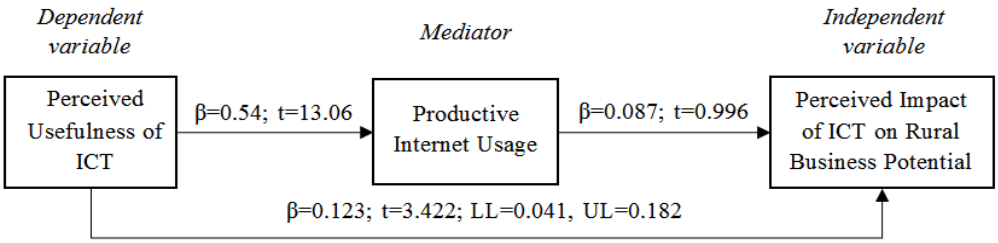

Figure-2. Analysis results for research question 1.

Figure 2 shows the analysis result for answering research question 1. From the mediation analysis, productive internet usage is determined to have no influence on the perceived impact of ICT on rural business potential (β=0.087, t=0.996) and has been influenced positively by perceived usefulness of ICT (β=0.54, t=13.06). The analysis also showed that the indirect effect of β=0.123 was significant with a t-value of 3.422. Also, the 95% Bootstrap Confidence Interval (CI) (Preacher & Hayes, 2008) does not straddle a 0 in between (LL=0.041, UL=0.182) indicates that there is a mediation. Thus, it was concluded that the mediation effect is statistically significant.

RQ2: Does productive internet usage mediates the relationship between perceived ease of use of ICT and the perceived impact of ICT on rural business potential?

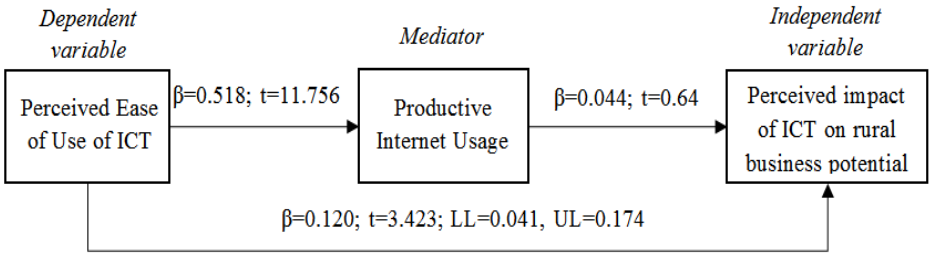

Figure-3. Analysis results for research question 2.

Figure 3 shows the analysis result for answering research question 2. From the mediation analysis, productive internet usage is determined to have no influence on the perceived impact of ICT on rural business potential (β=0.044; t=0.64) and has been influenced positively by perceived ease of use of ICT (β=0.518; t=11.756). The analysis also showed that the indirect effect of β=0.120 was significant with a t-value of 3.423. Also, the 95% Bootstrap Confidence Interval (CI) (Preacher & Hayes, 2008) does not straddle a 0 in between (LL=0.041, UL=0.174) indicates that there is a mediation. Thus, it was concluded that the mediation effect is statistically significant.

RQ3: Does productive internet usage mediates the relationship between ICT literacy and perceived impact of ICT on rural business potential?

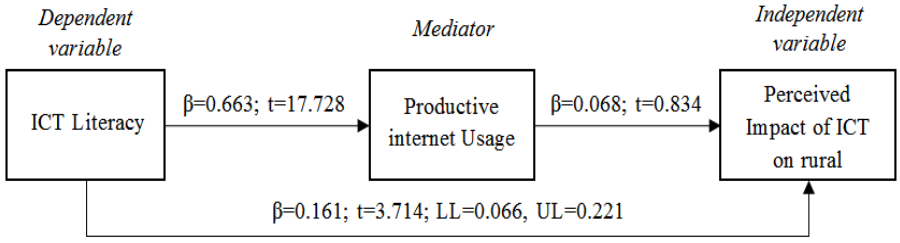

Figure-4. Analysis results for research question 3.

