International Journal of Social Science Research and Review

http://ijssrr.com
editor@ijssrr.com
Volume 8, Issue 10
October, 2025
Pages: 133-148

Sustainability of Post-Project Market Gardening Production Systems in the North of Côte d'Ivoire

BALLE Ségbé Guy Romaric

Peleforo Gon Coulibaly University of Korhogo, Côte d'Ivoire

balleromaric@yahoo.fr

http://dx.doi.org/10.47814/ijssrr.v8i10.2946

Abstract

Description of the subject: Evaluating the sustainability of agricultural production systems is a major issue for sustainable development, especially in market gardening sectors supported by development projects. **Objective:** This study aims to analyze the sustainability of market gardening production systems following the implementation of the PROPACOM, PARFACI and PRO2M projects in the department of Korhogo. **Methodology:** A combined approach of quantitative and qualitative methods was used. Thirteen beneficiary groups were surveyed through individual questionnaires and focus groups. Data were analyzed using the IDPM method (Indicators of Sustainability in Market Gardening), which evaluates agroecological, socio-territorial, and economic dimensions. In total, 260 producers mainly women were surveyed using a semi-structured questionnaire and through three (3) focus group discussions. **Results:** The results show that most producers are women aged between 36 and 60, with low literacy levels. The production systems are characterized by intensive use of chemical fertilizers and pesticides. Sustainability scores reveal that the PARFACI and PRO2M perimeters are more sustainable than those of PROPACOM in agroecological and socio-territorial dimensions. However, none of the assessed farms achieved satisfactory economic sustainability. Specifically, the transferability and viability components for the whole projects were revealed as extremely low to provide sustainability to the output of the actions leaded. **Conclusion:** Post-project farming systems face structural constraints, mainly due to limited technical and economic support, which undermines their long-term sustainability. As recommendations, it is imperative to focus on literacy among producers in order to reduce the illiteracy rate and facilitate the mastery of some necessary tools. It is also profitable to encourage the use of organic manure instead of chemical fertilizers, which are too expensive and often dangerous for health.

Keywords: *Production Systems; Market Gardening; Sustainability; Development Projects; Korhogo; Côte d'Ivoire*

Introduction

Agriculture forms the backbone of the economies of Sub-Saharan African countries. Between 1985 and 2015, it contributed between 29.9% and 33.2% of the GDP of West and Central African countries (Ouedraogo, 2019). To promote the development of this sector, numerous programs supporting production and marketing

have been implemented, though with mixed results. Since the publication of the Brundtland Report by the United Nations Commission on Environment and Development in 1987, development has been conceived as a multidimensional process, requiring integration of economic, social, and environmental factors to ensure "Sustainable Development" (Ahouangninou, 2013).

In the agricultural sector, the concept of sustainable agriculture refers to farming that is productive, economically viable, transferable across generations, environmentally friendly, respectful of human health, and capable of addressing the challenge of food security. It has therefore become crucial for states to develop or strengthen tools for analyzing the sustainability of their agricultural production systems (Esnouf & al., 2011). Like other agricultural branches, market gardening is a growing sector, largely due to rising food demand (Maseko & al., 2017). However, this growth does not always align with the principles of sustainable farming, which requires the rational use of natural resources while considering the needs of future generations (Velten & al., 2015).

In Côte d'Ivoire, market gardening is an expanding sector that is attracting increasing attention due to the strong demand for vegetables (Fromageot & al., 2005; Ballé, 2024). The development of irrigated production systems has been supported within the framework of strategies for accelerated growth and sustainable development (Koffi & Dugué, 2001). This dynamic continues today through the National Economic and Social Development Plan, which highlights the sector's significant economic potential, particularly in rural areas (MINAGRI, 2012). However, the sustainable development of market gardening is undermined by the degradation of natural resources caused by unsustainable farming practices, combined with climate change, demographic pressures, and the economic vulnerability of producers (ANADER, 2014). The issue of sustainability is therefore pressing, particularly as agricultural land is no longer extensible and climatic risks remain recurrent.

In the Korhogo department, the market gardening sector provides essential employment opportunities for local women and contributes significantly to the supply of urban markets (Fondio & al., 2011; Kouakou, 2019). The sector has also benefited from several support projects, the most recent being the Agricultural Production and Marketing Support Project (PROPACOM), the Agricultural Value Chains Support Project (PARFACI), and the Cassava and Market Gardening Value Chains Development Support Project (PRO2M). Following their implementation, an assessment of the sustainability of market gardening production systems in the post-project period in the Korhogo department would help consolidate project achievements and, where necessary, propose corrective measures.

1. Methodology

1.1. Materials

The study materials consisted primarily of a questionnaire administered to producers. This instrument collected information on farm characteristics, the three dimensions of sustainability, and the sociodemographic profiles of farmers (men and women). Additionally, an interview guide was developed to conduct discussions with actors responsible for agricultural extension and the regulation of activities. A GPS device was also used to record the geographical coordinates of the production sites.

