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Understanding Psychosocial Mechanisms of Farmers' Propensity to Innovate in a Context of Cluster-Based Agribusiness Development

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Abstract

This article investigated the influence of clusters on farmers' propensity to innovate. We conducted semi-structured interviews and three focus groups with 208 cashew producers. The data collected was analyzed using the LISREL structural equation modeling approach. The activities carried out and in connection with the cluster approach have a positive influence on the cognitive capital and the social sense of belonging of the producers. The knowledge gained by the producers has improved their sense of competence. Opportunistic thinking, perception of competence and social belonging have a positive influence on producers' propensity to innovate. The cluster strengthens producers' propensity to innovate through cognitive capital and a sense of social belonging. It is worth noticing that the effectiveness of the cluster approach depends on the organizational challenges in the value chains.

Keywords: marketing, opportunity, propensity to innovation, Benin

1. Introduction

The competitiveness of the Beninese cashew nut has been strengthened in recent decades, making Benin the fourth largest African producer country. Economically, cashews contribute 24.87% to agricultural export income, 7% to agricultural gross domestic product (GDP), and 3% to national GDP (MAEP, 2017). However, challenges still need to be addressed to improve the growth of this sector. Problems in the agricultural sector can range from technical crop issues to economic issues to environmental and socio-economic issues (Delmotte and al., 2013). The biggest challenge facing producers in the cashew sector is the post-production marketing of nuts to address the socio-economic issues faced by producers. In order to overcome this challenge, it is important for producers to join cooperatives or groups to benefit from the experiences of others' success or failure factors and to develop

further. The challenges that agriculture faces can be of different magnitudes: technical problems related to crops, economic problems of the farms and the environmental and socio-economic problems of the territory. In terms of developing the agricultural sector and fostering innovation, clusters is now seen as a way to overcome the socio-economic challenges that hinder development (Pezzini and Minsat, 2019). The agricultural cluster is a model for structuring and decision-making on farms that is oriented towards market control (Berbou and al., 2020). The cluster is a conglomeration of actors pursuing a common goal of increasing income through wealth accumulation and equitable redistribution, driven by a business model around one or more value chains in a given geographic location (Ferdj and Hamadi, 2021). Thus, today the cluster is seen as a model that encourages innovation, due to the proximity and relationships that develop between the actors. The challenges that agriculture faces can be of different scales: technical problems related to crops, economic problems of the farms and the ecological and socio-economic problems of the territory.

Given the importance of the cashew sector, there is a growing demand for cashew nuts. This demand offers producers opportunities to improve their living conditions socially and economically (Ruf and al., 2019). In the cashew marketing system, two main modes are highlighted: individual and group selling. Contract sales are now seen as a guarantee of better prices for farmers. This strategy of group sales contributions is increasingly emphasized by the cluster approach, which strengthens the existing links between the different actors (Degla and Ahodode, 2021). This bundling strategy results in projects focusing on facilitating business relationships between producers for the marketing of cashew nuts. This article is based on the case study of the PROFI-Anacarde project carried out in Benin, whose main objective is to facilitate business connections between actors from the supply of inputs to the marketing of finished products. In order to avoid the external effects associated with the fluctuation in the price of the nuts, the cooperatives meet and form clusters. The structuring into clusters allows these different structures to conform to the standard and stand the test of time. The cluster facilitates business relationships between direct aggregators and aggregators who have common interests to protect. Today, the importance of clusters is well established. This is one of the means for easy access not only to the market but also to other types of advisory services such as access to finance, support to strengthen the capacity of producers, to name a few (Nokairi and Errajaoui, 2022). A requirement for farmers to be members of the cluster is to join a cooperative or producer group. The proximity created by the cluster encourages the development of business relationship opportunities between members of different cooperatives (Balland and al., 2016). Clusters can mitigate reluctance to share knowledge through the participation of tight networks based on mutual trust and an existing collaborative relationship between members (Huang and Rice, 2013). Through knowledge sharing, the cluster develops the cognitive capital of farmers. In the innovation process, the psychosociological dimension associated with innovation must be taken into account and reflected in the inclination defined as the willingness to innovate. It is therefore important, if not necessary, that these farmers belong to cooperatives. Does the development of socio-economic business relationships between actors contribute to the development of their propensity to innovate or change? Does the membership of farmers in the cluster predispose them to innovate? So, the following questions were asked: what influence does the cluster

have on the cognitive capital and the degree of ownership of the producers? Does belonging to the cluster lead producers to develop strategies to seize opportunities for business relationships?

