Financial Exclusion and Sustainable Rice Production: A Model of Poverty Reduction in Ndop, Cameroon

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Abstract
The study examined the relationship that exists among the latent variables of financial exclusion, sustainable rice production and poverty reduction among some smallholder rice farmers in Ndop, Ngoketunjia Division in the North West Region of Cameroon. Data elicited via survey questionnaire administered on a sample of 206 households was analysed based on both factor analysis and structural equation modelling using SPSS 19.0 and SmartPLS 2.0 softwares. The results indicated that financial exclusion was negatively related to sustainable rice production and poverty reduction. Therefore, a unit increase in the level of financial exclusion would result to 24% reduction in sustainable rice production and exacerbate the level of poverty by 7%. The findings indicated that lack of financial inclusion among rice farmers in Ndop significantly and statistically restraint sustainable rice production and exacerbate the level of poverty. The study recommends that the Cameroon government should adopt policies that encourage financial inclusion in the area of rice cultivation, since financial inclusion has the tendency of promoting inclusive growth and development.

Keywords — *Financial exclusion, Sustainable rice production, poverty reduction and structural equation modelling*

I. INTRODUCTION

Approximately 20 million farmers in Sub-Saharan Africa grow rice and about 100 million people depend on it for their livelihoods (Nwanze, 2006). Demand for rice has steadily increased over the years. According to Minada (2009), Cameroon produces 100 thousand tons of rice per year and domestic demand stands at 300 thousand tons per year, thus creating a demand gap of 200 thousand tons per year. Despite the major reforms in the sector undertaken by the Cameroon government via the Ministry of Agriculture and Rural Development, as well as the extended services received from foreign organizations, Cameroon rice production is yet to keep pace with the increasing demand. The food crisis that affected Cameroon in 2008 triggered the government of Cameroon to undertake a number of reforms to revitalize the agricultural sector and rice production in particular. In December 2015, the budget of the Ministry of Agriculture and Rural Development stood at FCFA 110 billion (Mbella, 2015). Despite these efforts by the government of Cameroon, access and use of requisite financial resources still remain a major challenge among rice farmers in the Upper Noun valley in Ngoketunjia Division. Increasing access and use of requisite financial resources obtained from formal financial institutions (FFI) by farmers have the tendency of scaling up rice production and reducing the level of poverty in Ndop. The major goal of the study is to construct and validate the integrated financial exclusion and sustainable rice production model of poverty reduction for farmers in Ndop, Cameroon. The study is advantageous to policy makers to understand the causal relationship between the latent construct of financial exclusion, sustainable rice production and poverty reduction, so as to put in place policies that promote financial inclusion. Furthermore, the relative importance and efficiency of financial exclusion on affecting sustainable rice production and in fighting poverty cannot be ignored.

In fact, research survey (Longtau, 2003) has shown that financial exclusion is one of the major constraints that farmers face. The implication of financial exclusion is viewed in three perspectives. Firstly, the inability of smallholder farmers to transform their talents into productive uses due to lack of inherited physical, financial and social capital (Adewale, 2009; Beck and De la Torre, 2006). Secondly, the view that financial access is a private good and only those with a certain socioeconomic status are eligible, meaning that excludability to financial access is a right. Lastly, some self- exclusion barriers to financial access exist, and may be due to personal or religious inclinations (Corr, 2006). Providing increase access to finance for poor farmers is considered as one of the tools for economic development and poverty reduction (Hao, 2005).

II. THEORETICAL REVIEW

According to Zeller and Sharma (1998), the poor are normally caught up in the vicious cycle of poverty

that is caused by lack of access to finance. When the poor fail to smoothen their consumption through borrowing, their health and nutrition suffer, causing their productivity to decline. Once their productivity declines, it becomes impossible for them to produce with surplus. The vicious cycle can, therefore, only be broken by giving the poor access to finance. Easy access to finance will make them less risk-averse and courage them to invest in innovative processes that would increase their productivity. High transaction costs remain another means by which the poor are excluded from participating in financial markets. When financial markets are improved and are accommodative of the poor through easy access to information and reduced transaction costs, savings rates, investments and technology adoption are all enhanced. Wood and Spencer (2003) have argued that the financial sector has a direct effect on poverty at micro economic level, primarily by affecting the ability of the poor people to accumulate large sums for life cycle needs, emergency or investment purposes. The only reason why the poor do not participate in this process is that the markets exclude them.

