ANALYSIS OF FARMERS' PERCEPTION OF RUBBER RESEARCH INSTITUTE OF NIGERIA'S DEVELOPED TECHNOLOGIES: A CASE STUDY OF IKPOBA – OKHA LOCAL GOVERNMENT AREA OF EDO STATE

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ABSTRACT

The perceptions of Edo State rubber farmers on rubber production technologies developed in Rubber Research Institute of Nigeria (RRIN), Iyanomo, Benin City, Nigeria were examined in this study. Data were collected from 100 rubber farmers randomly selected from 5 communities in Ikpoba - Okha local government areas (LGA) of the state. Descriptive statistics, logistic and multiple regressions were used to analyze the data. The results showed that the respondents had high perception of the usefulness of rubber technologies developed by RRIN especially bi-annual weeding (mean = 3.94) and pruning (3.80). Their knowledge of the benefits of implementing improved rubber production practices was high (84.2%) especially with respect to increase in output (mean = 3.95) and being able to grow more crops (3.90) and 55.9% of them showed a favourable disposition to the use of rubber improved technologies. Despite these however, their level of adoption of rubber technologies developed by RRIN was low. The highest adoption score was recorded in bi-annual weeding (27.7%). Major reasons for the low adoption include high labour cost (3.82) and lack of funds (mean = 3.41). Significant factors affecting farmers' perception of the usefulness of rubber technologies were education (b = 0.710), age (b = 0.728), farming experience (b = 0.067), household size (b = -0.67) and farming status (b = 2.553). Other important factors include education (b = 0.741) and contact with extension agents (b = 0.959). The study suggested rubber farmers to form cooperative societies in order to be more recognized by government so as to have easier access to facilities such as extension services from Rubber Research Institute of Nigeria and acquaint them with up to date farm technologies from the Institute.

Keywords: Adoption, Improved technologies, Rubber farmers, Rubber Research Institute of Nigeria (RRIN)

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INTRODUCTION

Nigeria is a country dominated by small holder farmers as over 90 percent of Nigeria's total agricultural production comes from small holder farmers (Mesike and Abolagba, 2007). Rubber (*Hevea brasiliensis*) is cultivated on 154,000 hectares of the agricultural land in the country with small holders having 96,000 hectares (Anon., 2006), which represent 62.3% of total land used for rubber cultivation. It has been acknowledged that in order to contribute to development in Nigerian agriculture, research needs to be innovative and relevant, and its results

widely transferred and/or acquired by those who required them (Ekpere, 1995). Thus, the acceleration of agricultural growth is dependent on research, focused on the development, diffusion and adoption of modern agricultural technologies (Ekpere, 1995). Agricultural research is an important factor in the development of agricultural sector, largely because no nation has been known to achieve meaningful progress without huge investment in agricultural research (Brenor *et al.,* 1989). New technologies have to be constantly developed and disseminated if farmers are to continue farming efficiently.

Various research institutions have been established in the country, charged with the responsibility of developing new technologies (Lucas *et al.,* 1997). One of such institutes is the Rubber Research Institute of Nigeria (RRIN) established in 1961. The research institute is charged with the mandate to conduct research into rubber and other latex producing plants. Improved technologies can only deliver their potential when they are used by farmers. No matter how well new technologies work in research stations, if farmers do not make use of them their development would be in vain (Oladele and Fawole, 2007; Sandra *et al.,* 1989). The study therefore aimed at evaluating the perception of rubber farmers in Ikpoba–Okha local government area on rubber production technologies developed by RRIN, Benin City.

METHODOLOGY

Area of Study: The study was conducted in Edo state which has a population of 3,218,332, representing 2.30% of Nigeria's population (NPC, 2006). It has a landmass of 17,902km, and lies between Longitude $05^0$04 North and $06^0$43 East and Latitude $05^0$44 North and $07^0$34 North. Agriculture is a major activity of the people of Edo state and the main tree crops cultivated are rubber, oil palm and cocoa.