2. Research Methodology

2.1 Presentation of the PROFI-Anacarde

The Support Program for the Development of the Agricultural Sector (PROFI), implemented by the Belgian Development Agency (Enabel), accompanies the efforts of the Beninese government in the implementation of its agricultural policy. The aim is to contribute to improving the performance of Beninese agriculture in order to ensure sustainable food sovereignty and to contribute to the country's economic and social development. Through its support program for agricultural sectors (PROFI), Enabel Benin has proven experience in supporting producer and processor organizations in the marketing of cashew nuts and kernels (conventional and organic). Marketing is based on trade agreements based on the cluster approach (business relationships between producers and processors, securing and consolidating the quantity and quality of the nuts). The PROFI project is normally scheduled to end in 2019. It has done a job unanimously recognized by those involved in the cashew nut industry and has achieved the development goals it set itself. Hence the conversion from PROFI to PROFI-Anacarde. The general objective of PROFI-Anacarde is to ensure the competitiveness, attractiveness and access of productions and products to the markets through the promotion of agricultural sectors, taking into account the roles of the various operational actors, in order to contribute to ensure sustainable food sovereignty of Benin. Its mission is to facilitate the connection of all actors along the cashew value chain. This research aims to analyze the psychosociological mechanism of the intervention of PROFI-Anacarde on cashew producers.

2.2 Study Zone

PROFI-Anacarde is a project carried out by six cashew-producing municipalities in two departments, Atacora and Donga. The intervention municipalities of PROFI-Anacarde are: Kouande, Natitingou, Pehunco, Djougou, Copargo and Bassila. This study was conducted in three of the six municipalities as follows: Copargo, Kouande and Pehunco. The municipality of Copargo covers an area of 876 km 2 and is one of the four municipalities of the department of Donga. Copargo is about 510 km from Cotonou (economic capital of Benin) and 20 km from Djougou (capital of the department). The municipality borders to the north with the municipalities of Natitingou and Kouande, to the south and east with the municipalities of Djougou and Ouake, and to the west with the Republic of Togo. The Sudanese-Guinean climate nuanced by the Atacorian relief. A dry and fresh wind called harmattan blows there from December to February. The area has two seasons: a dry season from mid-October to mid-April, followed by a wet season from mid-April to mid-October. The soil types found there are leached tropical ferrous soils covering mainly the Anandana and Singre districts, ferralitic soils and few rare soils with a hydromorphic tendency are found at the foot of the peaks. The municipality of Kouande extends over an area of 4,500 km2 and borders on the north with the municipality of Krou, on the northwest with the municipality of Tanguieta, on

the southwest with the municipality of Natitingou, on the south with the municipalities of Copargo, Djougou and Boukombe, on the east with Pehunco and to the west by the municipality of Toucountouna. The municipality of Pehunco is located between the valleys of Alibori to the east and that of Mekrou to the west. It is one of the 09 municipalities in the department of Atacora. Pehunco borders to the north with the commune of Kerou, to the south with the commune of Djougou in Donga, to the east with the commune of Sinende in Borgou department and to the west with the commune of Kouande. It has three districts (Pehunco itself, Gnemasson and Tobre) and 26 villages or municipalities. Pehunco municipality enjoys a Sudano-Guinean climate characterized by a wet season from mid-April to mid-October and a dry season from mid-October to mid-April.

2.3 Sampling

A total of 208 cashew producers were sampled for this study. These producers were interviewed in 03 municipalities, which are the municipalities of Copargo, Pehunco and Kouande. We interviewed 31.3%, 34.6% and 34.1% of producers in the municipalities of Copargo, Pehunco and Kouande respectively. Simple random sampling was used to collect the data. This procedure assigns all individuals in the same population a chance of being selected. Use of this method is appropriate when the population is large and relatively homogeneous. We made this choice because the technique gives every member of the population an equal opportunity to be included in the sample. The following table provides information on the sample size by municipality.

Table 1. Number of producers surveyed per municipality

		Sex		Percentage (%)
		Male	Feminine	
Commune	Copargo	29.81	1.49	31.3
	Kouande	31.73	2.37	34.1
	Pehunco	33.17	1.43	34.6
Percentage (%)		94.71	5.29	100

Source: From our field data

2.4 Data Collected

We collected four categories of data using KoboCollect data collection software. This is data on the socio-demographic characteristics of cashew producers. This data relates to gender, marital status, seniority in production, the contribution of cashews to household income, the number of trainings received, and the place of cashews compared to other speculations. Then we collected information about the different intervention approaches of the project, such as activities of the project. Psychosocial factors were also measured. These factors relate to feelings of competence, self-confidence, autonomy and social belonging. And also measuring opportunistic thinking, cognitive capital and learning ability of cashew farmers. Finally, we

collected data on the propensity to innovate that drives producers to innovate. These psychosociological data were collected using 7-point Likert scales ranging from 1-Does not correspond at all to 7-Corresponds very strongly.