Figure 4 shows the analysis result for answering research question 3. From the mediation analysis, productive internet usage is determined to have no influence on the perceived impact of ICT on rural business potential (β=0.068; t=0.834) and has been influenced positively by ICT literacy (β=0.663; t=17.728). The analysis also

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showed that the indirect effect of β=0.161 was significant with a t-value of 3.714. Also, the 95% Bootstrap Confidence Interval (CI) (Preacher & Hayes, 2008) does not straddle a 0 in between (LL=0.066, UL=0.221) indicates that there is a mediation. Thus, it was concluded that the mediation effect is statistically significant.

In summary, the results show that there is significant mediation effect of the productive internet usage in the relationship between the three internal factors (perceived usefulness of ICT, perceived ease of use of ICT, and ICT literacy) and the perceived impact of ICT on cottage industry. The result is further explained in Table 6.

Table-6. Determination of Co-efficient (R2), Effect size (f2) and Predictive Relevance (Q2).

Construct	Co-efficient of Determination	Predictive Relevance	Effect Size f2			
	R^2	Q2	Productive internet usage	Effect Size	Perceived rural business potential impact of ICT	Effect Size
Perceived rural business potential impact of ICT	0.074	0.074				
Productive internet usage	0.459	0.459			0.034	Small to Medium
Perceived Usefulness of ICT			0.403	Large	0.024	Small to Medium
Perceived Ease of Use of ICT			0.361	Large	0.051	Small to Medium
ICT literacy			0.775	Large	0.014	No effect

With respect to effect size, the results show that the relationship between perceived usefulness of ICT, perceived ease of use of ICT, and ICT literacy indicate large effect with f^2 value of 0.403, 0.361, and 0.775 respectively.

Meanwhile, the relationship between perceived usefulness and ease of use of ICT with perceived impact of ICT on rural business potential shows small to medium effect with f2 values of 0.024 and 0.051, while there is no effect (f^2 = 0.014) in the relationship between ICT literacy and perceived rural business potential impact of ICT.

In regard to predictive relevance, the results show that the value of Q2 for perceived rural business potential impact of ICT and productive internet usage were greater than zero for the reflective endogenous latent variable. The result has predictive relevance (Hair et al., 2017).

5. DISCUSSION

Firstly, this study includes ICT literacy, perceived ease of use of ICT, and perceived usefulness of ICT in the internal factors of internet adoption. Several studies have determined the barriers of ICT adoption for agricultural activities (Musa, Salleh, Hayrol, & Jeffrey, 2009) and entrepreneurship (Fuzirah, Zaini, & Norizan, 2011; Lekhanya, 2018) and highlighted few determinants such as ICT illiteracy and lack of knowledge on the benefit of ICT. Adoption of the internet requires an individual to have ICT skills and the knowledge of how the internet can benefit them in their daily lives.

The findings of this study show that perceived usefulness of ICT contributes to the positive perception on the impact of ICT on rural business potential with the mediating effect of productive internet usage. The direct effect results show that this factor contributes to the productive internet usage, and perceived rural entrepreneurship impact the of the internet. This indicates that the perception of an individual on the usefulness of ICT contribute to their positive perception on the impact of ICT on rural entrepreneurship with the mediating effect of productive internet usage.

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Perceived ease of use and perceived usefulness of technology describes the intention to use the technology and has been part of the significant factors of technology adoption (Davis, 1989; Islam, 2011). In this study, the technology discussed is the internet. This study found that perceived ease of use of ICT contributes to the positive perception on the impact of ICT on rural business potential with the mediating effect of productive internet usage. The direct effect results show that this factor contributes to the productive internet usage, and perceived rural entrepreneurship impact the of the internet. This shows that the perception of an individual on the usefulness of ICT contribute to their positive perception on the impact of ICT on rural entrepreneurship with the mediating effect of productive internet usage.

