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Determinants of integration into global value chains for small and medium-sized enterprises (SMEs) in the beekeeping sector

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Abstract. Participation in global value chains is one of the keys to income growth. Despite the implementation of various agricultural development projects, Sub-Saharan African countries are still lagging behind in terms of integration into global value chains. The general aim of this article is to analyze the factors determining the integration of beekeeping SMEs into global value chains. Data were collected on a sample of 210 beekeeping SMEs identified by the snowball sampling technique and matched. The results of the logistic regression model of the determinants show that the model is globally significant at the 1% threshold (Prob > F = 0.00001). In addition, the variables, use of the digital platform for information, exchange and communication ; simultaneous use of family and casual labor ; membership of a financial solidarity group ; Dionysus culture and level of education determine integration into global value chains at the thresholds defined in this research.

Keywords. Determinants ; Integration ; Global value chains ; SMEs ; beekeeping sector

JEL Classifications. D51, G15, M21

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1. Introduction

Beekeeping has undergone considerable evolution (Blanc and Pouch, 2019) to meet the growing demand for food and nutrition. As a result, the beekeeping value chain has transformed considerably following changes in international market demand and the integration of new beekeeping SMEs into global value chains (Jin and Lee, 2012). According to estimates by the OECD and the Food and Agriculture Organization of the United Nations (2020), the beekeeping value chain has more than tripled in value.

According to the same source, on average worldwide, trade by beekeeping SMEs in global value chains for beekeeping products has posted an annual growth rate of around 9%.
In addition, the number of small and medium-sized beekeepers in the world has increased considerably, and is estimated at 6.6 millions with over 50 million hives, with record world production estimated by the FAO at around 1.200.000 tons (Bonakele, 2020a). While the USA was the world leader from 1961 to 1978, China has been the undisputed world leader since 1979. As a result, the global value chain market for beekeeping SMEs is dominated by China, which supplies over 50% of the world's imported honey, i.e. around 500.000 tons (Bonakele, 2020a). This makes China the leading exporter in the global SME beekeeping value chain, with sales in excess of US$247 millions, followed by countries such as Turkey, Argentina and New Zealand. However, despite this global performance, demand for beekeeping products from SMEs continues to grow and systematically outstrips supply (Boohene et al., 2020). In Africa, recent statistics indicate that trade through SME beekeeping global value chains represents 10% of trade compared with 1% in 2013 (Carraresi and Bröring, 2021). However, most scientific studies emphasizes that the integration into global value chains of beekeeping SMEs and the benefits derived from them depend largely on their understanding of the overall functioning of the value chain, the transparency of information and communication along the chain, and their bargaining power (Carroll and Kinsella, 2013).

In Benin, beekeeping was introduced in the 1950s, and the main production areas are located in the departments of Borgou, Atacora, Donga, Alibori, Zou and Collines, despite the fact that the whole country has significant melliferous potential (Collier and Dercon, 2014). Beekeeping is an important source of income for many beekeeping SMEs (Carroll and Kinsella, 2013) and helps reduce human pressure on forests. It generates various products such as honey, beeswax, pollen, propolis, royal jelly and bee venom, whose use in both food and therapeutics is established and ensures a good market for the beekeeper (Cunguara et al., 2011). With this in mind, we (Collier and Dercon, 2014) need to put in place the right strategies for conquering international markets and monitoring indicators for better integration into global value chains. It ensures the survival of beekeeping SMEs, enabling the latter to preserve their economic and financial independence, and to satisfy customers and stakeholders in order to face up to competition (Das Nair and Landani, 2020). Aligned with (Carroll and Kinsella, 2013) theory of inclusive sustainable development and cultural dimensions, an analytical framework has been proposed to better understand the role of cultural norms in the process of integration into global value chains.

To achieve this objective, the present paper has taken into account two factors that capture perceived cultural norms (zeus culture and dionysos culture). In particular, this study enriches the existing literature by highlighting the perceived role of cultural norms in the integration of beekeeping SMEs into global value chains. To this end, unlike previous studies, such as those by (Carroll and Kinsella, 2013), which showed that organizational norms and characteristic traits could influence the integration of beekeeping SMEs into global value chains, this article highlights that, despite the organizational norms and characteristic traits of the beekeeping SME leader, cultural norms, notably the Dionysian or participatory/democratic culture, have an influence on the integration of beekeeping SMEs into global value chains.

The following development will address the research methodology, related results and discussions. However, these various stages could not be easily completed without first reviewing the contributions of some of the authors who make up the literature review.

