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Social Capital, Agriculture Extension Services and Access of Resources toward Innovation Adoption in Household Farming in Malaysia

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The objectives of the researcher were to find out the impacts of social capital, extension services and access of resources on innovation adoption in household farming, for which, a major mediating impact of human capital has been considered as well. The target population of the researcher was a subsector of the agricultural sector in Malaysia, which is household farming sector. The researcher performed detailed review of literature and then adopted research design for this study having quantitative research method, positivist research philosophy, deductive research approach and cross-sectional time horizon. Moreover, from the target population, a sample of 330 individuals is selected based on purposive sampling technique. The researcher has collected the data with the help of self-administered questionnaire-based survey and 323 valid responses have been obtained by the researcher. The collected data is arranged and analyzed with the help of Microsoft excel and SPSS software, with the application of confirmatory factor analysis and regression analysis. The results propose significant impacts of extension services and access of resources on innovation adoption in household farming, and the human capital significantly mediates the relationship present among social capital, extension services, excessive resources, and innovation adoption in household farming as well. However, the impact of social capital on innovation adoption in household farming has been found to be insignificant. The study is significant for considering a subsector in the agricultural sector of Malaysia, and it is also significant and novel for considering diversified factors while analyzing the innovation adoption in household farming.

Keywords: Social Capital, Agriculture Extension Services, Access Resources, Innovation Adoption, Household Farming

1. INTRODUCTION

Innovation and investment in large businesses are often reduced due to social political and economic factors by parties that are small sized. The factors that affect the innovation can be political social and economic. The small holders participation in large commodity change that operate worldwide decides the innovativeness of a whole sector (Al Mamun, Muniady, Yukthamarani, Noor Raihani Binti et al., 2016). As compared to large multinational companies the system is more effective when small companies adopt innovative techniques by minimal input in terms of capital machinery and other resources (Kitchen & Marsden, 2009; Marsden, 2013). But there is a possibility that contrary to the benefits of following this method small companies tend to follow models given by large multinational corporations respective of the large inputs or investments required to be a part of that system (Tscharntke, Clough, Wanger, Jackson et al., 2012). In practical research finding states that both trends have not yet been followed. The small companies or households, as in various developing countries, are not trying to be innovative neither by following social intensification nor by agro-ecological models (Feintrenie, Schwarze, & Levang, 2010; Jerneck & Olsson, 2013). The path or method followed by small household-based firms is not unified. Different forms are trying to follow different ways and not being able to excel in one form to achieve innovativeness. A major limitation has been that both these paradigms have not been properly defined. Malaysian Palm oil industry has been facing a lot of pressure from western NGOs and clients to work on their industry sustainability and innovativeness. The first step towards betterment is to define the both paradigms of innovativeness (International, 2007) . Not only understanding of different paradigms of innovativeness can help protecting the rights of communities of independent small household firms but also social Justice is imperative for achieving the objective (Majid Cooke, 2012; Pye & Bhattacharya, 2013). Contrary to this in Malaysia small household firms have been widely criticized for not being completely engage with initiatives taken by the productivism in the economy (Baskett, Jacquemard, Durand-Gasselin, Suryana et al., 2007; Teoh, 2010).

This research aims to find how social capital, agriculture extension services, and access of resources help farming households in Malaysia to improve adoption of innovation. This paper would also highlight how human resources helps build a mechanism between social capital, agriculture extension services, access of resources and innovation adoption in Malaysian context. Malaysia has a total of about 645,136 SMEs Al Mamun et al. (2016) that contribute a lot to the economy of the current developing country. To improve the economic condition of the country the situation of the small household farming businesses should be improves by encouraging them to adopt new and innovative technologies, techniques, and methods. Hence, the factors that play the most crucial role in achieving the objective must be determined and analyzed.

The data given by Al Mamun et al. (2016) in his research paper states that about 97.3 percent are small and medium enterprises out of the total businesses running in Malaysia. Moreover, the small and medium enterprises can be divided into five sectors. The sectors are services mining construction agriculture and manufacturing. Malaysia is currently a developing country trying to achieve the status of a developed country for that it is trying to improve the economic and social condition of its small households that have low income. Video policies have been formed to improve the economic growth and reduce the inequality in terms of income skill and development, which is the purpose the government, is focusing on betterment of small household firms. Organizations have been formed to improve the condition of innovation in the industry. These organizations aim to provide social capital, ease the access to resources and providing agricultural extension services.

