PSYCHOSOCIAL FACTORS DIFFERENTIATING ORGANIC AND CONVENTIONAL FARMERS

G. B. D. AIHOUNTON*, AND A. H. EDJA

Laboratoire d'Analyse et de Recherches sur les Dynamiques Economiques et Sociales (LARDES), Département d'Economie et de Sociologie Rurales, Faculté d'Agronomie, Université de Parakou, République du Bénin

*corresponding author: aihountong@gmail.com

ABSTRACT

Despite the environmental and health benefits associated with organic farming in developing countries, the adoption rate of organic farming is lower and the exit rate is also increasing. This study compares the characteristics of organic, former organic, and conventional farmers, focusing on psychosocial factors. Cross-sectional data about the characteristics, attitudes and perceptions of farmers were collected from the three types of farmers in the cotton-growing areas of Benin. Descriptive statistics were used to identify differences in characteristics and psychosocial factors between the three farmers groups. The results show that organic farmers and former organic farmers are similar in most characteristics. In terms of psychosocial factors, organic farmers are more environmentally conscious, profit oriented and risk averse than other types of farmers. Conventional farmers express lower environmental concerns and share similarities with organic farmers in terms of information seeking attitudes. Organic farmers also perceive lower risk constraints associated with organic cotton production than conventional farmers. This study could help improve policies to promote adoption of organic farming in developing countries.

Key words: Organic farmers, conventional farmers, attitudes, perceptions, Cotton.

RESUME

FACTEURS PSYCHOSOCIAUX DE DIFFÉRENTIATION DES PRODUCTEURS BIOLOGIQUES ET CONVENTIONNELS

Malgré les avantages environnementaux et sanitaires associés à l'agriculture biologique dans les pays en développement, le taux d'adoption de l'agriculture biologique est plus faible et le taux de sortie augmente également. Cette étude compare les caractéristiques des producteurs biologiques, ex-bio et conventionnels, en se concentrant sur les facteurs psychosociaux. Des données transversales sur les caractéristiques, attitudes et perceptions des producteurs ont été collectées auprès des trois types de producteurs des zones cotonnières du Bénin. Des statistiques descriptives ont été utilisées pour identifier les différences de caractéristiques et de facteurs psychosociaux entre les trois groupes de producteurs. Les résultats montrent que les producteurs biologiques et les anciens producteurs biologiques sont similaires dans la plupart des caractéristiques. En termes de facteurs psychosociaux, les producteurs biologiques sont plus soucieux de l'environnement, orientés vers le profit et craintifs que les autres types de producteurs. Les producteurs conventionnels expriment moins de préoccupations environnementales et partagent des similitudes avec les producteurs biologiques en termes d'attitudes de recherche d'informations. Les producteurs biologiques perçoivent également des contraintes de risque moindres associées à la production de coton biologique que les producteurs conventionnels. Cette étude pourrait contribuer à améliorer les politiques visant à promouvoir l'adoption de l'agriculture biologique dans les pays en développement.

Mots clés : *Producteurs biologiques, producteurs conventionnels, attitudes, perceptions, Coton.*

Soumis : 27/09/2021 Accepté : 02/03/2022 Online : 30/08/2022

INTRODUCTION

Organic farming is gaining interest due to the adverse effects of conventional agriculture. Previous studies emphasized on the potential role of organic farming in providing environmental benefits through biodiversity conservation, better quality of soil, reducing evaporation and water harvesting, diversification of cropping patterns and reducing greenhouse gas emissions as well as energy efficiency (Seufert, 2012, Reganold & Wachter, 2016, Altenbuchner *et al.*, 2017). The economic and social implications of organic farming have also been addressed in terms of reduction of input costs, less dependency on money lenders and source of income generation (Panneerselvam *et al.,* 2012; Altenbuchner *et al*., 2017), gender empowerment and improvement in living conditions (Seufert, 2012; Altenbuchner *et al.,* 2016; Altenbuchner *et al.,* 2017).

The environmental, economic and social motivations associated with organic farming lead most developed countries to support organic farming through subsidy and premium prices (Läpple & Rensburg, 2011; Läpple, 2013), which lead most farmers to conversion. In contrast, in developing countries, there is still less commitment towards organic farming. Even though conventional farming is damaging agricultural land and compromising food and health security (Makita, 2012; Panneerselvam *et al.,* 2012), inducing financial risks due to high input costs (Eyhorn *et al.*, 2007), withdrawal from organic farming is being observed (Läpple, 2010; Madelrieux & Alavoine-Mornas, 2013).

The focus in this study is on different types of cotton farmers in Benin. As cotton plays a significant role in the national economy, due to export earnings (Alidou, 2014), most supports were granted to cotton sector leading to the intensive use of agrochemicals in cotton farming with important socio-economic and environmental effects (OBEPAB, 2002; Pazou *et al.,* 2006). Some development NGOs including the Benin Organisation for Promoting Organic Agriculture, have supported organic farming as a way to make cotton production more sustainable (OBEPAB, 2002; Sodjinou *et al*., 2015). It is well noticed that most organic cotton farmers are reverting to conventional farming methods and at the same time, there are new entries in the system. In order to limit the exit rate of organic cotton adopters, knowledge about the profile of the adopters, and non-adopters would be essential. In that respect, Läpple (2013) examined the differences in terms of characteristics and attitudes of those who adopt organic farming and non-adopters classified as former organic farmers and non-adopters at all. The findings suggest that organic farmers are found to be the most environmentally aware. They also rate information gathering as more important than the remaining two groups. However, the study of this author failed to integrate farmers' perceptions that could be seen as one of the most important behavioral drivers (Flaten *et al.,* 2006; van Winsen *et al*., 2016). Although attitudes and perceptions are important in explaining individual behavior, they are independently assessed in organic farming literature. In addition, there is a paucity of knowledge on the characteristics, attitudes and perception towards organic farming in developing countries, which could limit its uptake and long-term adoption. Against this backdrop, the present study aims at comparing farmers' characteristics and psychosocial factors between organic, former organic and conventional cotton farmers in Benin. The existing differences can provide substantial gains to policies makers and NGOs supporting organic farming in order to attract other farmers in the system and in the meanwhile limit the withdrawal rate.

