

Georges KOUADIO^{1*}, Beh OUATTARA²

¹*University of Jean Lorougnon Guede, Daloa, Côte d'Ivoire*

²*University of Jean Lorougnon Guede, Daloa, Côte d'Ivoire*

Corresponding author: Georges KOUADIO; email: adou.kabrangk@gmail.com

ENTREPRENEURIAL PERCEPTION OF THE FARM AND THE ROLE OF FINANCIAL SERVICES: A FACTORIAL AND DESCRIPTIVE APPROACH OF SMALLHOLDERS PROFILE IN COTE D'IVOIRE

ABSTRACT

This study analyses the entrepreneurial perception of small farms, particularly the role of financial perception in the construction of an entrepreneurial identity. Using multiple correspondence analysis, a factor score reflecting overall financial perception was constructed and then introduced into a logit model to assess its effect. The results reveal three groups of farmers according to the importance they attached to financial services: the group of convinced potential users, the group of sceptics and the group of moderate adopters. Furthermore, 76 % of small-scale farmers believe that their farms can be considered a business.

Finally, Logit model shows that financial score is negatively associated with entrepreneurial perception. Land tenure and generational renewal reinforce this finding. On the other hand, education, farm size, and income have a positive and significant influence on perception. These results shed new light: the importance of individual and social representations in the construction of entrepreneurial identity by smallholders. Policies therefore must be accompanied by strategies that strengthen training in both financial education and use of financial tools. Mechanisms to reinforce institutional confidence remain essential for the adoption of financial services in agriculture.

Key words: multiple correspondence analysis, entrepreneurial perception, financial services, factor score, logit.

JEL Classification: Q12, Q14, L26.

1. INTRODUCTION

The entrepreneurial orientation of the farm plays a positive role in its growth and performance and the financial literacy of farmers is an important factor for progress in agriculture (Falola *et al.*, 2023). Nevertheless, it remains that farmers have little knowledge and limited use of financial services (Prodhan *et al.*, 2024; Palarsca *et al.*, 2022). In such a context, it seems essential to understand the entrepreneurial perception of farmers and the effect of financial services within the farm.

In recent years, Côte d'Ivoire growth has been driven mainly by agriculture. Despite this upturn, the country's agricultural model is struggling to move towards modern and professional farming. The majority of farms remain small, very often family-run, and farmers are guided solely by a «spirit of subsistence». This model of agriculture is therefore not conducive to achieving productivity gains and helping to reduce the country's food insecurity situation.

Studies on farm development in Côte d'Ivoire generally focus on improving farmers' income and productivity and few of them have explored the direct influence of financial perception on the perception of entrepreneurial behaviour. This timely study seeks to contribute to the emergence of literature on agri-entrepreneurship in Côte d'Ivoire.

2. STATE OF KNOWLEDGE

The ever-increasing demand for agricultural products, fuelled by the global population explosion, has shifted agriculture from its traditional subsistence role to an industrial scale. To ensure their long-term survival, these farms require solid managerial skills, turning the farmer into an entrepreneur. While the agri-entrepreneur profile is already well established in Western countries (Guarin *et al.*, 2020), this is not yet the case in Africa and particularly in Côte d'Ivoire.

While the recent economic literature emphasises the key role of financial services in the adoption of entrepreneurial behaviour and farm development, its effects remain contrasted in a production context dominated by climate change.

Several studies show that financial inclusion is important for farmers' well-being. The financial inclusion also enables smallholders to cope with risks by reducing their vulnerability (Wang & He, 2020). Furthermore, farmers' use of financial services has become vital and critical for farm development (Carter, 2022; Dzanku *et al.*, 2021; Krell *et al.*, 2021).

Conversely, some authors found that financial inclusion have not had the expected effects (Prodhan *et al.*, 2024; Magbondé *et al.*, 2023; Palarsca *et al.*, 2022). In this regard, Logogye *et al.* (2024) highlight the existence of a threshold effect above which financial services stimulate entrepreneurship and below which they have no impact.

Few studies integrated cognitive dimensions (perception, confidence) with structural ones (income, farm size, land tenure, gender, education, etc.). Our study aims to address this gap by using a factor score and examining its effect on the construction of the entrepreneurial identity of Ivoirian farmers, moderated by socio-economic variables.