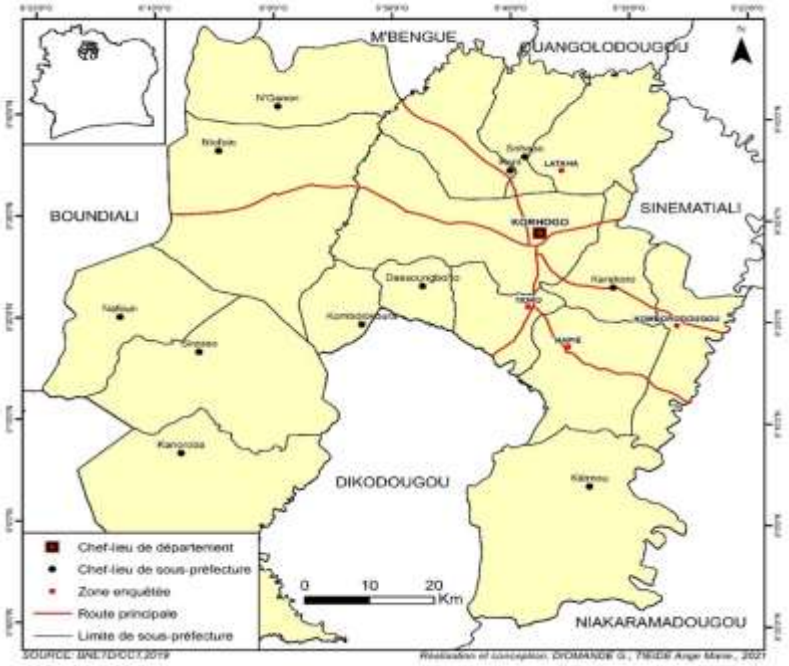
1.2. Methods

1.2.1. Selection of the study area

The study was conducted in the department of Korhogo, located in northern Côte d'Ivoire within the Poro region. The area is characterized by a Sudanian-Sahelian climate, with subsistence agriculture as the dominant activity and a rapidly expanding market gardening sector, largely driven by women (Ballé, 2024).

Thirteen (13) market gardening production sites, distributed across four (4) prefectures, were selected on the recommendation of the producer support agency to represent the beneficiary groups of the PROPACOM, PARFACI, and PRO2M projects (Figure 1).

Figure 1. Map of the Korhogo department showing the localities included in the study



1.2.2. Sampling

A purposive sampling approach was used to select 13 market gardening groups, with one group chosen per locality. The main selection criterion was that the group had benefited from at least one of the three projects under study. In total, 260 producers, the majority of whom were women, were surveyed using a semi-structured questionnaire and through three (3) focus group discussions (Table 1). Within each group, twenty (20) producers were selected by random draw. Their inclusion in the sample ultimately depended on their availability. If a selected producer was unavailable, they were replaced by another accessible producer.

Table 1. Distribution of surveyed individuals by locality and by agricultural program

Projects	Localities	Men	Women
PROPACOM	Sorokaha	0	20
	Kalahaplé	0	20
	Kafiokaha 2	0	20
PARFACI	Dagbaplé	0	20
	Noborikaha	0	20
	Sekonkaha	1	19
PRO2M	Nambodielekaha	0	20
	Lavononkaha	0	20
	Sibirikaha	1	19
	Pokaha	0	20
	Sirasso	0	20
	Tolman	0	20
	Kanihoua	0	20
Total		2	258

1.2.3. Data collection

Primary data were collected from producers using questionnaires and interview guides, following a pre-survey conducted from February 9 to 25, 2023. The main surveys took place in the department of Korhogo, from February 27 to April 6, 2023, on the selected production sites, from Monday to Saturday. Group interviews were also conducted with leaders of producer groups.

The questionnaire sessions lasted between 25 and 35 minutes, depending on the language used, while group interviews lasted approximately one hour. To ensure objectivity in responses, producers were interviewed individually, away from their entourage. The study employed a mixed-methods approach, combining quantitative and qualitative tools for an in-depth analysis of production systems.

1.2.4. Method of sustainability assessment

The evaluation of the farms was based on the IDPM method **(**Indicators of Sustainability of Market Gardening Production), adapted from the IDEA framework (Indicators of Sustainability of Agricultural Holdings) developed by Zahm & al. (2008). Like IDEA, the IDPM is a quantitative and ecosystem-based approach developed within a multidisciplinary working group. This framework makes it possible to quantitatively assess, at the level of a plot or a farm, practices that contribute to sustainable development (Ahouangninou, 2013). For this purpose, 40 indicators were developed.

The evaluation relies on a multi-criteria approach covering three equally weighted sustainability dimensions, each ranging from 0 to 100: These are shown by the Table 2.

- Agroecological sustainability**:** cropping practices, input management, biodiversity, etc.
- Socio-territorial sustainability: local integration, gender, governance, quality of life.
- Economic sustainability: financial viability, efficiency, autonomy, and transferability.

Each sustainability dimension is subdivided into three or four components that characterize the features of a sustainable agricultural system. The agroecological dimension analyzes the system's ability to combine efficient use of natural resources, ecological cost, and techno-economic viability (M'Hamdi & al., 2009). The socio-territorial dimension is measured through indicators relating to human development objectives, quality of life, employment and local development, ethics, and citizenship (Vilain & al., 2008). The economic dimension assesses medium- and long-term performance of the production system through viability, transferability, independence, and efficiency.

In total, the ten components of sustainability, shown in table 2, were subdivided into 40 indicators, each composed of several items. The scores obtained for each dimension were compared across the three projects. The Kolmogorov-Smirnov normality test was applied to assess the distribution of scores and to determine whether to use parametric analysis of variance **(**ANOVA**)** or non-parametric **(**Kruskal-Wallis**)** tests. The Student-Newman-Keuls multiple comparison test was then applied to the dimension scores across projects to form homogeneous subsets (Studer & al., 2009; Laurencelle, 2017).

Table 2: Assessment scale adapted from Zahm & al. (2008)

Components		Indicators		Maximum values
Agroecological Sustainability (A)				
Ecological diversi	A1	Diversity of traditional crops	10	Total limited at 33 unit
	A2	Diversity of exotic cultures	8	
	A3	Associated plant diversity	3	
	A4	Valorization and conservation of genetic herit	5	
	A5	Preservation of biodiversity	7	
Spatial organisati	A6	Crop rotation	13	Total limited at 33 unit
	A7	Plot size	13	
	A8	Crop rotation and succession	7	
Agricultural prac	A9	Fertilization	8	Total limited at 34 unit
	A10	Phytosanitary treatment	6	
	A11	Soil protection	4	
	A12	Water management	3	
	A13	Management of chemical product packaging	6	
	A14	Energy dependence	2	
	A15	Management of organic materials	5	
Socioterritorial Sustainability (S)				
Human developm	S1	Contribution to a balanced diet	7	Total limited at 33 unit
	S2	Training	5	
	S3	Work environment	7	
	S4	Quality of life	4	
	S5	Hygiene and safety at work	8	
	S6	Geographical and sociocultural isolation	3	
Management and quality of product	S7	Harvest quality	13	Total limited at 33 unit
	S8	Production waste management	8	
	S9	Accessibility of space	5	
	S10	Strength of customer relationship network	4	
	S11	Informing customers about product quality	3	
Employment ai local developme	S12	Valorization through the short supply chain	5	Total limited at 34 unit
	S13	Direct contribution through employment	7	
	S14	Collective work	6	
	S15	Job stability	3	
	S16	Acceptability of the setting by the neighborho	3	
	S17	Social involvement	7	
	S18	Participation in the development of policies	2	
Economic Sustainability (E)				
Economic Viabili	E1	Economic viability	20	30 units
	E2	Diversification of production	10	
Independence	E3	Financial autonomy	15	25 units
	E4	Sensitivity to aid	10	
Transmissibility	E5	Transmissibility	20	20 units
Efficiency	E6	Resource use	25	25 units