2.5 Data Analysis

Using a structural equation model, the psycho-sociological variables collected from producers were analyzed in order to see the link that may exist between them and the propensity to innovate. A reliability analysis was measured by checking for each variable the Cronbach's alpha, the reliability composite and the loadings. Thus, the results obtained make it possible to retain the variables whose Cronbach's alphas were acceptable, that is to say greater than 0.7. This evaluation therefore allows us to conclude on the validity and reliability of our external model. SPSS modeling software under the control of Amos, allows us to perform structural equation modeling. The exploratory factor analysis reveals that the results The Kaiser-Meyer-Olkin (KMO) measurement showed an index in all cases greater than equal to 0.5, the Bartlett sphericity test meanwhile shows a significant equal to 0. The results obtained allow us to continue our analyzes (Rherib and al., 2021). Since the variables of our model are all quantitative variables and our sample size exceeds 200 individuals, we have chosen to use the LISREL approach (Zheng and al., 2019).

Table 2. Reliability analysis and exploratory factor analysis of the data collected

Variables	Reliability analysis	Exploratory factor analysis	
	Cronbach's alpha	KMO index	Bartlett's test coefficient
Propensity	0.79	0.57	0.00
Opportunistic thinking	0.93	0.90	0.00
learning ability	0.71	0.76	0.00
Sense of socio-economic belonging	0.81	0.82	0.00
Feeling of autonomy	0.72	0.60	0.00
Feeling of self-confidence	0.84	0.81	0.00
Sense of competence	0.76	0.75	0.00

Source: From our field data

3. Results

3.1 Socio-Demographic Characteristics of Respondents

The following table presents the socio-demographic characteristics of the respondents of the PROFI-Anacarde project.

Table 3. Socio-demographic characteristics of respondents

Variables	Terms	Percentage (%)
Sex	Male	94.7
	Feminine	5.3
Marital status	Bachelor	2.9
	Married	97.1
Educational level	Illiterate	52.9
	Literate	9.1
	Primary level	20.2
	Secondary level	17.8
Number of years of experience	From 1 to 5 years	13.9
	Between 5 and 10 years	31.3
	More than 10 years	54.8
Number of training attended	Less than 5	39.4
	Between 5 and 10	51.0
	More than 10	9.6
Cashew as a secondary activity	No	37.0
	Yes	63.0
Contribution of cashew in the household	Important	16.8
	very important	83.2

Source: From our field data

Of the 06 municipalities covered by the project, our surveys were based on 03, namely the municipalities of Copargo, Kouande and Pehunco; 34.6% of the producers are from the municipality of Pehunco, 34.1% from Kouande and 31.3% from Copargo. Almost 95% of farmers are male. In Atacora-Donga, respondents are mainly from the Bariba ethnic group and 97.1% are married. The illiteracy rate is above average at around 53%. On average, PROFI beneficiaries have more than 10 years of experience in cashew production, and on

average they have already completed at least 5 to 10 cashew training courses. These training courses range from tending plantations to selling nuts. Certainly, the cashew nut takes a secondary place, but it has a very important role in the household.

3.2 Importance of Psycho-Sociological Factors in Determining the Propensity of Producers

Results of the confirmatory analysis

The confirmatory analysis makes it possible to see if the values of the indices obtained meet the requested threshold. The fit indices indicate how well the model fits the data. Several fit indices are included in structural equation models. The most important are the normalized chi-square, the probability P, the GFI, AGFI, the CFI, the NFI and the RMSEA. These indices are divided into three types of indices: absolute indices, parsimony indices and incremental indices (Nasser and Brahim, 2016) .

Model quality measurement

Table 4. Goodness of fit of indices

Types of clues	**Absolute indices**				**Incremental indices**		**Parsimony indices**
clues	P	GFI	AGFI	RMSEA	NFI	CFI	Normalized chi-square (*Chi-square/ddl*)
Desired values	>0.05	> 0.9		<0.05	> 0.9		<2
Values	0.06	0.99	0.90	0.04	0.98	0.99	1.23

Source: From our field data

The indices show that the model is robust. The PROFI-Anacarde is a project born after the success of PROFI. PROFI-Anacarde is a project which is mainly based on the cluster approach. Its objective is to facilitate the connection between producers and also between producers and other actors along the value chain.

