# Determinants of Cocoa Farmer's Participation in the Innovation Platform of the Humidtropics Programme in Southwestern Nigeria

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***Abstract—*** *In an effort to determine factors influencing cocoa farmer's participation in innovation platform (IP) activities of the Humidtropics programme, data was collected from purposively selected 177 farmers using multistage technique sampling technique and was gathered through the use of structured interview schedule. Data were collected and analyzed with percentage, frequency counts, mean, standard deviation and factor analysis. The study shows the mean age of the cocoa farmers in the IP to be 51.16±12.64 with about 52% aged above 50 years, female were only (23.73%), with more than 75$^{th}$ percentile literacy level and only about 31% of respondents generate annual income from farming above ₦50,000 while about 70% made below ₦40,000 extra income from other occupation. The mean farm size was 16.87 ±16.04 acre, farming experience 25.42±10.48 years and household size was 9.78±5.52. The six significant determinants of cocoa farmer's participation in IP arranged in order of magnitude are psychological factor (λ = 3.158), experience factor (λ = 2.164), community related factor (λ = 1.697) educational factor (λ = 1.854), economic factor (λ =1.438) and internal factor (λ = 1.113). The summative effect of the identified factors accounted for 76.17 % variation observed in cocoa farmer's participation in the IP.*

***Keywords— Innovation platform, Humidtropic programme, cocoa farmers and participation determinants.***

## I. INTRODUCTION

Cocoa (*Theobroma cacao* L.) is an important tree crop that has played significant role in Nigeria economy, especially in providing jobs and income to farmers, raw materials for the industry and foreign exchange for the country (Alamu, 2013). However, its economic role was challenged with the discovery of oil in the Niger-Delta in 1970 and the subsequent launch of the Structural Adjustment Programme (SAP) in 1986. This overall economic liberalization policy has been implicated to negatively affected government's interest in cocoa production and the subsequent decrease in its production rate in Nigeria (Idowu, 2007). The resultant effect led Nigeria into fourth position among the global exporters of cocoa, after Cote d'Ivoire, Indonesia and Ghana. Currently. Nigeria maintains annual cocoa export that accounts for 0.3 percent of the agricultural GDP (IFPRI, 2010).

Although cocoa is mostly grown in fourteen of the thirty-six States of the country, the southwestern states which include Edo, Ekiti, Ogun, Ondo, Osun and Oyo States dominate cocoa subsector of the country. According to FAOSTAT (2007) only 3 percent of the cocoa beans produced in Nigeria are consumed as food within the country, (52%) are exported while the remaining are classified as "other utility". The total annual cocoa production are left in the hand of some 30,000 smallholder's farmers cultivating less than five hectares per farming household (Ogunleye, 2007). The average cocoa farmer in Nigeria hold farm size of 2.5ha which delivers less than 5 bags per season (Nwachukwu *et al.*, 2010). Poor yield which characterized cocoa subsector in Nigeria have been attributed to non-adoption of improved seedlings, pests and diseases of cocoa (Asogwa and Dongo, 2009), old age of cocoa farms due to non-adoption of research recommendations (CRIN, 2010) and old age of cocoa farmers themselves (Aikpokpodion *et al.*, 2005).

Aikpokpodion *et al.* (2005) and Oyedele (2007) have separately challenged the continuous existence of these problems considering the abundant labour-saving technologies, improved seedlings with high yield and disease resistance potentials developed at the research station. However, Chamber (1989) and Asiabaka (2002) initially observed that rate of innovation uptake by farmers is enhanced when they are actively included in all stages of research from problems identification stage to

point of implementation and analysis of research results. Thus, application of participatory approach in research improves farmers' capacity for research, innovation and informed decision-making and stimulates farmers to become facilitators of their own research and learning process (Asiabaka, 2002). This ultimately makes research recommendations not only accessible, but also position farmers as the originator of research with meaningful impact on their livelihood.

Farmers' group approach in the past has been variously explored to manage the deficiency early mentioned premised on the assumption that farmers' group gives wider access to new information and a greater pool of diverse scares productive resources beyond the control of individual farmers (Arrow *et al.,* 2000). Empirical studies by Mehra *et al.* (2001) and Sparrowe *et al.* (2001) indicated that positive relationships, such as friendship or advice seeking relationships in farmers' group situation, can provide opportunities for social support as well as access to critical resources, which, in turn, can lead to improvement in cocoa farmer's livelihood. While separate study considered farmers' group an effective mechanism to increase farmer's livelihood by reducing information asymmetries (Bernard and Spielman, 2009), risk aversion mechanism for capital intensive technology (Di Gregorio *et al.,* 2004) and reduction in transaction costs (Kruijssen, *et al*., 2009).