2. Results

2.1. Characteristics of producers

Table 3 presents the age, education level, gender, marital status, main activity, and years of experience of the market gardening producers. Analysis of the sociodemographic data shows that the producers are overwhelmingly women (99.23%), of whom 75% are between 36 and 60 years old. The majority are married (71.54%) and illiterate (97.31%). Market gardening is the primary activity for more than 77% of the respondents. Seniority in the profession is high, with 68.08% having more than 16 years of experience, and an overall mean of 20.56 ± 11.4 years.

	PROPACOM		PARFACI		PRO2M		Total	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Age								
25-35	02	3.33	04	6.66	23	16.43	29	11.5
36-60	51	85	45	75	99	70.71	195	75
61 and over	07	11.66	12	20	18	12.85	37	14.23
Educational le								
Primary	02	3.33	01	1.67	02	1.43	05	1.92
Secondary	00	00	00	00	02	1,43	02	0.77
Illiterate	58	96.66	59	98.33	136	97.14	253	97.31
Gender								
Male	00	00	01	1.67	01	0.71	02	0.77
Female	60	100	59	98.33	139	99.29	258	99.23
Marital status								
Bachelor	00	00	01	1.67	12	8.57	13	05
Married	46	76.66	42	70	98	70	186	71.54
Divorced	00	00	00	00	01	0.71	01	0.39
Widow	14	23.33	17	28.33	29	20.71	60	23.07
Main activity								
Market garden	42	70	42	70	117	83.57	201	77.31
Others crops	18	30	18	30	23	16.43	59	22.69
Experience (Years)								
1-5	00	00	00	00	11	7.86	11	4.23
6-15	13	21.67	13	21.67	46	32.86	72	27.69
16 and over	47	78.33	47	78.33	83	59.28	117	68.08

Table 3: Sociodemographic characteristics of producers

2.2. Agricultural practices adopted after the three projects

2.2.1. Use of fertilizers

Figure 2 presents the types of fertilizers used by the surveyed producers. Farmers predominantly use chemical fertilizers (NPK, urea), but also organic amendments such as cattle manure (44.61%) and rice bran (21.54%). Poultry manure (7.31%) and cottonseed cake (1.54%) are also used. The average application rates of mineral fertilizers (urea) and organic amendments (manure) on onion cultivation are 333.33 kg/ha and 16.08 t/ha**,** respectively. Regarding plant protection, producers under the PRO2M project reported the highest levels of chemical pesticide use (97.85%), followed by PARFACI (93.3%). PROPACOM producers remained the least intensive users (50%).

2.2.2 Characteristics of market gardening farms

Table 3 presents the main characteristics of market gardening farms. The sources of irrigation water were mainly wells (61.54%), dams (38.46%), boreholes (38.46%), and natural watercourses (11.38%). For water application, the majority of producers (84.62%) used manual watering, while some (15.38%) relied on drip irrigation systems. Motorized irrigation systems were dominant across sites.

Regarding farm size, only 7.69% of producers cultivated plots larger than 1,000 m². The majority worked on plots of 100–500 m² (69.23%) or 500–1,000 m² (23.08%). The average cultivated area was smallest among PRO2M producers (421.14 m²), compared to PARFACI (633.33 m²) and PROPACOM (666.67 m²).

In terms of cropping practices, 47.31% of producers practiced intercropping, while 52.69% opted for crop rotation. With regard to land tenure, all producers cultivated land belonging to the public domain. Labor was predominantly family-based across all production sites. The topography of the market gardening areas consisted entirely of developed plains.

