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THE RELATIONSHIP BETWEEN FARMERS' ATTITUDE TOWARDS THE IMPROVED CASSAVA PROCESSING TECHNOLOGY AND ADOPTION

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ABSTRACT: *This paper discusses the relationship between farmers' attitude towards improved cassava processing technology and its adoption. About 360 participants [181 (50.3%) males and 178 (49.7%) females], strategically selected from Serengeti, Sengerema and Biharamulo districts in Mara, Mwanza and Kagera regions respectively in Tanzania responded questions on both attitude towards cassava processing technology and adoption of the same. Chi-square test indicated farmers' difference in two components of adoption (involvement in pre-processing tasks and utilization of the cassava processed products) with two components (instrumental attitude and cognitive attitude) of attitude towards improved cassava processing technology. Further, direct logistic regression analysis indicated that attitude was not the only and sufficient variable uniquely explaining adoption of improved cassava processing technology despite having an influence on the same. Other variables such as attendance to training in improved cassava processing technology and intention to adopt the technology also uniquely explained adoption of improved cassava processing technology.*

KEY WORDS: attitude, adoption of agriculture technologies, attitude, adoption, cognitive attitude, instrumental attitude.

INTRODUCTION

This paper discusses the relationship between farmers' attitude towards improved cassava processing technology and adoption of the improved cassava processing technology. The study has been a reaction to the problem of farmers' low acceptance to adopt the improved cassava processing technology. The improved cassava processing technology was introduced among farmers in Tanzania about two decades ago to improve the quality of the cassava products and commercialise cassava farming in order to improve farmers' income and livelihood (Keya & Rubaihayo, 2013). The improved cassava processing technology in Tanzania involves production of high quality cassava flour (HQCF) for home based consumption and for bakery industry with some products such as biscuits, bread, starch, and ethanol (Hirschnitz-Garbers, 2015). Production of HQCF is, to a great extent, done through the use of processing machines such as graters and press. Drying is usually done in the sun before milling and packaging. The use of these machines is usually accompanied by some requirements such as timely harvesting (6 or 9 months after planting depending on cassava variety). Processing of cassava also needs to be done within 24 hours after harvesting, pealing and washing of roots to remove impurities. Though in patches the use of automated machines such as flash driers has been introduced in the country, they are very few and relatively new to have their adoption evaluated in the scope of this study.

The term adoption has been defined in many ways depending on the technology in question and the field of study (Mwangi & Kariuki, 2015). In the infusion of innovation studies, the term adoption is defined as a mental process through which an individual passes from hearing about an innovation to its implementation; that follows awareness, interest, evaluation, trial, and implementation stages (Honagbode, 2001). Adoption is also defined as the integration of a new technology into existing practice (Loevinsohn, Sumberg, & Diagne, 2012). More specifically in the agricultural technologies, the term has been understood as the extent to which farmers put into practice a new innovation in the future, given adequate information about the technology and the potential benefits (Ntshangase, Muroyiwa, & Sibanda, 2018). While the latter definition seems more relevant in the field of agriculture, it is worthy to note that the future is uncertain and unspecific. It is imperative, thus, to facilitate farmers to put into practice the innovations from the onset of an innovation introduction before the technology changes. In this study, the term adoption of the improved cassava processing technology refers to whether or not the farmer engages in the tasks related to the improved cassava processing technology, which include the use of improved cassava varieties, timely harvesting of cassava roots, processing within 24 hours, processing cassava using machines in the existing processing units. Adoption in this study also includes utilisation of the processed cassava products such as HQCF, biscuits and bread.

Introduction of the improved cassava processing technology in Tanzania was promoted by the government by providing processing machines such as graters and press to both small holder farmers' groups for free and Small and Medium Enterprises (SMEs) on credit (Silayo, 2003). To date, contrary to expectations, very few of the provided machines are in operation (Intermech Engineering Report Summary, 2003 – 2018). In the entire country, it is estimated that only about 15.9 percent of the provided processing units are in operation (Intermech Engineering Report Summary, 2003 – 2018). Research on why the cassava processing units have failed to operate indicated that the technology was perceived as tedious. Lack of raw materials was also associated with the technology failure (Match Maker Associate, 2007; Promar Consulting, 2011).