Theoretically, the Cobb-Douglas production function has proven to be quite useful in applied research especially in the area of agriculture (Driscoll, 2004; Hong, 2008; Nkurunziza, 2010). The Cobb Douglas production function with constant return to scale, capital and labour substitutability, and diminishing marginal productivity is of the form:

$$Q = F(K, L) \quad (1)$$

Where Q represents output, L is the labour and K stands for the capital stock.

The above production function is homogeneous of degree one, meaning that if all inputs are changed proportionately, then output will change by the same proportion. In other word, such a production function exhibits constant returns to scale. The function can be rewritten as

$$aQ = F(aK, aL) \quad (2)$$

If K and L are multiplied (a = 2), output Q will increase by the same proportion. This explains what is meant by the assumption of constant returns to scale. The model is relevance to the present study, where financial exclusion factors can be considered as input factors while financial exclusion is taken as output, and on the other hand, financial exclusion and sustainable rice production are inputs for poverty reduction. Feder et al., (1990) examined the relationship between credit and productivity in agriculture in China in similar theoretical context. Their analysis was conducted using cross-sectional household-level survey data from a study area in North-East China. It was observed that based on the estimated coefficients, if every credit-constrained household in the sample was given additional credit to the tune of 17.82 Yuan, the total output of the household would increase by 201.8 Yuan in nominal value. Considering investment demand and assuming a Cobb –Douglas production function of the form;

$$y = aK^{\alpha} N^{1-\alpha} \quad (3)$$

The above function assumes that the exponents of the inputs add up to 1, which means it is a function of constant returns to scale. Considering the marginal product of capital as demonstrated:

$$MPK = \frac{dy}{dk} = \alpha a K^{\alpha-1} N^{1-\alpha} = \frac{\alpha a K^{\alpha} N^{1-\alpha}}{K} \quad (4)$$

And substituting equation (3) into equation (4) results in equation 5 below

$$MPK = \frac{\alpha y}{k} \quad (5)$$

At equilibrium, the marginal product of capital is equal to the user cost of capital

$$MPK = \frac{\alpha y}{k} = \frac{C_t}{P_t} \quad (6)$$

Where C_t is the cost per period of using capital stocks, and at the same represents the rental price
Where the user cost is the price to obtain the real cost of capital. From equation 6, an expression for the equilibrium level of capital stock is derived as follows:

$$K^{E} = \frac{\alpha P y}{C} = \frac{\alpha y}{\frac{C}{P}} \quad (7)$$

Where K^{E} = Equilibrium level of capital stock

The equilibrium level of capital stock rises with an increase in output and falls with increases in real cost of capital. Within the framework of the classical and special conditions for the Keynesians it is assumed that net investment is equal to changes in the stock of capital. Therefore equation 7 can be reduced to a simple accelerator principle by assuming that the proportion of output and real user cost of capital are constants in the long run.

$$I = \frac{\alpha}{C}\Delta Y \quad (8)$$

In the long run, any change in net investment would be as a result of any change in the level of output.

III. EMPIRICAL REVIEW

Motamed (2009) researched on the role of cooperative companies in sustainable rice production and poverty alleviation in Guilan state of Iran by a survey questionnaire of 300 samples. Using descriptive statistics and analysis of variance as method of estimation, the results showed that there was a significant difference between members and non-members with respect to the production rate of paddy, income gained through sale of rice, level of participation, reduction of unemployment, increment of annual income and lastly, technical knowledge. Muritala et al., (2013), examined the relationship between sustainable financial services and poverty

reduction in Nigeria using a secondary data from 1965 to 2010, and estimated by the error correction model (ECM). The results showed that financial inclusion tends to strengthen financial deepening and provide resources to the banks to expand credit delivery thereby leading to financial development. Chisasa (2014) researched on the link between credit and agricultural output growth in South Africa using the structural equation modelling (SEM) approach to survey data of smallholder farmers. From a sample size of 362, the findings indicated that bank credit was positively related to agricultural output. Shahin and Malekmohammadi (2013) by the application of a structural equation modelling (SEM) in restructuring state intervention strategies toward paddy production development in Iran from a sample of 385 found out that the study confirmed the theoretical model of paddy production development when tested for convergent validity, discriminate validity and construct reliability.