Figure 2: Types of fertilizers used by producers

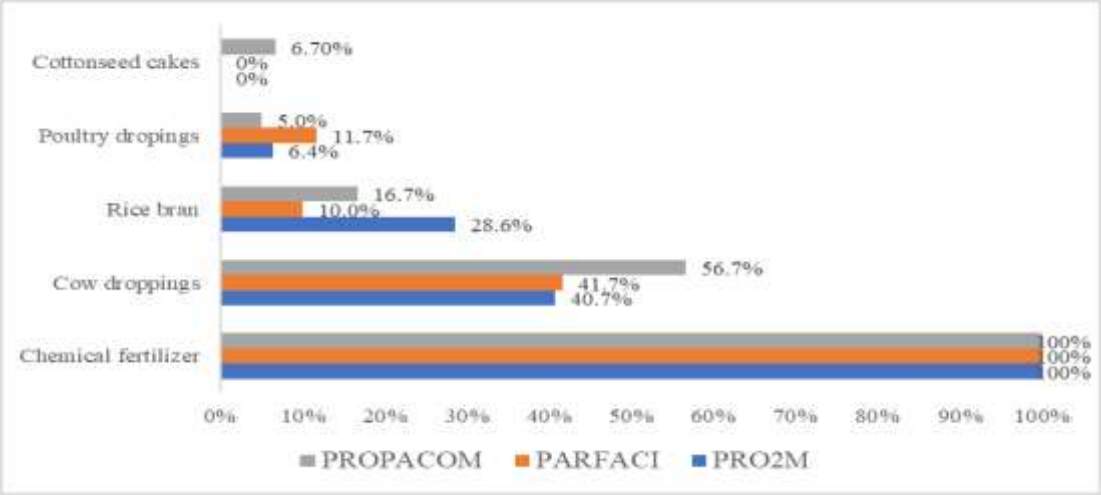


Figure 3: Frequency of use of phytosanitary products

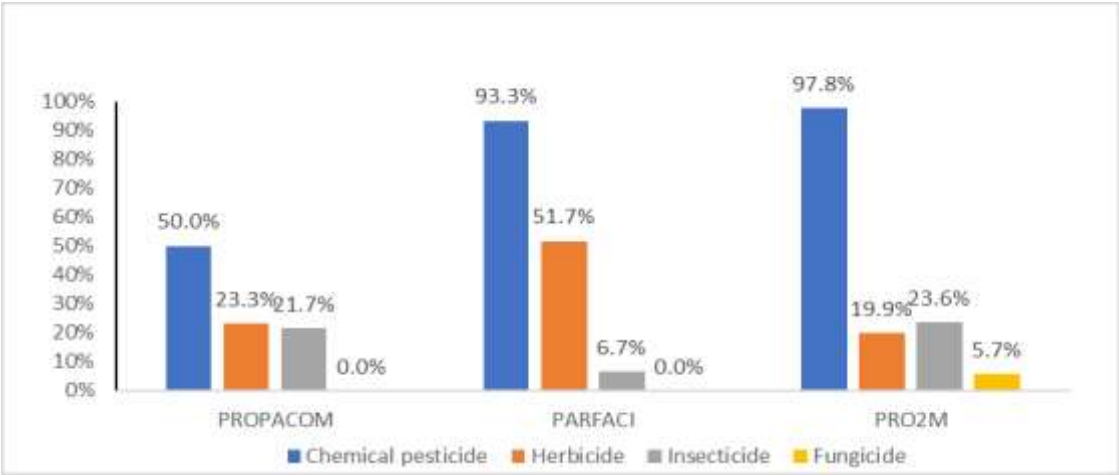


Table 3: Descriptive parameters of market gardening farms by project

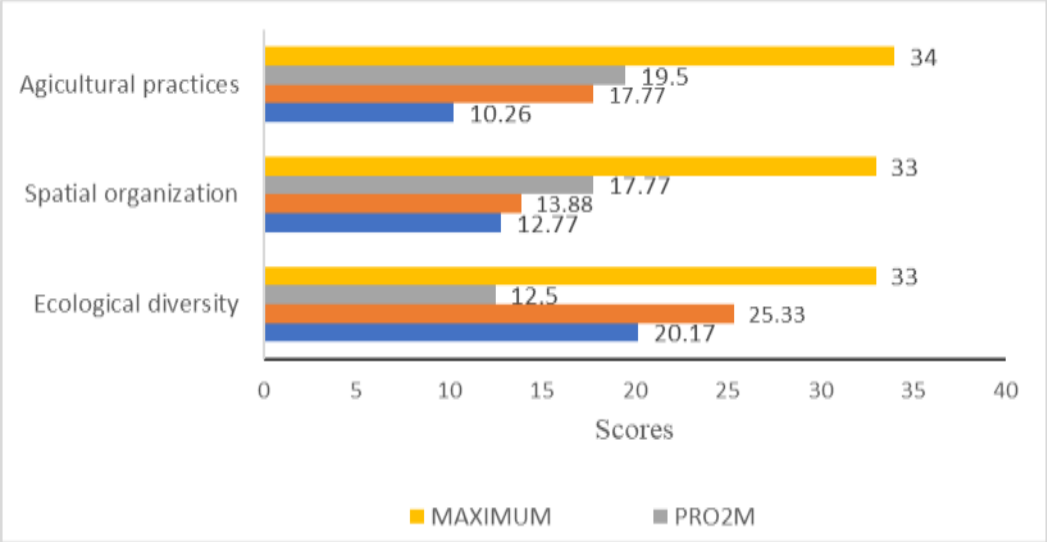
	PROPACOM		PARFACI		PRO2M		Total	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Relief of the plot								
Developed plain	60	100	60	100	140	100	260	100
Shallows	00	00	00	00	00	00	00	00
Area (m^2)								
[100-500[	40	66,7	20	33,3	120	85,7	180	69,2
[500-1000[	20	33,3	40	66,6	00	00	60	23,1
>1000	00	00	00	00	20	14,3	20	7,7
Workforce								
Family	60	100	60	100	140	100	260	100
Employee	00	00	00	00	00	00	00	00
Irrigation systems								
Manuel watering	60	100	20	33,3	140	100	220	84,5
Drip system	00	00	40	66,7	00	00	40	15,4
Water sources								
Well	60	100	20	33,3	80	57,1	160	61,5
Dam	00	00	20	33,3	80	57,1	100	38,5
Boreholes	40	66,7	40	66,7	20	14,3	100	38,5
Natural watercource	20	33,3	00	00	20	14,3	40	15,4
Crop combination								
Association	33	55	43	71,7	47	33,6	123	47,3
Succession	27	45	17	28,3	93	66,4	137	52,7

2.3. Evaluation of the sustainability of market gardening farms

2.3.1. Agroecology sustainability dimension

Figure 4 shows that the components of agroecological sustainability have overall low scores. The "ecological diversity" component displays above-average scores for PARFACI (25.33) and PROPACOM (20.17). The deficit observed at the PRO2M level for this component is made up for by its scores in the "agricultural practices" (19.5) and "spatial organization" (17.77) components of farms. The cumulative sustainability scores establish in ascending order the components spatial organization (44.3), agricultural practices (47.5) and ecological diversity (58). PARFACI's actions induced the highest agroecological sustainability scores (57). This project is followed by PRO2M (49.8) and PROPACOM (43.2).

