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Auteurs : Vodounou G. Kéty, Attanasso Marie-Odile, Sossou K. Benoît, Akanro Raoul and Dossou Justin

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Gender analysis of the hive product value chain in Benin

Vodounou G. Kéty^{1,2}, Attanasso Marie-Odile², Sossou K. Benoît², Akanro Raoul² and Dossou Justin²

¹Doctoral School of Agricultural and Water Sciences, National University of Agriculture of Kétou/ Benin

²Laboratory of Population Dynamics and Sustainable Development / Beninese Center for Scientific Research and Innovation

Abstract: - The purpose of this study is to identify the role of gender throughout the hive product value chain in Benin. The data is collected through a socio-economic survey. A total of 430 beekeepers, including 43 women, were surveyed using the snowball method. Macro, meso and micro level analyses of the said chain were carried out followed by a SWOT analysis. Data processing was done with Excel 2016, SPSS, and ARCGIS 10.1 software. The results of the study indicated that women beekeepers intervene more at the level of honey extraction with a participation rate of about half and a participation rate of less than 20% in the other links of the chain. While the men occupy more remunerative segments as the marketing, the production, the harvest of the honey as well as the manufacture of the wax. Three types of beekeeping groups were identified: men's, women's and mixed groups.

Keywords: Gender, value chain, beekeeping, honey, Benin

I. INTRODUCTION

Market access, through the commodity value chain, has become a major policy focus in developing countries, with the aim of addressing the recurring problems of food insecurity and poverty [34].

Since the pre-colonial period, men and women have practiced beekeeping activities in many societies in a kind of differentiated division of labor [18]. In general, the hive product value chain begins with flowers and ends with hive products [32]. In other words, a beehive produces various materials with multiple virtues. The best known is honey, and there are others, such as royal jelly, wax, propolis, pollen and bee venom. In the hive product value chain, the first phase is the supply stage. These inputs are usually provided by beekeeping training centers, artisans, collectors of jars and waste bottles, and foreign suppliers of stainless steel pots and other materials [34]. The phase of production concerns the actors of this activity which are the individual beekeepers, the groups of beekeepers, the collectors of honey and others [7]. During the harvest, honey is extracted from combs by flotation, pressing or centrifugation. This is usually followed by extraction, drying and sale of the products, but they may also be sold by the beekeeper without having been extracted [20].

In Benin, beekeeping remained traditional with the hunting of honey and the use of traditional hives until 1972 when modern beekeeping was born [13]. It is a multifactorial activity that has long been used in Benin as an additional income tool for farm households and an entrepreneurial opportunity for young

people. It has a strong potential for income generation and remains one of the best solutions in the fight against poverty, income diversification and conservation of forest resources. However, several constraints hinder the development of the hive product value chain in Benin. Among others, it is the poor mastery of production techniques, the poor organization of this value chain [9]. This weak organization affects the intensive involvement of women in all the links of the chain for this fact, women occupy activities of transformation and marketing and very few of them devote themselves to the activities of beekeeping production [1], [32]. In other words, women do not take full advantage of the economic potential and ecosystem services offered by honey production in Benin and beekeeping has remained an activity essentially carried out by men.

Indeed, women's need to improve their living condition is attributable to modern technologies that allow them to easily participate in beekeeping activities. However, the extent of their participation and the activities from which they turn away is not known. Furthermore, it is important to uncover the disadvantages that lead to non-participation in such activities if the hive product chain is to benefit both men and women. Studies have shown that, traditionally, men have been actively present throughout the hive product value chain, while women have shied away for reasons [27]. In Uganda, women were mainly involved in honey processing and marketing compared to other beekeeping practices [6]. Nevertheless, gender roles in the hive product value chain differ from community to community and from country to country. Although some studies show roles assumed by men and women along the value chain, they do not assess whether participation in modern beekeeping has led to changes in gender roles.

II. THEORETICAL FRAMEWORK

Most of the work done on value chain analysis focuses on the different linkages between actors in the chain, but the social, cultural and symbolic relationships between these actors are ignored [17]. In line with this, [28] criticize the emphasis on production aspects along the value chain and the limited nature of the assessment of social aspects such as gender in value chain analyses. The gender approach to value chain development allows for the examination of different gender inequalities in the value chain. This examination contributes to an awareness of power and weaknesses in the chain. [11]

posit that the value chain is a lever for rectifying inequalities. However, [19] sharing the same idea as Grosser specify that these inequalities are reduced when the relevant value chain is supported by different forms of organizations.

In West Africa, women working seasonally and part-time earn relatively low incomes [3]. Women are culturally subordinate to their husbands who hold decision-making power in both production and reproduction and it is also the husband who owns the land. This social marginalization implies the precarious state of African women. In the value chains, these women are the largest workforce but they remain disadvantaged [10]. This marginalization is explained by the fact that some links in the value chain or even government agencies attribute some of women's achievements to men. The work of [16] on the value chain of milk derivatives in Nicaragua is an example. Indeed, during the meetings, exchanges focused attention on women's contribution to the issue of inequalities in the distribution of earnings and income. These women linked gender equality to product quality and competitiveness. As a result, a better understanding of roles, improved communication, and joint decision-making took place between men and women in a family.

The aspects of beekeeping discussed in the literature in Benin relate mainly to the factors of honey production, socioeconomic characterization of beekeeping, bee diseases as well as the constraints related to this activity. This is the case of the study of [33] which evaluated the socioeconomic importance of the production of honey in the Guinean and Sudanese-Guinean zones. In the same way, a study was carried out in 2016 on the characterization of the beekeeping production system and the use of Geographic Information Systems (GIS) as a basis of cartography for the sustainable management of the hives and the melliferous perimeters in the center of BENIN [32]. In the northwest and central Benin, studies have been conducted on the determinants and constraints of honey production, then the perceptions and adaptations of beekeepers and honey hunters to climate change [25]. Also, [7], in their study entitled "Analysis of the multifunctionality of non-timber forest products of the W-Arly-Pendjari complex (WAP)", analyzed the sustainability of the management of non-timber forest products (NTFPs) based on beekeeping, the most promising value-added chain in the riparian zone of the WArly-Pendjari complex (WAP) in Benin. They demonstrated that the value-added chain of consumption honey is the most promising, because honey is in high demand on the national and international market and its production is accessible to young people and women.