Berker et al.., (2001) examined the success story of rice production across the globe and arrived at a conclusion that, government capability to formulate a comprehensive food policy with particular reference to rice, coupled with social engineering program that was able to gear-up agricultural practitioners can actually boast rice production globally. Zephania and Nghengwa, (2014), carried out a study on the community economy of the population of the Ndop plain prior to the priming of rice cropping to evaluate the infrastructural achievements to individuals and the community accruing from their adoption and involvement in the cultivation of rice. They concluded that the achievements were significantly beneficial to the development of the community contrary to some perceptions of the advent of rice cropping in Ndop that considered it as a mixed blessing.

IV. METHODS AND PROCEDURES

A. Area of the Study

The research was conducted in the Babessi sub-Division and Ngoketunjia Division of the North West Region of Cameroon. Survey questionnaires were administered to households living within four villages namely Babessi, Baba -1, Babungo and Bamunka of the Ndop Plain, which are actively involved in the cultivation, milling and distribution of Ndop rice.

B. Research Design

The study adopted both qualitative and quantitative causal cross sectional study. The qualitative approach used interviews where information recorded was transcribed and a survey questionnaire was applied in the collection of primary data.

C. Sampling Methods

A purposive sampling technique was adopted because of it flexibility and applicability in deciding the composition of the respondents. Such a method of sampling was actually based on the research knowledge of the population and research interest.

D. Model Specification

The casual relation among the latent constructs; voluntary exclusion factors (VEF), involuntary exclusion factors (IEF), financial exclusion (FE), sustainable rice production (SRP) and poverty reduction (POR) was specified following the ideology of Hony (2008) and the theoretical framework of financial exclusion of Adewale (2014) with the addition of sustainable rice production and poverty reduction constructs of the structural model.

The specification of the structural model in the study is divided into direct and indirect effects. The direct effects give the size and the direction of the relationship between the exogenous and the endogenous variables while the indirect effects give the size and the direction of one exogenous variable mediated by other exogenous variables.

Direct effects of the functional specification of the structural model are expressed in the following equation:

$$FE = f(VEF, IEF) \quad (9)$$

$$PR = f(FE, SRP) \quad (10)$$

$$SRP = f(FE) \quad (11)$$

Equation 9 examines the causal relationship among voluntary exclusion factors, involuntary exclusion factors and financial exclusion. The theoretical argument in the literature suggests that both voluntary exclusion factors and involuntary exclusion factors stand as proxy for both access to and use of financial services (Kunt & Honohan, 2009). Adewale (2014) carried out a study aimed at examining the relationships among voluntary exclusion factors, involuntary exclusion factors and financial exclusion and the results revealed a positive correlation. Equation 10 gives the direct effects of financial exclusion and sustainable rice production on poverty reduction while equation 11 expresses the direct effects of financial exclusion on sustainable rice production.

The empirical model for direct specification takes the linear form because of the method of estimation. Therefore, the study is exploiting SmartPLS (statistical software) graphic and maximum likelihood estimation method.

Empirical model for direct effect;

$$FE_i = \theta_1 VEF_i + \theta_2 IEF_i + \eta_1 \varepsilon_i \quad (12)$$

$$PR_i = \theta_3 FE_i + \theta_4 SRP_i + \eta_2 \varepsilon_i \quad (13)$$

$$SRP_i = \theta_5 FE_i + \eta_3 \varepsilon_i \quad (14)$$

$$PR_i = \theta_6 \theta_5 SRP_i . FE_i + \eta_4 \varepsilon_i \quad (15)$$

Where the theoretical expectations of the signs of the coefficients apriori are;

$\theta_1 > 0,\ \theta_2 > 0,\ \theta_3 < 0,\ \theta_4 > 0,\ \theta_5 < 0,\ \theta_6 > 0$