Sustainable livelihoods can be achieved or captured when the basic idea about social norms and social bonds has been cleared in the minds of the people (Pretty & Ward, 2001). Originally the idea of social capital and its role wasn't very refined and clear when it was proposed by Jacobs (1961) it later passed through numerous developmental stages to have come in its present form. Pretty and Ward (2001) explains that social capital helps in encouraging cooperation by boosting the confidence of the people to investment their money, time, and efforts in new collective ideas. Social capital decrease resource degradation in an economy. Without the concepts of social capital people usually prefer to make investments in ideas of private interest ignoring the concept and need for social development and well-being. Gibbs (1990) defines social structure as a proper structure formed to increase the happening of productive activities in an economy by forming 'relations between actor and among actors. This formed social structure and organization are taken as resources or social capital by the individuals (Bromley, 1993).

In development of the agriculture and farming sector in a country a huge part is dependent on the agriculture extension services. The face of agriculture extension services is different in case of each country (David & Samuel, 2014). The goals, objectives, and actions related to agriculture extension services are largely dependent on the government of a country. The goals can have very diversified range such as improving rural livelihood, improving natural resource management, building social capital, empowering farmers, and national food security (Swanson & Rajalahti, 2010). David and Samuel (2014) explains that in Malaysia, as a requirement for living in 21st century, the extensions must be based on defining and devising different mechanisms to reach farming small households. Other than that extension should ease the way for collaborations, improving human infrastructure, and catalysts. The way the present extensions in Malaysia are formed and working needs to be modified periodically as per the change in environment and need for innovation. A rather linear approach for extensions in used which lets the opinions of the farmers left out. However, the basic purpose of agriculture services extension is to reduce the gap between farming practices used at present and the new research that has been published. Furthermore, extension services itself provides the human resources, the frontline workers, to directly participate in the process of farming and build strong collaborative relation and understanding with farmers (Terblanche, 2005). A full extensive review of the literature has been done to understand the variables and their relationships. Afterwards the methodology, data collection and analysis, results, and conclusions drawn from them has been given in detail.

2. LITERATURE REVIEW

2.1. Theory of Social Capital

Social capital is the network of the people who live and work in a common community and thus contribute to the effective functioning of their community. This depends on the effective functioning of the social groups in which the individuals share a common sense of identity, mutual understanding, norms, values, and trust. Social capital is said to be the main force to measure the effective functioning of a community. Social capital is the reason behind the cooperation and mutual support in the social groups that make a community. This turns out to be effective in dealing and combating with social disorders which are inherent to the modern societies, among which crime is said to be one of the most important social disorders. Social capital focuses on the specific benefits to the society in which the flow of trust, information and cooperation among the social groups that form the social networks (Lin, 2008). Norms of reciprocity and trustworthiness that are part of social groups and arise from the social capital. The idea of social capital enables the people to cooperate with each who are part of a society. However, another aspect of the social capital also exists in the literature. The authors have related the social capital towards the inequality, direct and indirect employments of social connections (Kreuter & Lezin, 2002). Therefore bridging of social groups in social capital is of great importance otherwise it can lead to the isolation of social groups and adverse consequences (Portes, 2014).

2.2. Social Capital and Innovation Adoption in Household Farming

Social capital is the concept that of shared values and network of relationships that exists between the people who work in the same community, and thus the achievement of their purpose and effective working of the community is achieved (Ab Yajid, 2020). Social capital is linked to development and the economic prosperity which enables the formation of new strategies (Woolcock & Narayan, 2000). Literature focuses on three main dimensions of the social capital, network, norms, and trust in the inter relations that make the society and contribute towards the effective functioning of the society. Studies have shown that the behavior of the farmers towards the adoption of the new technologies is positively related to the social capital. The positive relation between the social capital and development of the community also reflects the contribution of the social capital towards the economic development. Strengthened social capital leads to the flow of information which therefore enhances the adoption of new technologies (Sandefur & Laumann, 1998). Studies have shown that social capital exerts noticeable influence

on the farmers in their participation towards the adoption of new technologies. Their norms and trust towards the concerned authorities also shapes their trend and level of interest in the adoption of new technologies.