Thus, in a comparative way, the question of gender in beekeeping activities in Benin still remains an almost unexplored field of study. It is in this context that the main objective of this study is to analyze the hive product value chain in Benin according to gender at the macro, meso and micro levels. Specifically, it is a question of determining the socio-demographic characteristics of the beekeeping actors, to

identify the distribution of the roles and responsibilities in the beekeeping activities according to the gender and to define the gender approach within the value chain of the hive product.

This work is thus in line with the development of tools for the economic emergence of the local population, especially women, in order to bring a better contribution to this sector.

III. MATERIALS AND METHODS

Value chain analysis consists of assessing the results of research conducted on a value chain. Based on this assessment, a value chain development strategy and specific interventions are developed. This process starts already during the research phase, through interviews with different stakeholders. The results are then analyzed using a market systems framework applied to the drivers of value chain development, namely: system efficiency, product quality, product differentiation, environment, and social and environmental standards.

A. Data collection

A field trip was carried out from July 12 to 20, 2020. It was carried out a qualitative and quantitative survey which made it possible to see how the chain of value of the honey in Benin is organized precisely in four communes to know Bantè, Bassila, Ouèssè and Glazoué of the department of the Hills. This investigation is made with the big key actors having trained beekeepers and having great renown in this sector. Socio-economic and geographic surveys were conducted in two phases:

- *Individual interview*: it made it possible to collect a set of qualitative data on the perception that the beekeepers have on their organizational structure, their knowledge on the beekeeping practice, their income and the difficulties encountered.
- *Focus group* interviews were also conducted to enrich the information collected in individual interviews.

To determine the involvement of public institutions in gender issues in Benin, the following documents were consulted:

- The National Gender Promotion Policy, Document designed for the Government of Benin (2008);
- PSCC/APP 2010 Thematic Clarification Guide on Gender Promotion CCSP/APP 2010/Thematic Clarification Guide (2010)
- The country report on progress in implementing the Beijing+20 Platform for Action;
- Parallel report to the fifth periodic report of the Government of Benin on the implementation of the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) (2013);
- The French Development Agency's Benin Gender Profile (2016);
- Millennium Challenge Account-Benin II Gender and Social Integration Plan.

B. Data processing and analysis techniques

Several analytical methods were used to achieve the objectives of this study. The method of analysis of the data on the socio-demographic characteristics (age, gender, level of education, main and secondary activities) of the beekeepers surveyed, was done using the Excel spreadsheet of the Microsoft Office 2016 software where the different tables and figures based on the information received were made. A diagnosis, with the help of the SWOT analysis (Strength, Weakness, Opportunity and Thread) was realized in order to identify the main strengths, weaknesses, opportunities and threats that the honey value chain is facing. This analysis helped to determine whether the chain is able to develop as it should, and also to help propose a plan for the sustainable and integrated management of beekeeping activities in Benin. The SWOT approach is divided into two analyses:

The external analysis that focuses on the environment of the honey value chain and its market. It distinguishes: Opportunities, which are the external elements that can allow the improvement of the said chain, and Threats, which are the external elements that jeopardize the current level of this chain.

The internal analysis focuses on the hive product chain itself. It studies the strengths and weaknesses of the value chain.

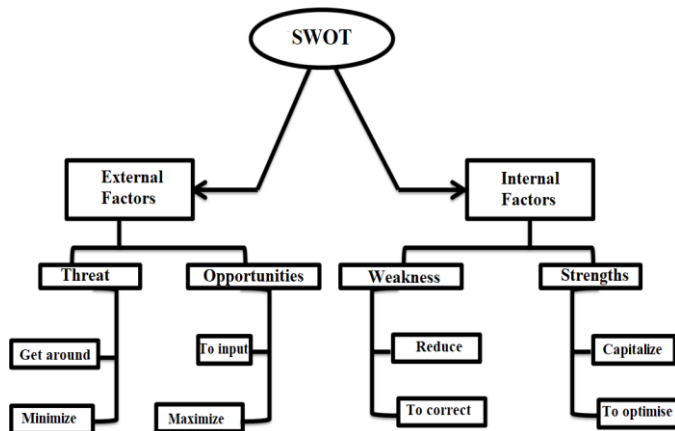


Fig.1. The SWOT matrix

The SWOT matrix is made by defining a scale that goes from 0 to 3:

- 0: not determinant
- 1: not very important
- 2: determinant
- 3: Very decisive.

Then from a confrontation matrix (table 1), the analyses will be made.

Table I. A Matrix of Confrontation

		Opportunities				Threats			
		O 1	O2	O3	O4	M 1	M 2	M 3	M 4
Strengths	P1		1	3		1			
	P2	3		2		2			1
	P3		3			3	2	1	2
Weaknesses	F1						1	2	
	F2	1					3		

C. Study environment

This study was conducted in the Sudano-Guinean climate zone precisely in the communes of Bantè, Bassila, Ouèssè and Glazoué as illustrated in Fig.2. This zone is characterized by two

(02) rainy seasons and two dry seasons with hazards. The main rainy season occurs from March to July followed by a minor dry season from August to September. The minor rainy season occurs from October to November followed by the main dry season (December to March). It covers a peneplain shaped on a Precambrian basement and dominated by hills averaging 300 m in altitude. The Daniella Oliveiri savanna is the dominant vegetation of the area and is more pronounced towards the north. The most widespread species today are shea, néré and caïlcédrat [14].

The Sudano-Guinean zone, considered as a potential beekeeping production zone, hosts a few classified forests that are highly threatened by human activities. Its soils are of tropical ferruginous type on a crystalline base with very variable characteristics.

The Commune of Bantè, located about 2921 km from Cotonou, shares its borders with the communes of Savalou to the South, Bassila to the North, Ouèssè and Glazoué (by the Agbado River) to the East and the Republic of Togo to the West. With an area of 2695km² it occupies about 19.44% of the territory of the Collines, and 2.49% of the national territory [2].

The Commune of Bassila covers an area of 5,661 km², located 375 km from Cotonou (the economic capital of Benin), and is one of the four communes that make up the Department of Donga in northern Benin. It is bordered to the north by the communes of Ouaké and Djougou, to the south by the communes of Bantè and Glazoué, to the east by the communes of Tchaourou and Ouèssè and to the west by the Republic of Togo [4].