E. Derivation of Estimation Technique of Factor Analysis

According to the Kelvin(1883) when you can measure what you are talking about and can express it in numbers, then you know something about it; but when you cannot express it in numbers, your knowledge about it is of meager and unsatisfactory kind. This is to reiterate that measurement is very necessary especially when dealing with unobservable behaviours or concepts. The use of factor analysis in the initial stage of data processing is to permit us to; (1) identify the underlying manifesting indicators of the unobservable variables in the study. The unobservable variables in this study include financial exclusion, involuntary exclusion factors, voluntary exclusion factors, sustainable rice production, and poverty reduction. The purpose of factor analysis is to describe, if possible the covariance relationships among the observable characteristics of the aforementioned constructs in terms of a few underlings (Bartholomew, Knotts and Moustaki, 2011) with unobservable random quantities called factor (Wichen, 2002). For instance, poverty reduction is a multifaceted concept of social dimension (access to school, access to healthcare and ability to access financial services), and economics dimension (level of household income, affordability to participate in the market, level of engagement in economic activities such as agriculture). The general model specification is expressed as follows:

$$\underset{p.1}{X} = \underset{p.1}{\mu} + \underset{p.m\ m.p}{\Gamma}\ \underset{}{F} + \varepsilon \qquad (16)$$

Where

$$\underset{p.1}{X} = \begin{pmatrix} X_1 \\ X_2 \\ . \\ . \\ X_p \end{pmatrix}, \underset{p.1}{\mu} = \begin{pmatrix} \mu_1 \\ \mu_2 \\ . \\ . \\ \mu_p \end{pmatrix}, \underset{p.m}{\Gamma} = \begin{pmatrix} \lambda_{11} & \lambda_{12} & \cdots & \lambda_{1m} \\ \lambda_{21} & \lambda_{22} & \cdots & \lambda_{2m} \\ . & & & \\ . & & & \\ \lambda_{p1} & \lambda_{p2} & \cdots & \lambda_{pm} \end{pmatrix}, \underset{p.1}{F} = \begin{pmatrix} F_1 \\ F_2 \\ . \\ . \\ F_p \end{pmatrix}, \underset{p.1}{\varepsilon} = \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ . \\ . \\ \varepsilon_p \end{pmatrix} \qquad (17)$$

Where X is p x 1 vector of the manifest variables representing the latent constructs in the study. We assume that these manifest variables have a mean vector (μ) of px1, and also that, the matrix of the coefficient or factor loading is given by Γ . The variation in the manifest variables (or vector X (p x 1)) is caused by the factor vector F. The relationships between the factors and the manifest variables are assumed to be linear (Gorsuch, 1983). The coefficient matrix of the factor loading measures the correlation between the factor and the manifests. They may be some unobservable surprises in the construct that are not captured in the measurement of this latent construct. These shocks or surprises are described as idiosyncratic terms which constitute the measurement errors. Hence, the inclusion of the error vector matrix ε (px1) to take care of that. Also there is the assumption that there is no relationship between the factors when explaining the variation in the manifest variables, simply meaning that they are orthogonal (or independent).

On its part, the factor analysis assumes that the expected mean of the manifest variables should be equal to the population mean as in equation 18.

$$E(X) = \mu \qquad (18)$$

The covariance of the manifest variables (variability) is explained by the factor loading and the error.

$$Cov(X) = \Sigma = E\left[(X-\mu)(X-\mu)^T\right] \qquad (19)$$

Simplifying and re-arranging expression (19) (15), we obtained;

$$Cov(X) = \Gamma\Gamma^T + \varphi \qquad (20)$$

The covariance of the manifest variables has two components:

- Contribution by the common factors sometime called communality
- Unique factor or the unexplained or specific variance of the manifest.