3. MATERIAL AND METHOD

The data for this study come from the research entitled “National household surveys of smallholders”. It was conducted in 2016 by CGAP (Consultative Group to Assist Poor) and its partners in six countries (Mozambique, Uganda, Tanzania, Côte d’Ivoire, Nigeria, Bangladesh). In Côte d’Ivoire, the research was carried out in coordination with the National Institute for Statistics (INS), now ANStat. It focused on the financial needs and behaviour of smallholders’ households. A census of farming households was carried out in 212 randomly selected enumeration areas based on the 2014 population census. A total of 3,000 households were sampled between 15 April and 13 May 2016.

Due to their importance, these data are useful for understanding the long-term trends noticed in the financial inclusion behaviour of smallholders and showing how these trends evolve over time. In this respect, these data are a solid basis for analysing the structural aspects of the use of financial service such as farm size, education etc. In this way, it is possible to see the areas in which progress has been made and in which efforts still need to be made with the aim of informing practices and public policies.

We intend to analyse smallholders’ entrepreneurial perception. We therefore characterise their profile according to their perception of the importance of using financial services. They were asked to state their perception of whether it was “very important”, “fairly important” or “not at all important” to have some financial services. These variables, all ordinal qualitative, led us to carry out a multiple correspondence analysis (MCA) supplemented by k-means method (Jadwal *et al.*, 2022). Multiple correspondence factor analysis is a method used to describe the links between several qualitative variables. The MCA made it possible to represent the farmers in a factorial plan. In addition, the calculation of line profile and column profiles was used to calculate the matrix of distances and eigenvalues (individual coordinates). Finally, the factorial axes were determined so that the first axis contained the maximum inertia (maximum information). It should be noted that as the axis increases, the explanatory power decreases (inertia decreases). In accordance with common practice, we have chosen the first two axes that represent 85.34 % of the cumulative inertia (Table 3).

In order to represent smallholders’ overall perception of financial services, a factor score was calculated from the MCA by making a weighted linear combination of the two axes. The index obtained was then standardised and included into the logit as explanatory variable. This factor score reflects the level of value that each farmer places on financial tools. The higher the score the greater the importance the farmer attaches to using financial services.

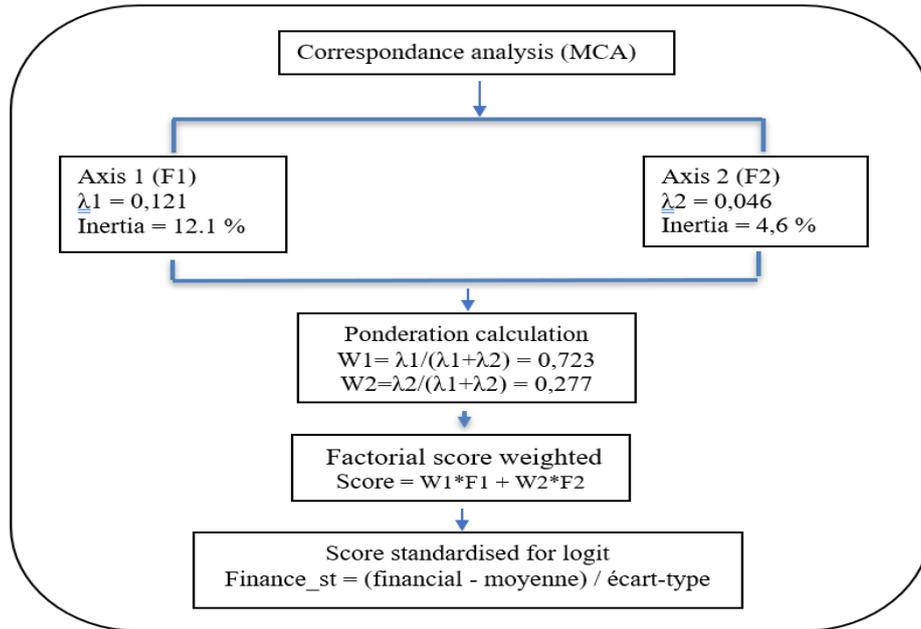


Figure 1. Conceptual diagram of factor score

Finally, to identify the effect of financial perception and socio-demographic variables on the propensity of farmers in Haut Sassandra to consider their farm as a business, we use logit model specified as follows:

$$Y_i^* = \beta_i X_i + e_i \quad (1)$$

$$Y_i = \begin{cases} 1 & \text{if } Y_i^* > 0 \\ 0 & \text{otherwise} \end{cases} \quad (2)$$

The functional form is written as:

$$Y_i = f(\text{finance_st}, X_i) + e_i \quad (3)$$

Y_i represents the dependent variable which takes value 1 when the farming household perceives its farm as a business and 0 otherwise; finance_st a finance score; X_i a set of control variables, β_i represents the estimated parameters and finally e_i represents the error terms.