Located in the heart of Benin, Ouèssè stretches between Opkara in the east and Ouémé in the west over an area of approximately 3,200 km², or 2.56% of the national area. It shares its borders to the North with the Commune of Tchaourou, to the South with the Communes of Savè and Glazoué, to the West with those of Bantè and Bassila, and to the East with the Federal Republic of Nigeria [5].

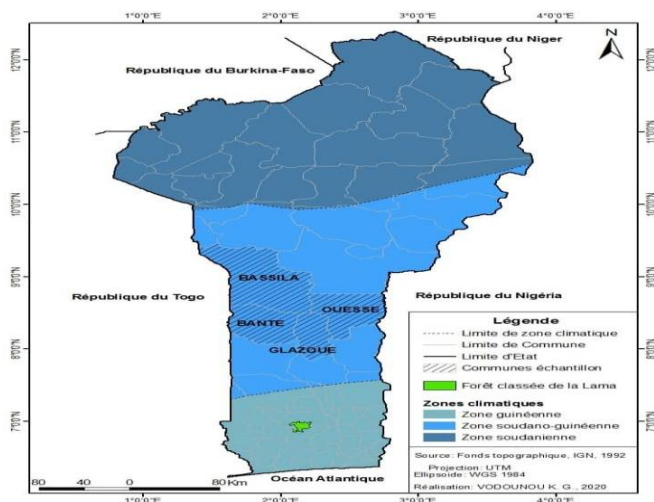


Fig.2. Communes that were the object of the study

Source: Field survey, July 2020

D. Biophysical characteristics of Benin

1) The Climate

Climatic factors are of great importance for the survival of honey bees. They can influence, at given thresholds, the development of the colony and the life span of bees and thus contribute to the yield of beekeeping production. Benin has two (02) types of climate, namely: an equatorial climate with high humidity in the south. There is an alternation of dry seasons from November to March and from mid-July to mid-September and rainy seasons from April to mid-July and from mid-September to October. A tropical climate in the center and north with a dry season from November to April and a rainy season from June to September [26].

2) Hydrography of Benin

Several rivers cross the country and are characterized as follows:

Table II. Characteristics Of Benin's Waterways

Type of pool	Rivers and streams
The Beninese basin of the Niger River	<ul style="list-style-type: none"> • The Mekrou: 480 km; • Alibori: 427 km; • The Sota: 254 km and the Pendjari
The Volta River Basin	<ul style="list-style-type: none"> • The Pendjari: 420 km and the Perma
The Mono-Couffo basin	<ul style="list-style-type: none"> • The Couffo River: 190 km; • the Mono River: 500 km
The Ouémé basin	<ul style="list-style-type: none"> • The Ouémé River: 608 km
Southern rivers	<ul style="list-style-type: none"> • Lake Nokoué: 138 km²; • Lake Ahémé: 78 Km²; • The lagoon of Porto-Novo : 35 km² .

3) Vegetation and fauna

Three (03) types of vegetation characterize Benin: the wooded savannah in the Sudanese regions of the North; the savannah in the Center with species such as mahogany, Iroko, Samba and the forest in the South and Middle Benin [26].

As for the fauna, Benin has two (02) national parks: The Pendjari park with an area of 275,000 ha and the "W" park which covers an area of 502,000 ha. In these two parks are found mammals such as elephants, buffaloes, hippos, lions, cheetahs, antelopes, leopards, monkeys, reptiles such as caimans, snakes, etc. There are also birds, insects, etc.

4) Technical and biological material

The equipment includes field collection and data processing tools and consists of:

- Data collection survey forms sent to beekeepers;
- A digital camera for the shooting;
- One HP laptop for research and data entry;
- GPS for taking geographical coordinates;
- Word processing and calculation software (2016);
- A recorder (from a Tecno cell phone) for the interviews;
- A notebook, writing materials, an eraser;
- A YAMAHA motorcycle to move on the ground.

IV. RESULTS

A. Gender analysis of the honey value chain at the macro level: Socio- demographic characteristics and role distribution of the actors

1) Gender of respondents

The figure below provides information on the distribution of the surveyed beekeepers according to gender.

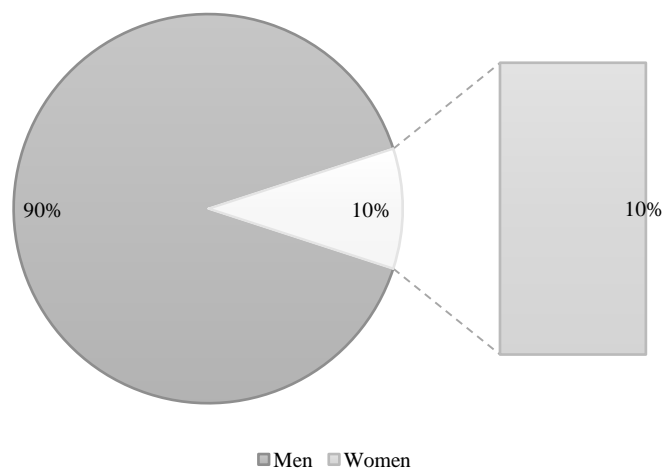


Fig.1. Répartition des apiculteurs suivant le sexe

Source : Enquête de terrain, mai 2021

The analysis of fig.5 shows that there is a weak implication of the women in the apiarian activities in Benin, that is to say a percentage of 10% of women beekeepers surveyed against 90% of men. This shows that the beekeeping activity in Benin is essentially carried out by men.

2) Marital status of respondents

Table 3 provides information on the marital status of the respondents. It reveals that only 3% of the beekeepers are

single against 97% who are married.

Table III. Marital Status

Marital Status	Men	Women	Total	Percentage
Single	12	1	13	3.02
Married	375	42	417	96.98
Total	387	43	430	100.00

Source: Field survey, May 2021

As observed in the table above, beekeeping can be considered in Benin as an activity of the responsible persons and having family loads. This can be explained by the fact that married people are helped by their partners in the process of honey production.

3) Ethnic working context

Figure 4 represents the distribution of the beekeepers according to the ethnic groups. A total of thirty-two (32) ethnic groups were identified and listed.