Where $\Gamma\Gamma^T$ in expression (15), when simplify we have

$$\underset{p.m}{\Gamma\Gamma^T} = \begin{pmatrix} \sum_{k=1}^{m}\lambda_{1k}^2 & \sum_{k=1}^{m}\lambda_{1k}\lambda_{2k} & \cdots & \sum_{k=1}^{m}\lambda_{1k}\lambda_{pk} \\ . & \sum_{k=1}^{m}\lambda_{2k}^2 & \cdots & \\ . & & & \\ \sum_{k=1}^{m}\lambda_{1k}\lambda_{pk} & \cdots & . & \sum_{k=t}^{m}\lambda_{pk}^2 \end{pmatrix} \qquad (21)$$

The diagonal element of the factor loading component of the covariance measures the variability in the manifest variables (voluntary exclusion factors (VEF), involuntary exclusion factors (IEF), financial exclusion (FE), sustainable rice production (SRP) and poverty reduction (POR)). It is often called variance and it is what is known as communality.

The unique or unexplained variance is given by the vector matrix of $\underset{pp}{\varphi}$ bellow:

$$\varphi_{p.p} = \begin{pmatrix} \varphi_{11} & 0 & \dots & 0 \\ 0 & \varphi_{22} & \dots & 0 \\ . & & & \\ . & & & \\ 0 & 0 & \dots & \varphi_{pp} \end{pmatrix}, \quad Cov(X) = \begin{pmatrix} \sigma_{11} & \sigma_{12} & \dots & \sigma_{1p} \\ \sigma_{21} & \sigma_{22} & \dots & \sigma_{2p} \\ . & & & \\ . & & & \\ \sigma_{1p} & 0 & \dots & \sigma_{pp} \end{pmatrix}$$

For example, factor 1 (F1) as seen in the system above, can influence X_1, X_2 and X_p by

$$\sigma_{11} = \sum_{k=1}^{m} \lambda_{1k}^{2} + \varphi_{11} = \lambda_{11}^{2} + \lambda_{21}^{2} + \lambda_{m1}^{2} + \varphi_{11} = CV + UV \quad (22)$$

Where CV =Communality component and UV = Unique Variance component.

The lambda-square (λ_{ik}^{2}) in equation (22) (17) is called the communality of X_j in the one factor case. In this study case, it represents the percentage variability in X_j where j =1, 2, 3. This is similar to the coefficient of determination in the regression analysis. When X_j is reflexive, communality is high (Mayer, 2006). When X_j is normally distributed N (0, 1), the correlation coefficient between the latent factors and manifest variables can be interpreted as the slope of the regression of X_j on F. The interpretation is valid if and only if the following assumptions hold;

- Factor analysis also assumes that the measurement errors have a constant variance, and on average should be equal to zero.

$$Var(\varepsilon_j) = \sigma_j^{2}; \quad E(\varepsilon_j) = 0 \quad (23)$$

- No association between the factor and measurement errors

$$Cov(F, \varepsilon_j) = 0 \quad (24)$$

- No association between the errors :

$$Cov(\varepsilon_j, \varepsilon_k) = 0 \quad (25)$$

- Given a factor, observed variables are independent of one another:

$$Cov(X_j, X_k / F) = 0 \quad (26)$$

- Covariance of the factors(latent constructs) is assume to be unity:

$$Cov(F) = E(FF^{T}) = I$$

V. RESULTS AND DISCUSSION

In other to use the proposed techniques of analysis, there are pre-test that are indispensable, which were carried out to ensure the validity and reliability of the instruments.

A. The Test of Convergent Validity

Convergent validity refers to the degree of agreement in two or more indicators of the same construct (Camines and Zeller, 1979). Evidence of convergent validity was assessed by inspection of average variance extracted for each factor (Fornell and Larcker, 1981).

Table 1: Results of the Average Variance Extracted

Constructs	AVE
FE	0,907105
IVEF	0,442591
POR	0,560062
SRP * FE	0,404888
SRP	0,592974
VEF	0,765437

Source: SmartPLS output computed by the authors, 2017

The average variance extracted (AVE) was significant as they were above the cut- off criteria of 0.5 recommended by Fornell and Larcker, 1981, except for two constructs (involuntary exclusion factors and the interactive constructs between SRP and FE). The results revealed that there is evidence of convergence validity between the constructs in the study.