2. Literature review

2.1. Theory of inclusive sustainable development for beekeeping SMEs

Economic literature recognizes that innovation in the beekeeping sector remains a real driver of development (Zahonogo et al., 2019). This view is shared by (Raymond, 2001), who explored the potential of inclusive value chains for inclusive beekeeping growth. (George et al., 2012) and (Zahonogo et al., 2019) used the terms "inclusive innovation" and "innovation for inclusive beekeeping growth" interchangeably to refer to beekeeping innovations that create or enhance opportunities to improve the well-being of beekeeping SME stakeholders.

Inclusive beekeeping growth is a social development approach that refers to the creation of added value for the managers of beekeeping SMEs in order to increase their income, welfare and other social goods, and stimulate competition in order to reduce the poverty of its stakeholders (Collier and Dercon, 2014). It is closely linked to the concept of pro-poor beekeeping growth. However, its indicators are restrictive, notably beekeeping GDP growth per capita (Gupta et al., 2015). The concept has then evolved in beekeeping development theory towards other concepts such as inclusive beekeeping wealth, inclusive beekeeping economy and inclusive beekeeping development.

Furthermore, (Gupta et al., 2015) define inclusive beekeeping development as development that includes marginalized beekeeping SME stakeholders and developing countries in beekeeping social, political and economic processes to improve stakeholder well-being, social and environmental sustainability, and empowerment (Collier and Dercon, 2014). All conceptualizations of inclusive value chains have implications for theorizing inclusive development (Westlake, 2020). Thus, global value chains are often considered inclusive if they are innovative, efficient, credible, adaptable, make beekeeping markets free and transparent for all, create jobs, have economic, financial and ecological sustainability and contribute to poverty reduction and food and nutrition security (Zahonogo et al., 2019). In the context of this research, this theory enables us to understand how beekeeping SME actors appropriate innovations due to global value chains and how they adapt to them in order to better position themselves on the international market and improve their added value.

2.2. Synthesis of previous work on the factors of integration of beekeeping SMEs into global value chains.

2.2.1. Relationship between digital platform and integration of beekeeping SMEs into global value chains.

Rapid advances in new technologies and digital platforms have led to the emergence of a new society of technological innovation (Waller et al., 2001). The implementation of business-oriented activities through the use of digital platforms for the benefit of beekeeping SMEs representes a competitive advantage for their participation in global agricultural value chains and the promotion of their beekeeping products and services (Ruben and Gigliotti, 2017). Thus, the development of digital platforms is a real challenge for all beekeeping SMEs wishing to participate in global value chains and consequently their strategy must adapt to the new behaviors of Internet users in order to effectively meet their needs and build their loyalty. Thus, for (Pengame, 2015), the use of digital platforms appears to be a business opportunity and enables beekeeping SMEs to overcome barriers to entry into global value chains (Domanou et al., 2021).

Furthermore, other authors like das (Domanou et al., 2021) have shown in a recent study that certain barriers to entry into global value chains, particularly for beekeeping SMEs, can be overcome through innovation and the use of digital platforms. These findings are also similar to those of (Bonakele, 2020b) and (Keijser et al., 2021), who have shown that many of the challenges and barriers faced by beekeeping SMEs in integrating into global value chains can be overcome through the use of digital platforms (Boohene et al., 2015). For example, information services on modern cultivation methods and techniques, on changes in the cost of raw materials, on best practices, certifications and standards required by regional and international supermarket chains, and on the price of beekeeping products can be provided digitally to beekeeping SMEs (Caraça et al., 2009) to further promote their integration into global value chains.

2.2.2. Certification of the cash product as a key factor in SME beekeeping's participation in global value chains.

In the literature, certification of a cash product is increasingly seen as an attractive strategy to strengthen the integration of beekeeping SMEs into global value chains and to improve beekeepers' performance (Ruben and Gigliotti, 2017). Indeed, for some authors, certification of beekeeping products is not based on legal status, but recognizes a valued practice (defined as the standard) and provides a license to operate that can be recognized and verified by an independent third party (Gadema and Oglethorpe, 2011). This standard enables SME beekeepers to comply with the needs of economic agents and international standards in order to satisfy them (Gadema and Oglethorpe, 2011)

(Sirdey and Lemeilleur, 2015) distinguish six main impact pathways through which certification can promote access to increasingly larger markets (prices, contract, premium, quality, labor). Thus, they distinguish between prices that constitute certificates that guarantee a floor price (fair trade) or offer a quality premium, which can promote access to global agricultural value chains and can lead to better net profits for beekeepers. Long-term delivery contracts, on the other hand, which include prepayment (before harvest) and credit provision (or can be used as collateral for borrowing) with the aim of improving market access, guaranteed outlets, enhancing income stability and reducing vulnerability to shocks. These effects can lead to increased income and consumption at SME beekeeping level (Van Rijsbergen et al., 2016).