The model can be specified empirically as follows:

$$Y = \beta_0 + \beta_1 \text{finance_st} + \beta_2 \text{age} + \beta_3 \text{gender} + \beta_4 \text{school} + \beta_5 \text{family} + \beta_6 \text{income} + \beta_7 \text{herit} + \beta_8 \text{cooperative} + \beta_9 \text{size} + \beta_{10} \text{landtenure} + \varepsilon \quad (4)$$

4. RESULTS AND DISCUSSIONS

4.1. DESCRIPTIVE ANALYSIS OF FARMERS

This section looks at the socio-demographic characteristics of farmers in relation to their farm perception. An analysis of Table 1 shows that farmers in Haut Sassandra are predominantly male and mostly adults. They are largely settled on small farms. Many of them have not attended school and are not members of any farming organisation. The analysis of the land issue shows that farmers are on farms that are not very formalised.

Turning to the link with the perception of farm entrepreneurship, it is important to note that some variables are significantly associated with the perception of the farm as a business. These variables relate to education, farm size, household size, land tenure, income and generational renewal. Farmers who had attended school were more likely to consider the farm as a business. Furthermore, those with larger farms are more likely to develop entrepreneurial behaviour. The same applies to farmers living in large households. The nature of land tenure is also significant: farmers on more formalised farms tend to develop an entrepreneurial spirit. In addition, income indicates that a higher level of income is associated with a positive perception of the farm. Finally, farmers who wish to pass on their farms to their offspring are more likely to see them as genuine businesses. On the other hand, variables such as gender, age, experience, and membership of producer group did not show a significant relationship with entrepreneurial perception. This result suggests that the development of an entrepreneurial behaviour is shaped by individual, family and structural factors.

Table 1

Socio-demographic characteristics of farmers

Characteristics	Category	Frequency	Farm as business		Chi2 test with perception (p-value)
			Yes (%)	No (%)	
Gender	Male	123	78.86	21.14	1.41 (0.234)
	Female	62	70.97	29.03	
Age_F	20-35	60	71.67	28.33	1.25 (0.534)
	36-64	110	79.09	20.91	
	65 and more	15	73.33	26.67	
School attendance	Yes	87	83.91	16.09	5.36 (0.021)*
	No	98	69.39	30.61	
Farm size	0-2	54	80	20	19.34 (0.000)*
	3-4	87	63.53	36.47	
	≥5	44	97.73	2.27	
Household size	0-4	45	91.11	8.89	11.00 (0.004)*
	5-10	67	64.18	35.82	
	>10	73	78.08	21.92	
Experience	0-5	38	76.32	23.68	0.48 (0.784)
	6-9	28	82.14	17.86	
	≥10	106	81.13	18.87	

Characteristics	Category	Frequency	Farm as business		Chi2 test with perception (p-value)
			Yes (%)	No (%)	
Group membership	Yes	22	90.91	9.09	1.81(0.178)
	No	150	78.67	21.33	
Generational renewal	Yes	125	84.80	15.20	15.66 (0.000)*
	No	60	58.33	41.67	
Land property type	With lease	29	93.10	6.90	56.12 (0.000)*
	Under customary	75	85.33	14.67	
	With certificate	51	84.31	15.69	
	Others	19	23.33	76.67	
Income	≤ 75 000	144	73.05	26.95	3.27 (0.070)*
	> 75 000	41	86.36	13.64	

Source: Authors' processing based on data from CGAP, 2016.

Table 2

Importance of financial services and chi2 test association with farm perception

Variables	Frequency	Percentage	Farm as business		Chi2 test with farm perception (p-value)
			Yes	No	
Bank					
very important	99	53.51	68	31	7.14 (0.028) *
quite important	55	29.73	48	7	
not important	31	16.76	25	6	
Phone					
very important	159	85.95	121	38	0.19 (0.908)
quite important	15	8.11	12	3	
not important	11	5.95	8	3	
Money					
very important	128	69.19	92	36	4.33 (0.114)
quite important	37	20	32	5	
not important	20	10.81	17	3	
Insurance					
very important	106	57.30	82	24	1.82 (0.402)
quite important	63	34.05	49	14	
not important	16	8.65	10	6	
Saving					
very important	89	48.11	65	24	4.30 (0.116)
quite important	77	41.62	64	13	
not important	19	10.27	12	7	
Loans					
very important	58	31.35	40	18	2.88 (0.236)
quite important	76	41.08	62	14	
not important	51	27.57	39	12	
Credit					
very important	37	20	27	10	1.29 (0.522)
quite important	68	36.76	55	13	
not important	80	43.24	59	21	

Source: Authors' processing based on data from CGAP, 2016.