B. Discriminate Validity

Discriminate validity is the degree to which a construct is distinct from other constructs in the model (Carmines and Zeller, 1979). Discriminate validity was assessed by the test provided by Fornell and Larcker (1981) in which the pair-wise correlations between constructs obtained were compared with the square root of the AVE.

Table 2: Latent constructs correlations and square roots of AVE (diagonal elements)

	FE	POR	SRP * FE	SRP
FE	0.952365			
POR	-0,167386	0.74832		
SRP*FE	0,553960	0,463805	0.63560	
SRP	-0,235589	0,763613	0,646482	0.7680114

Source: SmartPLS output calculated by authors, 2017

Discriminate validity is confirmed if the diagonal elements are significantly higher than the off-diagonal values in the corresponding rows and columns in table 2 above. The diagonal elements are the square roots of the AVE for each of the construct while the off-diagonal elements are the pair wise correlations between constructs. In the study, AVE is higher than the correlation between the constructs, demonstrating evidence of discriminate validity.

Table 3: Reliability Test

Constructs	Cronbach's Alpha	Composite Reliability
Financial exclusion	0,948433	0,966958
Poverty Reduction	0,841308	0,882765
SRP * FE	0,962974	0,940711
Sustainable Rice Production	0,795008	0,846521

Source: SmartPLS output computed by authors, 2017

In the study, the composite reliability coefficients of the constructs ranged from 0.651 to 0.967, meeting the standard of 0.70 as suggested by Fornell and Larcker (1981) as well as Nunally and Bernstein (1994). The indicators of financial exclusion which are savings, credits and bank exclusion have better estimates of the variance shared, meaning that they measures what was intended with no errors. The Cronbach's alpha for the latent construct involuntary exclusion factors did not meet up with the minimum cut-off criteria of 0.60. Therefore the results suggest a strong evidence of consistent reliability between the score of the constructs.

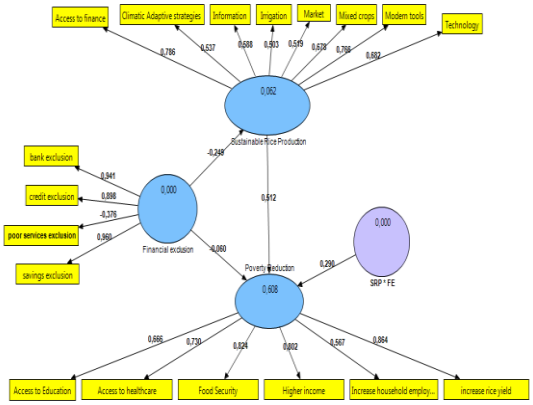

Fig 1: Structural equation model of financial exclusion and sustainable rice production for poverty reduction

Source: Output Computed by authors using the software SmartPLS

Figure 1 shows the results of the path coefficients and the factor loadings. The construct is represented by the circle while the manifests or indicators of the constructs are represented using the rectangle. The number in the circle represents the goodness of fit index (R square). The magnitude of the relationship between the constructs and it manifest is captured by the factor loadings or the centroid weight. The magnitude of the relationship between constructs is referred to as the path coefficient. Path coefficients and factor loadings are not very much informative in explaining whether the predictive variations in the system are significant or not. The path coefficients, however, indicate that there exist relationships between to constructs. The significant of the path coefficients, is determined by bootstrapping the original observation or jack-knifing (Miller 1974). The test result of the bootstrapping is presented below.