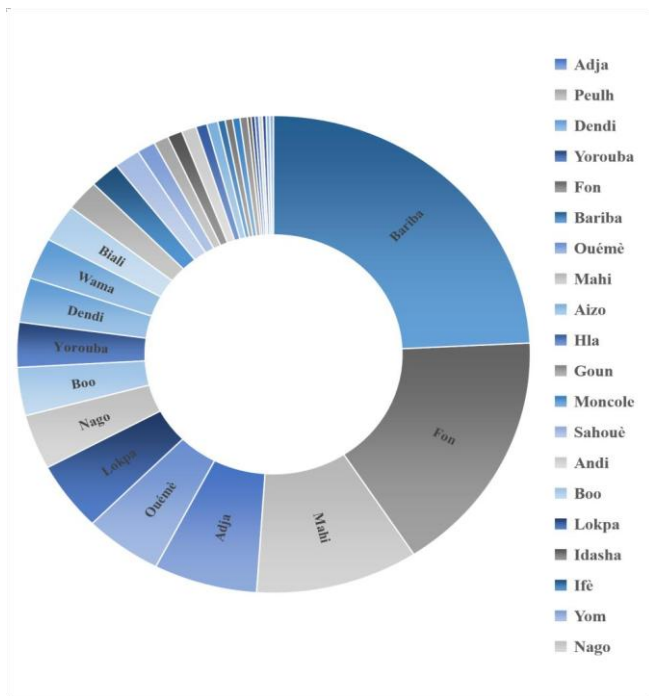


Fig.4. Ethnic groups practicing beekeeping in Benin

Source: Field survey, May 2021

From this figure, it appears that the main ethnic groups practicing beekeeping activities in Benin are categorized as follows: The Bariba, which is strongly represented, followed by the Fon, which comes in second place. Then come in order, the Mahi, the Adja, the Ouémé, the Lopka, the Nago, the BOO, the Yorouba, the Dendi, the Wama, the Biali, the Peulh, the ifè, the Gando, etc.

Fig.5 provides information on the distribution of ethnicities by gender.

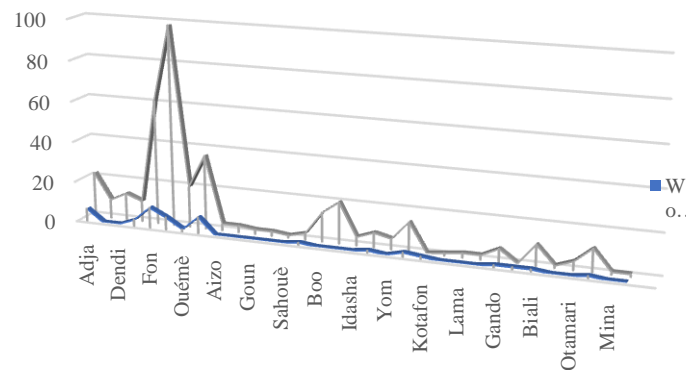


Fig.5. Distribution of ethnic groups by gender

Source: Field survey, May 2021 The analysis of this figure shows that among men, the Bariba are the majority of beekeepers, followed by the Fon and Mahi. Among women beekeepers, the Fon dominate, followed by the Mahi, and in equal proportions the Bariba and Adja.

4) Education level of beekeepers

Table 4 presents the educational level of the beekeepers to assess their literacy rate. The analysis of this table shows that beekeeping is practiced at all levels of education. But there is a predominance of approximately 41% of unschooled beekeepers. This situation reveals the existence of endogenous knowledge on the basis of which the unschooled conduct the activity with more or less success.

TABLE IV.

EDUCATION LEVEL OF BEEKEEPERS Gender	Not in school	Primary	Secondary 1	Secondary 2	University	Total
Female	25	4	6	2	6	43
Male	155	88	63	37	44	387
Total	180	92	69	39	50	430
Percentage	41,86	21,40	16,05	9,06	11,63	100

Source: Field survey, May 2021 Age of beekeepers

The figure below represents the distribution of the surveyed beekeepers by age group. Of the total number of beekeepers surveyed, the age of the beekeepers varies from 19 years to 80 years.

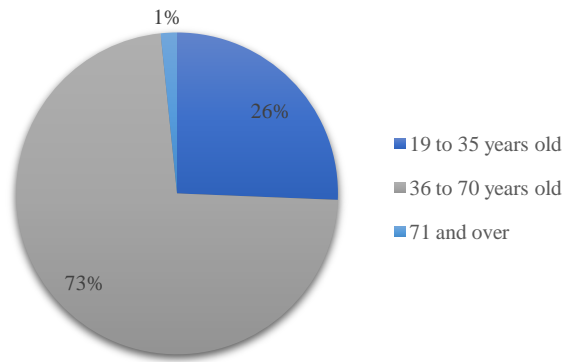


Fig.6. Age range of beekeepers

Source: Field survey, May 2021

Adults between 36 and 70 years of age have the highest number of actors with 312, or 73% of the beekeepers, while young people (19-35 years) represent only 26% (110) of the actors (Fig.6.). This situation could be explained by the mystical character that surrounded the practice of beekeeping, which was intended for older people.

5) *Distribution of beekeepers by occupation*

Table 5 shows the main activities carried out by the beekeepers encountered in the eleven departments of Benin covered by the study.

Table V. Distribution of Beekeepers By Occupation

Profession	Workforce	Percentage
Agriculture	370	86
Breeder	11	2
Teacher	8	2
Merchant	6	1
Consultant	4	1
State employee	3	1
Carpenter	3	1
Other	25	6
Total	430	100

The table below shows that the vast majority of respondents, about 86%, have agriculture as their main activity, hence the name of farmer-beekeepers. It is also observed that livestock breeders (2%), teachers (2%), traders, etc., practice beekeeping as a second income generating activity.

The remaining occupations identified are shown in detail in the figure below. A total of 28 occupations were identified.

From the analysis of fig.7., it appears that beekeeping is compatible with other types of activities. However, it is essentially practiced in the form of a secondary activity, given that among the 430 beekeepers surveyed, no one declared beekeeping as their main activity.