Examining the utilization of cassava processing techniques among rural women in Nigeria, Felicia and Olaniyi (2015) report similar low acceptance, whereby, 71 percent of respondents had utilized cassava processing techniques for a while and later abandoned. It was also reported that the technology was considered as time wasting and energy sapping. Other studies have associated low acceptance to adoption with variables such as farmers' characteristics and their access to financial institutions (Honogbode, 2001; Okpukpara, 2010; Sewando, Mdoe & Mutabazi, 2011), characteristics of the innovation and socioeconomic variables such as market and infrastructure (Mwangi & Kariuki, 2015; Felicia & Olaniyi, 2015).

Studies on the relationship between attitude and adoption of the farming technologies in general, and the improved cassava processing technologies in particular (Ogunsumi, 2011; Sewando, Mdoe, & Mutabazi, 2011; Krichanont, Opal, & Suneeporn, 2014; Nyanda, 2015; Felicia & Olaniyi, 2015; Mombo, Pieniak, & Vandermeulen, 2016; & Salum, 2016), indicate mixed findings. For example, while Felicia and Olaniyi (2015) found that the improved cassava processing technology was perceived simple to use and reduced stress among 96% respondents in Nigeria, they also found that some farmers (about 71 %) had abandoned the technology because they perceived it as time wasting and energy sapping. Similarly, while Salum (2016) found that some farmers had negative attitude towards the improved cassava varieties due to lack of planting materials, some farmers had positive attitude towards the improved cassava varieties due to their resistance to pests and diseases as well as high yield compared to local varieties (Felicia & Olaniyi, 2015).

Available literature does not clearly inform the extent to which attitude towards improved cassava processing technology influenced adoption of the improved cassava processing technology in Tanzania. Also, the specific components of attitude determining the adoption, particularly in cassava technology, have not been adequately covered.

The importance of adoption in the development of farming technologies may not be overemphasized. It is key to economic, social, political, and cultural development in human history. Adoption of agricultural technologies seems to follow the pattern whereby the source of innovation is usually agricultural researchers and food technologists while farmers play the recipient role through the education provided by extension agents (TARP II SUA, 2005). This pattern makes farmers' response in terms of acceptance or rejection of the technologies, an important determinant of the development of the technology innovation. Although farmers' attitude has been for years, documented as a key to behavioral acceptance or rejection (Bandura, 1977; Franzoi, 2000; Ajzen, 2001), its association with adoption of the improved cassava processing technology in Tanzania is still unclear. Therefore, a study on whether or not attitude could determine low acceptance of the innovated cassava processing technology might sound timely and beneficial for the improvement of economic, social, political, and cultural development of the country. It was against this background that this study assumed that farmers' attitude towards the improved cassava processing technology determined farmers' adoption of the improved cassava processing technology in Tanzania. In addition, it was assumed that other variables reported in the previous studies, which are sex, age, access to credit, intention to engage in cassava processing tasks and attendance to the training on cassava processing technology might intervene the relationship between attitude and adoption. These were therefore controlled during the analysis process.

The term attitude refers to positive or negative evaluation of an object (Franzoi, 2000; Ajzen, 2001). Both Franzoi and Ajzen agree that attitude is made up of knowledge

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accumulated regarding engagement in the target behaviuor and evaluation of the consequences of engaging in the behaviour. According to ABC model, attitude is comprised of three main components; the affect component, behavioral component and cognitive component (Jain, 2014). The affect component of attitude refers to emotional beliefs that an individual has accumulated regarding the object. Examples of statements indicating one's affect could be *'I enjoy how cassava is quickly crashed and dewatered using the grater and press machines*', '*I like the biscuits made of high Quality Cassava Flour.'* Behavioral component refers to the evaluation of potential actions one could perform toward the object. Examples of statements indicating one's behavioral evaluation could be: *'I would easily take my harvested cassava to the processing unit to be quickly crashed and dewatered using the grater and press machines*,' *I would easily buy the biscuits made of high Quality Cassava Flour.'* Cognitive component refers to the evaluation of one's knowledge and skills one has regarding the object. An example of a statement indicating one's cognitive evaluation could be: *I can easily identify the biscuits made of high Quality Cassava Flour.* 'Therefore, to date most psychologists agree that characterization of attitude needs to include positive or negative evaluation of an object, without leaving out affective, behavioral and cognitive components that form the attitude as a construct.