Data Collection: Primary data were used for the study, and a multistage sampling technique was adopted. The first stage was a purposive sampling of Ikpoba–Okha Local Government Area (LGA) of Edo state, Nigeria; while the second stage was a random sampling of five rubber growing communities in the LGA which include Obaretin, Obanyator, Ogbwekwe, Iyanomo and Okha. Data on the farmer's usage of RRIN 's developed technologies, educational status, age, rubber farming experience, farm size (ha) and their family sizes were obtained through the use of structured questionnaire and oral interview schedule on twenty farmers in each of these communities. This gave total a sample size of 100 respondents.

Data Analysis: Data were analyzed using descriptive analysis (simple percentage and frequency), logistic and multiple regressions. Logistic regression was used to test the relationship between the farmers' socio-economic variables and their perception of the relevance of rubber technologies. Logistic regression is a method for determining whether each of a set of independent variables has a relationship to a dichotomous dependent variable (Chekoway, 1989). The implicit regression model is given as:

$Y = a + b_1 X_1 + b_2X_2+\ldots\ldots + b_n X_n + e.$

Where: Y = Dependent variable i.e. Perception of the usefulness of RRIN's rubber technologies (very useful = 1, useful = 0). a = Constant; b = Coefficient; X_i = Independent variables like X_1 (Gender; Male = 1, Female =0); X_2 (Age in years); X_3 (Education in years); X_4 (Farming experience in years); X_5 (Farm size, ha); X_6 (Household size as number of people living and feeding together);

and e = error term. Multiple regressions were used to test the effect of farmers' personal characteristics, (age, income, educational level, family size, gender and farm size) on the perception and attitudes (1 = favourable, 0 = unfavourable) towards adoption of rubber technologies developed by RRIN. Multiple Regressions is a statistical test used to test the influence of two or more variables (independent) on a dependent variable (Cohen et al. 2003). The multiple regression equation is specified as:

$Y = a + b_1 X_1 + b_2X_2 + \ldots\ldots\ldots + b_n X_n + e$

Where: Y = Dependent Variable (rate of adoption of RRIN's Technology);

a = Constant; b = Coefficient; X_i = Independent variables; e = error term. The variables in the equation are defined as follows: Y = Adoption index (total number of technologies adopted) divided by total available technologies multiplied by 100 as adopted by Daramola (1987). X_1 = Age (years); X_2 = Gender (Male = 1, Female =0); X_3 = Education (years); X_4 = Farm Size (ha); X_5 = Income (₦); X_6 = Perception of technology relevance (total score); X_7 = Attitude towards rubber technologies (favourable = 1, Unfavourable = 0); X_8 = Farming experience (years); X_9 = Household size (number of people living and feeding together).

Four different functional forms of the regression model were run to determine the best model of fit based on the magnitude of the adjusted coefficient of determination (R^2), the number of significant variables, the size of the error term and the number of variables with logical sign. (Alabi, 2004). The functional forms are expressed as follows:

Linear: $Y = f(a + b_1 X_1 + b_2X_2 + \ldots\ldots + b_n X_n + e\ x)$

Exponential: $Y = f\ (a + b_1 LnX_1 + b_2LnX_2 + \ldots\ldots\ldots\ldots + b_nLn\ X_n + e)$

Double Log: $LnY = f(a + b_1 LnX_1 + b_2LnX_2 + \ldots\ldots\ldots\ldots + b_n\ LnX_n + e\ )$

Semi-log: $LnY = f(a + b_1 X_1 + b_2X_2 + \ldots\ldots\ldots\ldots + b_n X_n + e\ x)$

RESULTS AND DISCUSSION

The socio – economic characteristics of the respondents is as shown in Table 1. The result depicts that all respondents were males, implying that rubber farming in the study area is mainly a male activity. It is possible that the land tenure and inheritance systems might be the major factors limiting women from owning land to participate in rubber cultivation, as their culture denies female from inheriting. The dominance of males in rubber farming was also observed by Ihalang et al., (2006) in Indonesia, where they observed that male rubber farmers accounted for over 92% and 98% in the two areas studied.

The result of marital status revealed that 94% of the respondents were married while 6% were single. This shows that rubber farmers in the study area were dominated by married men. It therefore might be a major source of income for caring of their household. Table1 also shows that 21% of the respondents had no formal education, 66 % had primary education, and 8% had secondary education, while 5% had post secondary education. The result indicated that majority of rubber farmers had low formal educational background. This is similar to the findings of Giroh *et al.,* (2005), in their study on Adoption of rubber quality innovations among small holder rubber farmers in two farm settlements of Delta State, Nigeria in which they reported that 75% had no formal education while only 7% had OND or HND (Lower or Higher Diploma). The low level of education might affect their perception and adoption

of rubber innovations since education is known to enhance the ability to understand the relevance and application of improved technologies (Ojo and Imoudu, 2000).