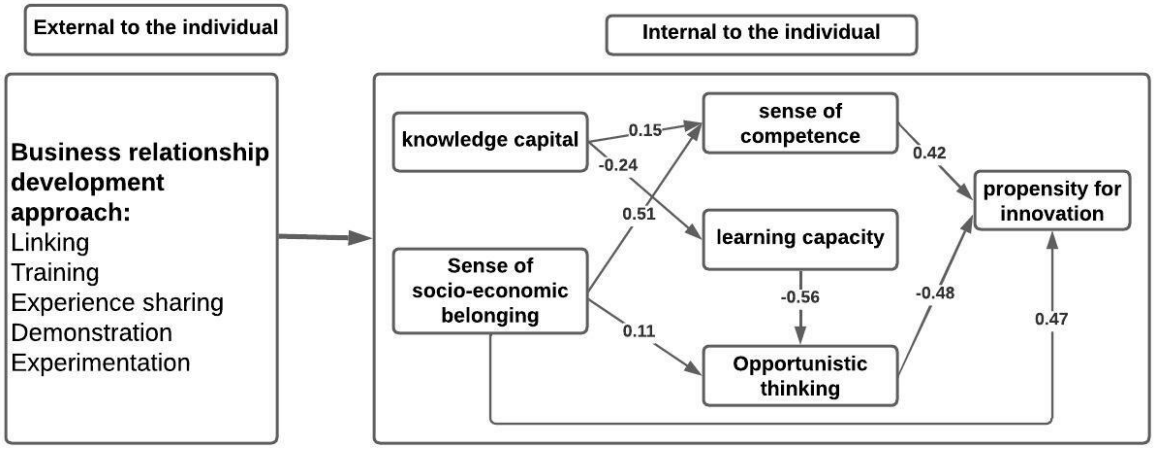

Figure 1. Relationship between the cluster approach and psychosocial factors

Source: From our field data

Verification of basic assumptions

Table 5. Relationship between model variables

Hypotheses			Coef.	P	Testing of assumptions
Learning ability	<---	Cognitive capital	-.243	***	Validated
Sense of competence	<---	Sense of socio-economic belonging	.511	***	Validated
Opportunistic thinking	<---	Sense of socio-economic belonging	.111	.070	Validated
Opportunistic thinking	<---	learning ability	-.562	***	Validated
Sense of competence	<---	Cognitive capital	.154	.009	Validated
Propensity	<---	Sense of competence	.424	***	Validated
Propensity	<---	Opportunistic thinking	-.480	***	Validated
Propensity	<---	Sense of socio-economic belonging	.474	***	Validated
NB: * significance at 5% and ** significance at 10%**					

Source: From our field data

The following table presents the relationship that exists between cognitive capital, feelings of socioeconomic belonging and feelings of competence on the one hand, and between feelings

of competence and propensity on the other hand.

Cognitive capital has a significant and positive influence between the feeling of socioeconomic belonging and the feeling of competence. There is also a positive correlation between the feeling of competence and propensity. The knowledge of the producer increases thanks to the technical support provided by the agricultural advisors and the relay trainers, which allowed an improvement in cognitive capital. As cognitive capital increases, it increases the producer's feelings of competence. The project thus improves the producers' feelings of competence.

Figure 2. Competence acquired thanks to the project allowing the association of beekeeping and cashew

As an example, to show the skill level of the producer:

> *"Thanks to the training on entrepreneurship, I started doing association beekeeping in my plantation".*

There is a significant and negative association between cognitive capital and learning ability. And, a significant and negative relationship between opportunistic thinking and learning ability. The analyzes showed that the higher the producer's cognitive capital, the less he learns. The less he learns, the more he thinks about being opportunistic. In the cluster, each producer, by making connections with other people, begins to develop so-called opportunistic thoughts, that is, he thinks of exploiting the existing relationship between himself and the others to achieve his goals. personal goals other than those formulated by the project.

4. Discussion

The results show that compliance with the project is mainly related to the fact that the project connects producers with the various actors along the value chain. Through its intervention, the project develops partnership relations between potential customers and producers. When the producer joins the project, he sells his cashews at competitive prices. The connection has