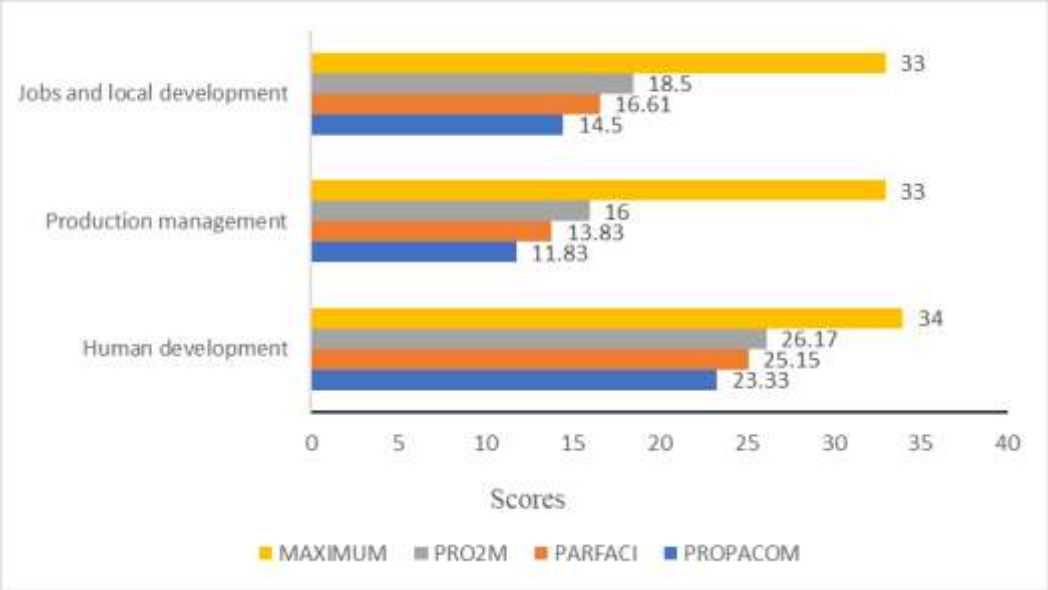
Figure 4: Components of the agroecology dimension



2.3.2 Socioterritorial sustainability dimension

The aspects of socio-territorial sustainability are represented by Figure 5. It appears that apart from the "Human Development" component, the other components have relatively low scores. These values are rarely higher than the average of the maximum score. Indeed, human development records an average score of 25 out of 34 for all projects. PRO2M has the best sustainability score for this component (26.17). The lowest score is held by PROPACOM (23.33). The average scores for the "employment and local development" and "production management and quality" components are respectively 15.53 and 13.92 out of a subtotal of 33. PRO2M's actions have induced the highest socio-territorial sustainability scores (60.67). This project is followed by PARFACI (55.5) and PROPACOM (49.66).

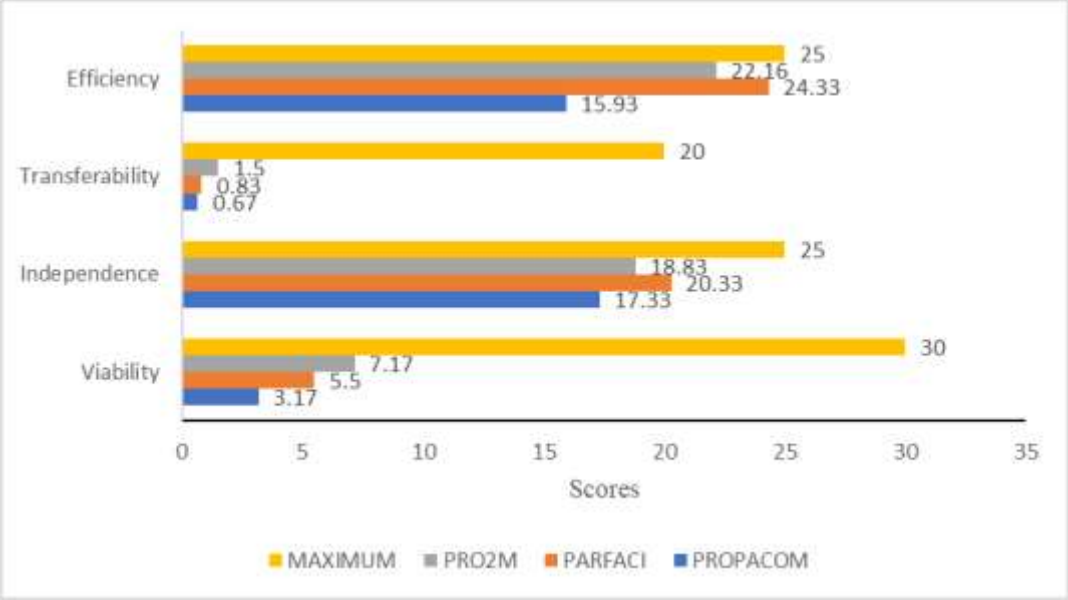
Figure 5: Components of the socioterritorial dimension



2.3.3. Economic sustainability dimension

Figure 6 presents the components of the economic sustainability dimension. It indicates that the "transferability" component has almost zero indices. The average score for this component is equivalent to 1 out of a maximum of 10 for all the projects considered. Otherwise, no project has succeeded in building a mechanism guaranteeing the transferability of program achievements. The "viability" component also displays relatively low sustainability scores with an average of 5.28 out of a subtotal of 30. Among the various aspects studied in this dimension, the "efficiency" component of actions at the farm level reflects the level of satisfaction of producers with regard to the gains obtained. The scores for this component are high for PRO2M (22.16) and PARFACI (24.33) out of 25. In addition, that of PROPACOM is quite low (15.93) compared to the previous ones. Regarding the dimension of economic sustainability, the ascending order of the scores recorded indicates PARFACI (60), PRO2M (49.6) and PROPACOM (37.1). It is worth noting the low score of PROPACOM regarding this dimension.