Thus, after the decline in Nigerian agricultural production in late 1970's, and subsequent decline in cocoa annual output, various strategies to revive the agricultural sector have been tested by stakeholders particularly in cocoa production (Oseni, 2011). Consequently, organized cocoa farmer groups were promoted as a useful entry point to increasing farm productivity through implementation of food security programme and other community development projects at all levels. Unfortunately, group approach to a large extent was unable to address the complex problems associated with cocoa based farming system in Nigeria. Due to several reasons which spin from power asymmetry/overrepresented in group activities (Liverpool-Tasie, 2012), promotion of group activities that were less benefit to farmers due to the top-down approach (Fraser *et al.,* 2006; Francesconi and Ruben 2007), effect of excluding important stakeholders in group formation were not seriously considered and farmer's input into the innovation generation and dissemination processes were largely neglected (Mulema, 2012). Thus, most farmers became passive recipient of research recommendations that are of low relevance to their socio-economic situation. The non-involvement in innovation generation and dissemination process greatly influences their decision and hence resulting in low adoption of research recommendation (Nwankwo *et al.,* 2010; Lawal and Oluyole, 2008), formulation of incompatible innovation with farmers felt need (Falconer, 2000).

In the light of this, the Humidtropics program (a cocoa productivity improvement research initiative) modelled her programme into an innovation platform (IP) with emphasis on cocoa-based farming system which smallholder cocoa farmers at the center surrounded by other relevant stakeholder in the southwest. According to (IITA, 2013), the development programme is hinged on the participatory approach of innovation platform model which hold the potential to stimulate farmer's and all relevant stakeholder's capacities to innovate and systematically tackle the complex cocoa productivity challenges. The project seeks to solve problems of high levels of poverty and food insecurity among household member, high rate of soil degradation, lack of appropriate use of organic resources and livestock integration, low use of fertilizer and appropriate mechanization, lack of a systems approach to agricultural intensification, and insufficient capacity of stakeholder networks to disseminate knowledge-intensive agricultural innovation through cocoa-based system intensification and diversification options (IITA, 2013).

Since farmer's participation at all stages of the development programme has been demonstrated to be pivotal to its success, it is necessary to understand the factors influencing cocoa farmers' participation in the programme. Specifically, the study described the socio-economic characteristics of cocoa farmers in the IP; isolated factors associated with their participation and determine percentage contribution of each identified factor.

## II. METHODOLOGY

The study was conducted in the late cropping season of 2015 (October 2015 to January 2016) in Southwestern geopolitical zone of Nigeria (Fig. 1). The zone encloses six states which are Lagos, Ogun, Oyo, Osun, Ondo and Ekiti states which are predominantly of tropical rain forest and dominated by one of the major tribes in Nigeria (Yoruba speaking). The population of the region according to 2006 population census was 27, 581, 992 heads. Multistage sampling procedure was adopted to select the respondents for the study. At the first stage, Oyo and Osun States were purposively selected because the programme is domiciled in the States. At the second stage, two units of the IP in each State were purposively selected. These were: Akindele IP (Ido Local Government Area (LGA)) and Lagbedu IP (Ogo-Oluwa LGA) for Oyo State, and Iwara IP (Atakunmosa East LGA), Osunwoyin IP (Iwo LGA) in Osun State. At the third stage, fifty-nine percent of the cocoa farmers in each IP were selected based on Taro Yamane sampling formula for the finite population. Fifty-five respondents out of 94

in each of Osunwoyin and Akindele IPs, while 35 out of 60 and 32 out of 55 in Iwara and Lagbedu IPs respectively, were randomly selected to give a total of 177 respondents out of 311 registered cocoa farmers in the Humidtropics programme.