On the other hand, the result on age depicts that 9% were 30 years and below, 5% were 31 – 35 years old, 17% were 36 – 40 years old, 7% were 41 – 45 years old, 9 % were 46 – 50 years old, 19% were 51 – 55 years old, while 24% were above 55 years old. The average age of the respondents was 51years, showing that majority were relatively old. This agrees with the findings of Giroh *et al* (2005) and Abolagba *et al*., (2003) that rubber farmers are aged. Being old, may make them conservative about the relevance in rubber innovations.

Rubber farming experiences of the respondents depicts that 49% of the respondents had less than 15 years experience, 19% have been growing rubber for 16 - 30 years, and 24% had 31 – 40 years of experience, while 8% have been growing rubber for more than 41years and above (Table 1). The result shows that majority of the farmers in the study area had more than ten years experience in rubber production, and may therefore be favourably disposed towards innovations that may improve their rubber output.

Majority of the respondents (52%) had a household comprising of 5 – 9, people while 30% had 10 – 14 people (Table 1). The benefit of a large household is that they can assist in farming operations thereby reducing labour cost. The study also revealed that 87% of the respondents had a farm land of 1.0 – 2.0ha, 6% had above 2.5ha, while 5% had 2.1 – 2.5ha, and only 2% had 0.5 - 1.0 ha. The average farm size was 1.7ha, indicating that the farmers are small scale farmers. It is possible that farmers with large farms might perceive rubber technologies to be more relevant to them than farmers with smaller farms.

Analysis in Table 1 also revealed that 90% of the respondents were full time farmers while 10% cultivate rubber on part time basis. As majority of the respondents were full time farmers, it was expected of them to be interested in innovations that would increase their rubber farms output. About 32% of the respondents realized between ₦20, 000 and ₦ 25,000 annual income from their farms, 40% realized between ₦26, 000.00 and ₦ 45,000.00, while 28% realized above ₦45, 000.00 yearly. The average income of the farmers was ₦32, 923, which is quite low couple with numerous needs and wants in life.

The adoption trend of RRIN recommended Rubber technologies by respondents is as shown in table 2. The result on the levels of rubber technologies awareness and adoption by the respondents indicated that 41% of them practiced weeding twice a year, and this was the highest technologies adopted (Table 2). Planting method by holing/dibbling, pruning of side branches and clearing about 2m radius around the plantation was adopted by 20%, 32% and 37% of the respondents respectively. These results show that respondents' adoption of rubber technologies was generally low and not up to half of the respondents' have gone beyond the level of awareness stage of all the technologies tested among the respondents. The level of discontinuance of technologies of the rubber innovations among the respondents was fairly high with the highest observed in planting method by holing/dibbling (80%), while clearing around plantation (3%) was the lest discontinued. This

might be due to their low levels of formal education, conservatism and old age that influenced their conservatism to change.

Table 1: Demographic Characteristics of Rubber Farmers

Characteristics	Categories	Frequency	%
Sex	Female	-	-
	Male	100	100
	Total	100	100.0
Marital Status	Married	94	94.00
	Single	6	6.00
	Total	100	100.0
Educational Level	No formal education	21	21.00
	Primary Education	66	66.00
	Secondary education	8	8.00
	Post secondary education	5	5.00
	Total	100	100.00
Age (years)	25-30	9	9.00
	31 – 35	5	5.00
	36 – 40	17	17.00
	41 – 45	7	7.00
	46 – 50	9	9.00
	51 – 55	19	19.00
	Above 55	24	24.00
	Total	100	100.0
Farming Experience (years)	<15	49	49.200
	16 – 30	19	19.00
	31 – 40	24	24.00
	41 & above	8	8.00
	Total	100	100.0
Household size	1-4	6	6.00
	5 – 9	52	52.00
	10 – 14	30	30.0
	>14	12	12.00
	Total	100	100.00
Farm Size (ha)	0.5 - 1.0	2	2.00
	1.0 – 2.0	87	87.00
	2.1 – 2.5	5	5.00
	> 2.5	6	6.00
	Total	100	100.0
Methods of Farming Operation	Part time	10	10.00
	Full time	90	90.00
	Total	100	100.0
Income (₦)	20,000- 25,000	32	32.00
	26, 000 – 45,000	40	40.00
	Above 45,000	28	28.00
	Total	100	100.0

Source: Survey Data, (2008).