THEORETICAL AND ANALYTICAL FRAMEWORKS

The study attempts to reveal the differences among adopters, former adopters and non-adopters of organic farming. Since organic farming is perceived as having positive socio-economic implications and environmental benefits compared to conventional farming (Seufert, 2012; Sahm *et al.*, 2013; Fayet & Vermeulen, 2014; Jouzi *et al.*, 2017); and in the meanwhile fewer farmers are engaged to; there is a strong insight into what differs among farmers groups. Very few conventional farmers convert to organic and also some withdrawals have been observed from organic farming leading to the distinction of three different groups namely adopters known as organic farmers, organic farmers who previously ceased organic farming known as former organic farmers and non-adopters at all known as conventional farmers. The main question that might arise is what

factors drive these three farmers groups. From a classical distinction between adopters and non-adopters, Sodjinou *et al.* (2015) found existing differences in terms of socio-economic and demographic characteristics between adopters and non-adopters of organic farming. Flaten *et al.* (2006) accounted for differences between adopters' stages which have been later more developed by Läpple and Rensburg (2011). From these studies, farmer's types differ with respect to their characteristics which cannot only explain their decision-making process.

In line with the theory of decision-making (Mintzberg *et al.*, 1976), a decision towards a given technology depends on the expected utility provided by the technology. If conventional farmers did not perceive strong benefits that could drive them into organic farming, they obviously may not switch to. For instance, as argued by van Winsen *et al.* (2016), a decision to adopt a given risk management strategy depends on farmers' risks perception and their attitudes. According to Tashi and Wangchuk (2016), conversion to organic farming is limited as conventional farmers were not aware of the benefits of organic farming and then perceive most constraints. Adoption of organic farming could also be constrained by marketing barriers (Flaten *et al.,* 2010) and technical knowledge (Seufert *et al.,* 2017), which can be measured at farmers' level through their specific perceptions. Organic farming might attract conventional farmers if this meets their expectation. As well, former organic farmers ceased organic farming since their expectations are not met. Therefore, farmers' perception of the benefits associated with organic farming, could constrain non-adopters in their decision-making process. Related to the behavioral process and extended to a limited part of the theory of reason action (Ajzen, 1985, 1991), attitudes towards innovation play an important role in decision-making process. In this line, further studies argued that attitudes towards a given technology can better shape adoption of organic farming (Läpple, 2013; Lapple & Kelley, 2015; Läpple & Rensburg, 2011). These studies rely on four groups of attitudes namely profit orientation (i.e. intrinsic economic motivation), environmental attitudes (i.e. awareness of environmental related concerns), information seeking attitudes (i.e positive behavior towards technology knowledge) and risk attitudes (risk averse given the constraints associated to the technology) have often been addressed in literature. In this frame, Läpple (2013) focuses on the differences between adopters and non-adopters of organic farming accounting for not only differences in terms of socio-economic and demographic characteristics but also based on their attitudes towards the innovation. Therefore, farmers' attitudes towards organic farming can play a significant role in behavioral decision. By adjusting Burton (2004) framework of behavioral process, the establishment of differences among groups can be analysed in three ways: (i) seeking to understand the characteristics of the three farmers types; (ii) focusing on psychological constructs such as attitudes and perceptions but also commonly gather additional relevant data on farm structure, economic situation; and (iii) employing largely quantitative methodologies such as psychometric scales to investigate psychological constructs such as attitudes and perception. By using Ajzen and Fishbein (1975) approach, attitudes and perceptions are assessed with multiple items and the respondents are asked to agree or disagree with each statement.

Overall, this study focuses on farmers' characteristics and on three levels of perception: environmental, socio-economic and risk perceptions towards organic farming. We also account for differences between current adopters, former adopters and conventional farmers in terms of their environmental, profit oriented attitudes, risk attitudes and information seeking attitudes towards organic farming. The analytical framework used in summarised in figure 1.

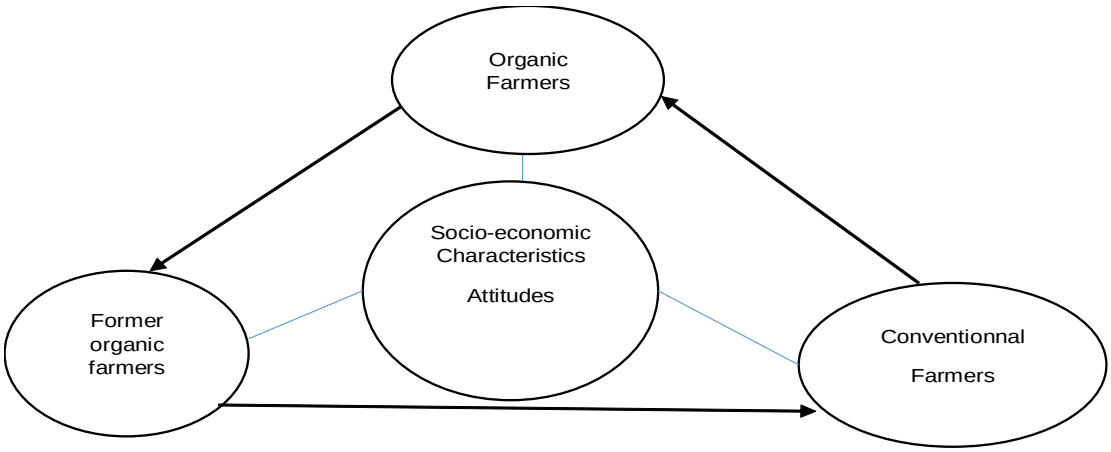

Figure 1: Analytical framework of the study.

Cadre analytique de l'étude.