According to the level of importance they attached to financial services in agricultural activities, Table 2 shows that, on the whole, it is very important for farmers to have access to financial services in order to carry out their farming activities. This level of importance was expressed by 53.51% for having a bank account and over 80% for a phone. In addition, 69.19% thought that mobile money was very important for their farm. Their perception of savings reveals that 48.11% think it is very important to save. That said, the level of importance given to borrowing and access to credit seems to reflect the behaviour of farmers who do not have this borrowing and credit culture. In fact, only 31.35% felt that it was very important to borrow for their farming activities and only 20% for access to credit.

Looking at the extent to which financial perception is linked to entrepreneurial perception, it emerges that only farmers who consider it important to have a current account are likely to become agricultural entrepreneurs. In other words, compared to those who do not perceive the importance of bank accounts, those who attach some importance to them are more likely to see their farm as a business.

This result confirms an important element of the economic literature, namely that the banking system is crucial in structuring the agricultural sector. The bank account is a key aspect of the formalisation of agricultural activity as an economic activity capable of boosting access to credit and providing credibility in the eyes of donors. In the context of this research, it emerges that access to the bank remains the key factor in the process of migration towards a more entrepreneurial vision of agricultural activity. On the other hand, the other tools, although frequently used, are not sufficient to explain the entrepreneurial vision and underline the need to deepen the conceptual link. Farmers may regard financial services as mere support instruments with no direct influence on entrepreneurial behaviour.

4.2. CHARACTERISING THE FARMERS' PROFILE

Our results indicate that variables introduced into the perception model explain the percentage of 85.34% of the contributions on the first two dimensions. Our variables are therefore well calibrated and give a high level of confidence in the interpretation of the results.

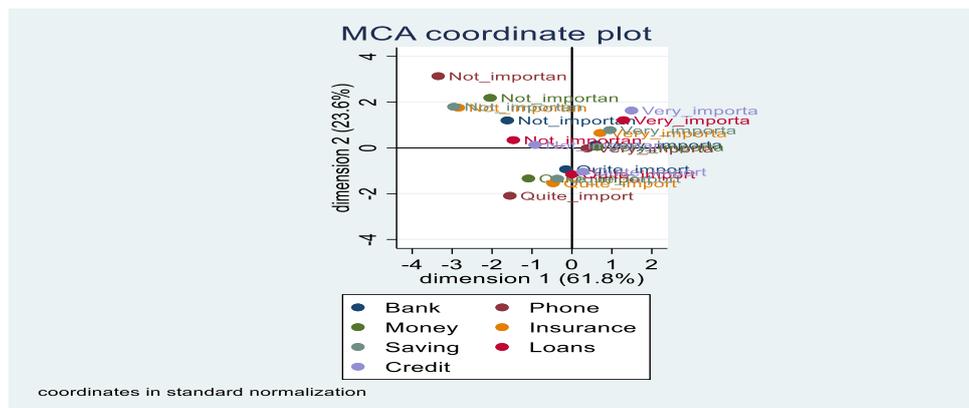
Table 3

Proportion of information for dimension

Dimensions	Principal inertia	Percent	Cumul percent
Dim 1	0.12	61.79	61.79
Dim 2	0.05	23.56	85.34
Dim 3	0.005	2.68	88.02
Dim 4	0.0007	0.38	88.40
Total	0.19	100.00	

Source: Authors' processing based on data from CGAP, 2016.

Figure 2 shows that for each tool, axis 1 contrasts with the perception of “very important” and “not at all important”. This axis could therefore represent farmers’ level of interest in financial services. It indicates the level of value that each farmer attributes to the potential use of the tools on the farm. It highlights the profile of farmers who appear to be financially committed and convinced, and those who are not. Axis 2 contrasts the farmers who appear to be marginalised in their use of modern digital tools (phone, mobile money) and basic tools (insurance, savings), therefore rejecting modern tools, with the farmers who consider these tools to be important but not essential to their farming activities. In addition, we can distinguish along this same axis a group of farmers who might have a propensity for intensive use of credit services (credit and loans). This axis can be seen as showing the positioning of farmers according to their level of financial education.