2.2.3. The perceived role of cultural norms in the integration of SME beekeepers into global value chains

Perceived cultural norms are a real driver of business growth, business and integration into global value chains (Minguzzi and Passaro, 1997). Indeed, cultural norms within beekeeping SMEs indicate how the structure operates and is run. As such, they are perceived as the identity, image and visibility that one wishes to give to the beekeeping SME in the international market (Minguzzi and Passaro, 1997). Perceived cultural norms indicate the codes that govern the beekeeping SME in material, financial and human terms. Indeed, one of the theories that provides a framework for intercultural relations is Hofstede's cultural dimensions theory developed in 1980 (Bartley et al., 2019). The first dimension developed by Hofstede concerns individualism versus collectivism / communitarianism. This is a dimension in which "I" takes precedence over "we", and where the interests of the group come before the personal interests of the actors in the beekeeping SME. This theory, developed by (Hofstede, 1980), refers to the importance given by a manager to his or her own person or entourage within the SME. Thus, in societies marked by individualism, SME players are more concerned with their own interests or development and their immediate environment (Hofstede et al., 2010). The second dimension concerns hierarchical or

authoritarian distance (culture zeus). This cultural dimension expresses the degree of inequality in power and authority that a member of a beekeeping SME accepts and expects between himself and his superior (Van Rijsbergen et al., 2016).

The third cultural dimension developed by Hofstede (1980) relates to the interchangeability of roles or masculinity versus femininity. It refers to the question of values and the prevalence of hard values such as winning, excellence and competition over soft values such as mutual aid, solidarity and empathy. In masculine cultures, individuals seek upward mobility through excellence and material success (Dossou et al., 2012). In female cultures, on the other hand, the values of mutual aid, benevolence and tenderness prevail. The fourth dimension is linked to controlling uncertainty. This dimension distinguishes between SMEs with high and low levels of uncertainty control. It refers to the degree of uncertainty tolerance. The level of uncertainty control means the extent to which actors or individuals in a culture accept ambiguous, risky, unpredictable, unstructured or even anarchic situations, and the way in which this unpredictability is responded to Collier and Dercon (2014).

2.2.4. Socio-economic and demographic characteristics of beekeeping SME managers for better integration into global value chains.

The study carried out by (Julien and Marchesnay, 1988) on beekeepers highlights the importance of the beekeeping SME manager's profile in decision-making, particularly with regard to participation in global agricultural value chains through technological innovation and the improvement of agricultural cultivation techniques (Ince et al., 2016) in their study, showed that participation in global value chains is a function of technology adoption and therefore the production of quality cash crops. These are also a function of the characteristics of beekeeping SME managers such as age, gender and level of training in new farming techniques. Moreover, age is often used as an indicator of beekeepers' maturity in decision-making processes (Ince et al., 2016).

In the SME development literature, the participation of beekeeping SMEs in global value chains (GVCs) is seen as a promising instrument for achieving economies of scale and income opportunities (Ince et al., 2016). Thus, some scholars emphasize that beekeeping SMEs need to evolve within new institutional and policy frameworks to better include themselves in global value chains. This is undoubtedly what prompted (Oughton and Whittam, 1997) to show in their study focused on the importance of cooperative economies or collective external economies on the competitiveness of beekeeping SMEs in increasingly global markets where the laws are dictated by the strongest. For (Fischer and Qaim, 2012), cooperation makes it easier to invest in market information, and the scale created improves the bargaining power of beekeeping SMEs. Similarly, investment in knowledge dissemination becomes easier, and forms of upgrading become possible. Finally, access to finance can be facilitated if the cooperative plays a role in reducing information asymmetry, in the credit relationship with a financial institution (Lutz and Tadesse, 2017). These theoretical findings support the following hypothesis : Age, gender, beekeeping SME size and cooperative membership influence the integration into global value chains of beekeeping SMEs. Based on all these theoretical conclusions, we present below the conceptual research model as follows (**Figure 1**) :