2.3. Mediating Role of Human Capital in relation between Social Capital and Innovation Adoption in Household Farming

Human capital is the term regarded for the experience, abilities, creativity, and skill of the workers. Social capital is considered as a deciding factor which contributes towards the development and economic boost of the community. However human capital in return also plays a mediating role in this aspect. The stronger and greater the human capital is more developed social capital is . Human capital contributes in the development of the social capital as the individual skill, experience and abilities of members of the community contribute towards the development and efficient working of the community (Goldin, 2016). Studies have shown that participation of the farmers towards the innovation technology adoption in the household farming techniques is significantly dependent on the human capital which also influences the social capital. The adoption of new technologies is greatly dependent on the skill, education and experience of the related group of people (Davenport, 1999). Therefore, to introduce a new technology or to study the behavior of adoption of new technology in the farmers human capital and social capital are the prime factors in this regard.

2.4. Extension Services and Innovation Adoption in Household Farming

Agriculture extension services aims to educate and guide the farmers regarding the farming techniques. It also aims to educate and provide adequate information to the farmers regarding the hazards that crops, and farmers are vulnerable to and create awareness about the environmental hazards. The main aim behind this extension service is up bringing of the life style of farmers and introducing new farming techniques to ease their life and bring more fruitful outcomes (Labarthe, 2009). Agents of agriculture extension service introduce the new scientific techniques of farming the farmers, so that they can adopt them and make their farming more productive. Agriculture extension services also aims to at introducing the innovative technological farming methods in the house hold farmers to also enhance their farming outcomes that ultimately strengthens the economic outcomes of their farming techniques (Sarker & Itohara, 2009). Providing quality information to the household farmers to adopt the innovative, novel scientific farming practices proves to be positive enough towards the household farming. However, agriculture extension service plays an effective role in bringing the household farmers towards the innovative adoption of the farming practices.

2.5. Mediating Role of Human Capital in relation between Extension Services and Innovation Adoption in Household Farming

Human capital in the farmers plays a pivotal role in determining the farming practices being observed and ultimately towards the farming outcomes. Skilled and educated farmers have a different perspective towards the adoption of the farming techniques (Maffioli, Ubfal, Vazquez-Bare, & Cerdan-Infantes, 2013). Human capital is regarded as the ability of the farmers to tackle with the situation and produce the most fruitful outcomes from the farming practices by applying their knowledge and skills. Human capital actively contributes towards the perception of the farmers towards the knowledge and information being provided by the agents of the agriculture extension service (Barro, 2001). Educated and skilled farmers with high literacy adopt the ideas and information provided by the agents and have the attitude to adopt that information. Agriculture extension services have become a norm across the world to introduce new scientific and technological farming techniques in the farmers to enhance the livelihood of farmers and also make the farming techniques more productive (Huffman, 2001). Human capital plays a mediating role in this regard. Which motivates the farmers and their perception towards the adoption of the new innovative farming techniques which are introduced by the agents of the agriculture extension service. Agriculture extension service proves to be useful in introducing new innovative techniques to farmers.

2.6. Access to Resources and Innovative Adoption in Household Farming

Farmers across the world are considered as the backbone of the agriculture sector and a blessing to the entire humanity as they are responsible for the production of food. To enhance the production of food and productivity of the agriculture sector it is important to enhance the livelihood of the farmers as well as to provide them with the enough resources so that can produce the most productive outcomes from the farming techniques. Ensuring that farmers are financially stable enough and also have the access to resources also falls in the responsibility of the government and other concerned authorities (Oyinbo, Chamberlin, Vanlauwe, Vranken et al., 2019). Farmers must also be educated and guided enough regarding the new innovative techniques of farming, to ensure fruitful outcomes. Adoption of innovative techniques of farming in the farmers of household levels of farms providence of enough resources is the first step on the ladder leading to adoption of innovative farming techniques (Mei, Li, Yu, Li et al., 2020). Importance of access and correct use of the resources in the farmers is of prime importance when the use of innovative techniques is being studied.