Theoretical Underpinnings

The assumption that attitude could have an influence on adoption of improved cassava processing technology was informed from social cognitive models. Several social cognitive models explain behavioral adoption and change, a few of which are the Theory of Planned Behavior (TPB; Ajzen, 1986; 1991), The Behavior Change Wheel framework (BCW; Michie, *et al.*, 2011), and The Social Cognitive Theory (SCT; Bandura, 1997). Despite their differences in explaining behavioural change, this group of theoretical work shares some crucial proximal factors underlying the adoption and performance of a particular behavior. The review of the social cognitive theories cited in the proposed study has revealed that there is an overlap of the main concepts of the constructs in these theories. For example, the construct perceived behavioral control in the TPB means the same as the construct self efficacy in the SCT. The same concept is coined and construed as physical and psychological capability in the BCW. While this overlapping construct seems to be the central focus of the cited social cognitive models, the SCT has comprehensively captured the role of cognitive variables and the potentiality intervention design behind the same. The SCT has also captured both personal and environmental variables, which are factors external to human mental processes. The proposed study is interested in Cognitive variables, which refer to mental processes such as consciousness, sensation and perception; attention, decision making and judgment; thinking, memory, meta memory, and metacognition (Santrock, 2000; Papalia, Olds & Feldman, 2004).

Despite the broad nature of the cognitive variables, the scope of this particular paper has been set to address attitude and leave out other cognitive variables such as self efficacy, and cognitive flexibility for other papers. The choice of cognitive variables has been due to twofold reasons.

First, cognitive factors are assumed to be important causes of behavior which mediate the effects of many determinants including socio demographic variables (Rutter & Queen,

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1996; Msuya, & Duvel, 2007; Annor-Frempong, & Düvel, 2009; Mlyuka, 2011). Second, cognitive factors are assumed to be more open to change than other factors such as personality, suggesting that it is possible to design intervention programs addressing cognitive variables that might influence adoption of cassava processing technology. For example, to change one's attitude often sets in motion a modification of behavior since attitude is believed to influence behavioral intentions, which are conscious decisions to undertake specific actions such as adopting cassava processing technology (Ajzen, 2001; Franzoi 2002, 2003). As such the conceptual model guiding this particular paper is graphically illustrated in figure 1. The framework is comprised of the independent, Intervening and Dependent Variables. It is assumed that the reciprocal relationship exists between attitude, and adoption of improved cassava processing technology. It was expected that relative to their counterparts with positive attitude, farmers with negative attitude towards improved cassava processing technology would demonstrate low adoption of the technology. It was further assumed that variables such as sex, age, intention to adopt cassava processing technology, training on cassava processing technology and receiving loans support could have intervening influence on adoption of improved cassava processing technology. The double arrows imply the reciprocal relationship among variables.

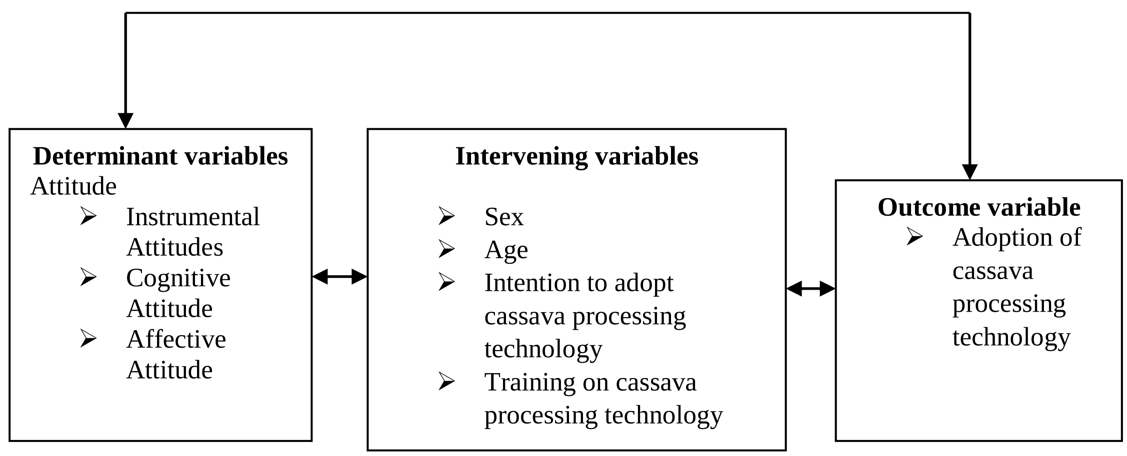

Figure 1: Conceptual Framework

METHODOLOGY

Study Design, Area and Sampling

This cross-sectional study was carried out among cassava farmers in Serengeti, Sengerema, and Biharamulo Districts in Mara, Mwanza and Kagera regions respectively. The regions are located in the Lake zone of Tanzania. The districts were selected given their cassava farming potential and presence of the cassava processing units in operation, which is a potential drive for adoption of the improved cassava processing technology.