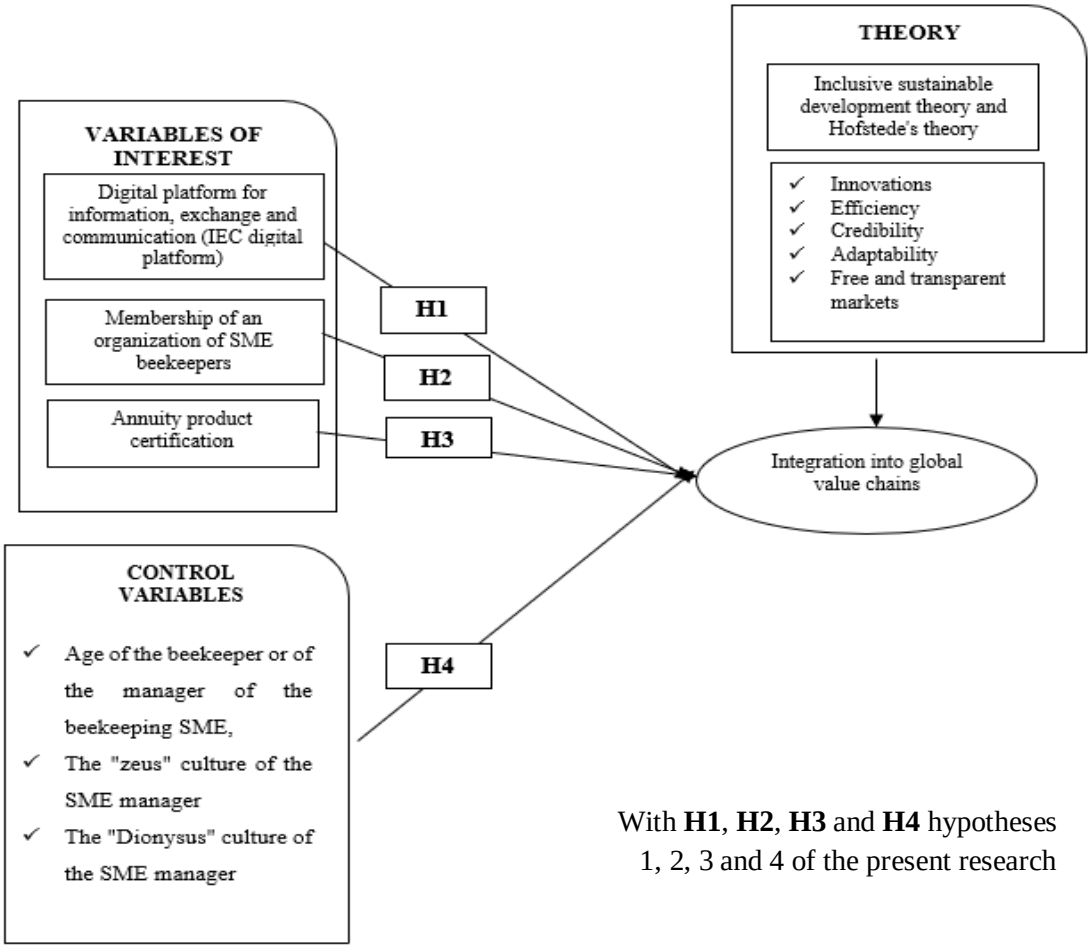

Figure 1. Conceptual research model

3. MATERIALS AND METHODS

3.1. Study areas and research sampling

The data used for the analyses were collected from beekeeping SME managers in Benin, more precisely in the north-west of Benin, in the Natitingou and Tanguiéta city. These two cities belong to Agroecological Zone IV, commonly known as Zone Ouest Atacora. Natitingou city lies at an altitude of 421 meters (10° 18' 46" North, 1° 23' 19" East) and covers an area of 3,045 km^2, i.e. 12.8% of the department's total surface area. Tanguiéta city is 234 meters above sea level. Its geographical coordinates are 10° 37' 0" North, 1° 16' 0" East. The commune covers an area of 5,456 km^2 and is located in the Atacora department (Paraïso et al., 2012).

It should also be noted that many SME beekeepers still operate in the informal sector, which makes it difficult to estimate statistics. This is why the non-probabilistic method is used, based on data from beekeepers' organizations. Snowball" and "matched" sampling were chosen. Matched because the SMEs sampled have similar characteristics in terms of selection criteria (SMEs having successively participated in global value chains over the last two years). For this reason, the sample considered includes two hundred and ten (210) managers of beekeeping SMEs operating in the honey trade, 105 of whom meet the conditions for integration into global value chains, and 105 others who do not yet meet the conditions.

3.2. Determinants of SME beekeeping integration into global value chains

The data used in this research were collected over a single period, and the binomial logistic (logit) regression model was used to examine the determinants of this decision. The dependent variable representing integration into global value chains is dichotomous. It can take only two values (0 if no, 1 if yes). The probability and proportion of the variable are also between 0 and 1, as is the error term, which thus follow a discrete distribution (Bourbonnais et al., 2005). In this context, simple linear regression is not appropriate, as it does not consider maxima or minima, and assumes the normality of the error terms (Pampel, 2000). Instead, a binary choice model should be used, where the aim is to estimate the probability associated with an event.

(Maddala, 1990) cited by (Magrini and Triboulet, 2010), in the most classical case of a two-modality choice model (which is our case here, i.e. 0 for non-integration and 1 for integration into global value chains), the probability of occurrence of the alternative considered is estimated by a binary probit or logit model. On the other hand, if several alternatives are possible, in no predefined order, we need to estimate the probability of each alternative in relation to a reference alternative. The econometric model required in this case is a multinomial logit or probit model, depending on the distribution law adopted for the error terms.