MATERIAL AND METHODS

STUDY ZONE AND SELECTION PROCEDURE

The study was conducted in the districts of Péhunco and Kandi in Northern Benin. In order to arrive to the selection of two districts for the survey, we have adopted the following approach. Firstly, a literature review was performed to identify the main cotton growing areas in Benin with a variety of production systems, including conventional and organic production systems. Four districts: Ouassa Péhunco, Banikoara, Kandi, in Northern Benin, and one, Glazoué in Center Benin, were then retained. The scoping study consisted to collect some cotton statistics from previous cotton campaigns and to discuss with key respondents (extension agents and farmers groups) at district's level. One village has been secondly selected per district for in depth discussions through focus groups with key farmers groups from both cotton production systems. These discussions provided understanding of the various production systems currently practiced in different locations and their technical roots as well as constraints and attitudes towards organic farming. Third, by setting the double objective of having two cotton-growing areas that are representative of the diversity of cotton production systems, but opposed by the relative density of each system, we were able to select the districts of Péhunco and Kandi (Figure 2). These two districts also benefit from advisory services from different institutions supporting organic cotton-growing. Seven (07) villages have been selected per district making a total of 14 villages. A total of 77 and 72 conventional farmers were selected respectively in the districts of Péhunco and Kandi and 20 and 71 organic farmers respectively in the same districts. Given the small number of dis-adopters of organic farmers per village, all available dis-adopters were selected as informants in each village, making a total of 30 and 31 dis-adopters in Péhunco and Kandi respectively. In total 301 cotton farmers, of which 149 conventional farmers, 91 organic farmers and 61 former organic cotton farmers were surveyed in the two districts.

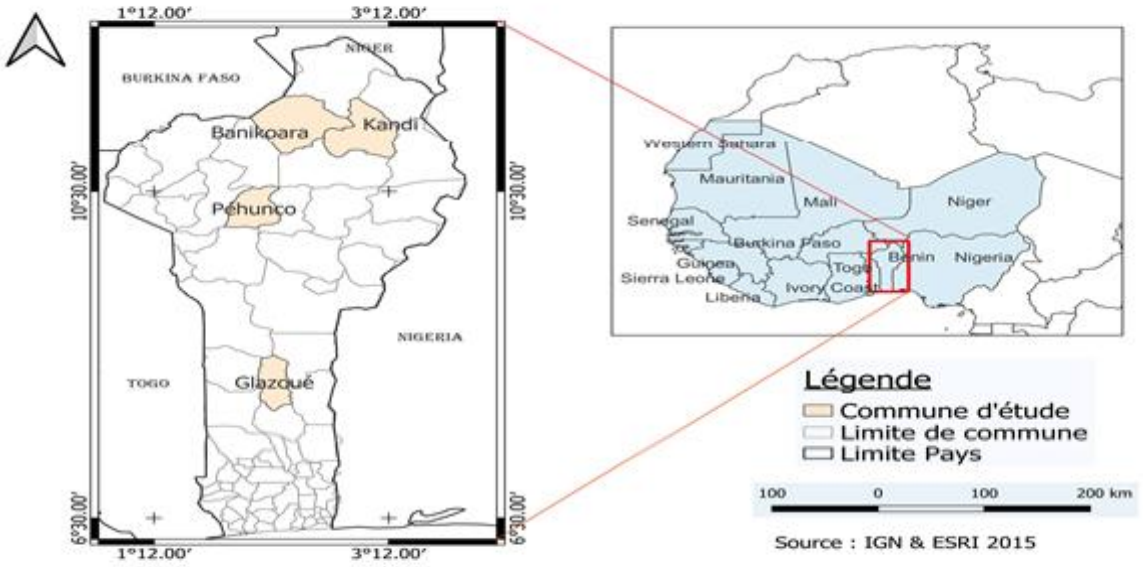

Figure 2: Study area.

Carte de la zone d'étude.

DATA COLLECTION AND VARIABLE CONSTRUCTS

During our scoping studies, different questions related to farmers' characteristics, attitudes and perceptions regarding organic cotton farming have been discussed through focus groups, which lead to the improvement of the household questionnaire. Afterwards, a deep interview step gathers individual information related to farmers' attitudes and perception towards organic farming.

Four attitudinal items inspired from Läpple (2013) were considered but adjusted to Benin farming conditions. Farmers' socio-economic, environmental and risk perceptions have been considered in the study (Table 1). Both attitudinal and perception items were measured based on fully anchored 5-point bi-polar Likert-type scales with a range from 1 to 5 in terms of their level of agreement or disagreement with the statements 1 = strongly disagree, 3 = neither agree nor disagree, and 5 = strongly agree.

Table 1: summarizes the variables of interest and their related modalities.

Résumé des variables intéressants et leurs modalités.

Variables	Modalities
Sex	0 = Female; 1 = Male
Age	Age in years
Education	Number of years of formal education
Literacy	1= If a farmer knows to speak and write in his mother language and 0 otherwise
Advisory Service	Frequency of consultation with a farm advisor
Off-farm income	1=If the farm has an off-farm activity and =0 otherwise,
Farm size	Total number of hectares of land
Household laborers	Number of household laborers
Livestock units	Total unit of livestocks
Environmental Attitude	Score of environmental attitudes between 1 and 5, explaining the level of environmental concerns
Profit Attitudes	Score of profit orientation attitudes between 1 and 5, explaining the level of profit motivation
Risk attitude	Score of risk attitudes between 1 and 5 and explaining the level of risk averse.
Information attitudes	Score between 1 and 5 and explaining the interest in information gathering.
Environmental perception	Score between 1 and 5, explaining the level of knowledge of the effects of agrochemicals use in farming
Socio-economic perception	Score between 1 and 5, explaining the awareness of the socio-economic benefits associated with adoption of organic farming
Risk perception	Score between 1 and 5, explaining the level of believe in terms of production constraints as a challenge for organic farming.

DATA ANALYSIS

We used Principal Component Analysis to underlie the constructs of farmers' attitudes and perceptions towards organic farming in order to reduce the dimensionality of the variables. We used predefined variables and examined them in accordance with the relevance of factors and related items in order to have the most realistic sets of factors. Items that load below 0.35 based on the sample size of 250 and with commonalities below 0.5 were considered for deletion from the models (Hair *et al.*, 2010). Since the items variables are not directly observable and can be correlated between factors, we used an oblique rotation allowing for factors correlation. We also employed Kaiser's overall measure of sample adequacy (KMO), which requires that the KMO of each statement and the overall KMO should be at least 0.5. All factors were checked and solutions that failed to this rule were considered for deletion. Factors were also examined to check if they met the criteria of conceptual validity, consistency and reliability as per Hair *et al.* (2010). The Kaiser measure also suggested that all factors must have eigenvalues >1 to ensure the factor contribution to the variances explanation of the variables. These steps lead to the differentiation of four factors of attitudes and three factors of farmers' perception labeled from literature review. An additional statistical test Cronbach's alpha was performed to ensure of the internal consistency of the factor construct and reliability of the scale with a threshold value of 0.7 (De Vaus, 2002).