2.7. Mediating Role of Human Capital in relation between Access to Resources and Innovation Adoption in Household Farming:

It is of primary importance to provide the farmers with enough resources to farmers to ensure productive farming techniques. As the productive farming is related to economic prosperity of the countries especially in the regions of world where agriculture contributes to maximum extent in the GDP of countries. However, in this regard human capital is also of great importance and its significance is also undeniable. Human capital is

regarded as the skill, experience, creativity, and the education of the farmers that they apply to make their farming techniques more fruitful. With the access to resources, correct use of these resources involving the skill of the farmers is the major force that leads to the farm productivity (Foster & Rosenzweig, 1995). Resources need to be utilized by the farmers in the most efficient way to make their best use. Ensuring the effective use of resources, human capital plays a mediating role in this regard and thus lead towards the positive behavior of the farmers towards the adoption of new technologies (Rustamovich, Musaevich, Zaripbaevich, Mavlonovich et al., 2020). Human capital also ensures the flow of information, which induces the positive behavior in the farmers to adopt the new scientific and innovative farming techniques.

The following hypothesis can be generated for this study:

H1: Social Capital effects the innovation adoption in household farming.

H2: Human Capital plays a mediating role in relation between social capital and innovation adoption in household farming.

H3: Extension services effects the innovation adoption in household farming.

H4: Human Capital plays a mediating role in relation between extension services and innovation adoption in household farming.

H5: access to resources effects the innovation adoption in household farming.

H6: Human Capital plays a mediating role in relation between access to resources and innovation adoption in household farming.

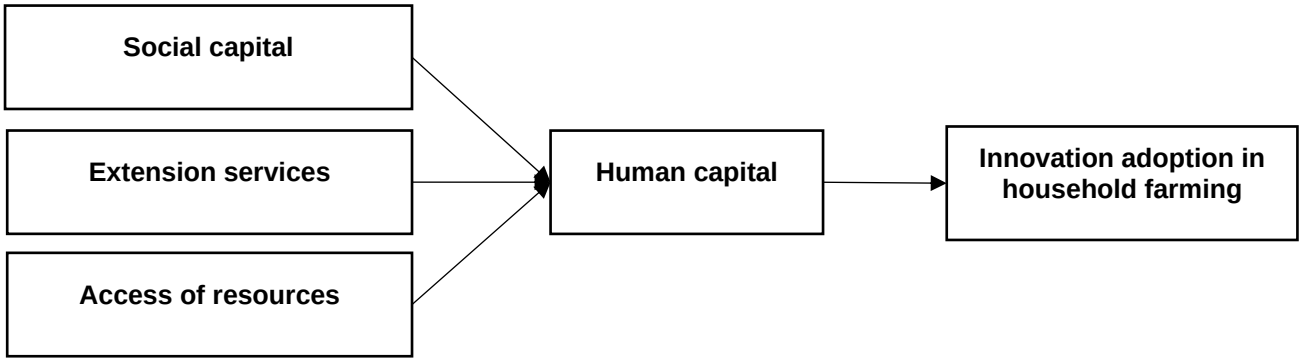

Figure 1: Theoretical framework

3. RESEARCH METHODOLOGY

3.1. Research design

In this research, the applied research method is the quantitative research method as the researcher has the objective to analyze the impacts of social capital, extension services and access of resources on the innovation adoption in household farming quantitatively (Auer, Beretvas, Colton, Hill et al., 1977; Crossan, 2003). For this purpose, quantitative data is retrieved and then it is analyzed with the help of quantitative tools and techniques, in order to find out that how social capital, extension services and access of resources can influence innovation adoption in household farming (Etikan, Musa, & Alkassim, 2016). Quantitative research method is preferred by various researchers in the past studies as well, where the major objective is to quantitatively analyze the impacts of independent variables on the dependent variables (Holden & Lynch, 2004; Kenneth, 2000). The adopted research philosophy is the positivist research philosophy, and it is adopted by the researcher as the major objective is to keep the personal bias and opinion out of the interpretation of the outcomes of this research (Mkansi & Acheampong, 2012). The researcher has the objective to base the results completely on the collected and analyzed data, and to keep the personal interference to a minimum level. So, in the previous studies, where the researchers have the objective to keep the personal interference, opinion and buyers to a minimum level, the preferred and adopted research philosophy is positivist research philosophy, as it fulfills these objectives (Östlund, Kidd, Wengström, & Rowa-Dewar, 2011; Park & Park, 2016).