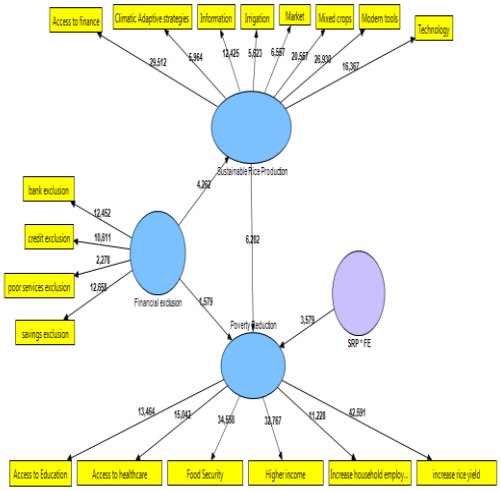

Fig 3: Bootstrapping of the original sample showing the t-statistics

Source: Output Computed by authors using the software SmartPLS

From figure 2, all the factor loadings are significant at 1% since all the t values are above 2. The entire path coefficients are significant at 1%, except for the path coefficient between financial exclusion and poverty reduction which is significant at 10% significant level. The results equally revealed that the interactive effects of sustainable rice production and financial exclusion on poverty reduction were positive and significant. The coefficients of the arrows in the figure above are the t values after re-sampling the observations 5000 times. These findings failed to include the size effect of each path in the model. Blindfolding procedure suggested for relevance by Stone (1974) and Geisser (1975) was used to test predictive relevance of the model. The results of the test are presented below in figure 3.

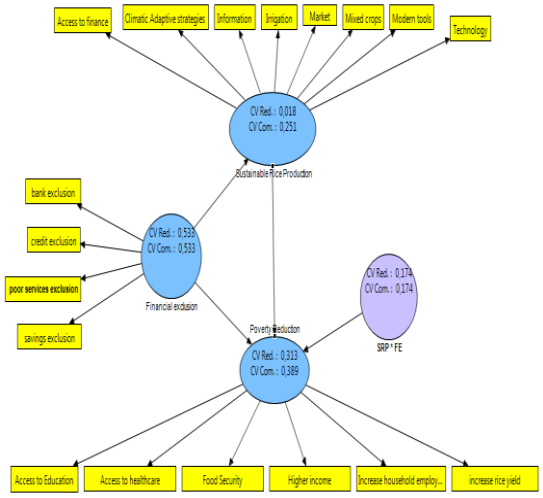

Figure 2: Blindfolding test for predictive relevance

From figure 3, it is revealed that the results show a strong evidence of predictive relevance as the Q2 for all the constructs are greater than zero. The predictor latent constructs have a very strong size effect at the structural level as they were well above the threshold criterion of 0.35 according to Cohen (1974), except for the interactive construct and involuntary exclusion factors construct.

Table 4: **Summary hypothesised path coefficients**

	hypothesized paths	coefficient (β)	remarks
H1	FE → POR	-0,0686 (0,0368) [1.86]	Supported
H2	SRP → POR	0,5146 (0,0818) [6.28]	Supported
H3	FE → SRP	-0,2369 (0,0556) [4.258]	Supported
H4	SRP*FE → POR	0,2909 (0,0810) [3.579]	Supported

Note: Values in brackets are standard errors (SE) while those in the square brackets represent the t-values

Source: Computed by the authors, using SmartPLS software, 2017

The path coefficients show the relationship between financial exclusion and sustainable rice production indicating that financial exclusion significantly account for reduction in sustainable rice production (β_1 = - 0, 2369, SE =0, 0556, t = 4.25, p<0.05).The findings could be interpreted to mean that absence of access to financial resources and intermediate services to rice farmers in Ndop, have restrained the capacity of rice production. These findings are consistent with those of Akinbode (2013) in the studyon access to credit in rice production where results showed that farmers with access to financial credit recorded more yield and return.

Financial exclusion (FE) is significantly negative related to poverty reduction (β_1 = -0, 0686, SE =0, 0368, t = 1.86, p<0.01). This can be interpreted to mean that a 100 standard deviation increase in financial exclusion results to an increase of 6.8 standard deviation surge in the level of poverty among smallholder rice farmers in Ndop. In other words, financial exclusion exacerbates the level of poverty among rice farmers in Ndop. The indicators of financial exclusion such as poor services, lack of credits, low savings and bank exclusion were all significant at 0.001, except for poor service that was significant at 0.05 as observed in the bootstrapping result supra.

V. CONCLUSION

The results of the findings indicate that financial exclusion is negatively related to poverty reduction and sustainable rice production in Ndop. Sustainable rice production has a positive significant contribution to poverty reduction. This therefore leads to the conclusion that reforms to revitalize the agricultural sector and rice production in particular as well as reforms encouraging financial inclusion among smallholder rice farmers will lead to increase sustainable rice production and poverty reduction. Financial inclusion and sustainable rice production are therefore very important aspects for poverty reduction.

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