Furthermore, a series of one-way analyses of variances for quantitative variables and chi-square tests for discrete variables were performed to examine the differences in characteristics and the psychological constructs across the three groups. Moreover, differences in observed factors between any of the two groups are examined with chi-square tests for discrete variables and t-test for quantitative variables.

RESULTS AND DISCUSSION

SOCIO-ECONOMIC CHARACTERISTICS OF THE RESPONDENTS

Table 2 summarises the descriptive statistics of the characteristics of current organic, former organic, and conventional cotton farmers. Means values and statistical tests are reported to point out the difference between the three groups. For simplicity purpose, we report the results of p-value associated with the correlation tests of the characteristics and psychosocial factors of the respondents between paired groups in bracket in the text.

Table 2 show that all groups differ with respect to household characteristics in line with the findings from Läpple (2013). The majority of organic and former organic farmers is female. Indeed as indicated by Glin *et al.* (2012) and Sodjinou *et al.* (2015), women are more attracted by organic farming as they have limited access to production resources including land and cash credit. Considering also that organic inputs can be produced at the household level, women can plant cash crops more easily than their conventional counterparts and can thus earn extra income (van Elzakker & Eyhorn, 2010). In terms of educational attainment, there is no difference between current organic farmers, former organic farmers ($p = 0.23$) but conventional farmers are more educated than organic farmers, which reveals that educational achievement seems to be a key factor maintaining farmers in conventional farming (Table 2). This contradicts the common understanding that education plays a key role in adoption of organic farming (Djokoto *et al.*, 2016; Mzoughi, 2011). In Benin, educated farmers are more able to manage chemical inputs and belong to conventional groups, which help them to obtain inputs on credit. Almost the same tendency is observed with regard to the literacy in local language where conventional farmers are found to be more literate than the two other groups but there is only significant difference with former organic farmers ($p = 0.04$). Looking at the farmers' contact with advisory service, organic farmers are more likely to be in contact with advisory service compared respectively to former organic ($p = 0.00$) and conventional farmers ($p = 0.00$). Läpple and Rensburg (2011) and Moumouni *et al.* (2013) have pointed out the importance of extension service in the uptake decision to grow organic cotton or not. Although organic farming is labor consuming (Sodjinou *et al.,* 2015; Tovignan & Nuppenau, 2004), organic farmers are more likely to adopt income diversification. However, no significant difference could be detected among groups. Due to small plot size managed by organic farmers, they are more involved in off-farm income as a source of side income generation. In contrast to some studies (Beuchelt & Zeller, 2011; Sodjinou *et al.*, 2015), organic farmers have less household labors compared to former organic ($p = 0.04$) and conventional cotton farmers ($p = 0.00$). It is also worth noting that conventional farmers are the most holder of household labors and are almost similar ($p = 0.78$) to former organic farmers. This different trend is due to the amount of household labor that conventional farmers may need for their large firm size. This exhibit almost the same tendency with farm size where conventional ($p = 0.01$) and former organic ($p = 0.01$) farmers have significantly larger farms than current adopters of organic cotton. No significance difference ($p = 0.51$) could be detected between organic farmers and conventional farmers with respect to farm size. From this, we can conclude that former organic farmers switched to conventional farming methods to take more advantages of their larger firm size (Table 2). Organic farmers due to the difficulties they faced in inputs managements and access, they only grow on small plot size. As argued in empirical literature, organic farmers could have more livestock densities in order to have organic fertilizer for their plots. However, former organic farmers own more livestock units than the two other types in our context.

Table 2: Descriptive statistics of the respondents' socio-economic characteristics.

Statistiques descriptives des caractéristiques socioéconomiques des enquêtés.

Characteristics (n=301)	Overall mean	Overall SD	currently organic farmers	previously organic farmers	Currently conventional farmers	p-Value[a]
Sex	.82	.37	.72	.63	.96	0.00***
Age	42.98	12.75	43.62	44.83	41.82	0.25
Educ	1.91	3.3	1.14	1.72	2.46	0.01**
Literacy	.21	.41	.19	.13	.26	0.10*
Advisory Service	1.47	1.17	2.10	.93	1.30	0.00***
Off-farm income	.56	.49	.61	.50	.55	0.41
Farm size	13.42	12.75	10.31	15.79	14.35	0.00***
Household laborers	8.02	5.51	6.67	8.426	8.68	0.00***
Livestock units	5.66	10.21	5.14	7.22	5.33	0.00***

aOne-way ANOVA p-values comparing means for metric variables, chi-square or Fisher exact test for discrete variables.

ATTITUDINAL CONSTRUCTS

As we have several attitudinal items, comparing farmers' attitudinal items from a large perspective will be misleading. A Principal Component Analysis was performed to transform the 19 attitudinal items into a small number of factors. Table 3 presents the results of Principal Component Analysis with suitable factor loadings. Four items associated with low factor loadings or low communality were removed from the final PCA model. Overall, the Measure of Sampling Adequacy (MSA) was 0.77 for the final solution confirming the suitability of the remaining 15 items. Four factors with eigenvalues greater than unity were identified and confirmed the predefined attitudinal variables from literature. The four principal components explained 68% of the variance of the statements. In addition, all attitudinal groups exhibit a Cronbach's á above 0.7, confirming the suitability of the associated items in the attitudinal constructs (Table 3).

Table 3: Results of PCA for attitudinal constructs.

Résultats de PCA pour les attitudes constructives.