Furthermore, the utilized the approach of research is the deductive research approach, following which, the researcher has first performed literature review, resulting in the formulation of statements of hypothesis, then relevant data is collected and analyzed by the researcher. As a result, according to the outcomes, the hypothesis statements are accepted or rejected (Quah, 1993). So, along with this structure of research, the most suitable and applicable approach of research is the deductive research approach which allows the researcher two later on apply the results of the research on the whole population as well (Rutberg & Bouikidis, 2018; Saunders, Lewis, Thornhill, & Bristow, 2015). Lastly, the time horizon of this research is cross sectional time horizon as the data is collected by the researcher for one time only and a onetime phenomenon is studied by the researcher with the help of that collected data, so the most suitable time horizon of research is the cross-sectional time horizon (Soiferman, 2010). In the previous studies as well, where the researcher has the objective to study a phenomenon for one time only or the researcher has the objective to analyze the impacts of independent variables on dependent variables, on the basis of a onetime phenomenon, the preferred and applied time horizon has been observed to be cross sectional time horizon (Suen, Huang, & Lee, 2014; Tongco, 2007).

3.2. Population and sampling

The population in focus of the researcher is a subsector of the agricultural industry in Malaysia, which is household farming, however, as it is not possible for the researcher to conduct a study on the whole population, so, a sufficient sample is taken out from this population, in order to proceed with the procedures of the research (Crossan, 2003). The most suitable sampling technique for this research is the purposive sampling technique, as this technique helps the researcher to find out and select the sample according to the judgment of the researcher and the objectives of the specific research (Crossan, 2003). This similar sampling technique is also proposed by various previous studies, where the researchers have the objectives to keep the sample of the study very relevant to the research objectives and the judgment of the researcher (Woiceshyn & Daellenbach, 2018; Zahra & Covin, 1995). So, with the help of this sampling technique, a sample of 330 individuals is selected for this study. The sampling frame is the subsector of the agricultural industry in Malaysia, which is household farming sector, whereas the sampling unit is one individual from the respective sector.

3.3. Data collection and procedures

The tool for data collection is a structured questionnaire, and the data is collected with the help of self-administered questionnaire-based survey (Etikan et al., 2016). In total, a sample of 330 individuals is targeted whereas, only 323 valid responses are obtained by the researcher. All the statements of the questionnaire are measured on a five-point Likert scale. After obtaining the data, the researcher has arranged the data in the software Microsoft Excel, so that it can be analyzed later.

3.4. Measures

There are seven measures of social capital, which have been adopted from the study of Hunecke, Engler, Jara-Rojas, and Poortvliet (2017), there are 4 measures that are adopted for extension services, and these are adopted from the study of Hunecke et al. (2017). moreover, there are three measures of excess of resources and five measures of human capital that are adopted from the study of Hunecke et al. (2017), and similar measures are adopted by the study of Hunecke et al. (2017). Lastly, there are three measures of innovation adoption in household farming, which are adopted from the study of Hunecke et al. (2017), as adopted by Hunecke et al. (2017).

3.5. Data analysis tools and techniques

the arranged data is imported to the software SPSS, and the data is analyzed in this software with the help of the application of different analysis techniques. The applied techniques and tests involve demographical analysis, descriptive analysis, rotated component matrix, KMO and Bartlett's Test, convergent and discriminant validity, confirmatory factor analysis and structural equation modeling over the regression analysis (Park & Park, 2016). After the analysis of the data, the tables are exported to Microsoft Word, and the results are presented with proper interpretation of every table.

4. DATA ANALYSIS AND INTERPRETATION

4.1. Demographics

The table below represents with the demographical details of the respondents, including the age, experience and gender of the respondents (Micheels & Nolan, 2016).

Table 1: Demographical details

Dimensions		Frequency	Percent
Age	20-25	50	15.5
	26-30	60	18.6
	31-35	108	33.4
	36-40	53	16.4
	40+	52	16.1
	Total	323	100.0
Experience	2 years or less	192	57.8
	Above 2 years	74	22.3
	Above 4 years	66	19.9
	Total	332	100
Gender	Male	140	43.3
	Female	183	56.6
	Total	323	100

15.5% of the respondents were of between 20 to 25 years of age, 18.6% of the respondents were of 26 to 30 years of age, 33.4% of the respondents were of 30 to 35 years of age whereas, 16.4% and 16.1% of the respondents were of 36 to 40 or 40 plus years of age. The experience of 74 of the participants was above two years, the experience of 192 of the participants was of two years or less than two years, whereas the experience of 66 of the participants was more than four years. 183 of the participants were females whereas, 140 of the participants were males.