Vol.8, No.2, pp.41-56, 2021
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The study target population for this study was farmers growing cassava in the catchment areas of the cassava processing unit. These were of two categories. The first category was farmers growing cassava and process their cassava using the improved cassava processing technology. The second category was farmers growing cassava but process their cassava using traditional methods. Due to indefinite population frame of these groups and the scattered nature of the farmers in the catchment ares, it was necessary to undertake purposive sampling through invitation. Consenting farmers were enlisted to participate in the study. About 360 participants [181 (50.3%) males and 178 (49.7%) females] responded to the questionnaire comprised of both attitude towards cassava processing technology scale (ACPT) and cassava processing technology adoption scale (CPTA). Participants were of the heterogeneous nature in terms of age group, including 174 (48.3%) young age group (<= 35 years), 84 (23.3%) middle age group (36 – 44 years), and 102 (28.3%) old age group (45+). There were 70 (19.4%) participants with no formal education, 138 (38.3%) with primary education, and 152 (42.2%) with secondary education level or above. In terms of economic activities, 183 (50.8%) reported only farming, 36 (10%) reported farming and business, while 141 (39.2%) reported farming and other economic activities. 'Other economic activities' reported includes rearing cattle, poultry, casual labor in other farmers' farms, driving motor cycles, carpentry, selling charcoal and firewood, and bull-cart driving/dragging.

Instruments for Data Collection

One general questionnaire comprised of questions on both attitude towards cassava processing technology and adoption of improved cassava processing technology was administered. In addition, the questionnaire comprised of other variables reported in the previous studies, which are sex, age, access to credit, intention to engage in cassava processing tasks and attendance to the training on cassava processing technology. Attitude towards cassava processing technology was measured using attitude towards cassava processing technology scale (ACPT). The instrument has been adopted from the pupils' attitude toward technology short questionnaire (PATT-SQ) (Ardies, De Maeyer, & Gijbels, 2013), Blog Attitude Questionnaire (BAQ) (Aryadoust & Shahsavar, 2016) developed to measure blog users' attitudes, and Ajzen's (2001) questionnaire based on the theory of planned Action. This analysis found ACPT a 10 item, two factor scale with instrumental attitude and cognitive attitude subscales. In terms of reliability, the instrumental attitude subscale has reached good internal consistency ($\alpha = .85$) just like cognitive attitude subscale, whose internal consistency was $\alpha = .84$. The items clustered under instrumental attitude were grounded in evaluating the comparable advantages between processed cassava products (improved cassava processing technology) and the same products made of other cereals and traditionally processed cassava. Respondents evaluated the products in terms of palatability, accessing the products, market for the products, preparation time and safety in terms of consumer's health. Adoption of the improved cassava processing technology was measured using cassava processing technology adoption scale (CPTA). The scale measured farmers' adoption in three components, namely; involvement in the pre-processing tasks necessary to be accomplished before cassava is placed in the machines; involvement in processing tasks, which are directly carried out during the processing in the factory; and utilization of the processed products. The internal consistency for the components has been found good (α

Vol.8, No.2, pp.41-56, 2021
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= .87 for involvement in the pre-processing tasks, α = .72 for involvement in the processing tasks, and α = .81 for utilization of the processed products subscale).

Data Analysis

Items in the scales were entered in the statistical package for social sciences (SPSS) version 21 for analysis. After screening, all negatively worded items were reversed so that high scores in the CPTA scale represented high level of adoption while low scores in the CPTA represented low level of adoption of the improved cassava processing technology. Similarly, high scores in the ACPT represented positive attitude towards the improved cassava processing technology and low scores in the ACPT represented negative attitude towards the improved cassava processing technology. To categorize farmers with negative from positive attitude, the ACPT scores were summed up for each participant, arranged in descending order, then the median score was treated as a cutoff point separating the high from low scores. Participants whose scores fell below the median were labeled as a negative score group while those with scores above the median were labeled as a positive attitude group. Categorization of adoption of the improved cassava processing technology was done in specific subscales. Items in the involvement in the pre-processing tasks subscale for example, were totalized, arranged in the descending order, and the median score separated participants who adopted from participants who did not adopt the tasks. Similar procedure was carried out in the involvement in processing tasks and utilization of the cassava processed products subscales. Data analysis employed Principle Component Analysis (PCA) statistic supplemented by the Monte Carlo PCA for Parallel analysis to check for the structures of the scales, Cronbach analysis for internal consistency of the scales. Further, Chi-square (χ^2) analysis was performed to explore the difference in farmers' attitude towards the improved cassava processing technology with the components of adoption of the cassava processing technology, namely; involvement in pre-processing tasks, involvement in the processing tasks and utilization of the cassava processed products. This was supplemented by the logistic regression analysis for prediction of farmers' adoption of improved cassava processing technology from attitude, when other independent variables such as sex, age, access to credit, intention to engage in cassava processing tasks and attendance to the training on cassava processing technology were controlled.