Attitudinal items	Mean item score	Factor 1	Factor 2	Factor 3	Factor 4	Communality
Profit orientation						
It is important to sell the product at better price	4.57		0.45			0.60
It is important to make the largest possible profit from farming.	4.50		0.52			0.72
It is important to try alternative production factors that can lead to more economic returns	4.19		0.54			0.74
Trying new ways of farming is important to obtaining the highest possible from agriculture	4.18		0.38			0.59

Environmental attitudes				
Organic farming is better for the environment than conventional farming	3.05	0.54		0.71
The use of chemical fertilizers is not harmful as long as it leads to an increase in yield (-)	3.42	0.49		0.77
Maximising profit is more important than caring about the environment (-)	3.43	0.36		0.64
The use of chemicals inputs is good in farming as long as it leads to increase in profit (-)	3.09	0.55		0.77
Risk attitudes				
Before applying new farming practices, it is important that they have to be used and proven by others.	3.12		0.56	0.72
It is important to be cautious about adopting new production methods.	3.55		0.59	0.80
It is important to avoid risky options in farm decision-making	3.60		0.51	0.61
Information gathering attitude				
It is important to discuss farming options with other farmers or friends.	4.34	0.45		0.57
It is important to visit other farms in order to look at their farming methods and learn from them.	4.24	0.46		0.57
It is important to be in contact with extension and be informed as well on innovative agricultural technologies	4.22	0.50		0.70
Having good contact with his fellows is important to discuss farm related issues and find appropriate solution together.	4.22	0.51		0.68
Summary				
Eigenvalue		2.98	2.53	2.52	2.14
% Total (variance)		19.92	16.89	16.86	14.33
Cronbach's alpha		0.84	0.79	0.79	0.76

Information seeking attitudes

This group of items contains 4 items associated with the farmers' information seeking behavior. All items grouped in this factor solution exhibit together a Cronbach's á of 0.84. In addition, this factor solution explains 19.92% of the share total variance. A farmer who scores high value of informational attitudes looks for more information to improving his farm performance.

Environmental attitudes

The second factor group contains four items and explains 16.89% of the total variance. These items are related to farmers knowledge and understanding of the use of agrochemicals in farming. The items performed well with a Cronbach's á of 0.79. An increase in the score from 1 to 5 implies that farmers are more environmentally aware.

Profit-oriented attitudes

This construct contains four items, which together exhibit a Cronbach's á of 0.79. Farmers were ranked according to their profit attitudes. This factor solution explains 16.86% of the share of the total variance. Overall, a farmer is profit-oriented if he scores a high value of profit scales. More specifically, the farmers who tend to combine alternative production methods, looks for high profit in production decision-making, and prefers to receiving high prices for the product, are found to be more profit oriented.

Risk attitudes

This attitudinal construct is measured with three statements related to risk-adverse behavior in farming. Cronbach's á of this attitudinal construct is 0.76. This factor solution explains 14.33% of the share of the total variance. A farmer who scores high value is considered as riskier averse.

Comparison of farmers' attitudes

The average mean values of the different attitudinal constructs and the ANOVA tests used to assess the relative difference across groups are summarised in table 5. T-test results of differences between any two groups are presented in the text. The three groups differ significantly with respect to their attitudes towards organic farming. Organic farmers are significantly more profit oriented than former organic ($p = 0.00$) and conventional farmers ($p = 0.01$) corroborating with findings from Flaten *et al.* (2006) and Koesling *et al.* (2008). Indeed, organic farmers tend to be business minded and more attracted by premium prices than others. This is in contrast with Läpple (2013) who found that conventional farmers are more profit oriented. Price premium incentives as well as favorable marketing factors are also considered as the drivers of farmers' conversion to organic crops (Pinthukas, 2015).

In terms of farmers' environmental attitudes and in line with Läpple (2013), organic farmers are more environmental concerned than former organic ($p = 0.00$) and conventional farmers ($p = 0.00$). Koesling *et al.* (2008) pointed out the importance of caring about the environmental in decision-making regarding adoption of organic farming. Even though conventional farmers are significantly less environmental concerned than former organic farmers, a withdrawal from organic farming has been observed. This implies that a high environmental awareness even though leads to conversion in most empirical studies, does not always match with long-term adoption. We could then conclude than other factors may play a key role in farmers' decision to stay organic production or not.

A possible relationship can be established with regards to their willingness to take risks where there is emphasis of significance difference between the three groups. Former organic farmers are less risk averse compared to organic farmers ($p = 0.00$) and conventional farmers ($p = 0.03$). However, current organic farmers are more risk averse than conventional farmers which could imply that the risk nature of the farmers is not a key determinant for their conversion to organic farming. Other factors including social pressures could play a key role in the adoption of organic farming.

Another key attitudinal variable that plays a certain role is farmers' behavior towards information seeking. Farmers are less educated in rural areas in Benin and then their attitudes towards information gathering could be to some extent limited. However, educated farmers are more likely to be engaged in conventional farming in order to play some leadership roles and manage other in getting access to chemical inputs. So, even though organic farming is seen as an attractive solution for the problems raised by conventional agriculture, organic farmers express about the same information seeking attitudes than conventional farmers ($p = 0.99$). It is also worth noting that former organic farmers express significantly lower information seeking attitudes than organic farmers ($p = 0.01$) and conventional farmers ($p = 0.01$). This is in contrast with Genius *et al.* (2006) and Läpple (2013) who found substantial differences between organic and other types of farmers.

PERCEPTION CONSTRUCTS

Results from the PCA on 11 perception items with consistency checks reveal 09 items for the final solution (table 4). Three factors with eigenvalues greater than unity were identified. The Keyser Measure of Sampling Adequacy (MSA) was 0.85 exceeding largely the threshold of 0.50, recommended by Hair et al. (2010) and falls down on the top meritorious threshold of above 80. This indicates that the reduced set of variables meet the fundamental requirements for component Analysis. Furthermore, the three factors solution explained 74.32% of the total variance, thus implying a good model performance. Factor solutions are related to farmers' socio-economic perceptions of the benefits of adopting organic farming, overall risks specific perception including production, marketing and climate change risks and agro-environmental risks perception including farmers' knowledge on effects of agrochemicals use on the environment.

Socio-economic perception

This construct includes 5 items related to farmers' perception of associated benefits with organic farming. Emphasis has been granted to the place women plays in decision marking regarding organic farming and their empowerment within households. It is also argued that organic farming can help to reduce indebtedness and can be a source of safe income. This factor solution explains 35.18% of the share total factor variance and the joint items exhibit a Cronbach's á of 0.89. A positive socio-economic effect is obtained for a given farmer if he scores high value in the average items scores (Table 4).