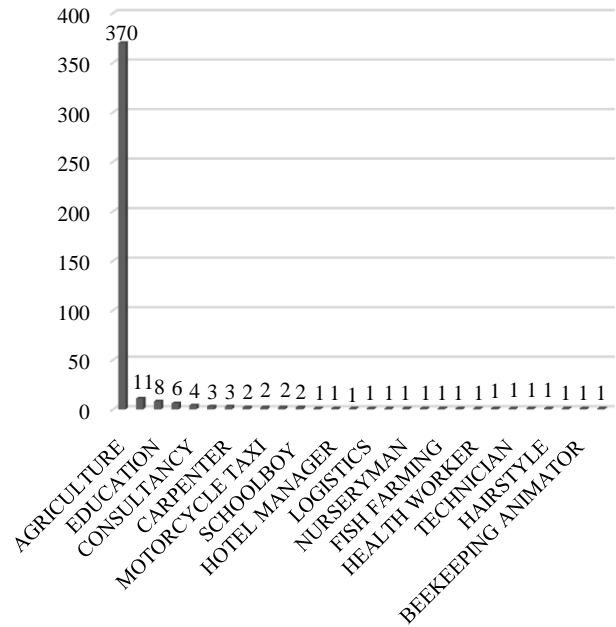


Fig.7. Profile of beekeeping actors in Benin

Source: Field survey, May 2021

6) *Involvement of women in beekeeping activities*

The results of this study showed that very few of these women practice beekeeping. But it was identified that among the married men met, some of them are helped by their wives in their beekeeping activities.

As illustrated in the table below, of the 375 married men surveyed, 208 or 55% are assisted by their wives in their beekeeping activities.

Table Vi. Statistics of The Men Surveyed

Statistics of the men surveyed		
Married	Not married	Total
375	12	387
97%	3%	100%
Men helped or not by their wife's in their beekeeping activities		
Assisted	Unassisted	Total
208	167	375
55%	45%	100%

The analysis of table 6 shows that approximately 208 women are involved in beekeeping activities. It was identified (figure 10) that 52 of them are involved in more than one activity. With the help of a cross-tabulation, they intervene on average in a minimum of two (02) activities and at most in three (03) activities. The dominant activities in this case are extraction and wax manufacturing respectively.

7) Distribution of roles and responsibilities between men and women

The distribution of women's roles is shown in Fig.8, which shows that 167 or 45% of the wives of married men are not involved in beekeeping activities. The remaining women participate in all activities of the honey value chain, but at disproportionate rates.

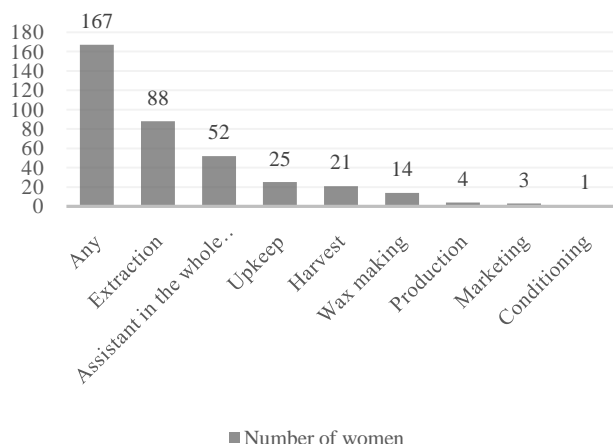


Fig.8. Women's roles in beekeeping activities

Source: Field survey, May 2021

From the analysis of this figure, it appears that women participate in activities such as honey extraction, cleaning the apiary, which is an activity that often involves cleaning the bushes near and around the hives to keep predators away. Some women (52) are involved in the entire honey value chain process, while others are involved in honey harvesting and wax making. Wax is another by-product of the hive.

Fig.9 presents the responsibilities between men and women within each link of the honey value chain.

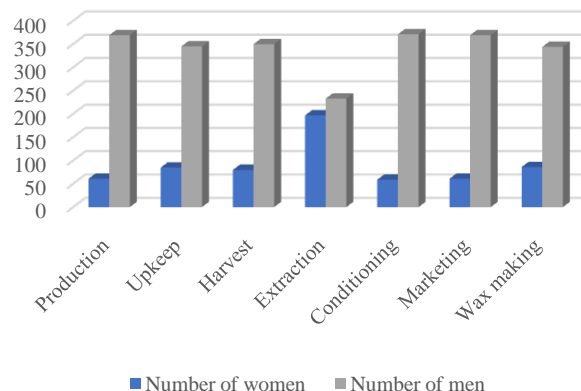


Fig.9. Responsibilities between men and women

Source: Field survey, May 2021

The figure above shows that the responsibility of women in the honey value chain is to ensure the extraction of honey.

These women are relegated to low-skilled activities such as honey extraction and hive maintenance. While men occupy more remunerative segments such as marketing, production, honey harvesting and wax manufacturing

8) Legal and regulatory environment relating to the status and economic rights of women in Benin

The Government of Benin has taken several measures relating to equality between men and women in order to protect and promote women's rights.

To this end, Benin has ratified the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), as well as many other international and regional instruments for the promotion and protection of human rights and women's rights.

Table 7 presents some of the key actions and brief descriptions of these actions carried out by the Beninese government for the economic emancipation of Beninese women

Table VII. Actions And Laws For Equality Between Men And Women In Benin

Year	Documents	Descriptions
2003	The law n°2003-04 of March 03, 2003	Law on sexual health and reproduction in the Republic of Benin. This law gives women the right to lead a satisfying sexual life in complete safety, to be able to procreate freely and at the pace of their choice, to be informed and to use the family planning method of their choice, and to have access to health services that allow them to carry out pregnancy and childbirth while giving couples every chance to have healthy children.
2004	The code of persons and family	It is a compilation of legal rules that govern the person from birth to death. It allows, among other things, the woman to keep her name while being in the bonds of marriage, sets the legal age of marriage at 18 years for women and men, allows the woman/daughter to enjoy the inheritance in the same way as the man and the boy etc.
2006	The law n°2006-19 of September 5, 2006	Law on the repression of sexual harassment and protection of victims in the Republic of Benin. It defines sexual harassment, specifies its fields, the recourse of victims, the sanctions incurred and guarantees the protection of victims
2006	The law n°2005-31 of April 5, 2006	Law on prevention, care and control of HIV/AIDS in the Republic of Benin. This law is of great importance for women since statistics have shown that in Benin women are infected twice as much as men and that the HIV/AIDS pandemic is becoming more and more feminized.
2007	Law 2007-03 of October 16,	Law on rural land tenure in the Republic of Benin. It specifies the principle of equal access for all Beninese to natural resources in general and to agricultural land in particular, without discrimination on the basis of gender or social