RESULTS

Difference in Farmers' involvement in the improved pre-processing tasks with Attitude

A chi-square test for independence (with Yates Continuity Correction) was performed to explore the difference in farmers' involvement in the improved pre-processing tasks between farmers with positive attitude and those with negative attitude towards the improved cassava processing technology. Table 3 shows the results.

Difference in Farmers' involvement in the improved pre-processing tasks with Attitude

Table 1 indicates that there was a significant difference, $\chi^2 (1, n = 360) = 8.19, p = .004$, phi = -.16 in adoption of the pre-processing tasks with farmers' instrumental attitude.

Vol.8, No.2, pp.41-56, 2021
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More farmers with positive than their counterparts with negative instrumental attitude towards the improved cassava processing technology were more likely to report to have adopted the pre-processing tasks. However, the phi = .16 indicates that the magnitude of difference was just small. Similarly, a significant difference, χ^2 (1, n = 360) = 5.12, p = .024, phi = -.13 in adoption of the pre-processing tasks with farmers' cognitive attitude was reported. This interprets that farmers with positive cognitive attitude reported adoption of the pre-processing tasks tan farmers with negative cognitive attitude.

		Adoption Involvement in the Pre-processing tasks				**Chi-square test**			
Attitude	**Level**	**Not adopted**		**Adopted**					
		f	**%**	**f**	**%**	**χ^2**	**df**	**p**	**phi**
Instrumental attitude	*Positive*	83	45.9	98	54.1	8.19	1	.004	-.16
	Negative	110	61.5	69	38.5				
Cognitive attitude	*Positive*	95	48.0	103	52.0	5.12	1	.024	-.13
	Negative	98	60.5	64	39.5				
		Involvement in the Processing tasks							
		Not adopted		**Adopted**					
		f	**%**	**f**	**%**	**χ^2**	**df**	**p**	**phi**
Instrumental attitude	Positive	87	48.1	94	51.9	11.726	1	.001	-.19
	Negative	119	66.5	60	33.5				
Cognitive attitude	Positive	101	51.0	97	49.0	6.384	1	.012	-.14
	Negative	105	64.8	57	35.2				
		Utilization of the processed cassava products							
		Not adopted		**Adopted**					
		f	**%**	**f**	**%**	**χ^2**	**df**	**p**	**phi**
Instrumental attitude	Positive	89	49.7	90	50.3	6.44	1	.011	.14
	Negative	115	63.5	66	36.5				
Cognitive attitude	Positive	73	45.1	89	54.9	15.31	1	.000	.21
	Negative	131	66.2	67	33.8				

Table 1: Difference in Farmers' adoption of the improved cassava processing technology with Attitude

Vol.8, No.2, pp.41-56, 2021
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Difference in Farmers' involvement in the improved processing tasks with Attitude

As Table 1 indicates, there was a significant difference, χ^2 (1, n = 360) = 11.73, *p* = .001, phi = .19] in farmers' involvement in the improved processing tasks with farmers' instrumental attitude towards the improved cassava processing technology. Farmers with positive attitude towards the improved cassava processing technology were more likely to report involvement in the improved processing tasks than farmers with negative instrumental attitude towards the improved cassava processing technology with a moderate magnitude of difference (phi = .19). Results further indicate a significant difference, [χ^2 (1, n = 360) = 6.38, *p* = .012, phi = -.14] in farmers' involvement in the improved processing tasks with farmers' cognitive attitude towards the improved cassava processing technology. This means that farmers with positive cognitive attitude towards the improved cassava processing technology reported involvement in the improved processing tasks than farmers with negative cognitive attitude towards the improved cassava processing technology.

Farmers' difference in utilization of the cassava processed products with Attitude

Results in Table 1 reveals a significant difference [χ^2 (1, n = 360) = 6.44, *p* = .01, phi = .14] in utilization of the cassava processed products with farmers' instrumental attitude towards the improved cassava processing technology. Farmers with positive attitude towards the improved cassava processing technology were more likely to report utilization of the cassava processed products than farmers with negative instrumental attitude towards the improved cassava processing technology. The magnitude of difference was however, small (phi = .14). There was also a significant difference, [χ^2 (1, n = 360) = 15.31, *p* = .00, phi = .21] in utilization of the cassava processed products with farmers' cognitive attitude towards the improved cassava processing technology. The magnitude of difference was moderate (Phi = .21). This means that farmers with positive cognitive attitude towards the improved cassava processing technology reported utilization of the processed cassava products than farmers with negative cognitive attitude towards the improved cassava processing technology.