Production risk perception

This group comprises three items from multidimensional perspective. Farmers' perception towards accessibility of production inputs, difficulties previously experienced in marketing chains and overall convenience with the ongoing climate change context. The factor solution explains 22.96% of the share total factor variance and Cronbach's á of the joint items is about 0.82. A high value implies a high perception of production constraints (Table 4).

Agro-environmental risks perception

Only two items are grouped in this factor solution. These items are related to the perception of the adverse effects of agrochemicals on human and animal health and on the environment. As this variable group only includes two items, the joint items exhibit a low Cronbach's á of about 0.55, which is still not far from the minimum threshold of 0.60. The factor solution explains 16.18% of the share total factor variance (Table 4). A farmer perceives a more pronounced negative effect of agro-chemicals use if he scores highly in the average items scores.

Table 4: Results from PCA for perception items constructs.

Résultats de PCA pour les perceptions constructives.

Perception items	Overall mean	Factor 1	Factor 2	Factor 3	Communality
Socio-economic perception					
Organic production strengthens equity by giving women a place in farming compared to conventional farming	2.79	0.41			0.75
Women are free in organic farming decision-making compared to conventional farming.	3.06	0.41			0.72
Organic production promotes the empowerment of women in the household (personal income, participation in health care and schooling of children, etc.)	3.18	0.48			0.82
Organic farming enables women to have a stable and safer income than agriculture conventional	2.94	0.48			0.77
Organic production strengthens the social status of organic producers by giving them financial power which improves their relationship with money loaners	2.79	0.44			0.70
Agro-environmental perception					
The use of chemical pesticides has negative effects on human and animal health				0.69	0.71
The use of chemical fertilizers have negative effects on the environment				0.55	0.67
Production risk perception					
Organic farming is more risky as it less fit with ongoing climate change	3.13		0.60		0.80
Organic farming is risky with regards to production inputs gathering	3.11		0.61		0.79
Organic cotton marketing chain is risky due some marketing difficulties	2.72		0.44		0.75
Summary					
Eigenvalues		3.51	2.29	1.61	
% Total (variance)		35.18	22.96	16.18	
Cronbach's alpha		0.89	0.55	0.82	

Comparison of farmers' perception

The average mean value of the different perception constructs and the results of ANOVA tests accounting for the differences across groups were summarised in table 5. The p-value associated with results of t-test are presented in the text. The results suggest existing significance difference among the three groups regarding the farmers' perception towards the effects associated with the use of agrochemicals in farming. Specifically, organic farmers are found to be more environmental concerned regarding the effects of agrochemicals use in farming than former organic farmers (P = 0.93) and conventional farmers (p = 0.00); while conventional farmers exhibit also significant lesser environmental perception score (P = 0.00) than former organic farmers. Overall, all farmer types expressed to some extent an agro-environmental perception previously mentioned by Lithourgidis *et al.* (2016) who indicated that the majority of the farmers considered that

chemical fertilizers are harmful substances particularly to surface and groundwater, and pesticides are highly harmful to human health. However, in our case organic farmers are the most environmental concerned by the adverse effects of agrochemicals corroborating with Power *et al.* (2013) who found that organic farmers were better informed about environmental issues and carried out more environmentally orientated behaviours.

It is also well argued that the adoption of organic farming could result into some potential socio-economic benefits that could lead to social cohesion co-ordination and gender empowerment within households (Jouzi *et al.,* 2017; Sahm *et al.*, 2013; Seufert, 2012). Confirming previous findings, organic farmers perceive higher positive socio-economic advantages toward organic farming regarding income generation, empowerment of women with household and free of indebtedness than former organic (P = 0.00) and conventional farmers (P= 0.00). Jouzi *et al.* (2017) emphasized the role of organic farming in enhancing social capital and increasing employment opportunities for rural households. Evidence from literature (Altenbuchner *et al.,* 2017) also showed that farmer's profit from organic agriculture reduces their dependency on money lenders which is in line with the organic farmers' perception regarding their dependency towards indebtedness. Even though former organic farmers' perception level was higher than conventional farmers (p = 0.00), they both express much less benefits. This could also explain their reluctant attitudes towards organic farming.

In addition, significance difference between the three groups has been underlined in regards to their constraints and problems related to organic farming. Organic and former organic farmers perceive less productions constraints associated with organic farming, with no significance difference between the two groups (p = 0.18). It is therefore important to bring emphasis into the motives of withdrawal as both express similar perceptions. Conventional farmers still perceive most constraints related to organic farming than current organic (p = 0.00) and former organic farmers (p = 0.00) in line with the studies by Panneerselvam *et al.* (2012) who identified production and marketing barriers as main constraints associated with the adoption of organic farming. Tashi and Wangchuk (2016) also indicated that conventional farmers are not aware of benefits associated with organic farming and then perceive most constraints. Consequently, increasing technical knowledge availability could better improve farmers' perception towards problems related to organic farming.

Table 5: Differences in means values of attitudes and perception of the three groups.

Différences des moyennes entre les trois groups de perception et d'attitude.

Psychosocial factors	Overall mean	Overall SD	Currently organic farmers	previously organic farmers	Currently conventional farmers	P-value
Attitudinal variables						
Profit orientation	4.27	0.61	4.48	3.88	4.29	0.00
Environmental attitudes	3.29	1.07	4.41	3.50	2.53	0.00
Risk attitude	3.35	0.91	3.53	3.04	3.36	0.04
Information gathering attitude	4.20	0.61	4.25	3.97	4.25	0.05
Perception variables						
Socio-economic Perception	2.95	0.98	3.88	2.96	2.38	0.00
Agro-environmental perception	3.45	1.08	3.89	3.87	3.01	0.00
Risk perception	2.99	1.05	2.28	2.49	3.6	0.00

CONCLUSION

Conventional farming is nowadays seen as hindering sustainability due to its reliance on agrochemicals and related harmful effects. Despites an overall interest towards organic sector in the world, the rate of adoption is still very low. In addition, dis-adoption is still being observed leading to a small proportion of adopters of organic farming in developing countries. Our results suggest that farmers' characteristics, attitudes and perception towards organic farming could constrain the uptake of organic farming. In addition, the results show that the three groups differ with respects to their characteristics and psychological constructs as well.