Let A_i be a binary variable, indicating the integration or not of a beekeeping SME $i\ (i = 1, \dots\dots, N)$ with $Ai = 1$ integration and 0 : non-integration and Ai^* a latent variable associated with Ai. This latent variable is a function of a matrix of explanatory variables X_{ij} expressed in equation (1) :

$$A_i^* = \alpha + \sum_{j=1}^{j} \beta_j X_{ij} + \varepsilon_i \quad (1)$$

Where : ε_t is a random term whose distribution is given by the density function f.

$$\begin{cases} Ai = 1 & \text{Si } A_i^* > 0 \\ Ai = 0 & \text{Si } A_i^* \leq 0 \end{cases} \quad (2)$$

Replacing (1) in (2) gives :

$$P(A_i = 1) = P\left[\varepsilon_i > -\left(\propto + \sum_{j=1}^{j} \beta_j X_{ij}\right)\right] = P\left[-\varepsilon_i \leq \left(\alpha + \sum_{j=1}^{j} \beta_j X_{ij}\right)\right] = F\left[\alpha + \sum_{j=1}^{j} \beta_j X_{ij}\right] \quad (3)$$

Where : F is the distribution function corresponding to the density function f.

Depending on the nature of the distribution of f, which may be normal or logistic, equation (3) is estimated by a binomial probit or binomial logit model.

$\ln\left(\frac{P(Ai)}{1-(PAi)}\right) = \alpha + \sum_{j=1}^{j} \beta_j X_{ij} + \varepsilon_i$ where X_{ij} represents the matrix of explanatory variables, β_j the coefficients to be estimated and ε_i the error term ; α is the constant term.

The factors affecting integration into global value chains have therefore been deduced from the literature **(see Table 1)** :

Table 1. Description of research variables

Labels	Variables	Nature	Terms and conditions	Expected signs
Integration	INTE	Discontinued	If Yes = 1 ; If No = 0	Control variable
Variables related to organizational norms				

Langstroth beehive	LB	Discontinued	If Yes = 1 ; If No = 0	+
Digital platform for information, exchange and communication	DPL	Discontinued	If Yes = 1 ; If No = 0	+/-
Annuity product certification	APC	Discontinued	If Yes = 1 ; If No = 0	+/-
Simultaneous use of family and casual labour	SUF	Discontinued	If Yes = 1 ; If No = 0	+
Use of casual labor only	UCO	Discontinued	If Yes = 1 ; If No = 0	+
Use of family labour only	UFL	Discontinued	If Yes = 1 ; If No = 0	+
Variables linked to operating managers				
Age of SME manager	AGE	Continue	Quantitative	+/-
Membership of an SME beekeeping organization	MB	Discontinued	If Yes = 1 ; If No = 0	+/-
Size of beekeeping SME	SIZE	Continue	Quantitative	+
Membership of a financial solidarity group	MSG	Discontinued	If Yes = 1 ; If No = 0	+/-
Years of experience	YEE	Continue	Quantitative	+
Gender	GENDER	Discontinued	Female = 1 ; Male = 0	+
Education level	ELEVEL	Discontinued	1 = Primary 2 = Secondary 1 3 = Secondary 2 4 = Superior	+
Variables linked to the farm's cultural norms				
Zeus" culture	ZEUS	Discontinued	If Yes = 1 ; If No = 0	+
"Dionysus" culture	DIONY	Discontinued	If Yes = 1 ; If No = 0	+

Furthermore, based on the theoretical framework and the work of (Gbaguidi, 2019) ; (Bourbonnais et al., 2005), the exogenous variables of integration in global value chains B_i^* can be modeled as follows :

$$B_i^*(INTE) = \alpha_0 + \alpha_1 LB_i + \alpha_2 DPL_i + \alpha_3 MB_i + \alpha_4 SUF_i + \alpha_5 UCO_i + \alpha_6 UFL_i + \alpha_7 ZEUS_i + \alpha_8 DIONY_i + \alpha_9 MSG_i + \alpha_{10} APC_i + \alpha_{11} AGE_i + \alpha_{12} ELEVEL_i + \alpha_{13} GENDER_i + \alpha_{14} SIZE_t + \alpha_{15} YEE + \mu_i$$

The coefficients α of the variables are to be estimated to obtain directly the elasticity of the factors of participation in global value chains of beekeeping SMEs.

4. RESULTS

4.1. Descriptive statistics for research variables

Table 2 shows the descriptive statistics and the significance of the research variables at the 1% level (Chi-square and t-student tests). There is therefore a statistical difference between the two cities in terms of research variables. Interpretations of the results show that beekeeping and its marketing in global value chains is an activity in which women are in the majority. On average, 74 women and 32 men were involved in this activity. According to the information obtained, a number of projects are active in the area, motivating and encouraging

beekeepers and beekeepers to learn good beekeeping practices, honey processing and how to extract wax and propolis.