4.2. Descriptive statistics

The table below represents with the results of the descriptive analysis, representing the summarization of the collected data, in the form of minimum values, maximum values, mean values, standard deviation values, skewness and standard error values (Saint Ville, Hickey, Locher, & Phillip, 2016).

Table 2: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
SC	323	1.00	7.00	3.7397	1.10268	-.787	.136
ES	323	1.00	7.00	3.8781	1.21108	-.623	.136
AR	323	1.00	7.00	4.0048	1.17301	-.787	.136
HC	323	1.00	7.00	3.7312	1.11237	-.732	.136
IA	323	1.00	7.00	3.9322	1.13237	-.742	.136

According to the table above, there are 332 total observations, and the minimum and maximum values are equal to 1.00 and 7.00, respectively, the mean values can be observed to be lying in between the minimum and maximum value ranges, which means that all the data is normally distributed and none of the values are very high or very low. Furthermore, the low level of skewness and standard deviation is representing that the values are not significantly dispersed or deviated from the mean value. So, it can be proposed that the data is normal, and the data is close to the mean values, which means that it is good to go for further testing and analysis.

4.3. KMO and Bartlett's Test

The table below is representing the results for the KMO and Bartlett's Test, and this test is evaluating all of the data, altogether at once (Wossen, Berger, & Di Falco, 2015).

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.938
Bartlett's Test of Sphericity	Approx. Chi-Square	11564.400
	df	1081
	Sig.	.000

The value of the Kaiser-Meyer-Olkin Measure of Sampling Adequacy must be more than 0.5 according to the standard, and, on the other hand, Bartlett's Test of Sphericity is supposed to have a value lower than 0.05. In the results, it can be observed that the first value is equal to 94% or 0.93 whereas, the second value is significantly lower than 0.05. It is indicating that the data in the model are significant and there is a substantial correlation present in the available data.

4.4. Rotated Component Matrix

The table below is representing the results for rotated component matrix, it represents the relationship present among the items and the selected components under study (Chen, Wang, & Huang, 2014).

Table 4: Rotated Component Matrix

	Component				
	1	2	3	4	5
SC1					0.651
SC2					0.706
SC3					0.692
SC4					0.722
SC5					0.768
SC6					0.775
SC7					0.76
ES1				0.729	
ES2				0.745	
ES3				0.683	
ES4				0.752	
AR1			0.775		
AR2			0.785		
AR3			0.834		
HC1		0.698			
HC2		0.736			
HC3		0.709			
HC4		0.834			
HC5		0.864			
IA1	0.729				
IA2	0.745				
IA3	0.783				

According to the table above, all of the values are almost above 0.7 and according to the standard as well, the valid values for the rotated component matrix are more than 0.7 (Chen et al., 2014). It means that there is a significant relationship in between the first component and IA1, IA2 and IA3 respectively, as all the values are above 0.7. Moreover, the same goes for other components and selected items as well, there is a significant influence of the second component on the items of AR. And similar is the case with the other items and components as well.

4.5. Convergent Validity and Reliability

The convergent validity represents that what is the extent to which a new scale is closely related to the other measures and variables of the same construct. Whereas the discriminant validity represents the measurements or concepts that should not be related and not being actually related as well (Hassan & Birungi, 2011).

Table 5: Convergent Validity and Reliability

	CR	AVE	MSV
SC	0.921	0.563	0.350
ES	0.921	0.517	0.227
AR	0.954	0.566	0.263
HC	0.934	0.574	0.350
IA	0.944	0.565	0.349

The valid value for convergent validity is more than 0.8 whereas, the valid value for AVE is more than 0.5, and in both of the cases, for all of the variables, the values can be observed to be significant as all of the values by more than 0.8 and 0.5 for both of the cases respectively (Hassan & Birungi, 2011). On the other hand, the value for MSV is lower than AVE value, which makes it valid and significant as well.

4.6. Correlations

The values in the table below are representing the correlation that is present among the variables under study, the correlation with the variables itself and among the variables is represented, which shows the strength of relationship or impacts present among the variables (Hunecke et al., 2017).