Source: Authors' processing based on data from CGAP, 2016

Figure 2. Projection of variables on the factorial plane

By projecting the farmers into the factorial plane and using the kmeans method, we can highlight three typical profiles that we call: convinced users; intermediaries (moderate adopters); sceptical users (Table 4).

- Profile 1: Convinced users

Farmers in this group are in favour of using on-farm financial services, which they consider essential for their business. They are potential intensive users of these services (Bank, Saving, Loans, Credit). For them, the use of financial tools is a well-being guarantee. More educated, this group of farmers is mostly made up of women, and their farms are more or less formalised, with 41% on leased farms and around 47% on farms with customary contracts. As part of an agricultural policy, these farmers can serve as control farmers for the dissemination of financial tools. They can also act as relays for disseminating good practice in the use of financial services.

- Profile 2: Sceptical users

These farmers have little access to banking services and are often excluded from modern financial system. They reject digital tools (phone, mobile money). Predominantly female, this group is made up of farmers with a low level of education, which can be an obstacle to financial innovation. They also make heavy use of loan services. In addition, most of them have formal farm titles. A policy focused on financial education training for this group deserves particular attention.

- Profile 3: Users in transition

These farmers consider all financial tools to be fairly important. For them, financial services are of some use; moreover, they are somewhat familiar with these tools, but it seems that they will not necessarily use them on their farms. Mostly men, this group is well educated and their farms are formalised, some with certificates (52.94%) and others with leases (55.17%). Farmers in this group can increase their use of financial services through incentive policies.

Table 4

Profile by gender, patronage and mode of land ownership

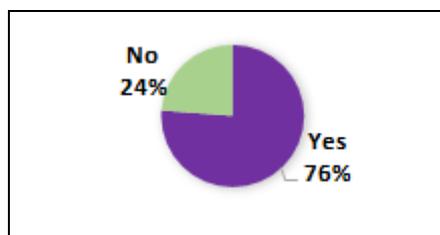
	Category	Profile 1	Profile 2	Profile 3
Gender (%)	Female	41.94	14.52	43.55
	Male	37.4	13.01	49.59
School attendance (%)	No	37.76	20.41	41.84
	Yes	40.23	5.75	54.02
Land tenure (%)	With Certificate	25.49	21.57	52.94
	With Lease	41.38	3.45	55.17
	Customary	46.67	12	41.33
	Others	40	13.33	46.67

Source: Authors' processing based on data from CGAP, 2016.

4.3. ENTREPRENEURIAL PERCEPTION OF THE FARM

We take a close look at what farmers think of their farms, whether or not they consider them to be a business and then identify the effect of the financial score and socio-demographic variables on their perceptions. Farming households were asked the question "Do you consider your farm to be a business?" Figure 3 below summarises their responses.

It is shown that 76 % of farm households consider their farms to be genuine businesses. This perception is indicative of the entrepreneurial vision that these farmers could give to their farms, and therefore reflects a resolutely market-oriented approach and the search for profitability. That said, a significant proportion continue to be guided by a subsistence approach to their farming activities, since these farmers do not see their farms as businesses. Indeed, 24% of them see their farming activities more as a traditional way of life guided by the search for subsistence products.



Source: Authors' processing based on data from CGAP, 2016.

Figure 3. Farmers' perception of farm as a business.

As we see the overall index of financial perception and link with entrepreneurial perception, the results indicate that the calculated factor score has a mean centred around zero ($-2.59e-09$) with a standard deviation of 1. The extreme values of the score vary between -2.33 and 1.60, reflecting a heterogeneous perception of financial services. This heterogeneity confirms the profiles obtained: the group that attaches great importance to financial tools; the group that feels excluded and the moderate group. The average value close to zero shows a virtual balance between farmers who attach importance to financial services and those who do not. Furthermore, the average score is higher among farmers who do not consider their farms to be a real business (0.15) to the detriment of those who do (-0.05). However, the difference is not significant ($p\text{-value} = 0.25$) reflecting that at descriptive level, the entrepreneurial perception of the farm is not linked to the perception of financial services. It could be influenced by various factors, both institutional and personal. To go further a logit model was estimated to measure the effect of the synthetic index of financial perception in interaction with control variables, particularly socio-demographic variables.