In addition, women in beekeeping cooperatives are becoming better organized, better trained and ensuring sustainability, traceability and exchange in global value chains for these beekeeping products. In terms of type of cultivation, the number of managers practicing dionysos cultivation (87) far outnumbered those practicing zeus cultivation (45) in the beekeeping SMEs of the Tanguiéta city. However, in the city of Natitingou, the number of managers practicing zeus culture (62) was much higher than the number practicing dionysos culture (50). We conclude that the type of beekeeping practiced by SME managers varied from one city to another. The statistical results also show that in Tanguiéta and Natitingou, beekeepers most often belong to a financial solidarity organization. Thus, (70) beekeeping SMEs in the Tanguiéta city versus (79) in the Natitingou city belonged to financial solidarity organizations. In terms of level of education, those surveyed in the research area had a primary level of education (on average 55 of those surveyed, compared with 46 in higher education).

Variables		Tanguiéta	Natitingou	Average	Difference Test
Qualitative variables					
Simultaneous use of family and casual labour	Yes	52	64	58	χ^2 = 303.438 *** ddl = 4; P < 0.01
	No	53	41	47	
Use of casual labor only	Yes	85	61	73	χ^2 = 302.906 *** ddl = 4; P < 0.01
	No	20	44	32	
Use of family labour only	Yes	54	57	55,5	χ^2 = 306.983 *** ddl = 4; P < 0.01
	No	51	48	49,5	
Zeus" culture	Yes	45	62	53,5	χ^2 = 303.719 *** ddl = 4; P < 0.01
	No	60	43	51,5	
"Dionysus" culture	Yes	87	50	68,5	χ^2 = 302.573 *** ddl = 4; P < 0.01
	No	18	55	36,5	
Membership of a financial solidarity group	Yes	70	79	74,5	χ^2 = 304.590 *** ddl = 4; P < 0.01
	No	35	26	30,5	
Education level	1 = Primary	70	40	55	χ^2 = 302.563 *** ddl = 4; P < 0.01
	2 = Secondary 1	3	2	2,5	
	3 = Secondary 2	2	1	1,5	
	4 = Superior	30	62	46	
Gender	Female	73	74	73,5	χ^2 = 302.298 *** ddl = 4; P < 0.01
	Male	32	31	31,5	
Quantitative variables					
		Tanguiéta Mean (Standrad deviation)	Natitingou Mean (Standrad deviation)	Average	
Age of beekeeping SME manager		36.60 ± 6.148	44.13 ± 6.205	40.365 ± 6.177	
Number of years experience		7.97 ± 2.268	11.58 ±1.511	9.775 ± 1.89	
Size of beekeeping SME		6.50 ± 1.570	6.56 ± 1.587	6.53 ± 1.579	

Table 2. Summary of descriptive research statistic

4.2. Integration of Beninese beekeeping SMEs into global value chains

Table 3 shows the factors that determined the integration of SME beekeepers into global value chains. The coefficients (δ) obtained from the exogenous variables were not directly interpretable, but their exponential (e^{δ}) offers an easier interpretation by measuring the effect on the probability of an increase in the associated continuous variable. The model is globally significant at the 1% level (Prob > F = 0.00001). Variables such as use of the digital platform, simultaneous use of family and casual labor, use of casual labor only, membership of a financial solidarity group, Dionysus culture and level of education determined integration into value chains. The digital platform variable had a positive and significant effect on integration into global value chains. In other words, if the digital information, exchange and communication platform, variable increased by 1%, participation or integration in global value chains increased by 0.37%. The variables simultaneous use of family and casual labor, use of casual labor only had a positive and significant influence on the integration of SME beekeepers into global value chains.

As for the financial solidarity group variable, it had a positive and significant influence on the integration of SME beekeepers into global value chains. In other words, being a member of a financial solidarity group leads to better integration into global value chains. In fact, financial solidarity groups were created to support new cooperators in taking up their beekeeping activity, and in developing a better conquest of the international market. The Dionysus culture variable has had a significant and positive influence on integration into global value chains.