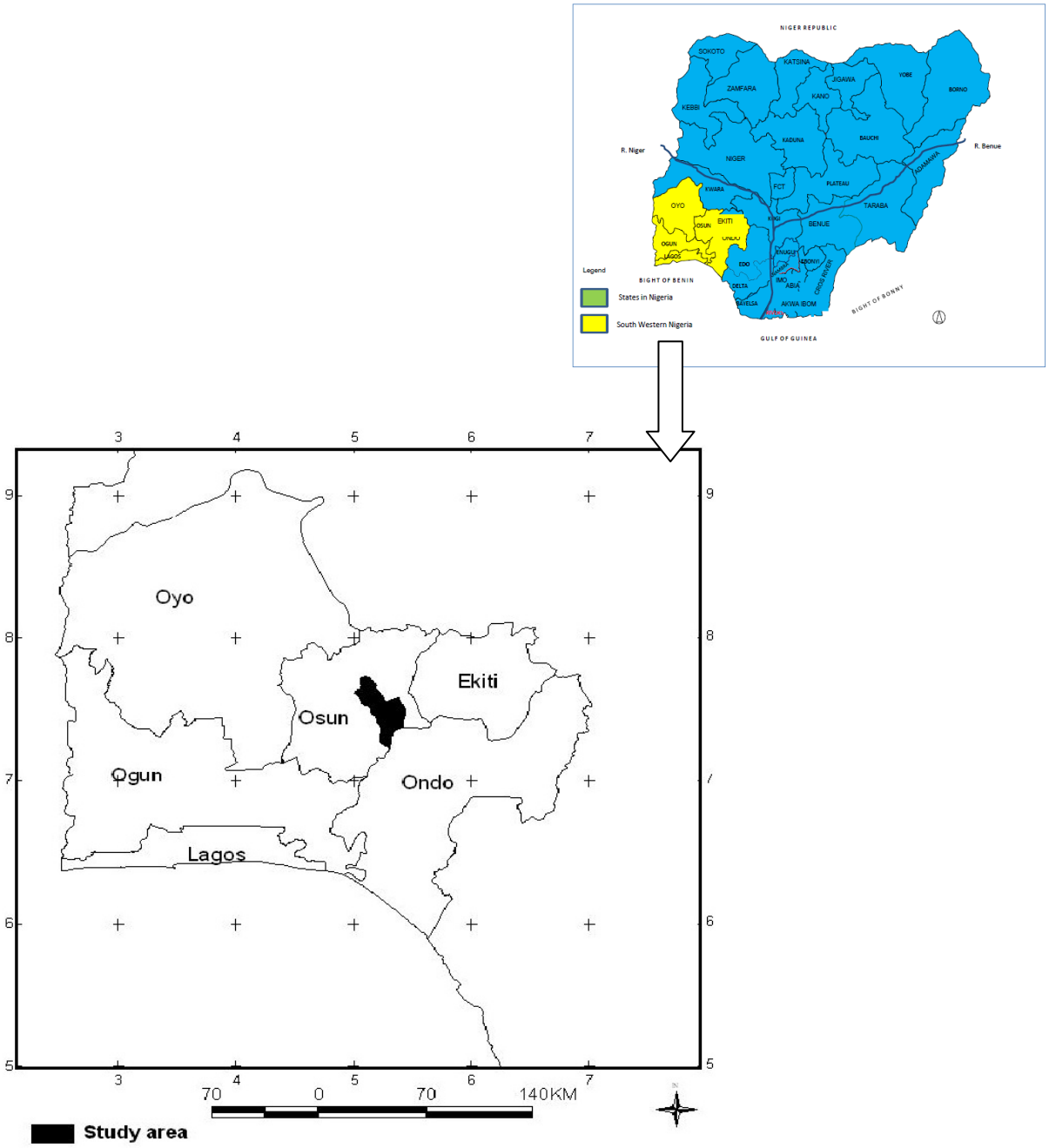


**FIG. 1: NIGERIA MAP SHOWING SOUTHWESTERN INNOVATION PLATFORMS**

$$n = \frac{N}{1 + N(e)^2} \quad \text{(Taro Yamane formula)}$$

$$\frac{311}{1 + 303(0.05)^2} = \frac{311}{1 + 303(0.0025)} = \frac{311}{1.7575} = 176.955 \approx 177$$

Where n = the sample size, N = the finite population (the universe), e = level of significance (0.05) and 1 = unity (constant)

Structured interview schedule was used for data collection and analyzed with percentage, frequency counts, mean, standard deviation and factor analysis. All statistical analysis was done with SPSS version 17.