Table 2: Adoption trend of RRIN recommended rubber technologies by respondents

	Aware of it		**Tried it before**		**Still using it**		**Not using it**	
	Freq.	**%**	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**
Technologies								
Weeding (twice a year)	94	94	74	74	41	41	59	59
Planting method (holing/dibbling)	80	80	40	40	20	20	80	80
Pruning of side shoot/branches)	73	73	37	37	32	32	68	68
Fire tracing (Clearing 2m radius around plantation)	65	65	40	40	37	37	3	3
Growing other crops with rubber	54	54	40	40	24	24	34	34
Use of trained tappers	79	79	18	18	20	20	35	35
Use of improved rubber clone (NIG 800/900 series)	86	86	46	46	40	40	60	60
Recommended spacing (6.7m x 3.4m)	89	89	30	30	7	7	23	23
Planting cover crops	94	94	10	10	6	6	42	42

Source: Survey Data, (2008).

The Farmers perception score of benefits of improved rubber technologies is as shown in Table 3. The respondents perceived all the technologies to be useful in terms of contributing to increase in output since the mean scores are greater than 2.50. However, the technologies perceived to be most useful were weeding (mean = 3.94), pruning (3.80), planting method by holing/dibbling (3.55) and recommended spacing (3.38). Weak perception of farm technologies have been said to be an important barrier to the adoption of farm technologies (Truong, 2008).

Table 3: Farmers perception score of benefits of rubber technologies

Technologies	Mean	SD
Weeding (twice a year)	3.94*	0.24
Pruning (removal of side shoot/branches)	3.80*	0.40
Clearing about 2m radius around plantation (i.e. fire Trace)	3.72*	0.48
Planting method by holing/dibbling	3.55*	0.61
Recommended spacing (6.7m x 3.4m)	3.38*	0.49
Using trained tappers to tap rubber	3.13*	0.39
Use of improved rubber clone (NIG 800/900 series)	3.11*	0.42
Growing other crops with rubber	3.04*	0.41
Planting cover crops	2.65*	0.60

* Perceived to be useful (mean ≥ 2.50); SD = Standard Deviation

The respondent's perception of benefits of rubber technologies is as shown in Table 4 below while farmers' categorization based on perception of rubber technologies is shown in table 5. The mean score, all of which exceed 2.50, shows that the respondents perceived the technologies to be beneficial, most especially in the area of increased yield (mean = 3.95), time saving (3.79), making more effective use of farm land (3.91), increase income (3.89), early harvest of rubber lump (3.70), control of pest/diseases (3.51) and improvement in soil fertility (3.32). Such an awareness of the benefits of using rubber technologies should encourage its adoption. Perception of the economic benefits of farm innovations was found to be an important factor influencing farmers' adoption of farm innovations (Alvarez and Nuthall, 2001) Perception of likely benefits and cost have equally been said to reflect on farmers adoption of farm technologies (Payne et al, 2003).

Table 4: Respondents perception of benefits of rubber technologies

Benefits	Mean	SD
Increased yield/output	3.95*	0.21
It helps to save time in working on the farm (i.e. saves time)	3.79*	0.41
Making more effective use of farm land e.g. able to grow more crops	3.91*	0.28
Increased income	3.89*	0.32
Early harvesting of rubber lumps	3.70*	0.50
Helps in control of pest/diseases	3.51*	0.50
Improvement in soil fertility	3.32*	0.60

* Benefits (mean ≥ 2.50); SD = Standard deviation.
Source: Survey data, (2008).