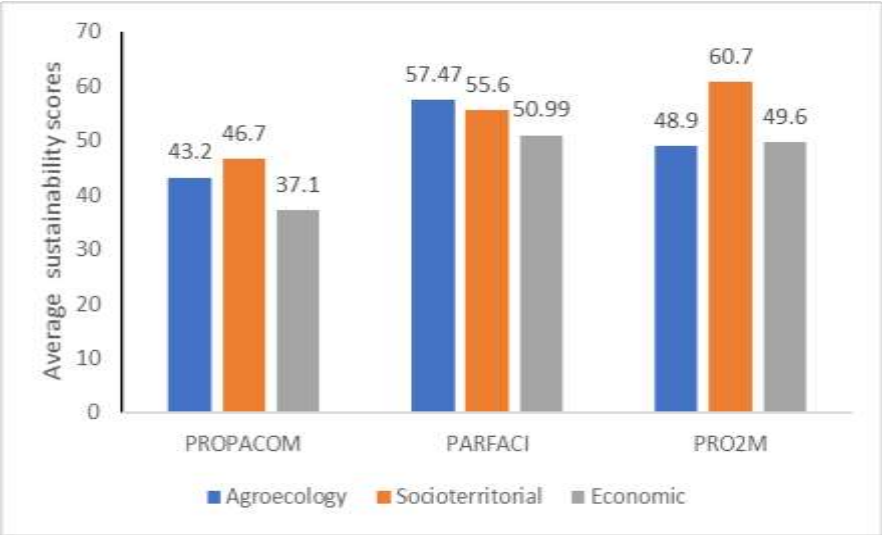
Figure 6: Components of the economic dimension



2.3.4. Overall average sustainability of the three projects perimeters

Figure 7 presents the average overall sustainability of the three projects areas. The average agroecological sustainability is above the median for PRO2M sites (57.47%), but below the median for PROPACOM (43.72%) and PARFACI (49.77%). For socioterritorial sustainability, the average is relatively low for PROPACOM (46.66%) and stands at 55.59% and 60.67% for PARFACI and PRO2M, respectively. With respect to economic sustainability, the average score is relatively closed to the median for PARFACI (50.99%) and PRO2M (49.66%). In contrast, economic sustainability for PROPACOM is markedly weak (37.10%). The analysis using the IDPM method highlights contrasting results across dimensions. The PRO2M and PARFACI perimeters show the best performance, particularly in agroecological and socio-territorial dimensions. However, economic sustainability remains only moderate for PRO2M and PARFACI and weak for PROPACOM, reflecting low financial autonomy and limited profitability overall.

Figure 7: Overall sustainability of the farms



Since the Kolmogorov-Smirnov normality test indicated that the sustainability scores for the three dimensions did not follow a normal distribution, a non-parametric analysis of variance was performed using the Kruskal-Wallis test. The results are summarized in the hypothesis tests presented in Table 4. Overall, there are statistically significant differences between the sustainability scores across dimensions for the three projects **(**P-value = 0.000**).** The PARFACI and PRO2M perimeters stand out as more sustainable than PROPACOM across all evaluated dimensions.

The multiple comparison test on the economic sustainability scores of the market gardening production systems shows a relative similarity between the PARFACI (51%) and PRO2M (49.8%) projects.

Table 4: Summary of hypothesis testing (Kruskal-Wallis Test)

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of "agroecological" scores is identical across project categories	Kruskall-Wallis test of independent samples	0.000	Null hypothesis rejected
2	The distribution of "socioterritorial" scores is identical across project categories	Kruskall-Wallis test of independent samples	0.000	Null hypothesis rejected
3	The distribution of "économic" scores is identical across project categories	Kruskall-Wallis test of independent samples	0.000	Null hypothesis rejected

The significance level is 0.05

3. Discussion

The analysis of the data shows that market gardening in Korhogo is practiced predominantly by women (99.23%), compared to only 0.77% of men. This imbalance is explained by the importance of this activity for women's income, while men generally prefer cash crops such as cotton, cashew, and mango. These results are consistent with Boitini (2013), who also noted strong female involvement in Korhogo, unlike in Abidjan, where, according to Traoré (2022), market gardening is largely male-dominated (77.98%).

Beneficiaries of the PROPACOM and PARFACI projects have longer experience in market gardening than those of PRO2M, due to the older age of the first two projects (around 10 years), compared to the more

recent PRO2M (less than 6 years), composed mainly of young beginner producers. The majority of producers (97.31%) are illiterate, with an average of 20 years of experience, and 77.31% consider market gardening their main activity. From childhood, they are involved in agricultural work. These findings align with Tujague (2001), who observed a high rate of illiteracy among market gardeners in Bouaké, often linked to the priority given to farm work over schooling, especially among rural women.

Market gardening in the three post-projects in Korhogo is mostly conventional, characterized by heavy use of chemical inputs to improve yields and control pests. This trend is largely due to the high cost of organic inputs. These results confirm those of Koné & al. (2018) in Abidjan and Traoré (2022) in Korhogo, who also observed the predominance of conventional systems in market gardening production.

The agroecological dimension evaluates sustainability through crop diversity, which is essential for the functioning of agroecosystems. The PARFACI, PROPACOM, and PRO2M perimeters recorded relatively high scores, indicating good diversification, partly due to seeds supplied by the projects. These findings support Emanuele & al. (2016), who showed that diversification is a strategy to cope with uncertainties. However, in the "spatial organization" component, PROPACOM and PARFACI perimeters performed poorly compared to PRO2M, which was considered more sustainable. This suggests limited adoption of sustainable land-use practices, even though they are beneficial for soil fertility. These results agree with Morel (2016), who noted that in vulnerable areas, pressure on limited land pushes farmers to intensively exploit available space. Similarly, the "farming practices" component showed low sustainability in PROPACOM and PARFACI perimeters, unlike PRO2M, which demonstrated notable improvements. This situation is linked to the excessive use of chemical pesticides, sometimes diverted from cotton production, which damages soil biodiversity. Such observations echo Ahouangninou (2013), who emphasized that in southern Benin, farmers often overdose pesticides without respecting management and storage standards.