	2007	origin. Similarly, it explicitly guarantees women the right to inherit rural land from their ancestors or spouses.
2009	National Gender Policy	Adoption and implementation of the Decree on the creation, composition, attributions and functioning of the National Council for the Promotion of Gender Equity and Equality (CNPEEG) and its branches. This will encourage and promote legislative and regulatory measures aimed at improving the conditions for achieving equity and equality between men and women for sustainable human development.
2012	Law 2012-26	Law on the prevention and repression of violence against women in the Republic of Benin
2021	law N°2021-12 of Thursday, October 21, 2021	This law amends and completes Law 2003-04 of March 3, 2003, on sexual health and reproduction in the Republic of Benin. It provides for the possibility of access to abortion within 12 weeks, on medical prescription, when the pregnancy is the consequence of rape, but also when it causes material, professional or moral distress for the woman

Source: Field survey, May 2021

The analysis of Table 7 shows that Benin has several legal and regulatory provisions relating to women's rights. However, these are little known by women, especially those in rural areas, because

of the high illiteracy rate observed in these areas. Law 2007-03 of October 16, 2007 on rural land tenure in the Republic of Benin is a very beneficial law for women beekeepers since it favors their access to natural resources in general and to agricultural land in particular. This will facilitate their access to land for beekeeping activities.

The effective application of all these provisions will have a very positive impact on the freedom of choice of these women, on their access to resources and benefits.

9) *Involvement of public institutions in gender issues in Benin*

Most of Benin's public institutions have integrated the gender dimension into their action plans. The government of Benin, in its commitment to promote women's issues, has set up institutions on women's issues, namely

- The ministry in charge of the promotion of women and gender in 1998;
- The National Commission for the Advancement of Women (CNPF), which is responsible for overseeing the implementation of the policy and whose members are essentially the gender focal points. The actions of the focal points have made it possible to initiate gender mainstreaming at the sectoral level, to have specific policies for the advancement of women and to implement programs with specific actions in favor of women.
- The gender and development thematic group composed of gender focal points and members of civil society organizations.
- The ministry in charge of microfinance and youth and women's employment.
- Projects and programs in the agricultural sector that do not take into account the specific interests and needs of women. Etc.

While Benin has a national policy document for gender equality that explicitly sets out the government's commitment to gender equality, it is clear that these commitments are also not described in relevant sectoral policies, such as in the area of beekeeping, and that the Beninese government has not yet committed to addressing gender inequality and discrimination

within the honey value chain.

B. Meso-level value chain analysis: Local gender equality performance

The meso-level analysis focuses on organizations and their governance and aims to determine whether gender equality principles are reflected in their structure, organizational culture and type of services, and the way services are delivered.

1) Beekeepers in couples

Among the beekeepers who carry out the beekeeping activities together with their women, the latter have for main role to help their husband during the harvest of honey by holding the smokers and to ensure the extraction of honey. The rest of the activities are carried out, in the majority of the cases, by the men.

2) Individual beekeepers

The individual beekeepers themselves ensure the implementation of the whole process of obtaining honey from the supply of inputs to the marketing.

These beekeepers make their own hives and arrange their customers to sell their product.

3) Beekeepers' groups

The analysis of table 8 makes it possible to retain that approximately 55% of the beekeepers are constituted in grouping whereas approximately 45% of the beekeepers evolve alone. It is necessary to retain that the character of beekeeping, especially at the time of the harvests leads the beekeepers in the zones where beekeeping is developed to evolve in cooperative in order to profit from the support of the others.

Table VIII. Membership or Not In an Organization

Membership in an organization			
Gender	No	Yes	Total
Female	12	31	43
Male	181	206	387
Total	193	237	430
Percentage	44,88	55,12	100

Source: Field survey, May 2021

Three (03) types of groupings were identified, namely

Men's groups

The men generally form groups to facilitate the implementation of their beekeeping activities, since most of them have agriculture as their main activity.



Fig.10. A group of men in overalls in Ouèssè

Source: Field survey, July 2020

Women's groups

These are groups made up solely of women beekeepers. In Bantè, for example, there is a group of twelve (12) women beekeepers, named "KASSOWOKPO" and formed by the Association of Beekeepers of Bantè (ASAB). These women have an apiary of 11 hives and benefit from the products of the hives. But for the harvest of honey, they benefit from the help of a representative of the ASAB who is put at their disposal to coordinate with them the implementation of their beekeeping activities.

As indicated in Table 8, out of the total number of women surveyed (43), 31 women belong to organizations. Fig.11 shows that nine (09) or 29% of these women are members of the executive committee of their group, which shows their decision-making and leadership capacity.

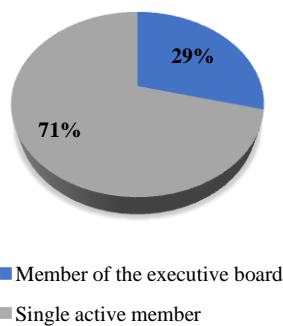


Fig.11. Role of women in the groups

Source: Field survey, May 2021

Mixed groups

These are groups made up of men and women who work in synergy and each with specific roles. In Ouèssè, a group of beekeepers' couples was identified, consisting of 36 members (18 beekeepers with their wives). They have 100 functional

hives and share the profits from their harvest without any other investment or savings.

As regards the role of the members, the men ensure the maintenance of the hives while the women intervene during the harvest and the extraction of honey. Since they do not have a storage warehouse, they sell the honey in bulk. In the said group, it is the women who are in charge of the sale and the treasury of the group, because according to these men, the women are good managers of money.

C. Micro-level Value Chain Analysis: Scope and Impacts

The micro level identifies the constraints that women face within the household that will have implications at the meso and macro levels.

1) Scope and impact of beekeeping on women

Beekeeping is a discreet activity, so anyone can own bees, with no age or gender restrictions. Bees do not need daily care and beekeeping can be practiced in parallel when other activities allow it. The results of this study have allowed us to deduce the duration of work that women as well as men devote to beekeeping varies from 1 to 20 days per month with an average of 10 days of visit of the hives per month.

This means that women spend less time and effort on beekeeping production and have enough free time to attend meetings or trainings. Even if men do not share the workload with them, then there is less gender inequality in the honey value chain.

2) Investment from beekeeping income

Women beekeepers are independent in the management of their beekeeping income.

Fig.12 shows that these women invest for the majority in the acquisition of the beekeeping material, use these incomes for business and for the construction or the improvement of their house. They also invest for the family load and the purchase of kitchen utensils.