The findings of this study show that productive internet usage mediates the relationship between ICT literacy and the perceived rural entrepreneurship impact of ICT. The direct effect shows that ICT literacy affects productive internet usage significantly. Similarly, Adila et al. (2013) determine that a lack of ICT knowledge is a part of the reason for not using ICT. However, ICT literacy was found to not have any effect on the rural entrepreneurship impact the of the internet. Although there is no significant effect of ICT literacy on the perceived impact of ICT on rural entrepreneurship, by exerting productive internet usage, the relationship was established. The extent to which someone uses the internet productively increases their positive perception on the impact of ICT on rural entrepreneurship.

6. THEORITICAL IMPLICATION

This study provides further empirical evidence and validates perceived attributes theory (Rogers, 1995) in the aspect of the relative advantage of innovation diffusion and the innovation's complexity, as well as compatibility with existing values and practices. Besides that, it also verifies technology acceptance model (Davis, 1989) in which perceived usefulness and perceived ease of use of technology contributes to the attitude towards using the technology and the behavioral intention to use the technology, in which in this study context, the internet.

Besides that, this study contributes to development of a mediation model of the relationship between internal factors of internet adoption and perceived impact of ICT on rural business potential with the mediating effect of productive internet usage see Figure 5. This model indicates that individual with good ICT knowledge and skill, positive perception on the ease of use and usefulness of ICT tends to have positive perception on the impact of ICT on rural business potential, providing that they use the internet frequently for productive purposes.

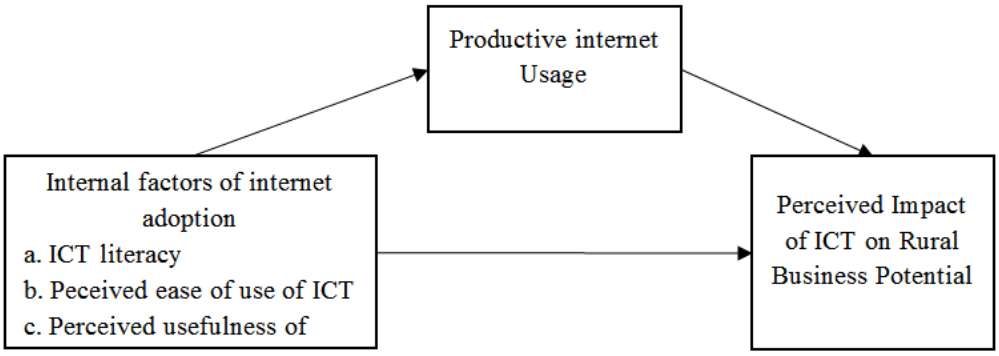

Figure-5. Mediation model of the relationship between internal factors of internet adoption and perceived impact of ICT on rural business potential with the mediating effect of productive internet usage.

7. INTERVENTION IMPLICATION

The findings from this study give a comprehensive perspective on examining the impact of productive internet usage on the community's perception on rural entrepreneurship impact of ICT. The findings provide policymakers and those interested in the use of the internet in the rural community with an understanding of the factors that has been preventing internet diffusion and how those facilities can be used optimally in the rural community for its socio-economic development, especially in the aspect of rural entrepreneurship. Although it is impossible to control

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individual's usage of internet, the authority and the service provider can create more opportunity for the community members to get more exposure to the productive internet usage and its benefit, especially in increasing the business potential, to fulfill the government's objective of Universal Service Provision (USP) program to increase the use of ICT among communities towards the socio-economic development of the local community, other than providing access to communications to groups and individuals in underserved areas, and to bridge the digital divide between rural and urban areas.

Moreover, this study explains the need for the authority to consider these demographic factors, as well as internal factors in determining user behavior and internet adoption patterns. The demographic findings in this study can be used to identify the target group for the ICT intervention in the rural community. The information can be referred to, to give more exposure to the group in the community that was less exposed to the benefit of the intervention.

Furthermore, it is essential for the practitioner to consider the intention to use ICT and ICT literacy, as the possible challenges during the design and implementation phases to enhance the efficacy of ICT implementation. The capability of the service provider in designing the right training module for the target group will strongly invoke productive internet usage in the community, thus encourage a more positive perception of ICT impact on the rural entrepreneurship development in those areas. Lack of ICT skill, knowledge and exposure on the technology will hinder the community intention to use ICT for economic purposes.

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