The socio-territorial dimension assesses farmers' quality of life and their contribution to local development. The "human development" component recorded high scores across all perimeters, thanks to regular training sessions that improved farming practices and hygiene. These results contrast with Ahouangninou (2013), who highlighted the negative effects of a lack of training on hygiene, safety, and compliance with technical recommendations. The "management and quality of production" component, however, displayed low sustainability across all areas, due to limited cooperation among producers and information asymmetry, reflecting the strenuous nature of the work. These findings align with Van & al. (2015), who stressed that the socio-territorial sustainability of market gardening farms is constrained by the lack of quality assurance processes and decent working conditions, driving farmers toward more input-intensive systems. The "employment and local development" component was more sustainable in PRO2M and PARFACI than in PROPACOM, reflecting producers' engagement and the positive impact of market gardening on local employment in Korhogo. This corroborates Ouédraogo (2019) in Burkina Faso, who showed that structured rural market gardening fosters employment and stimulates local development.

The economic dimension measures profitability, efficiency, independence, and transferability. The "economic viability" component was found to be non-sustainable across all perimeters, mainly due to constraints such as pest attacks, plant diseases, and the lack of automated irrigation systems. These factors limit short-term profitability, a finding similar to Ndjadi (2021) in the Democratic Republic of Congo. The "independence" component, however, was sustainable across all perimeters, based on financial autonomy and low dependence on external aid. Farms received agricultural inputs, some repayable after harvest and others free of charge. These findings mirror those of Fondio & al. (2011) in Bouaké, where market gardeners in associations also benefited from repayable or free inputs. The "transferability" component was deemed unsustainable across all perimeters, as younger generations, often educated, are not motivated to take up market gardening due to its labor-intensive nature. This observation is consistent with Ouédraogo (2019), who noted that market gardening remains unattractive to younger generations. Conversely, the "efficiency" component was sustainable across all perimeters, reflecting effective resource use. This can be explained by producers'

experience, productivity gains, profitability, and the growing interest in market gardening, particularly in rural areas where land is more available. These results confirm those of Boitini (2013).

Overall, the farms supported under the PARFACI and PRO2M projects exhibited greater sustainability than those of PROPACOM, likely due to the longer duration and greater impact of these projects. Testimonies further indicate that PROPACOM generated less satisfaction in terms of technical and organizational outcomes compared to the other two projects.

Conclusion

This study was conducted with the aim of contributing to the promotion of sustainable market gardening that respects the environment and human health in the Korhogo department. In the area, the conventional system is the most dominant in the different farms. It aimed to promote sustainable market gardening in Korhogo, with practices respectful of both the environment and human health. Market gardening, practiced by 99.23% women, most of whom are non-schooled, remains an important source of income despite constraints such as damage caused by cattle and limited access to water, which have led 43% of beneficiaries to abandon the activity.

The sustainability analysis, based on the IDPM method, shows that overall, farms achieved scores above the median for the agroecological, socio-territorial, and economic dimensions, although economic sustainability was slightly weaker. At the socio-territorial level, the components “human development” and “employment and local development” performed positively, despite weaknesses in “management and production quality”.

Economically, the farms were marked by low scores in efficiency, profitability, and transferability to younger generations. Indeed, the transmissibility of farms to future generations is a weakness in the economic sustainability of farms revealed by the "viability" and "Transmissibility" components. Methodologically, the study led to the application of a contextual IDPM assessment tool that is intended to be applicable and adaptable to other agricultural contexts in tropical Africa.

Statistically, the PARFACI and PRO2M projects recorded higher sustainability scores compared to PROPACOM. Results relating to the economic sustainability of market gardening production systems showed a relative similarity between PARFACI (51%) and PRO2M (49.8%), according to the multiple comparison test.

As recommendations, it is imperative to focus on literacy among producers in order to reduce the illiteracy rate and facilitate the mastery of some necessary tools. It is also profitable to encourage the use of organic manure instead of chemical fertilizers, which are too expensive and often dangerous for health.

Acknowledgments:

Sincere thanks to the officials of the Poro Regional Office of the Ministry of State, Ministry of Agriculture, Rural Development and Food Production, and to those of the Training and Development Advisory Office, for making this study possible.

References

Ahouangninou, C. (2013). Durabilité de la production maraîchère au sud- Bénin : un essai de l'approche écosystémique. Thèse en Gestion de l'Environnement, Université d'Abomey-Calavi, (Cotonou, Bénin), 358 pages. https://agritrop.cirad.fr/572410/

ANADER. (2014). Rapport provisoire. Etude diagnostic opérationnelle de la filière légumes dans les régions administratives de mise en œuvre du PARFACI. Projet PARFACI 002/FIRCA/DCARA/PARFACI, CTB Coopération Belge, Ministère de l'Agriculture de Côte d'Ivoire, 80 pages.

Ballé, S. G. R. (2024). Le maraichage urbain et périurbain face à la raréfaction des facteurs de production dans la ville de Korhogo (Côte d'Ivoire). Revue Africaine d'Environnement et d'Agriculture, 7(4) :56-66

https://www.researchgate.net/publication/389011812_Le_maraichage_urbain_et_periurbain_face_a_la_rarefaction_des_facteurs_de_production_dans_la_ville_de_Korhogo_Cote_d'Ivoire

Boitini, A. (2013). Usage des pesticides en cultures maraîchères urbaines et périurbaines de la ville de Korhogo. Mémoire de Licence, Université Peleforo GON COULIBALY, (Korhogo, Côte d'Ivoire), 34 pages.

Emanuele, Z. Amy F., Yacine, N. & Raisha, D. (2016). Analyse de la durabilité des exploitations maraichères dans le bassin arachidier à travers la méthode IDEA/IDPM. Rapport PAPSEN, Programme d'Appui au Programme National d'Investissement de l'Agriculture du Sénégal, *Coopérative Italienne au développement*, 26 (1) : 5-38. DOI:10.13140/RG.2.2.29683.84006.

Esnouf, C., Russel M. & Bricas, N. (2011). Line-durabilité de l'alimentation face à de nouveaux enjeux. Questions à la recherche. Rapport Inra-Cirad, France, 238 pages. https://agritrop.cirad.fr/561420/1/document

FIRCA. (2018). Projet d'appui à la mise en marché des produits issus des périmètres maraîchers des régions du Gontougo, du Poro, du Tchologo,du Bélier et du Gbéké (PRO2M).Rapport final,C2D,Côte d'Ivoire, 35 pages.