## III. RESULTS AND DISCUSSION

Table 1 shows that the majority (76.27%) of the cocoa farmers selected were male while only 23.73 percent were female. The result indicates that there was a disproportionate representation of male and female beneficiaries of the project. The inference is that the female counterpart may be at a disadvantage and intimidated by the male dominance characters of IP. Significantly, this may influence female's participating in the collective action and in accessing project's benefits. Thus, proper representation of both sexes may be critical to the success of the project since both genders are vital components of the rural household. Besides, female members have been tagged by several studies as the most poverty vulnerable among members of the rural household (Horrell and Krishnan, 2007; Shah *et al*., 2013 and Agarwal, 1986). This implies that the programme is more likely to achieve its 15% poverty eradication goal if more female cocoa farmers are encouraged to benefit from the empowerment opportunity of IP.

Furthermore, Table 1 shows that average age of respondents was 51.16±12.64 years with the majority (33.89%) aged 40 - 49 years while those aged below 29 years constitute only 1.12%. In other words, cocoa farmers in the programme are aged in agreement with Jibowo (2003) who asserted that the rural areas in most developing countries have the higher proportion of its population aged above 45 years. Prevalence of old age recorded might be connected to the fact that young people partly migrate to the city for education and search for white collar jobs that are non-existing as reported by Akangbe *et al.* (2006); Adebayo (2013) and Ayinde *et al*., (2014). The ageing farmers that characterized the cocoa farming household is counterproductive.

**TABLE 1**
**DISTRIBUTION OF RESPONDENTS BY SOME SOCIO-ECONOMIC CHARACTERISTICS (N =177)**

| Variables | Frequency | Percentage | Central tendency |
|---|---|---|---|
| **Sex** | | | |
| Male | 135 | 76.27 | |
| Female | 42 | 23.73 | |
| **Age** | | | |
| 20-29 | 2 | 1.12 | Mean =51.15 |
| 30-39 | 23 | 12.99 | SD = 12.64 |
| 40- 49 | 60 | 33.89 | |
| 50– 59 | 37 | 20.92 | |
| >60 | 55 | 31.07 | |
| **Religion** | | | |
| Christianity | 130 | 73.45 | |
| Islam | 44 | 24.86 | |
| Tradition | 3 | 1.69 | |
| **Marital Status** | | | |
| Married | 164 | 92.66 | |
| Single | 2 | 1.13 | |
| Divorced | 1 | 0.56 | |
| Widowed | 10 | 5.65 | |
| **Educational Qualification** | | | |
| Non Normal | 43 | 24.29 | |
| Primary | 64 | 36.16 | |
| Secondary | 48 | 27.12 | |
| Tertiary | 17 | 9.6 | |
| Standard | 3 | 1.69 | |
| Koranic | 1 | 0.56 | |

***Source: Field survey, 2015***

According to Mokgadi and Oladele (2013), old age in farming poses a threat and negative implication to the sustainability of agricultural development projects because of their risk averseness nature and lack eagerness in accepting transformation from obsolete to more efficient technologies. Also, lack of physical and mental strength to cope with the demand of labour intensive technology peculiar to the agricultural sector may be another point of weakness. Thus, deploy of appropriate energy saving and high productivity enhancing technology may be needed to compensate the ageing deficiency of the population.

Marital Status of the respondents plays a significant role in shaping the behaviour of an individual in the rural area to positively conform to societal expectation because married people are considered as responsible and mature. Results in Table 1 show that the majority (92.65%) were married while only 0.56 percent was divorcees and 5.65 percent were widowed. The married majority recorded was not unexpected considering their age profile since rural inhabitants are generally known to be married at an early age. With over 90th percentile of the respondents married, there is the possibility of more financial responsibility as household members' increases through procreation. Marital status of the respondents may have a strong effect on the decision to participate in IP activities since marriage increases a farmer's concern for household welfare, financial obligation and food security (Nnadi and Akwiwu, 2008).

Furthermore, results in Table 1 show that the respondent's average household size was 9.78±5.52, average farming experience were 25.42.3±10.48 years and average farm size 16.87±16.04 acre. The average annual household income from farming activities was ₦878,833. 07± 2.59 while the average income from non-farming activities was ₦38,681.82±76,468.27 this is still insignificant income compared to drudgery associated farming in Nigeria. For religion affiliation, the majority (73.45%) of the respondents were Christian faithful; 24.86 percent practice Islam and only 1.69 percent were practising traditional religion. The results indicated that all the respondents had one religious affiliation or the other, although Christian faith constitutes the largest proportion. The findings are convergent Alao (2010) and Adeloye (2015) who separately reported that a higher proportion of rural inhabitants within southwest states of Nigeria were Christians. Thus, religious affiliation could be a useful indicator in identifying and mobilizing more cocoa farmers in the study area for meaningful participation in IP activities of the programme.