Table 3. Summary of the estimated logit model

Variables	**Coefficient δ**	$\frac{dy}{dx}$	e^{δ}
Variables related to organizational norms			
Langstroth beehive	0.082868	0.0101883	0.2252586
Digital platform for information, exchange and communication	0.3734883***	0.0473824	1.0152465
Annuity product certification	0.4826398	0.0619951	1.3119511
Simultaneous use of family and casual labour	1.061022***	0.1372092	2.8841568
Use of casual labor only	1.629787***	0.2499645	4.4302204
Use of family labour only	-0.465776	-0.0569199	1.2661104
Variables linked to beekeeping managers			
Age of SME manager	-0.0367227	-0.0045197	0.0998226

Membership of an SME beekeeping organization	0.1425372	0.017785	0.3874568
Size of beekeeping SME	-0.1279676	-0.0157497	0.3478520
Membership of a financial solidarity group	1.37976**	-0.0486139	3.7505765
Years of experience	-0.0162423	-0.001999	0.0441511
Gender	-0.5842122	-0.0663491	1.5880534
Education level	0.394993*	0.0486139	1.0737022
Variables linked to the cultural norms of the beekeeping operation			
"Zeus" culture	-0.0841034	-0.010346	0.2286174
"Dionysus" culture	1.311279***	0.1869186	3.5644267
Probability (F) = 0.0000 R^2 = 42.32 Comments : 210			

5. Discussion

Based on the inclusive sustainable development theory and that of (Hofstede, 1980), the logistic regression model was estimated and showed the existence of a relationship between the exogenous and endogenous research variables. From the results of the analysis, it emerged that the variables use of the digital platform, simultaneous use of family and casual labor, use of casual labor only, membership of a financial solidarity group, Dionysus culture and level of education determined the integration into global value chains of beekeeping SMEs at the thresholds defined in this research. **Figure 2** below summarizes the estimation of the research model :