Explaining the Likelihood of adoption of improved cassava processing technology from Attitude

Direct logistic regression was performed to assess the influence of age, sex, training on cassava processing, intention to process, instrumental attitude, and cognitive attitude on the likelihood that respondents would report adoption of improved cassava processing technology. Three models were separately assessed to address each aspect of adoption of the technology. The first model assumed that independent variables (age, sex, training on cassava processing, intention to process, instrumental attitude, and cognitive attitude) would uniquely contribute to the likelihood of reporting involvement in the pre-processing tasks. The second model assumed that the same independent variables would uniquely contribute to the likelihood of reporting involvement in the processing tasks. The third model assumed that the same independent variables would uniquely contribute to the likelihood of reporting utilization of the processed cassava products. The three models were all statistically significant, [$\chi2$ (6, N = 360) = 24.93, $p < .001$], [$\chi2$ (6, N =

360) = 20.72, p < .001] and [χ2 (6, N = 360) = 26.97, p < .001] for involvement in the pre-processing tasks, involvement in the processing tasks and utilization of the processed cassava products respectively. This indicates that the models were capable of distinguishing respondents who reported from those who did not report adoption of improved cassava processing technology.

	B	S.E.	Wald	df	Sig.	Odd Ratios	95% C.I. for Odds Ratio	
							Lower	Upper
Involvement in Pre-processing tasks								
Age	-.029	.016	3.291	1	.070	.971	.941	1.002
Sex	.059	.220	.072	1	.788	1.061	.689	1.634
Training on Cassava processing	-1.269	.369	11.825	1	.001	.281	.136	.579
Intention to adopt	.531	.257	4.268	1	.039	1.701	1.028	2.814
Instrumental Attitude	.607	.367	2.739	1	.098	1.835	.894	3.767
Cognitive Attitude	.048	.370	.017	1	.896	1.049	.509	2.165
Constant	1.301	.738	3.109	1	.078	3.672		
Involvement in Processing Tasks								
Age	.004	.016	.057	1	.811	1.004	.973	1.035
Sex	-.163	.221	.547	1	.460	.850	.551	1.309
Training on Cassava processing	-.883	.355	6.200	1	.013	.414	.206	.829
Intention to adopt	.030	.251	.015	1	.904	1.031	.631	1.685
Instrumental Attitude	.837	.372	5.054	1	.025	2.309	1.113	4.788
Cognitive Attitude	-.130	.375	.120	1	.729	.878	.421	1.831
Constant	.045	.722	.004	1	.950	1.046		
Utilization of the processed cassava products								
Age	.018	.016	1.263	1	.261	1.018	.987	1.051
Sex	.303	.222	1.86	1	.17	1.354	.877	2.091

Vol.8, No.2, pp.41-56, 2021
Print ISSN: ISSN 2058-9093,
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Training on Cassava processing	.907	.381	5.654	1	.017	2.477	1.173	5.231
Intention to adopt	-.351	.254	1.917	1	.166	.704	.428	1.157
Instrumental Attitude	.395	.388	1.034	1	.309	1.485	.693	3.179
Cognitive Attitude	-1.211	.389	9.668	1	.002	.298	.139	.639
Constant	-1.189	.742	2.566	1	.109	.305		

Table 2: Likelihood of adoption of improved cassava processing technology

The model for predicting involvement in the pre-processing tasks explained between 6.7% (Cox and Snell R square) and 8.9% (Nagelkerke R squared) of the variance in involvement in pre-processing tasks, and was able to categorise 62.8% of non-adopters. The model for predicting involvement in the processing tasks explained between 5.6% (Cox and Snell R square) and 7.5% (Nagelkerke R squared) of the variance in involvement in processing tasks, and categorised 61.9% of non-adopters. The model for predicting utilization of the cassava processed products explained between 7.2% (Cox and Snell R square) and 9.7% (Nagelkerke R squared) of the variance in utilization of the cassava processed products, and correctly classified 63.6% of non-adopters. Table 2 indicates the contribution of each independent variable to the specific model.