Results in Table 1 show that the majority (92.66%) of the respondents were married, 1.13 percent was single, 0.56 percent was divorcees and 5.65 percent were widowed (Yusuf, 2014). This may not be unconnected with the desire to have children to help them with farm work and other livelihood engagement on one hand and performing family's lineage roles on the other hand. Also, marriage is considered as a respected tradition where married people are regarded as mature and responsible members of the society. However, divorce being a culturally rare occurrence due to stigmatization attached to it within the rural settings (Fadipe, 1970).

For educational qualification of the respondents, Results in Table 1 indicate that 24.29 percent of the respondents had non-formal education, the majority 36.16 percent had primary education, 27.12 percent had secondary education, 9.60 percent had tertiary education and standard level education respectively and only 0.56 percent of the respondents had Koranic education. This result further shows that cocoa farmers in the study area have 75.13% literacy level (at least primary education). The findings aligned with the submissions of Soyebo (2005), Alao (2010) and Yusuf (2014) that rural dwellers in their respective study areas in the southwest were literate.

High literacy level recorded may be of positive effect to IP success and sustainability because literate farmers are able to document their individual experiences and communicate same to relevant stakeholders. This may also be instrumental to farmers taking an informed decision about their livelihood in line with Siyanbola (1995) that educational attainment broadens a social actor's perceptive to take an informed decision about one's livelihood. Because well-educated people are better able to interpret and synthesize complex agricultural information and be receptive of innovations push to them than those who have less education or no education at all (Mokgadi and Oladele, 2013).

Furthermore, results on years of farming experience measured with respect to the number of years already spent in cocoa farming activities in Table 2 indicate that a few (2.82%) of the respondents had at most 9 years of cocoa farming experience, 24.29 percent had between 10 to 19 years, while the majority, 72.88 percent had above 20 years of farming experiences. The average years of farming experience were 25.42±10.48 years. The implication from the results is that majority of the respondents had years of experience in cocoa farming. This may have positive implications for agricultural development and sustainability as new farming members may be easily socialized into farming by experienced adult members. Years of farming experience is an important factor for success in farming because as the as farmers increase in years of farming experience, they tend to gain more useful information and practical skills about farming (Mokgadi and Oladele, 2013).

**TABLE 2**
**DISTRIBUTION OF RESPONDENTS BY SOME SOCIO-ECONOMICS CHARACTERISTICS (n = 177)**

| Variables | Frequency | Percentage | Central tendency |
|---|---|---|---|
| **Years of farming experience in cocoa** | | | |
| < 9 | 5 | 2.82 | Mean = 25.42 |
| 10 – 19 | 43 | 24.29 | SD = 10.48 |
| >20 | 129 | 72.88 | |
| **Household size** | | | |
| Below 7 | 49 | 27.68 | Mean =9.78 |
| 7 – 12 | 93 | 52.54 | SD =5.52 |
| 13 – 17 | 24 | 13.56 | |
| Above 17 | 11 | 6.22 | |
| **Farm size** | | | |
| <5 | 29 | 16.38 | Mean = 16.87 |
| 5 – 10 | 49 | 27.68 | SD = 16.04 |
| >10 | 99 | 55.93 | |
| **Household income from farming** | | | |
| <₦10,000 | 27 | 15.25 | Mean = ₦87833.07 |
| ₦10,100 – 20,000 | 25 | 14.12 | SD = 2.59 |
| ₦20,100 – 30,000 | 27 | 15.25 | |
| ₦30,100 – 40, 000 | 13 | 7.35 | |
| ₦40,100 – 50,000 | 31 | 17.51 | |
| >₦50,000 | 54 | 30.51 | |
| **Household income from other sources** | | | |
| <₦10,000 | 57 | 32.20 | Mean = ₦38681.82 |
| ₦10,100 – 20,000 | 37 | 20.90 | SD = 76468.27 |
| ₦20,100 – 30,000 | 18 | 10.17 | |
| ₦30,100 – 40, 000 | 11 | 6.21 | |
| ₦40,100 – 50,000 | 16 | 9.04 | |
| >₦50,000 | 17 | 9.60 | |
| ***Other occupation** | | | |
| Agro-processing | 23 | 12.99 | |
| petty trading | 11 | 6.21 | |
| Hunting | 11 | 6.21 | |
| Civil servant | 4 | 2.26 | |
| Driver | 4 | 2.26 | |
| Hair Dresser | 2 | 1.13 | |

**** Multiple responses***
***Source: Field survey, 2015***

Advancement in years of farming experience could help farmers to assess the performance of modern and traditional technology, and to develop more confidence to take risks related to farming. Consequently, innovations introduced to IP cocoa farmers must be truly capacity building, capable of standing the test of time and provide a relevant opportunity for livelihood improvement. Otherwise, the resultant effect may be decline in their commitment to IP activities. This may be triggered by farmers' experiences of several years of frustration in agricultural development projects whose participation has not translated to any meaningful livelihood improvement.