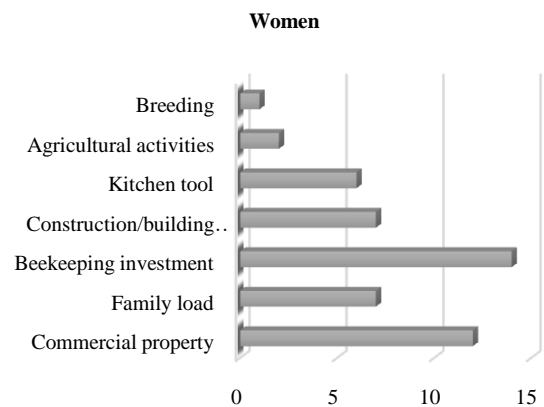


Fig.12. Investment made by women from beekeeping income

Source: Field survey, May 2021

As for the men, as illustrated in fig.13, they invest mainly in the construction or the improvement of their house. Also they use their apiarian incomes to buy beekeeping equipment, to ensure the family load, to buy motorcycles and plots, to use these incomes for business. They also invest in the purchase of kitchen utensils and in their agricultural activities.

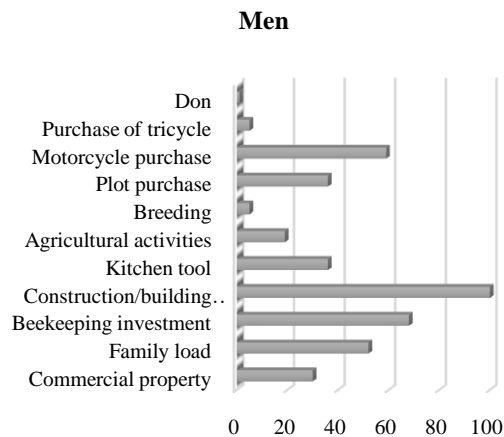


Fig.13. Investment made by men from beekeeping income

Source: Field survey, May 2021

Despite the financial independence of women beekeepers, men still take on family responsibilities within the household and participate in household chores and child rearing to help their wives.

3) Assets and constraints related to the value chain of the beehive product in Benin

Based on the information received during the field surveys, several constraints related to beekeeping activities were identified. Fig.14 presents the hierarchy of these constraints from major to minor. It appears from this figure that theft and vandalism of hives are the major constraints encountered by beekeepers in Benin.

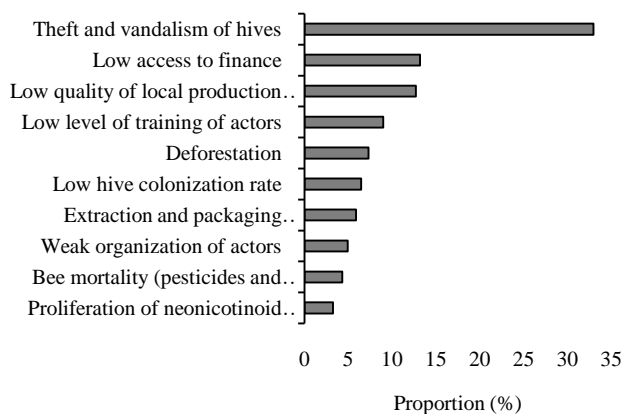


Fig.14. Main constraints related to beekeeping activities

Source: Field survey, May 2021

4) Constraints of women beekeepers in the home

Women beekeepers in Benin do not face major constraints in their households, especially since they do not need to devote much time to beekeeping, which is not the case in agricultural production. However, they do need additional support compared to men, especially for training in honey production techniques as well as in the production of hive by-products such as wax, propolis, royal jelly, etc.

Owning land is not essential, as hives can be placed on any kind of land and beekeeping does not require quality land. Bees collect nectar and pollen wherever they can find it, so pristine, cultivated or abandoned areas are all valuable for beekeeping.

It is imperative for women to be in an organization or network, they would learn more and could participate in more development projects. It is difficult for women to carry out projects independently, however, when they are in a group, they feel more comfortable sharing with other women.

D. SWOT analysis of beekeeping in Benin

After the diagnosis of the constraints and assets related to the apiculture, these last ones were categorized in internal factors (strengths and weaknesses) and external (opportunities and threats) which influence the die chain produced by the hive in Benin as the table below presents.

This allowed for an analysis of the internal and external environment of the hive product value chain in Benin.

Table IX. Swot Analysis

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> Availability of local labor; Availability of honey resources; High demand for honey and wax. 	<ul style="list-style-type: none"> Non mastery of beekeeping techniques by the beekeepers; Weak organization of the value chain; Low involvement of women; Inexistence of an approved center for professional training in beekeeping; Difficult access to beekeeping equipment; Weak involvement of the State in beekeeping activities.
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> Beekeeping production potential Support from Technical and Financial Partners; Access to the European market. 	<ul style="list-style-type: none"> Disappearing bees; Theft and Vandalism of Hives/Hives; Bushfires; Deforestation; Climate hazards; Bee mortality.

Source: Field survey, May 2021

After the diagnosis of the strengths, weaknesses, opportunities

and threats of the hive product sector, a matrix of confrontation (table 10) of these factors was elaborated in order to determine the strategic position in which the beekeeping activities in Benin are located.

Table X. Confrontation Matrix

		Opportunities			Total	Threats						Total
		O1	O2	O3		M1	M2	M3	M4	M5	M6	
Strengths	P1	3	2	3	8	0	2	2	0	0	2	6
	P2	3	1	3	7	3	3	3	2	0	0	11
	P3	3	2	3	8	3	3	3	3	2	2	16
Total		9	5	9	23	6	8	8	5	2	4	33
Weaknesses	F1	3	3	3	9	3	0	0	0	0	0	3
	F2	3	2	3	8	1	3	2	2	2	1	11
	F3	3	1	1	5	0	0	0	0	0	0	0
	F4	3	3	1	7	3	1	2	2	1	0	9
	F5	3	3	3	9	3	3	2	1	0	3	12
	F6	3	3	3	9	3	3	3	3	0	3	15
Total		18	15	14	47	13	10	9	8	3	7	50

Source: Field survey, May 2021

After having carried out the above matrix (table 18), it was obtained as a result that the commodity chain of the hive is located in quadrant IV, quadrant having the highest value (50). This gives the commodity chain a strategic position with a "SURVIVAL" character.