Table 5: Farmers' categorization based on perception of rubber technologies

Categories	Frequency	Percentage
A. Perception of Usefulness		
Useful (mean ≤ 30)	35	35.00
Highly useful (mean ≥31)	65	65.00
Total	100	100.00
B. Perception of Benefits		
Beneficial (mean ≤ 23)	18	18.00
Highly beneficial (mean ≥ 24)	82	82.00
Total	100	100.00

Source: Field Survey, (2008).

Table 6 shows the attitude of the farmers towards the use of rubber technologies. The frequency distribution shows that 75% of the respondents had a favourable attitude or were positively disposed towards use of the RRIN's technologies, while 25% were highly favourably disposed. This implies that there was great prospect in disseminating agricultural technologies to these farmers since their general attitude towards use of improved technologies was positive. Kulshreshtha & Brown (2004) and Oladele (2005) identified attitude as an important factor that influences farmers'

adoption of crop and irrigation technologies.

Table 7 shows the level of the respondents' contact with extension agents from RRIN. The result shows that 80% of the respondents had never come in contact with extension agents from RRIN, 5% had 3 – 5 times contact with the extension agents from RRIN, 14% had 6 – 8 times contact with extension agents while 1% came in contact with extension agents less than 3 times a year. The result implies that extension agents' contact with rubber farmers in the study area was very low and this might impact negatively on farmers' adoption of the RRIN's innovations. This is due to the fact that contact with extension agents is known to encourage farmers' adoption of farm innovations (Mirani et al, 2001).

Table 8 shows the logistic regression result analysis for the relationship between respondents' socioeconomic characteristics and their perception of the usefulness of rubber technologies. The model chi-square value (X^2 = 40.88, df = 8) is significant at the 1% level (critical X^2 = -2.733). This means that the model is significant and appropriate for the test.

The coefficient of determination or adjusted R^2 (0.326) shows that the explanatory variables accounted for or explained 32.6% variation in the dependent variable, i.e. farmers perception of the usefulness of rubber innovations. The results as shown in Table 8 showed that six of the variables have a significant influence on farmers' perception of the usefulness of rubber technologies. These are education (b = 0.710, t = 2.500), age (b = 0.728, t = 3.299), farming experience (b = -0.067, t = 2.352), household size (b = -0.067, t = 2.267) and farming status (b = 2.553, t = 3.166).

Table 6: Respondents attitude towards improved rubber farming technologies.

Attitude	Frequency*	Percentage
Favourably disposed	75	75.00
Highly favourably disposed	25	25.00
Total	100	100.00

* Based on the average score of 32.0 Source: Field Survey, (2008).

Table 7: Farmers' Contact with Extension Agents.

Contact	Frequency	Percentage
Never	80	80.00
Less than 3 times	1	1.00
3 – 5 times	5	5.00
6 – 8 times	14	14.00
Total	100	100.00

Field Survey, 2008

Table 8: Relationship between respondents' socio-economic characteristics and perception of the usefulness of rubber technologies (Logistic regression).

Variables	Coefficient (b)	T	Odd ratio
Education	0.710*	2.500	2.033
Age	0.728*	3.299	2.071
Rubber farming experience	0.067*	-2.352	0.935
Household size	0.725*	-2.267	0.484
Farm size	0.326	0.801	1.385
Farming status	2.553*	3.166	12.846
Contact with extension agents	0.408*	1.967	1.504
Income	0.137	-0.306	1.147
Constant	-3.00	-1.775	0.050

Adjusted R^2 = 0.326; model X^2 = 40.88; percentage Correct prediction = 70.5; Critical t (5% = 1.96). Dependent variable = Adoption of RRIN's developed farming technologies

The results for education is positive (b = 0.710), implying that education has a positive influence on farmers perception of the usefulness of rubber technologies. This means that farmers that are more educated have a greater perception of the usefulness of rubber technologies than farmers with less education. The odd ratio (2.033) suggest that farmers who are more educated are twice more likely to have a higher perception of the usefulness of rubber technologies than farmers who are less educated. The t value (t = 2.500) shows the relationship is significant at the 5% level since calculated t (2.500) is greater than the tabulated t at the 5% level (1.96). The finding of the study agrees with the assertion of Ojo and Imoudu (2000) that education enhances an individual's ability to understand the relevance and application of farm innovations.