Regarding the contribution of the determinant variables to each of the three models, Table 2 indicates that only two determinant variables (attendance to the training on improved cassava processing technology and intention to engage in the same) uniquely contributed to farmers' involvement in pre-processing tasks. The strongest predictor of reporting involvement in pre-processing tasks was attendance to training on improved cassava processing technology. The odd ratio of 0.28 was less than 1, implying that respondents who had not attended any training on improved cassava processing technology were 0.28 times less likely to report involvement in the pre-processing tasks, when other variables in the model were put under control. Intention to engage in improved cassava processing technology followed by recording the odd ratio of 1.72 indicating that farmers who reported that they had intended to engage in improved cassava processing technology were over 1.72 times more likely to report their involvement in the pre-processing tasks.

Further, Table 2 indicates that two determinant variables (attendance to the training on improved cassava processing technology and instrumental attitude) uniquely contributed to farmers' involvement in processing tasks. Attendance to training on improved cassava processing technology was also the strongest predictor of reporting involvement in processing tasks, recording the odd ratio of 0.41. This implied that respondents who had not attended any training on improved cassava processing technology were 0.41 times less likely to report involvement in the processing tasks, when other variables in the model were controlled for. Instrumental Attitude recorded the odd ratio of 2.31 implying that farmers with positive instrumental attitude had over 2.31 chances to report their involvement in processing tasks.

With regard to utilization of the processed cassava products, Table 2 indicates that only two independent variables (Attendance to the training on improved cassava processing technology and Cognitive attitude) made a unique statistically significant contribution to the model. Cognitive attitude was the strongest predictor of reporting utilization of the processed cassava products, recording the odd ratio of 0.30. This meant that farmers with negative cognitive attitude were 0.30 times less likely to report utilization of the processed cassava products than their counterpart farmers with positive cognitive attitude towards improved cassava processing technology. Attendance to the training on improved cassava processing technology followed by recording odd ratio of 2.48, implying that farmers who attended training on cassava processing technology were over 2.48 times likely to report utilization of the processed cassava products than farmers who had not attended any training.

DISCUSSION

This study has accepted the hypothesis that there would be a relationship between attitude towards cassava processing technology and adoption of the improved cassava processing technology among farmers. These results are similar to the findings reported by Ogunsumi (2011) in Nigeria, who reported that positive attitude was higher among the sustained users than abandoned users of farming technologies. The results are also in line with the findings by Salum (2016) who associated farmers' attitudes with the improved cassava varieties in Zanzibar. The findings also camps with Ntshangase, Muroyiwa, and Sibanda (2018) whose study in South Africa found that that farmers' positive perceptions not only positively correlated with higher maize yields but also increased the likelihood of a farmer adopting no-till conservation agriculture. However, in addition to the previous findings (Ogunsumi, 2011; Salum, 2016; Ntshangase, Muroyiwa, & Sibanda, 2018) these results have found that instrumental attitude (phi = .19) towards the improved cassava processing technology than cognitive attitude (phi = .14) towards the same indicated a bit higher magnitude of difference for pre-processing and processing adoption respectively. However, with utilization of the cassava processed products, cognitive (phi = .21) than instrumental attitude (phi = .14) explained adoption of the same. This implies that unlike instrumental attitude which is important in early stages of adoption, cognitive attitude might not play a key role in early adoption stages (involvement in the pre-processing and processing tasks), but rather it plays a key role in the utilisation of the processed cassava products.

Analysis of CPTA has brought to light a serendipitous observation. Most respondents reported involvement in the pre-processing tasks, which are necessary before the genesis of processing tasks and the utilization of the processed products. The number of adopters decreased in the involvement in the processing tasks but increased in the utilization of the processed tasks. This might alert that those who adopt the pre-processing tasks are the foundation or potential adopters of the next stage tasks; namely involvement in the processing tasks but it is not necessarily that only adopters of the early stages will adopt the last stage of utilization of the processed products. This means that even non-adopters of the early two stages of tasks might adopt the last stage of utilization of the processed products provided they are exposed to the products.

Another point to consider in this discussion is the fact that attendance in the training uniquely explained adoption in pre-processing and processing stages but did not uniquely explain utilization of the processed cassava products. This might imply that training is more required in the early stages to enable farmers develop intention to adopt pre-processing tasks and processing tasks more than it is required for utilisation of the processed cassava products. This assumption is in line with the arguments presumed by the social cognitive theory (Bandura, 1997). The theory argues that observational learning brings in cognitive skills, preconceptions, and value preferences of the observers, all of which determine what a person is more likely to adopt. For a person to be influenced by the observed object, a person must be able to remember the object. In addition, for more possibility of adoption, retention of the object in one's mind must take place because what a person retains in the mind regarding the object exerts biases about the object. At the same time acquisition of the behavior undergoes evaluation of positive and negative outcomes because people are more likely to engage in a modeled behavior if the behavior brings valued outcomes than if it has unrewarding or punishing outcomes to the role model.