Table 5

Descriptive statistics for the finance index of overall perception

Variables	Obs	Mean	Standard deviation	Min value	Max value	Percentile
Finance_st (financial score)	185	$-2.59e-09$	1	-2.33	1.60	-0.66 (25 %) -0.02 (50 %) 0.67 (75 %) 1.60 (100 %)
Farm as business (yes)	141	-0.05	0.96			
Farm as business (no)	44	0.15	1.11			
t-test (difference in mean)	Diff = 0.19	t = 1.13	P = 0.25			

Source: Authors' calculation based on data from CGAP, 2016.

4.4. IDENTIFICATION OF THE FACTORS EXPLAINING PERCEPTION

As we see in Table 6 below, we note that the financial score has a negative and significant effect on the entrepreneurial perception of farm as business. Thus, the more a farmer intends to value financial services the less likely he is to consider his farm as business. Some socio-demographic variables reinforce this result (land tenure, generational renewal), while others (education, farm size and income) confirm a positive and significant link with entrepreneurial perception. This counter-intuitive result is interesting because it contrasts with those of other authors who showed the positive effect of real financial inclusion on entrepreneurial attitudes (Ntu *et al.*, 2023; Twumasi *et al.*, 2022; Koloma, 2021). This suggests that it is not so much the perception of financial inclusion that shapes farmers' entrepreneurial vision, but rather its implementation and valorisation. Ntu *et al.* (2023) rightly show that effective implementation of financial services encourages investment in agriculture through savings. Our results also show that although financial services are frequently used on daily basis, they do not yet seem to be integrated into entrepreneurial development logic of farms. This is probably due to a certain mistrust and constraint towards financial services (costs, incompatibility with the agricultural sector). This is precisely what is revealed by the work of Proadhan *et al.* (2024). They show that although digital financial services are widely used by farmers in Bangladesh (87.3%), they are relatively limited in agricultural transactions. This finding is consistent with that of Palarsca *et al.* (2022), whose work showed that farmers in Kenya make little use of mobile technologies in agriculture despite the country being one of the pioneers of this technological boom. In addition, Magbondé *et al.* (2023) show low participation in the agribusiness sector due to a low confidence score in institutions despite the availability of finance. These results that are consistent with ours clearly show the importance of financial education, confidence and ease of use of financial technologies in the adoption of entrepreneurial attitudes. Furthermore, our results indicate that institutional constraints (land tenure and generational renewal) are likely to hinder the construction of an entrepreneurial identity. The arduous nature of farm work, the lack of access to markets and equipment on the one hand and the massive rural exodus on the other, do not facilitate intergenerational transmission. Kerbler (2010) argues that it is the owners' positive attitude, their encouragement and their positive opinion on their farms that motivate their children to continue the family work, thereby preserving the development and existence of the farm. As for land ownership, Arora *et al.* (2015) believe that land ownership has the capacity to predict a positive relationship of focus on long-term economic and social objectives. However, the lack of security on farms hampers investment and leads farmers not to commit to a long-term entrepreneurial vision.

Our results highlight that education, farm size and income have effects that are consistent with the literature, thus confirming the positive role of human and

economic capital. Indeed, Kumar and Gupta (2019) have rightly pointed out in their study that education promotes financial inclusion, which is an essential factor in better understanding the mechanisms at play in agriculture. With this in mind, Koloma (2021) concludes that educating young people is a factor that can stimulate their entrepreneurial intentions. In addition, higher income and larger farm sizes make it possible not only to increase agricultural investment but also to opt for more modern management practices. Andati *et al.* (2022) corroborate this assertion arguing that size is often seen as factor in crop diversification. Yet diversification can be seen as an aspect of the entrepreneurial vision. Similarly, farmers who are wealthier than the average are more inclined to develop an entrepreneurial behaviour.