Table 6: Correlations

		SC	ES	AR	HC	IA	Cronbach Alpha
SC	Pearson Correlation	1					0.922
	Sig. (2-tailed)						
	N	323					
ES	Pearson Correlation	.371**	1				0.927
	Sig. (2-tailed)	0					
	N	323	323				
AR	Pearson Correlation	.433**	.609**	1			0.936
	Sig. (2-tailed)	0	0				
	N	323	323	323			
HC	Pearson Correlation	.346**	.468**	.481**	1		0.944
	Sig. (2-tailed)	0	0	0			
	N	323	323	323	323		
IA	Pearson Correlation	.346**	.468**	.481**	1	1	0.944
	Sig. (2-tailed)	0	0	0	0		
	N	323	323	323	323	323	

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation values are presented in the table above, and in accordance with the table's values, it can be proposed that there is positive and significant level of correlation present among all of the variables (Hunecke et al., 2017). All the variables are positively correlated with each other, representing that the model is significant and the variables are significant enough to be studied to gather, so, the data is good to go for further testing and analysis.

4.7. Model Fit Indices

The table below is representing the results for confirmatory factor analysis, both the threshold and observed values are represented, that represent the overall model fit for this study (Koutsou, Partalidou, & Ragkos, 2014).

Table 7: Model Fit Indices

CFA Indicators	CMIN/DF	GFI	IFI	CFI	RMSEA
Threshold Value	≤ 3	≥ 0.80	≥ 0.90	≥ 0.90	≤ 0.08
Observed Value	1.924	0.803	0.917	0.916	0.054

The threshold value for the factor CMIN is less than or equal to three, and the observed value is equal to 1.9, the threshold value for the factor GFI is equal to or more than 0.80 and the observed value is equal to 0.803 on the other hand, the threshold value for the factor IFI is more than or equal to 0.90 and the observed value is equal to 0.917 (Koutsou et al., 2014). All these values are representing that the model is fit and valid for further testing and analysis. Similar is the case with the factors RMSEA and CFI (Koutsou et al., 2014).

4.8. Regression

The regression results are presented in the table 8 below, and it is also representing the impacts of all the variables along with the acceptance or rejection of the proposed hypotheses of the study (Willy & Holm-Müller, 2013).

Table 8: Regression results

Regression			Estimate	S.E.	C.R.	P	Hypothesis	Decision
SC	→	IA	.236	.055	5.557	.201	H1	Rejected
ES	→	IA	.217	.046	5.132	.000	H2	Accepted
AR	→	IA	.388	.039	10.157	.000	H3	Accepted
Mediation			**Estimate**	**S.E.**	**C.R.**	**P**	**Hypothesis**	**Decision**
SC*HC	→	IA	.228	.041	5.440	.000	H4	Accepted
ES*HC	→	IA	.185	.043	4.189	.000	H5	Accepted
AR*HC	→	IA	.174	.044	4.120	.000	H6	Accepted

According to this table, the impact of the variable social capital on the innovation adoption in household farming is insignificant, as the p value is more than 0.05. On the other hand, the impact of extension services on the innovation adoption in household farming is significant as the P value is less than 0.05 and the impact is equal to 21% which means that with every 1% increase in extension services, the innovation adoption will increase by 21% (Willy & Holm-Müller, 2013). The impact of access of resources on innovation adoption in household farming is significant and is equal to a value of 38%. The mediation of human capital between social capital and innovation adoption in household farming is significant, and similar is the case with the mediation for extension services and innovation adoption in household farming and access of resources and innovation adoption in household farming.

5. DISCUSSION AND CONCLUSION

5.1. Discussion

With the continuous development in technology, the agricultural technologies have also been improved with the passage of time. However, farmers from the rural areas work believing in the old school system and they are not engaged towards the implementation of new technologies to improve the working environment of the agricultural field. Many studies have been conducted in the past to determine the impact of important variables on the adoption innovation in household farming. The current study was also conducted to determine the impact of social capital, extension services and access of resources on the adoption innovation in household farming considering the mediating role of human capital. This research study helped in formulating four important results.

First, the social capital was found to have an insignificant impact on adoption innovation in household farming. According to Bisseleua, Idrissou, Olurotimi, Ogunniyi et al. (2018), as the social capital determines the shared values among the farmers, it promotes the incomplete information. This leads to different doubts in the minds of the farmers, and they do not opt new technologies due to misleading information and they prevent themselves from enjoying the benefits of the new technologies to gain more profits.