For this purpose, it is imperative to set up strategies being able to allow to reduce the weaknesses in order, on the one hand, to neutralize the threats to which the die is confronted and on the other hand, to seize the opportunities which are offered to her.

These strategies can be summarized as follows:

- Establish measures to combat theft and vandalism of beehives;
- To valorize the products of the hive through the improvement of the techniques of production;
- Improve working conditions for beekeepers;
- To ensure the effective involvement of all stakeholders in beekeeping;
- Effective involvement of the state in beekeeping activities.

V. DISCUSSION

This study analyzed the hive product value chain according to gender in Benin and highlighted the gender approach within the said value chain. The socio-demographic characteristics of the respondents showed that beekeepers in Benin are essentially made up of people between 36 and 70 years of age and that young people under 35 years of age do not practice this activity very much even though they represent a relatively

large proportion of the population. These results are in line with those of [32] when he discovered in Bantè that modern beekeeping is practiced by people between 30 and 80 years old. The young people would prefer to be used as occasional laborers for forestry work. However, with improved or modern beekeeping, awareness-raising work should make it possible to interest young people in this practice; this would contribute to the creation of jobs for this category.

In general, few women are involved in beekeeping activities in Benin which has been proven by [32], [1] and [34]. The present study showed that about 97% of the male beekeepers surveyed are married people and their wives help them in the honey production process. This is confirmed by [15] in their study on the socio-economic and technical characteristics of beekeeping in the departments of Bamboutos, Mifi and Menoua in Cameroon where they showed that the majority of beekeepers in the study area are men (79.6%) aged between 50 and 60 years and 88.5% married with more than 5 dependents. This shows the responsibility of the people practicing beekeeping and having family loads. The repair of the beekeeping actors of Benin according to their profession made it possible to identify agriculture as principal activity for the great majority of the actors and to characterize beekeeping as an activity compatible with other types of activities. This is in accordance with the results obtained in Burkina Faso in 2019 during the census of the Burkinabe beekeepers and beekeeping operators carried out by the Technical Secretariat of beekeeping [21].

Beekeeping in Benin is practiced without discrimination of the level of education with a predominance of more than 41% of those with no education. This situation reveals the existence of endogenous knowledge on the basis of which the uneducated conduct the activity with more or less success [33]. On the other hand, the level of education is one of the determining factors in the good practice of the beekeeping activities. In Zambia, for example, men in beekeeping groups kept records and took minutes during group meetings because they had more years of formal education than women [29].

Regarding the distribution of roles and responsibilities between men and women, it appears that Beninese women, involved in beekeeping activities, participate in activities such as honey extraction, cleaning the apiary which is an activity that often involves cleaning the bushes near and around the hives to keep predators away. This roughly responds to studies by [17] who showed that women's role in beekeeping was to clean the apiary, water the bees and carry the hives to the apiary. Other responsibilities of women in beekeeping are harvesting honey and making wax. These women, who assist their husbands in beekeeping, are relegated to low-skilled activities such as honey extraction and hive maintenance [24]. This has contributed in part to the slow development of the beekeeping industry, given that women contribute about 80 percent of the household food in most African families [30]. Moreover, in Zambia, beekeeping has been primarily a male occupation, which can be explained by several factors: first,

beekeeping is not considered suitable for women for reasons of modesty; second, harvesting honey from traditional hives also requires long absences from home, which competes with women's domestic chores [31]. Furthermore, in Uganda, women are mainly involved in honey processing and marketing compared to other beekeeping practices [6].

In Benin, there are several regulatory and legal provisions relating to women's rights [12]. Among many other laws, there is Law 2007-03 of 16 October 2007 on rural land tenure in the Republic of Benin. This law is very beneficial for women beekeepers as it favors their access to natural resources in general and to agricultural land in particular. This will facilitate their access to land for their beekeeping activities, but these activities are little known by these women, especially those in rural areas, due to the high rate of illiteracy observed in these areas [23]. To this effect, the effective applicability of all these provisions will have a very positive impact on the freedom of choice of these women, on their access to resources and benefits. This leads to the conclusion that Benin offers a favorable environment for gender equality in beekeeping activities.

The women beekeepers of Benin are autonomous in the realization of their beekeeping activities. They invest in everything they need without the obligatory intervention of their husbands and have their own time and devote less effort to beekeeping production. Also their membership in groups and their roles in the executive board of these groups show their decision-making capacity and their leadership. Furthermore, [22] revealed that women's participation in beekeeping is more likely to be within groups, as opposed to individuals, because of shared responsibilities, knowledge and indigenous skills in managing bee colonies. Thus, beekeeping is proving to be a very effective channel for women's socio-economic resilience leading to their economic empowerment [8].

VI. CONCLUSION

The gender analysis of the beehive product value chain allowed for the identification of priority issues in terms of inequality and discrimination in order to propose actions in favor of gender equality. This analysis provided qualitative and quantitative data by gender at the macro, meso and micro levels of the beehive product value chain in Benin with economic perspectives. It revealed that in Benin few women are involved in beekeeping, however some men are assisted by their wives in their beekeeping production. Women have several roles in the honey value chain, the most important of which is honey extraction, but they often lack the experience to negotiate and advocate for themselves, yet negotiation skills are an important starting point for women's empowerment.

In sum, the macro-level analysis of the "beehive product" value chain in Benin focused on the institutional environment and the interrelationships between actors throughout the chain. This angle of analysis made it possible to determine

that the relations are favorable to the development of the chain of value "product of the hive" in Benin. As regards the analysis at the meso level of the value chain "products of the hive" in Benin, it revealed that the men and the women beekeepers generally put themselves in grouping in order to facilitate their practice in beekeeping. Three types of beekeeping groups were identified: groups of men only, groups of women and mixed groups.

Among the latter, there are the traditional groups between men and women, but also groups of couples, i.e. groups of men with their wives. In these groups, the roles are divided according to sex: the men ensure the maintenance of the hives, while the women help the men during the harvest and extraction of honey, but are also in charge of the sale and the treasury of the group. As for the analysis at the micro level of the value chain "product of the hive", the results indicated that the women beekeepers of Benin do not meet major constraints within their household which could have repercussions at the meso and macro levels in their apian activities. This is not the case in agricultural activities where women devote more time and effort, but paradoxically, all the benefits accrue to men.

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