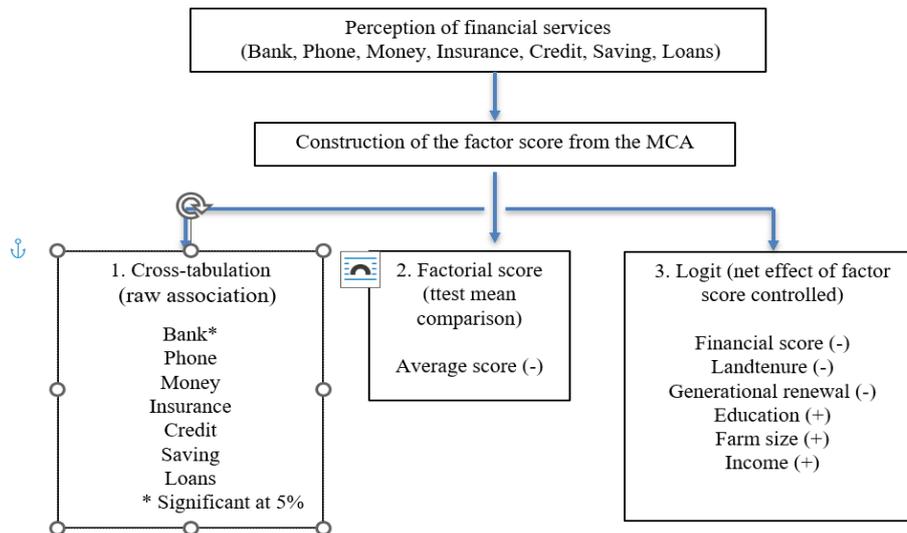
Table 6

Factors explaining farmers' perception

Variables		Coefficients	Std error	Pvalue	Marginal effect
Finance st		-0.42	0.23	0.06	-0.05 *
Age		-0.01	0.02	0.43	-0.00
Gender		-0.25	0.48	0.60	-0.03
School		1.34	0.48	0.00	0.16***
Family		-0.19	0.29	0.52	-0.02
Income		1.33	0.63	0.03	0.16 **
Herit		-1.16	0.48	0.02	-0.14 **
Cooperative		1.38	0.85	0.10	0.17
Size		0.26	0.16	0.09	0.03 *
Land tenure		-0.62	0.24	0.00	-0.07 ***
Constant		2.65	1.66	0.11	-
Number of obs	172	LR chi2(10)	37.26		
Prob > chi2	0.00	Log likelihood	-66.88		
Pseudo R2	0.22				

Source: Authors' calculation based on data from CGAP, 2016.

Ultimately, the negative nature of the relationship between the perception of financial services and the entrepreneurial perception confirms the existence of a threshold effect of financial inclusion on entrepreneurship (Logogye *et al.*, 2024). This emphasises the cognitive dimension as central to perception studies. It sheds new light on the importance of individual and social representations in the construction of entrepreneurial identity by small farmers and leads to a more nuanced approach to financial inclusion policies. It is no longer enough to implement financial inclusion policies; they must be accompanied by strategies that strengthen training in both financial education and use of financial tools. Finally, mechanisms to reinforce institutional confidence remain essential for the use of financial tools in agriculture.



Source: Authors' processing based on data from CGAP, 2016.

Figure 4. Summary conceptual diagram of entrepreneurial perception.

5. CONCLUSIONS

This study analyses the entrepreneurial perception of farms and the role of financial services in agriculture. Using a multiple correspondence analysis, a factorial score was constructed to capture the overall perception of financial inclusion. This score was then integrated into a logit model to examine its influence on entrepreneurial perception.

The MCA results identifies three profiles: convinced users who attach importance to financial tools, sceptical users who reject financial services particularly digital ones, and users in transition who consider financial services to be useful but not essential to their farming activities. Also 76% of farmers consider their farm to be a business. Finally, the logit revealed that financial perception has a negative but significant influence on the entrepreneurial construction of small-scale farmers. On the other hand, the predominant role of human and economic capital is established. Thus, education, farm size and income positively reinforce entrepreneurial attitude. Nevertheless, intergenerational constraints (farm transfer) and institutional constraints (land tenure) have a restrictive effect on the entrepreneurial orientation.

In the light of these results, several strategies can be envisaged. Firstly, policy-makers and farmer support organisations should set up training programmes in financial education and farm management for smallholders. Emphasis could be

placed on moderate adopters as relay farmers to amplify and popularise agri-entrepreneurial behaviour among the most sceptical. Emphasis should be placed on supporting farmers to limit information asymmetries and boost their confidence in financial instruments and institutions. Secondly securing land tenure remains vital to the development of farms. Finally, farmers will need to be equipped to reduce the arduousness of farm work so as to facilitate generational transfer. From a more global perspective, future evaluation of the use of financial tools by smallholders and of farm management methods could help to achieve economies of scale.