In terms of farmers and farm characteristics, organic farmers are found to be more in contact with advisory service and are more likely to be woman. It is also surprising to note that organic farmers have less labors availability perhaps due to their small firm size. In contrast, former organic farmers tend to have larger firm size, which suggests that firm size is a key determinant of abandonment of organic farming.

The results also confirm that the three groups differ with regard to their attitudes. Organic farmers are found to be more profit oriented whereas former organic farmers are the least profit-oriented group. Organic farmers stand out as being the most environmental concerned group, while conventional farmers are the least environmental concerned group confirming that environmental safeguard motivation could guide farmers towards long time organic farming adoption. In regards, former organic farmers tend to be the least risk averse group, whereas organic farmers are the most risk averse group. Finally, conventional farmers share similarity with organic farmers in terms of information seeking attitudes. The findings also show that the perceived benefits and effects associated to organic farming differ between the three groups of farmers. Organic farmers perceive higher environmental effects related to the use of agrochemicals in farming and socio-economic positive effects of the adoption of organic farming than the two other types, especially than conventional farmers. In contrast, conventional farmers perceive high production constraints associated with organic farming whereas organic farmers are the least perceiving of those risks.

Our findings have several policies implications for helping decrease the rate of withdrawal of organic farming and in the meanwhile increasing its adoption. Organic farmers are motivated by economic reasons, which could not sustain adoption, as the premium price is its key determinant. Environmental awareness and perception of the negative effects of agrochemicals use on the environment seem to be a strong predictor of long-term adoption of organic farming. It is then important to increase farmers' awareness towards environmental protection. However, former organic farmers even though are more environmental concerned than conventional farmers; they exit organic farming. This suggests that environmental awareness is not sufficient to favor long-term adoption alone. Farmers who ceased organic farming face some constraints and risks and less socio-economic benefits, which are revealed through their related perception. Supporting farmers with relevant knowledge can stimulate favorable attitudes towards organic farming. Seemingly, providing technical information and relevant knowledge about the production factors, the benefits associated with organic farming, could increase the viability of organic farming initiatives in sub-Saharan Africa.

REFERENCE

Ajzen, I. (1985). From Intentions to Actions: A Theory of Planned Behavior. In Action Control (pp. 11–39). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-69746-3_2

Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Ajzen, I., & Fishbein, M. (1975). Belief attitude, intention, and behavior: An introduction to theory and research. Addison-Wesley Pub. Co.

Alidou, G. (2014). Networking, social capital and gender roles in the cotton system in Benin. PhD thesis, Wageningen University. https://library.wur.nl/WebQuery/wurpubs/456571

Altenbuchner, C., Larcher, M., & Vogel, S. (2016). The impact of organic cotton cultivation on the livelihood of smallholder farmers in Meatu district, Tanzania. Renewable Agriculture and Food Systems, 31(1), 22–36.

https://doi.org/10.1017/S1742170514000416

Altenbuchner, C., Vogel, S., & Larcher, M. (2017). Social, economic and environmental impacts of organic cotton production on the livelihood of smallholder farmers in Odisha, India. Renewable Agriculture and Food Systems, 1–13. https://doi.org/10.1017/S174217051700014X

Beuchelt, T. D., & Zeller, M. (2011). Profits and poverty: Certification's troubled link for Nicaragua's organic and fairtrade coffee producers. Ecological Economics, 70, 1316–1324. https://doi.org/10.1016/j.ecolecon.2011.01.005

Burton, R. J. F. (2004). Reconceptualising the «behavioural approach» in agricultural studies: A socio-psychological perspective. Journal of Rural Studies, 20(3), 359–371. https://doi.org/10.1016/j.jrurstud.2003.12.001

De Vaus, D. (2002). Surveys in Social Research - David de Vaus - 9781865086118 - Allen & Unwin - Australia.

Djokoto, J. G., Owusu, V., & Awunyo-Vitor, D. (2016). Adoption of organic agriculture: Evidence from cocoa farming in Ghana. Cogent Food & Agriculture, 2(1). https://doi.org/10.1080/23311932.2016.1242181

Eyhorn, F., Ramakrishnan, M., & Maeder, P. (2007). The viability of cotton-based organic farming systems in India. International Journal of Agricultural Sustainability, 5(1), 25–38. https://doi.org/10.1080/14735903.2007.9684811

Fayet, L., & Vermeulen, W. J. V. (2014). Supporting Smallholders to Access Sustainable Supply Chains: Lessons from the Indian Cotton Supply Chain. Sustainable Development, 22(5), 289–310. https://doi.org/10.1002/sd.1540

Flaten, O., Lien, G., Ebbesvik, M., Koesling, M., & Valle, P. S. (2006). Do the new organic producers differ from the 'old guard'? Empirical results from Norwegian dairy farming. Renewable Agriculture and Food Systems, 21(03), 174–182. https://doi.org/10.1079/RAF2005140

Flaten, O., Lien, G., Koesling, M., & Løes, A. (2010). Norwegian farmers ceasing certi fi ed organic production/ : Characteristics and reasons. Journal of Environmental Management, 91(12), 2717–2726. https://doi.org/10.1016/j.jenvman.2010.07.026

Genius, Margarita, Pantzios, Christos, J., & Tzouvelekas. (2006). Information Acquisition and Adoption of Organic Farming Practices. Vangelis Journal of Agricultural and Resource Economics, 31(1).

Glin, L. C., Mol, A. P. J., Oosterveer, P., & Vodouhê, S. D. (2012). Governing the transnational organic cotton network from Benin. Global Networks, 12(3), 333–354. https://doi.org/10.1111/j.1471-0374.2011.00340.x

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). Multivariate Data Analysis: Overview of Multivariate Methods. Edition, S, 816.