More so, household size measured by total number of people living under the same roof, eating from the same pot and drawing common resources together for the ultimate advancement of the members of the household, results in Table 2, show that 27.68% of the respondents had household size below 7 members, about half 52.54 percent had household size between 7 and 12 members, 13.56 percent had household size between 13 and 27 members, and 6.22 percent had household size above 17 members. In summary, the average household size in the study area was 9.78±5.52. The finding was a bit different and above the result of Ekong (2010) who estimated the average household size in rural areas of Nigeria as 6. Though, the results indicated that respondents had a relatively large household size, this has proved to be advantageous, especially to rural

farm families, as large household provide needed support for the labour intensive farming technologies that characterized agriculture in most developing countries and particular in typical Nigerian rural communities where household members assist in the farming and related activities. According to Oladele (2008) household size serves as a form of family labour that complements the effort of the household head on the farm. Thus, availability of family labour provides the household head the needed opportunity to share responsibility and save time for other useful livelihood enhancement activities like participation in IP.

Results in Table 2 show that 16.38 percent of the respondents had total farm size below 5 acres while 27.68 percent of the respondents had total farm size between 5 and 10 acres, and 55.93 percent of the respondents had total farm size above 10 acres. The average farm size was 16.87 ±16.04 acre. Possession of farmland is an indispensable productive asset which has been implicated to be of high influence on the production level of the farming households (Ellis, 2000). Possession of land and landed properties among other production resources dictate the life chances available to individual members of the rural community to earn a reasonable livelihood from his/her respective enterprises (Ekong, 2010). Disparities in land ownership have a greater impact on income generation (Mokgadi and Oladele, 2013). Where land is not readily available to all members of rural for the farming purposes, there is likely to be high disproportion in the economics worth among them.

Results in Table 2 also show farm income derived from farming engagement in the last cropping season on a monthly basis. The results show that 15.25 percent of the respondents had household income below ₦10,000, 14.12 percent of the respondents had household income between ₦10,100-20,000, 15.25 percent of the respondents had household income between ₦20,100-30,000, 7.35 percent of the respondents had household income between ₦30,100- 40,000, 17.51 percent of the respondents had household income between ₦40,100-50,000 and 30.51 percent of the respondents had household income. The mean monthly household income from farming was N878,833.07± 2.59. This is still a meagre amount considering the degree of drudgery involved in the various farming activities cocoa farmers go through before earning this amount. In fact, findings further reveal that most times, respondents' earnings were used to settle debts bond. The implication of this finding is that cocoa farmers could be empowered economically through judicious use of the IP system to reduce production cost particularly those related to agricultural input purchase, through which they could increase their earnings and general livelihood.

Furthermore, results in Table 2 show that the more than half (53.1 %) of the respondents earn income below ₦20,100 from other sources, 10.17 percent earned between ₦ 20,100 - 30,000, while 6.21, 9.04 and 9.60 percent of the respondent earned between ₦30,100-40,000, ₦40,100-50,000 and ₦ 50,000 respectively. The mean annual income earned from other sources apart from farming was ₦38681.82±76468.27.This implies that cocoa farmers in the study area are diversifying household income based through extra earnings from non-farming activities. These findings converge with Canagarajah *et al*. (2001) and Minot (2006) who reported that smallholder farmers earn reasonable income from engagement in other activities apart from farming, in their separate study on non-farm income, gender, and inequality: evidence from rural Ghana and Uganda and income diversification and poverty in the Northern uplands of Vietnam respectively.