The result for age is positive (b = 0.728), which means that age has a positive influence on farmers perception of the usefulness of rubber technologies. This means that farmers that are older in age have a greater perception of the usefulness of rubber technologies than farmers that are younger in age. Older farmers also have more experience, and are therefore likely to appreciate the need for these technologies. The odd ratio (2.071) means that farmers who are older in age are twice more likely to have a higher perception of the usefulness of rubber technologies than farmers who are younger. The t value (t = 3.299) shows the relationship between age and perception is significantly at the 5% level since calculated t (3.299) is greater than the tabulated t at the 5% level (1.96).

The result for farming experience is negative (b = -0.067), which means that rubber farming experience has a negative influence on farmers perception of the usefulness of rubber technologies. This implies that farmers that have shorter farming experience have a higher perception of the usefulness of rubber technologies than farmers that have longer farming experience. The odd ratio (0.935) means that farmers who have shorter experience in rubber farming are 1.07 times more likely to have a higher perception of the usefulness of rubber technologies than farmers with longer experience. It is possible that farmers with longer farming experience are so used to the traditional ways of rubber farming and

may therefore not see the need for the application of new improved farming methods. The t value (t = 2.352) shows the relationship is significant at 5% level since calculated t (2.352) is greater than the tabulated t at the 5% level (1.96).

The result for household size is negative also (b = -0.067), which means that household size has a negative influence on farmers perception of the usefulness of rubber technologies. This suggests that farmers with smaller households have greater perception of the usefulness of rubber technologies than farmers with larger households. An explanation could be that rubber technologies help to reduce cost of labour of weeding. The odd ratio 0.484 (2.071/0.484) means that farmers who have smaller household size are twice more likely to have a higher perception of the usefulness of rubber technologies than farmers who have larger household size. The t value (t = 2.267) shows the relationship is significant at the 5% level (calculated t, 2.267 > tabulated t, 1.96).

The result for farming status is positive (b = 2.553), which implies that farming status had a positive influence on farmers perception of the usefulness of rubber technologies. This implies that farmers that are full time farmers have a greater perception of the usefulness of rubber technologies than farmers who are part-time farmers. A possible reason is that farmers who are on full time have more time on their hands, which they invest on their farming business and thereby, realized more income. Hence they have better perception of the usefulness of rubber technologies. The odd ratio (12.846) implies that full time farmers are twelve times more likely to have a higher perception of usefulness of rubber technologies than part time farmers. The t value (t = 3.166) shows the relationship is significant at the 5% level since calculated t (3.166) is greater than the tabulated t level (1.96).

The result for contact with extension agents is positive (b = 0.408). This means that contact with extension agents has a positive influence on farmers' perception of the usefulness of rubber technologies. This means that farmers who are more in contact with extension agents have greater perception of the usefulness of rubber technologies than farmers with little or less contact. The reason is that farmers who are more in contact with extension agents have more access to information from the extension agents regarding the usefulness of improved technologies on increasing output than farmers with less or no contact. The odd ratio (1.504) suggests that farmers with more contact with extension agents are 1.5 times more likely to have a higher perception of the usefulness of rubber technologies. The t value (1.967) shows the relationship is significant at the 5% level since the calculated t (1.960) is greater than the tabulated t at the 5% level. The finding of this study agrees with the assertion of Kipsat (2007) that contact with extension agents affect adoption of farm technologies. Farmers' adoption is affected by their perception of the profitability or income benefit associated with the use of the innovation.

The influence of farmers' demographic and psychological factors on adoption of rubber technologies is as shown in Table 9. The semi-log function was chosen as the lead equation. The F value (6.915) is significant at the 1% level (critical F = 2.32) meaning that this model is fit or appropriate. The adjusted R^2 (0.281) showed that the explanatory variables account for or explain 28% variation in the dependent variable i.e.

adoption of rubber technologies by the farmers. The results of the table showed that three of the variables had significant influence on farmers' adoption of rubber technologies. These are attitude towards use of rubber technologies (b = -1.339, t = 4.287), education (b = 0.741, t = 3.828) and contact with extension agents (b = 0.959, t = 4.276). This result agrees with the assertion of Truong (2008) that weak perception of farm technologies have said to be an important barrier to the adoption of farm technologies.