In that principle, people might adopt some tasks of the same technology that they consider rewarding and consciously decide to reject those aspects of the technology that they consider punishing. Even when people realize the advantages of an action, they do not automatically adopt it but rather they compare the action with their personal moral standards. Then people are more likely to pursue actions that they judge as self-satisfying and that bring them worth in the society and reject activities that they personally disapprove. In this case, some farmers who reported involvement in pre-processing tasks such as planting the improved cassava varieties and harvesting timely as instructed by the extension officers reported non–involvement in processing tasks such as grating, dewatering, and drying on the improved drying racks in processing units. At the same time these farmers reported not only liking but also buying HQCF. In the same line of argument, Krosnick, et al. (2005) holds that a person is likely to posses in the mind so many connections with a particular object, the connections which each might have evaluative implications. When a summary of the person's evaluation toward the object is required, then one gives an index of the total summary depending on the points of emphasis the researcher requires. The mechanism for translating cognition into action involves both transformational and generative operations. Execution of a skill must be constantly varied to suit changing circumstances. Adaptive performance, therefore, requires a generative conception rather than a one-to-one mapping between cognitive representation and action (Bandura, 2001).

Implication to Research and Practice

Findings in this study have indicated that attendance to training in improved cassava processing technology explained farmers' involvement in processing tasks. This might be because in these trainings farmers are exposed to the benefits related to involvement in

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processing tasks. Farmers might use this information to improve their attendance to the trainings for them to benefit from the education provided in the trainings. Researchers might use this information to study the content in these trainings that makes the difference between farmers attending and those who do not attend. It has also been found that instrumental attitude explained adoption. The details of instrumental attitude towards improved cassava processing technology evaluated specifically were palatability, accessing the products, market for the products, preparation time and safety in terms of consumer's health. This information may be used by processors of the products to ensure the quality of the processed cassava products in terms of these aspects. The most catching items were those related to farmers' easiness to access the processed products and easiness to sell their processed cassava products. This implies that if farmers are sure of where they can easily sell the improved processed cassava products, at comparable better price than how they can sell the traditionally processed ones, they might be able to easily adopt the processing technology. Likewise, those who want to buy the processed cassava products make the comparison of palatability and access to the products. This information may also be useful to marketing strategies aiming at convincing farmers to adopt the improved cassava processing technology, as they may realize that training content needs to include accompanying issues related to palatability, accessing the products, market for the products, preparation time and safety in terms of consumer's health. Introduction in farming technology to farmers should consider accompanying the introduced technology with investing in practical training of farmers basing on both exposure and expected advantages and disadvantages of the same. It is also potential application in assessing individual differences in instrumental and cognitive evaluation towards the ongoing introduced agricultural technologies among farmers. For successful utilisation of the processed cassava products one might require developing positive cognitive attitude towards the products through mere exposure effect to the products in addition to training on their making. It is also worth noting that training needs to precede both instrumental attitude and intention for successful adoption of the technology.

CONCLUSIONS

From the findings therefore, it is concluded that attitude towards the improved cassava processing technology has influence on adoption of the improved cassava processing technology. However, attitude is not the only and sufficient determinant of adoption of improved cassava processing technology. Attendance to the training in improved cassava processing technology and intention to adopt improved cassava processing technology determined farmers' involvement in the pre-processing and processing tasks required in improved cassava processing technology. The influence of attitude on adoption of the improved cassava processing technology is not the same across the components of adoption of the improved cassava processing technology. Instrumental attitude is more likely to determine adoption of the improved cassava processing technology in specific pre-processing tasks such as planting the improved cassava varieties and timely harvesting as instructed by extension officers. Similar likelihood exists in the processing tasks such as grating, dewatering, and drying in the processing units. On the other hand, cognitive attitude is more likely to determine the utilisation of the processed cassava products than it is likely to determine involvement in the pre-processing and processing tasks.

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Recommendation for Future Research

Future research may find it useful to use ACPT scale in studying farmers' attitude towards other agricultural technologies. ACPT has been found an effective research tool for measuring farmers' attitude towards the improved cassava processing technology. Second, studies on the adoption of farming technology need to improve the conceptualization of the adoption construct to capture all necessary tasks involved in the introduced technologies.

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