REFERENCES

1. Andati, P., Majiwa, E., Ngigi, M., Mbeche, R., & Ateka, J, (2022). Determinants of adoption of climate smart agricultural technologies among potato farmers in Kenya: does entrepreneurial orientation play a role? *Sustainable Technology and Entrepreneurship*, 1(2), 100017.
2. Arora, P., Bert, F., Podesta, G., & Krantz, D. H, (2015). Ownership effect in the wild: Influence of land ownership on agribusiness goals and decisions in the Argentine Pampas. *Journal of behavioral and experimental economics*, 58, 162–170.
3. Carter, M. R, (2022). Can digitally-enabled financial instruments secure an inclusive agricultural transformation? *Agricultural Economics*, 53, 953–967. <https://doi.org/10.1111/agec.12743>.
4. CGAP, (2016). *Understanding the demand for financial, agricultural and digital solutions from smallholder households: Insights from the household survey in Côte d'Ivoire*. Report <https://microdata.worldbank.org/index.php/catalog/2789/related-materials>.
5. Dzanku FM, Osei R, Osei-Akoto I, (2021). The impact of mobile phone voice message reminders on agricultural outcomes in Mali. *Agricultural Economics*; 1–18. <https://doi.org/10.1111/agec.12654>.
6. Falola, A., Olowogbon, T. S., Mukaila, R., Ayodele, O. S., & Ibrahim, F, (2023). Financial literacy of rural farming households in Kwara State, Nigeria: A guide for financial inclusion. *Journal of Rural and Community Development*, 18(3).
7. Guarín, A., Rivera, M., Pinto-Correia, T., Guiomar, N., Šūmane, S., & Moreno-Pérez, O. M, (2020). A new typology of small farms in Europe. *Global food security*, 26, 100389.
8. Jadwal, P. K., Pathak, S., & Jain, S. (2022). Analysis of clustering algorithms for credit risk evaluation using multiple correspondence analysis. *Microsystem Technologies*, 28(12), 2715–2721.
9. Kerbler, B, (2010). The role and importance of owners' perceptions and opinions in preserving continuity between generations on slovenian mountain farms. *Acta geographica Slovenica* 50-1. <https://doi.org/10.3986/AGS50102>.
10. Koloma, Y., (2021). Financial inclusion and entrepreneurship willingness of youth: Evidence from Mali. *African Development Review*, 33(2), 263–275.
11. Krell, N. T., Giroux, S. A., Guido, Z., Hannah, C., Lopus, S. E., Caylor, K. K., & Evans, T. P, (2021). Smallholder farmers' use of mobile phone services in central Kenya. *Climate and Development*, 13(3), 215–227.
12. Kumar, A., and Gupta, H., (2019). Financial inclusion and farmers: Association between status and demographic variables. *International Journal of Recent Technology and Engineering*, 8(4), 5868–5879.
13. Logogye, L., Adusei, M., Poku, K., & Aawaar, G, (2024). Financial inclusion-entrepreneurship nexus: evidence from a threshold analysis. *Journal of Business Economics*, 1–30.

-
14. Magbondé, K. G., Mignouna, D., Manyong, V., Adéoti, R., & Sossou, A. O. (2023). Impact of informal institutions on youth agribusiness participation in Southern Benin. *Agricultural and Food Economics*, 11(1), 11.
 15. Ntu, S. L., Egwu, B. M. J., & Tambi, M. D. (2023). The Effect of Financial Services on Youth Involvement in Agribusiness Entrepreneurship in Fako Division, Cameroon. *Asian Journal of Agriculture and Food Sciences* (ISSN: 2321–1571), 11(2).
 16. Parlasca, M. C., Johnen, C., & Qaim, M., (2022). Use of mobile financial services among farmers in Africa: Insights from Kenya. *Global Food Security*, 32, 100590.
 17. Prodhan, M. M. H., Jalal, M. J. E., Alam, H., Mostofa, M. S., Khondker, B. H., & Khan, M. A., (2024). State and potential of digital financial services among farmers in Bangladesh: An in-depth study. *Journal of Agriculture and Food Research*, 16, 101209.
 18. Twumasi, M. A., Jiang, Y., Ding, Z., Wang, P., & Abgenyo, W. (2022). The mediating role of access to financial services in the effect of financial literacy on household income: The case of rural Ghana. *Sage Open*, 12(1), 21582440221079921.
 19. Wang, X., and He, G. (2020). Digital financial inclusion and farmers' vulnerability to poverty: Evidence from rural China. *Sustainability*, 12(4), 1668.