Second, the extension services have significant impact on adoption innovation in household farming because they help in providing the needed education as well as knowledge to the farmers. These services support the farmers to opt for new technologies. According to Cofré-Bravo, Klerkx, and Engler (2019), the main function of the extension services is to promote the adoption of new technologies by the farmers by providing them the complete and significant knowledge about these technologies and how they can be implemented to increase the total income revenue of the farmers thus leading towards the growth in the economy (Usman & Ahmad, 2018).

Third, the access of resources was also found to have a significant impact on adoption innovation in household farming. According to Gao, Liu, Yu, Yang et al. (2019), the no. of resources play an important role on the social

behavior of the farmers. The farmers provided with a large no. of resources were more likely to adopt for new technologies in the household farming whereas, the farmers who do not have a large no. of resources, showed resistance towards it. This helped in promoting the wealth in such areas as the no. of resources is important for sustainable development as well. This promotes a healthy and better environment as the farmers work harder to encourage the "green farming" by using the new technologies effectively.

Forth, the findings showed that the human capital has significant impact on adoption innovation in household farming. The experiences of the farmers are also nurtured by the extension services as well as by the access of resources. However, the extension services helped in providing the best education to the farmers for improving their skills and thus leading them towards using the new technologies more effectively (Gong, Li, Parks, Pang et al., 2018). However, the social capital also improves the human capital as one educated farmer tries to spread the knowledge as far as possible. This improves the overall working environment of the agricultural sectors thus promoting the adoption of new technologies in household farming. Even though still some old farmers prefer to use old techniques but as the world is progressing they have to shift to the new technologies eventually in order to keep themselves in the never ending race (Kansanga, Luginaah, Bezner Kerr, Lupafya et al., 2020). This helps in promoting the effective profit gains as well for the farmers as well as for their households.

5.2. Conclusion

For encouraging the adoption of new technologies in the household farming, many steps have been taken by different countries around the globe. As the "green farming" became a trend with the passing time, it encouraged the farmers to adopt new technologies to keep themselves moving with the continuous development in the production technologies. This research study was conducted to determine the impact of different variables on the adoption innovation in the household farming (Pindado, Sánchez, Verstegen, & Lans, 2018). The results obtained from this research study showed that the social capital has a negative impact on the innovation adoption in the household farming due to the negative influence of the people on the thought process of each other in case of no proper guidance. Whereas, both access to resources as well as extension services, have a significant impact on the innovation adoption in the household farming as it helps in spreading of proper awareness as well knowledge about the benefits of the new technologies in the agricultural world (Kuang, Jin, He, Wan et al., 2019). Even though the human capital also plays a significant mediating role in the relationship between social capital, extension services, access to resources and the innovation adoption in the household farming. This helped in encouraging the farmers to implement the new techniques for improving the overall production in the household farming as well. This results in the maximization of the total profit gain.

5.2.1. Limitations and future research indications

The significant impact of social capital was observed in many past studies. However, no such study was conducted in the past that showed the negative impact of social capital on the innovation adoption in the household farming. This research study will provide another important aspect of social capital on the adoption of new technology in the household farming. This helped in improving the literature review in this context as well encouraging more scholars to consider this aspect of reality as well.

The data was collected by time-series method. This leads to a conservative approach. However, in order cross such limitations, the cross-sectional studies should be conducted to fill any observed gaps and to promote the positive influences of the innovation adoption in household farming. This will ultimately lead to a positive impact on the economic growth of the country along with promoting the sustainable development.

The impact of few variables on innovation adoption in the household farming was discussed in this research study. However, a large no. of other variables should also be considered for the future studies to have a better knowledge about the significance of the innovation adoption in the household farming. This leads to formations of many policies as well as other theoretical implications around the world.

5.2.2. Implications of the study

This research study not only helped in theoretical implications, but it also leads to many practical implications. Considering the significance of extension services, many organizations have planned different training as well as educational sessions for the farmers to improve their information so that they become more open towards implementing the new technologies in the household farming. Such sessions also helped in opening the minds of the farmers and they worked harder to improve their skills as well which led them to achieve the required goals. This led to the promotion of new technologies as well in different developing countries around the world especially in the rural areas where they are needed the most to make progress. This study has helped the government in encouraging the farmers to educate themselves as they were also rewarded for their work. This promoted the implementation of new technologies in the household farming, not only in Malaysia but also around the world. This helped the farmers to understand their worth and they kept on moving with full enthusiasm to achieve their goals effectively.

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