Jouzi, Z., Azadi, H., Taheri, F., Zarafshani, K., Gebrehiwot, K., Van Passel, S., & Lebailly, P. (2017). Organic Farming and Small-Scale Farmers: Main Opportunities and Challenges. Ecological Economics, 132, 144–154. https://doi.org/10.1016/J.ECOLECON.2016.10.016

Koesling, M., Flaten, O., & Lien, G. (2008). Factors influencing the conversion to organic farming in Norway. International Journal of Agricultural Resources, Governance and Ecology, 7(1–2), 78–95. https://doi.org/10.1504/ijarge.2008.016981

Läpple, D. (2010). Adoption and Abandonment of Organic Farming: An Empirical Investigation of the Irish Drystock Sector. Journal of Agricultural Economics, 61(3), 697–714. https://doi.org/10.1111/j.1477-9552.2010.00260.x

Läpple, D. (2013). Comparing attitudes and characteristics of organic, former organic and conventional farmers: Evidence from Ireland. Renewable Agriculture and Food Systems, 28(4), 329–337. https://doi.org/10.1017/S1742170512000294

Lapple, D., & Kelley, H. (2015). Spatial dependence in the adoption of organic drystock farming in Ireland. European Review of Agricultural Economics, 42(2), 315–337. https://doi.org/10.1093/erae/jbu024

Läpple, D., & Rensburg, T. Van. (2011). Adoption of organic farming: Are there differences between early and late adoption? Ecological Economics, 70(7), 1406–1414. https://doi.org/10.1016/j.ecolecon.2011.03.002

Lithourgidis, S. C., Stamatelatou, K., & Damalas, C. A. (2016). Farmers' attitudes towards common farming practices in northern Greece: implications for environmental pollution. Nutrient Cycling in Agroecosystems, 105, 103–116. https://doi.org/10.1007/s10705-016-9778-x

Madelrieux, S., & Alavoine-Mornas, F. (2013). Withdrawal from organic farming in France.

Agronomy for Sustainable Development, 33(3), 457–468. https://doi.org/10.1007/S13593-012-0123-8

Makita, R. (2012). Fair Trade and organic initiatives confronted with Bt cotton in Andhra Pradesh, India: A paradox. Geoforum, 43(6), 1232–1241. https://doi.org/10.1016/j.geoforum.2012.03.009

Mintzberg, H., Raisinghani, D., & Theoret, A. (1976). The Structure of «Unstructured» Decision Processes. Administrative Science Quarterly, 21(2), 246. https://doi.org/10.2307/2392045

Moumouni, I., Baco, M. N., Tovignan, S., Gbèdo, F., Nouatin, G. S., Vodouhê, S. D., & Liebe, U. (2013). What happens between technico-institutional support and adoption of organic farming? A case study from Benin. Organic Agriculture, 3(1), 1–8. https://doi.org/10.1007/s13165-013-0039-x

Mzoughi, N. (2011). Farmers adoption of integrated crop protection and organic farming: Do moral and social concerns matter? Ecological Economics, 70(8), 1536–1545. https://doi.org/10.1016/j.ecolecon.2011.03.016

Organisation Béninoise pour la Promotion de L'Agriculture. (2002). Le Coton au Bénin/ : rapport de consultation sur le coton conventionnel et le coton biologique au Bénin. 36p.

Panneerselvam, P., Halberg, N., Vaarst, M., & Hermansen, J. E. (2012). Indian farmers' experience with and perceptions of organic farming. Renewable Agriculture and Food Systems, 27(02), 157–169. https://doi.org/10.1017/S1742170511000238

Pazou, Y. A., Lalèyè, P., Boko, M., van Gestel, C. A. M., Ahissou, H., Akpona, S., van Hattum, B., Swart, K., & van Straalen, N. M. (2006). Contamination of fish by organochlorine pesticide residues in the Ouémé River catchment in the Republic of Bénin. Environment International, 32(5), 594–599. https://doi.org/10.1016/j.envint.2006.01.003

Pinthukas, N. (2015). Farmers' Perception and Adaptation in Organic Vegetable Production for Sustainable Livelihood in Chiang Mai Province. Agriculture and Agricultural Science Procedia, 5, 46–51. https://doi.org/10.1016/j.aaspro.2015.08.007

Power, E. F., Kelly, D. L., & Stout, J. C. (2013). Impacts of organic and conventional dairy farmer attitude, behaviour and knowledge on farm biodiversity in Ireland. Journal for Nature Conservation, 21(5), 272–278. https://doi.org/10.1016/j.jnc.2013.02.002

Reganold, J., & Wachter, J. (2016). Organic agriculture in the twenty-first century. Nature Plants.

Sahm, H., Sanders, J., Nieberg, H., Behrens, G., Kuhnert, H., Strohm, R., & Hamm, U. (2013). Reversion from organic to conventional agriculture: A review. Renewable Agriculture and Food Systems, 28(03), 263–275. https://doi.org/10.1017/S1742170512000117

Seufert, V. (2012). Organic Agriculture as an Opportunity for Sustainable Agricultural Development. 13, 1–26.

Seufert, V., Ramankutty, N., & Mayerhofer, T. (2017). What is this thing called organic? – How organic farming is codified in regulations. Food Policy, 68, 10–20. https://doi.org/10.1016/j.foodpol.2016.12.009

Sodjinou, E., Glin, L. C., Nicolay, G., Tovignan, S., & Hinvi, J. (2015). Socioeconomic determinants of organic cotton adoption in Benin, West Africa. Agricultural and Food Economics, 3(1), 12. https://doi.org/10.1186/s40100-015-0030-9

Tashi, S., & Wangchuk, K. (2016). Prospects of Organic Farming in Bhutan: A SWOT Analysis. Advances in Agriculture, 2016(July), 1–9. https://doi.org/10.1155/2016/1717352

Tovignan, D. S., & Nuppenau, E.-A. (2004). Adoption of organic cotton in Benin: does gender play a role? Tropentag 2004: Conference on Rural Poverty Reduction through Research for Development and Transformation, October, 5–7.

van Elzakker, B., & Eyhorn, F. (2010). The organic business guide (complete). 38–95.

van Winsen, F., de Mey, Y., Lauwers, L., Van Passel, S., Vancauteren, M., & Wauters, E. (2016). Determinants of risk behaviour: effects of perceived risks and risk attitude on farmer's adoption of risk management strategies. Journal of Risk Research, 19(1), 56–78. https://doi.org/10.1080/13669877.2014.940597