Furthermore, results in Table 2 show that about 12.99 percent of the respondents engaged in agro-processing as additional occupation to their cocoa based farming activities. Furthermore, 6.21 percent engaged each in petty trading and hunting respectively, while 2.26 percent each are civil servant and driver respectively. Only 1.13 percent engaged in hair making. The results, which concurred with the findings of Yusuf (2011), indicate that rural dwellers engaged in a variety of activities as additional occupations with agriculture usually the prime. They engaged in these varieties of activities including non-farm as a smart coping strategy against possible crop failure and spread their risks better. The implication of the findings is that cocoa farmers in the study area are multi-tasked people and are likely to engage in supplementary activities that will fetch them additional income. Deep involvement in non-farming activities may constitute a major distraction from the true worth and potential in the cocoa subsector, which may bear negative consequence on farmer's participation in IP programme. This situation may be explored through aggressive sensitization of rural dwellers thereby, drawing their attention to potentials and opportunities participation in IP activities can offer them in terms of improvement in worth, skills and livelihood.

**Factors determining the participation of cocoa farmers in IP activities:** Data in Table 3 show the result of principal component matrix extracted from variable correlating with the participation of cocoa farmers in IP activities. six groups of factors were isolated from fifteen variables with highly loaded components.

Factor I (Psychological factor): Variable that loaded very high on factor one included: perception about IP (L = 0.881), Constraint to participation (L = - 0.831), benefit derived (L = 0.792) and resources accessibility (L = 0.567). All the

identified variables are vital to shaping individual psychology about IP activities. In other words, cocoa farmers perceive activities in IP subject to benefit derive from such and level of constraint encountered in the course of the activities. Similarly, resources facility accessible play a key role in determining if a farmer will participate actively in IP activities or not. The implication is that continuous design of IP activities to address the felt needs of the cocoa farmers, particularly those that are perceived beneficial in its economic, social, cultural, political and otherwise sense through the organization of regular training and giving of incentives to farmers will encourage them to participate more in IP activities.

**TABLE 3**

**RESULT OF VARIMAX ROTATION COMPONENT MATRIX SHOWING EXTRACTED VARIABLES OF HIGHLY LOADING CORRELATION COEFFICIENT WITH COCOA FARMER'S PARTICIPATION IN IP ACTIVITIES**

| Independent Variables | Factors Loading | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Perception about IP | 0.881 | | | | | |
| Constraint to participation | -0.831 | | | | | |
| Benefit derived | 0.792 | | | | | |
| Resources accessibility | 0.567 | 0.413 | | | 0.375 | |
| Years of cocoa farming experience | | 0.759 | | | | |
| Age | | 0.747 | -0.316 | | | |
| Position occupy in IP | | 0.628 | 0.624 | | | -0.331 |
| Household income | | | 0.863 | | | |
| Education qualification | | | 0.670 | 0.419 | | |
| Community variable | | | | 0.893 | | |
| Project variable | 0.513 | | 0.300 | 0.530 | | |
| other occupation combine with cocoa farming | | | | -0.369 | 0.753 | |
| Farm size | | | | | 0.705 | |
| Household size | | | | | | -0.864 |
| Internal variable | | 0.357 | | | | 0.606 |

***Source: Computed form 2015 Survey.***

Factor II (Experience factor): Variable that loaded very high on factor two included: year of cocoa farming experience (L =0.759), age (L = 0.747), and position occupy in IP (L = 0.628). Those farmers that are advanced in age and years of cocoa farming are more likely to possess more knowledge about the cocoa farming system and have a good understanding of the community history particularly those of past agricultural development programme. Thus, they may desire to play a leading role in occupying leadership position which tends to enhance others participation. Thus, in planning IP activities or special programmes, the inclusion of such categories of cocoa farmers as described above may be invaluable to the success of the programme. There is a high likelihood for experienced farmers to share pertinent experience or contribution of advice that may enhance the programme. This may serve as motivation for others to participate and avoid costly mistakes. On the other hand, young cocoa farmers with relatively low experience will appreciate innovative method presented by the IP, will tend to participate more in achieving experiential learning.

Factor III (Educational factor):Variable that loaded very high on factor three included: household income (L =0.863) and educational qualification (L = 0.670). This explanation is that the better and higher educational status of cocoa farmers, the higher their likelihood to be comfortable in accepting exogenous agricultural recommendations and participate actively in innovation generation process of the IP. Similarly, a higher household income may mean that farmers have greater confidence to participate more in activities that may require spending from personal money to accomplish than those with lower household income level.