The result for farmers attitude towards use of rubber technologies is positive (b = 1.399). This suggests that farmers that are positively disposed towards the use of rubber technologies will adopt more rubber technologies than those with poor or unfavourable attitude. This shows that attitude is an important factor affecting adoption of improved technologies. The t value (t = 4.287) shows the relationship is significant at 1% level since calculated t (4.287) is greater than the tabulated t (2.81).

The result for education is positive (b = 0.741), which means that education has a positive influence on farmers adoption of rubber technologies. This implies that educated farmers adopt more rubber technologies than the less educated farmers. Educated farmers have a broader knowledge and understanding; hence they tend to adopt modern technologies faster than the less educated. The t value (3.828) indicates that the relationship is significant at the 1% level since calculated t (3.828) is greater than the tabulated t at 1% level (2.81). The finding of the study agrees with the assertion of Ojo and Imoudu (2000) that education enhances an individual's ability to understand the relevance and application of farm innovations.

The result for contact with extension agents is positive (b = 0.959) which means that farmers contact with extension agents has a positive influence on their adoption of rubber technologies. As farmers have frequent contact with extension agents they will have the technologies explained to them more and more, which makes it easier to adopt.

Perception of the usefulness (b = 0.480) and benefits (b = 1.455) of rubber technologies, though not significant, had a positive influence on farmers' adoption of rubber technologies. This suggest that as farmers get to know more of the benefits of using rubber technologies as well as their usefulness in increasing output, they will adopt more of the technologies. This result is in line with the studies of (Kipsat (2007) that contact with extension agents affect adoption of farm technologies. Farmer's adoption is affected by their perception of the profitability or income benefit associated with the use of the innovation. Farmers' adoption is affected by their perception of the profitability or income benefit associated with the use of the innovation (Kipsat, 2007).

Table 10 shows the reasons for respondents' non-adoption of rubber technologies. The adoption constraints perceived by the respondents to constitute serious limitations to their adoption of recommended rubber innovations were lack of funds (mean = 3.41), high labour cost (means = 3.82), scarcity of trained tappers (mean = 3.10), scattered farm plots and long gestation period (mean = 2.64) were also considered to be serious limitations.

Table 9: Demographic and psychological determinants of rubber technology adoption (Multiple Regression)

Parameters	Coefficients (b)	T
Constant	-3.636	0.854
Perception of technology usefulness	0.480	1.415
Perception of technology benefits	1.455	1.718
Attitude towards use of rubber technologies	1.399*	4.287
Education	0.741*	3.828
Age	0.524	0.366
Farming experience	-0.208	0.372
Household size	0.827	1.734
Farm size	0.404	0.469
Contact with extension agents	0.959*	4.276
Income	-0.145	-1.949

Calculated F = 6.915; R^2 = 0.281 *significant at the 5% level (Critical F = 2.32 t = 1.96).

Table 10: Adoption Constraints of Rubber Technologies

Constraints	Mean	SD
Lack of Funds	3.41*	0.11
Scarcity of trained	3.10*	0.56
tappers	3.82*	0.34
High Labour Cost	2.97*	0.64
Scattered Farm Plot	2.64*	0.96
Long gestation period		

*Serious (mean ≥ = 2.50)

CONCLUSIONS

● Farmers have a high perception of the usefulness or benefit of the RRIN's developed technologies.

● Farmers' education level, age, household size, farming experience and status were found to be significant factors affecting farmers' perception of the usefulness of the developed rubber production technologies.

● Farmers' were equally favourably disposed to the use of RRIN's developed rubber technologies, but their level of adoption of these technologies was very low.

RECOMMENDATIONS

● Extension activities by both RRIN and Edo ADP should be increased in order to further enhance farmers' perception of the usefulness of rubber technologies, as well as their adoption.

● Rubber farmers need to be further educated on the benefits of adopting recommended rubber technologies.

● There is need for RRIN to examine those technologies perceived to be less useful by the farmers so as to understand why and see if such technologies can be improved upon so that farmers' perception of their usefulness can be enhanced.

● Farmers should be encouraged to form cooperative societies to enable government to know them better and also to have access to credit facilities from both Agricultural and Commercial banks.

● Rubber farmers and other stakeholders should be encouraged by RRIN extension agents to use improved rubber clone of NIG 800/900 series which have shorter gestation periods.

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