a positive impact on their experiences and allows them to develop some level of knowledge. The acquisition of knowledge related to the producer's past experience in the industry increases his sense of competence (Zimmerman, 2000). In agriculture, the attractiveness for innovation or change depends on the individual's perception of these abilities and the conditions that enable him to achieve his goal. Sense of competence is one of the determinants positively affecting propensity (Ryan and al., 2003). So, having the ability and thinking, having the ability, are two different things. The individual may have the skills or ability to do something without realizing it, hence the importance of perception in triggering the propensity. Landry and al., (2005), have shown that the sense of competence plays a key role in the motivation process. In the theory of self-determination (Deci and Ryan, 2013), a feeling of competence is one of the factors motivating the individual to change. The cognitive capital defined by all the experience and knowledge acquired over the years makes producers less attentive to capacity building services. Project beneficiaries are no longer interested in activities related to plantation tending techniques, believing they already have the necessary knowledge to tend their farms. Linking strengthens the connections that exist between producers. You feel connected and united for developing business relationships. This established connection leads to opportunistic behavior, as each producer intends to benefit from the relationships that link him to others to develop his activities (Fulconis, 2010). The advantages that result from membership in the various cooperatives have a positive impact on the willingness of producers to innovate in agriculture.

The feeling of socio-economic belonging and the feeling of competence directly influence the intention, which is manifested in this study by the propensity that pushes the producers to change. These two factors were developed through the theory of self-determination (Deci and Ryan, 2004, 2013). The experiences derived from the trainings previously received and the knowledge acquired during these trainings have reduced their learning capacities from these producers. We see that reducing their ability to learn leads to a reduction in their ability to strategize to take advantage of situations. Socioeconomic membership is a factor that allows the reducer to strategize to take advantage of opportunities related to its membership in the cooperative (Fulconis and Paché, 2008). As the producer becomes less opportunistic, he develops his propensity for innovation. So, the more opportunistic the producer is, the less he thinks about change, preferring to remain in a situation he finds comfortable and safe. Through our results, we see that the diverse business relationships formed between producers strengthen their sense of belonging, leading them to develop a tendency to innovate.

The cluster that has formed between them allows them to learn from each other and overcome the fear and uncertainty associated with agricultural innovation. When the producer networks, he feels more competent and can develop strategies to use the cluster (Gardès and al., 2017). Therefore, sense of competence and socioeconomic affiliation positively and directly influence propensity to innovate (Landry and al., 2005; Ryan and al., 2003). A study by Qouri and Taghzouti, (2018), on the influence of the quality of the approach of Moroccan organizations (MFIs) on learning, showed that the network had a positive impact on knowledge development, on the cognitive capital and learning capacity of the partners contracting the credits. This result does not follow the same logic as our results showing the

negative effect of cognitive capital on the learning capacity of producers (Tekam Oumbe and al., 2019). When the producer has acquired the knowledge needed to develop his cognitive capital, he no longer wants to participate in the training organized by the project. The producer's cognitive capital, defined by his level of education, his length of service in the industry and by all the knowledge he has acquired during this number of years of activity, develops in him a certain fatigue in relation to capacity-building sessions. While the development of the ability to learn depends heavily on the acquisition of new knowledge. The techniques and technologies necessary for innovation are constantly changing depending on the difficulties related to climate change and the acquisition of production factors. Therefore, it is necessary for the producer to participate in and track the activities related to reinforcement and upgrading advisory services. It is this deficiency that leads to a reduction in the ability of these producers to learn. This reduction in learning ability leads to a reduction in opportunistic thinking. If the producer's opportunistic thinking is reduced, the producer can no longer implement the strategies that can influence his propensity to innovate. However, the development of these strategies contributes to the emergence and development of opportunistic behavior. Note that the development of opportunistic behavior reduces the producer's propensity to innovate.

5. Conclusion

In this article, we analyzed the impact of clusters for business relationship development on producers' propensities. Results showed that business opportunity creation relationships between producers influence two main factors, namely cognitive capital and the feeling of socioeconomic belonging. Note that the acquisition of competence necessary to trigger propensity depends on cognitive capital. Establishing business relationships between producers begins with creating the necessary conditions for obtaining the best quality nuts. If two people offer the same product in the same market, the one whose product quality is the most attractive will be the most competitive. The attractiveness of the product is the important element on which every market related decision is made. Thus, the feeling of competence remains an essential condition which, if present in the producer, leads him to embrace uncertainty through innovation. The existing links between producers reinforce their feelings, these links increase their feeling of socio-economic belonging through the burgeoning business relationships. Indeed, as the producer associates with others, he develops an opportunistic mindset that reduces his propensity to make changes in his operations. Opportunistic thinking and a feeling of competence play a mediating role between the feeling of socioeconomic belonging and the producer's cognitive capital. In conclusion, we note that of the variables used for this study, only the feeling of socioeconomic belonging has a direct impact on the farmer's propensity to innovate. Thus, through the cluster, the group can engage individuals to develop their sense of competence but also to excel, take risks and innovate.

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