Factor IV (Community factor): Variable that loaded very high on factor four included: community related variable (L =0.893), and project variable (L = 0.530). The explanation of this factor is that community stability creates a friendly atmosphere for development effort to attract good participation from the target audience. Hence, the absence of community restriction has a positive influence and indirect motivate cocoa farmers to participate in IP activities that do not contravene

the social value of the people. Similarly, development project can only be successful in the environment of mutual respect and peace.

Factor V (Economic factor): Variable that loaded very high on factor five included: other occupation combined with cocoa farming (L =0.753), farm size (L = 0.705). The explanation of this factor is that involvement in other occupation combine with cocoa farmers encourages may translate to diversified household income base which may mean more money to cultivate larger cocoa farm size. This will invariably increase participation in IP activities. This may indicate a positive driver for participation in innovation generation and dissemination process of the IP. However, care must be taken by project administrator in promoting other enterprises that are complementing to cocoa farming rather those that are substitutive.

Factor VI (Internal factor): Variable that loaded very high on factor six included: Household size (L = - 0.864) and internal variable (L = 0.606). The explanation is that large household size tends to reduce participation in IP activities. This may imply that large household size places a higher demand for house income which is usually earned working several hours on farms or any other worthwhile engagement. This may not give room to cocoa farmers, who have a large household to feed, to participation actively in IP activities that are perceived irrelevant to meet the immediate economic needs of their household. However, if the IP internal variables such as availability of resources to accomplish IPs' task, compatibility of IPs' objectives with individual goals, proper communication / interaction channels, among others are made favourable, there is high chance that farmers will participate more.

The contribution of extracted factors to the participation of cocoa farmers in IP activities of the Humidtropics programme: Data in Table 4 show that psychological factor contributed (21.06%) to IP participation of cocoa farmers in IP activities. Experience related factor contributed 14.42% while Educational factors contributed 12.36% to the cocoa farmer's participation in IP activities. Community-related factor and Economics factor contributed 11.32% and 9.59% respectively. The least contributor was the internal factor, which contributed 7.42%.

The high contribution of a psychological factor may be due to the fact that several variables such as perception about IP, constraint to participation, the benefit derived and resource accessibility are involved in the factor. While the least contribution of internal factor recorded may be due to the internal harmony among IP members or interaction of the variables with the dependent variable (level of participation). However, the total contribution of the entire factors drawn together (76.17%) was high, With only 23.83% unaccounted source of variation in the participation of cocoa farmers in IP activities which may be caused by unidentified variables or error due to statistical operation. This indicates that six factors drawn together would contribute 76.17% participation of cocoa farmer in IP activities in the southwest, Nigeria.

**TABLE 4**

**PRINCIPAL COMPONENT ANALYSIS OF COCOA FARMERS SHOWING PERCENTAGE VARIATION IP ACTIVITIES PARTICIPATION AS CAUSED BY EACH FACTOR EXTRACTED**

| Factors | Name | Eigen value | Percent variance | Cumulative |
|---|---|---|---|---|
| **1** | Psychological factor | 3.158 | 21.06 | 21.06 |
| **2** | Experience factor | 2.163 | 14.42 | 35.48 |
| **3** | Educational factors | 1.854 | 12.36 | 47.84 |
| **4** | Community factor | 1.697 | 11.32 | 59.16 |
| **5** | Economic factor | 1.438 | 9.59 | 68.75 |
| **6** | Internal factor | 1.113 | 7.42 | 76.17 |
| **7** | Other (not identified) | | 23.83 | 100 |

***Eigen values greater than 1***

***Source: Computed from result of factors analysis, 2015***

## IV. CONCLUSION AND RECOMMENDATIONS

The cocoa farmer's participation in IP activities of the Humidtropics programme was examined and crucial factors determining variation in participation were isolated. The six factors isolated and arranged in order of importance are: psychological, experience, educational, community, economic and internal factors. Furthermore, three important variables level of education, resources accessibility and benefit derived from IP participation were identified to be very crucial to predicting the level of cocoa farmer's participation in the southwest Nigeria.

There is the need for the provision of a conducive environment for participating farmers to derived possible maximum benefits from IPs; resources should be mobilized and made accessible when needed. Timely implementation of the programme plan should be intensified and competent extension agent should be encouraged to facilitate the IP to help to shape farmers perception of the programme. Also, the factors isolated should be considered in planning and execution of IP projects. There is the need to attract more youths and women cocoa farmer into the programme as a way of expanding the courage to including more poverty prone household members; improving income capacity of household members in the study area; enhancing food security at household level and nation at large; and enhancing sustainability of the programme.

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