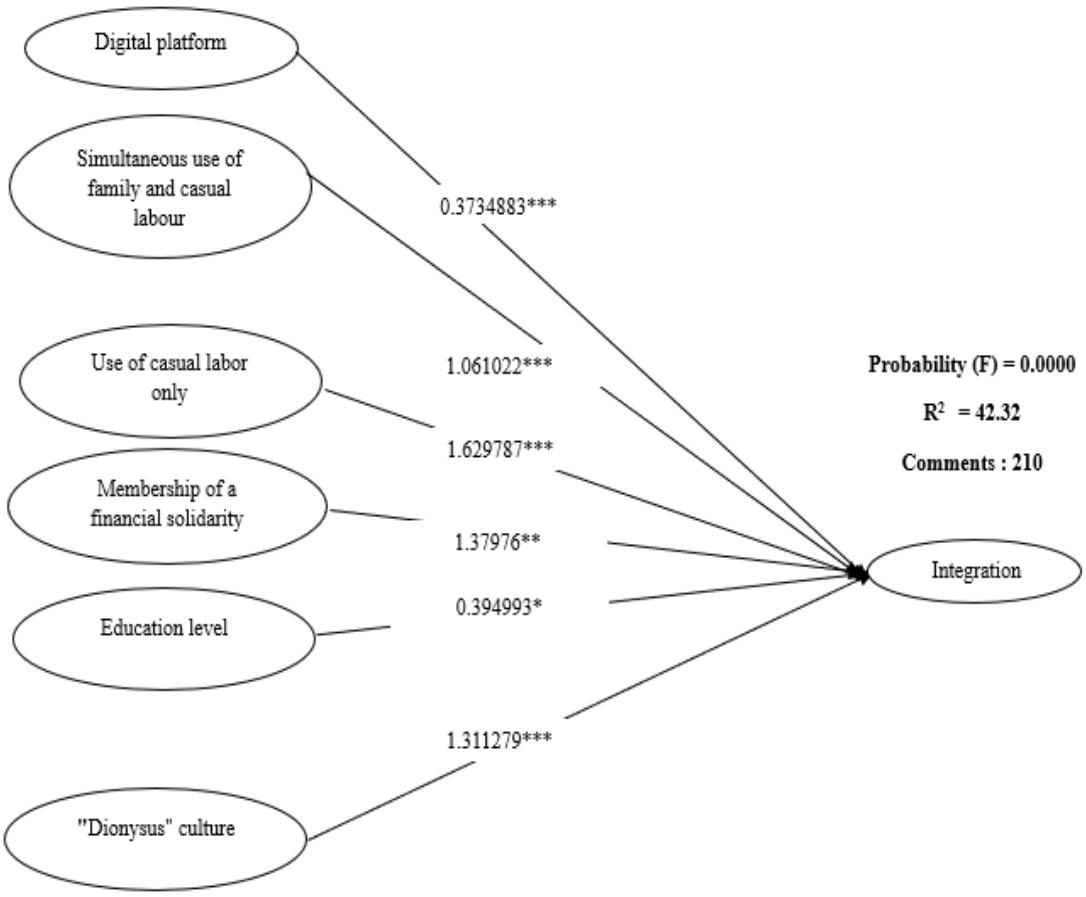

Figure 2. Estimated search model

These results show that the use of digital platform improves the participation of SME beekeepers in global value chains. Thus, for beekeepers in the regions surveyed, use of the digital platform would provide beekeeping SMEs with quite extraordinary opportunities and tools that could provide unprecedented access to data concerning consumer purchases of beekeeping products, behaviors, preferences, communities or discussions of individual web surfers; but also powerful media planning tools, as well as tools for real-time analysis of marketing campaign results to be able to adjust products and sales (Lassassi and Hammouda, 2012). The variables simultaneous use of family and casual labor, and use of casual labor only had a positive and significant influence on the integration of SME beekeepers into global value chains. These results are justified by the fact that the promoters of beekeeping SMEs using family and casual labor are generally female, as our results confirm. In other words, it is women who tend to use family labor, as predicted by some authors (Lassassi and Hammouda, 2012).

The variable financial solidarity grouping had a positive and significant influence on the level of integration into global value chains. Within small and medium-sized beekeeping businesses, there are different forms of solidarity : "natural" solidarity, which refers to family solidarity ; and "universalist" solidarity, which assigns to each individual a responsibility towards the whole human group. Thus, in the first group we find forms of union solidarity or solidarity based on associations for the defense of

particular interests; in the second group, solidarity will be linked to the sharing of particular practices that will fit into communities (Gouwakinnou et al., 2011).

Finally, the level of education had a positive and significant influence at the 10% threshold on integration into global value chains. In other words, the higher the level of education, the better the beekeeping SME defines strategies to integrate into global value chains. For SME beekeepers, a high level of education improves health and livelihoods, contributes to social stability and stimulates economic growth. In other words, a high level of education has the benefits of enabling beekeeping SMEs to be able to maintain a good level of output by improving their understanding on modern cultivation and value-added techniques (Gouwakinnou et al., 2011).

Thus, for better integration into global value chains, show that participation in global agricultural value chains is a function of the level of education and production of quality cash crops. Indeed, the latter are also a function of the characteristics of the bee farm manager, such as age, gender and level of training in new agricultural cultivation techniques (Minguzzi and Passaro, 1997). These results show the importance that the producer's profile has on different aspects of the life of beekeeping households and, in turn, on improving their standard of living by increasing their post-harvest income.

6. Conclusion

The present study carried out a contextual analysis showing that, in addition to organizational variables and the economic and demographic characteristics of the beekeeping SME manager, cultural variables on the beekeeping operation also have an influence on the integration of beekeeping SME managers into global value chains. The results of the analysis showed that organizational variables (use of the digital platform and use of casual and family labor and use of casual labor only) ; variables related to cultural norms (Zeus culture and Dionysus culture) ; socio-economic and demographic characteristics (membership of a financial solidarity group and level of education) have a positive and significant influence on the integration into global value chains of beekeeping SMEs. This research makes both theoretical and practical contributions to knowledge. Consequently this paper proposes a theoretical framework to understand how the organizational environment and socio-economic and demographic characteristics of beekeeping SMEs influence their integration in the global value chains of beekeeping SMEs. Thus, contrary to studies (Domanou et al., 2021) who showed that the participation of agri-food companies in value chains global agricultural markets can be characterized only by the adoption of digital marketing, studies of (Dagbelou and Yabi, 2020) who showed that the cooperative must promote continuing training, encourage the implementation of innovation, and establish partnerships with support organizations for better access to global value chains; this study showed that despite digital which would promote participation in global value chains of beekeeping SMEs there is also the dionysos organizational culture which is a key indicator of participation in value chains global.
At managerial level, beekeeping SME managers and other players involved in the beekeeping sector's distribution chain need to integrate these results to improve their company's competitiveness and their beekeeping SME's participation in global agricultural value chains. Finally, SME beekeepers need to update their knowledge and communication tools in order to be more competitive and in tune with new innovations and technologies. Although the results of this study are scientifically convincing, there are a number of limitations. Firstly, participation in global agricultural value chains was only measured on the basis of a single sample. It was not applied to a second, larger sample, as recommended by the psychometric approach (Gouwakinnou et al., 2011).

The conclusions should therefore be strengthened by a more robust study involving more SME beekeepers. Secondly, the research variables were only tested on the basis of two cities, namely Natitingou and Tanguiéta. Future research could therefore look at other citiess in Benin to better understand the factors that might explain the participation of SME beekeepers in global value chains. Thirdly, the study only verified the nature of the factors determining the inclusion of beekeeping SMEs in global value chains. A study devoted to analyzing the antecedents and consequences of this inclusion is envisaged.

Authors' declaration (Conflict of Interest)

The authors of this manuscript declare that they have no conflicts of interest.

Authors' contributions

DM funded the search engine data collection and analyzed the data and wrote the manuscript, FV supervised all work. All co-authors read and approved the final manuscript.

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