Fondio, L. (2007). Caractérisation des systèmes de production des légumes-feuilles en zones urbaines et périurbaines d'Abidjan et de Yamoussoukro en Côte d'Ivoire. Convention CNRA/ FIS– Coraf (K/3889-1), 16pages. https://ftech.byethost7.comtent/uploads/2022/08/DGN701.pdf

Fondio, L. Kouamé, C., Djidji, A.H. & Traore, D. (2011). Caractérisation des systèmes de culture intégrant le gombo dans le maraîchage urbain et périurbain de Bouaké dans le Centre de la Côte d'Ivoire. *International Journal Biological and Chemical Sciences*, 5 (3): 1178-1189. DOI:10.4314/ijbcs.v5i3.72251.

Fromageot, A., Parent, F. & Coppieters, Y. (2005). Femmes, culture maraîchère et recours aux soins en Afrique de l'Ouest. *Sciences Sociales et Santé*, 23 (4) : 49-70. DOI:10.3406/sosan.2005.1665.

Koffi, R. M .E. & Dugué, P. (2001). Le système de production maraichère dans la région de Bouaké : cas du village péri-urbain d'Allokokro. CIRAD, (Montpellier, France), 39 pages. http://agritrop.cirad.fr/487003/

KOUAKOU, K. P. A. (2019). Déterminants économiques et impact social du secteur maraicher dans la commune de Boundiali. *Agronomie Africaine*, N° Spécial (8)- AGRIEDAYS, 11p. https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.ajol.info/index.php/aga/article/view/192421/181531&ved=2ahUKEwjOx7HAkvWIAxUfVfEDHWLTI-wQFnoECA0QAQ&usg=AOvVaw3zpE4ur-q6XCj-2a1lI7IR

Koné, M., Anoh, M., Beda, E. & **Coulibaly, M. (2018)**. Etude sur les filières et chaines de valeur prometteuses dans les régions du Gbeke, Poro, Tonkpi et du District d'Abidjan. Direction des Etudes et de la Consultance. Projet ANADER / Femmes en Entreprise /, 137 pages. http://fr.scribd.com/document/520490716/ETUDE-SUR-LES-FILIERES-ET-CHAINES-DE-VALEUR-PROMETTEUSES

Laurencelle, L. (2017). The unweighted "harmonic mean" solution for unbalanced ANOVA designs: A detailed argument. *The Quantitative Methods for Psychology*, 13(1): 95-104. https://www.tqmp.org/RegularArticles/vol13-1/p095/p095.pdf

Maseko, I., Mabhaudhi, T., Tesfay, S., Tesfamicael, H., Fezzehazion, M. & **Du Plooy C. (2017)**. African Leafy Vegetables : A revew of status, production and utilization in south africa. *Sustainability*, 10 (2): 1-16. DOI : 10.3390/SU10010016.

MINAGRI. (2012). Filière de cultures maraîchères. Rapport d'activités 2012. Ministère de l'Agriculture, Direction Régionale des Savanes, Côte d'Ivoire, 53 pages.

Morel, K. (2016). Viabilité des microformes maraîchères biologiques. Une étude inductive combinant méthodes qualitatives et modélisation. Thèse en Agriculture, Alimentation, Biologie, Environnement et Santé (ABIES), Spécialité : Sciences Agronomiques, Université de Paris Saclay, (Paris, France), 354 pages. https://theses.fr/2016SACLA023

Ndjadi, S.S. (2021). Systèmes de culture et durabilité des pratiques agricoles au Sud-Kivu (République Démocratique du Congo). Thèse en Sciences Agronomiques et de l'Eau. Spécialité : Horticulture et Systèmes Culturaux, Université d'Abomey-Calavi, (Cotonou, Bénin), 175 pages. http://repository.ruforum.org/system/tdf/FINAL%20Serge%20Ndjadi%20PhD%20Thesis.pdf?file=1&type=node&id=39473&force=

Ouédraogo, F. (2019). Analyse de la durabilité des exploitations maraîchères du Burkina Faso : essai d'une approche socio-écosystémique (cas de la Province du Houet). Thèse en Sciences Politiques et Sociales, Université de Liège, (Liège, Belgique), 112 pages.

STUDER, M., RITSCHARD, G., GABADINHO, A. & MÜLLER, S.N. (2009). Analyse des dissimilarités par arbre d'induction. Actes de colloques, Extraction et Gestion des Connaissances, Strasbourg 27-30 janvier 2009.https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.researchgate.net/publication/220787013_Analyse_de_dissimilarites_par_arbre_d%27induction&ved=2ahUKEwiIvuHq9vSOAxWWcaQEHQBqOJ0QFnoECBcQAQ&usg=AOvVaw18UOzpxvXxmVT8_t_RIG52

Tano, B.F., Abo, K., Dembélé, A. Fondio, L. (2011). Systèmes de production et pratiques à risque en agriculture urbaine : cas du maraîchage dans la ville de Yamoussoukro en Côte d'Ivoire. *International Journal Biological and Chemical Sciences*, 5 (6): 2317-2329. DOI:10.4314/ijbcs.v5i6.12.

Traoré, A. J. F. (2022). Analyse socioéconomique de la chaine de valeur des cultures maraichères dans la zone de Korhogo, au Nord de la Côte d'Ivoire. Mémoire de Master, Université Peleforo GON COULIBALY, (Korhogo, Côte d'Ivoire), 59 pages. https://agritrop.cirad.fr/604171/1/Traor%C3%A9%20-%202022%20-%20Analyse%20socio%C3%A9conomique%20de%20la%20cha%C3%AEne%20de%20valeur%20des%20cultures%20mara%C3%AEch%C3%A8res%20dans%20la%20zone%20de%20Korhogo.pdf

Tujague, L. (2001). Enjeux socio-économiques du maraîchage en zone de plantation : le cas de la tomate dans la région du Centre-Est de Côte d'Ivoire. Thèse en Histoire et Société Rurale, Université Toulouse Le Mirail, (Toulouse, France), 135 pages. https://theses.fr/2001TOU20012

Van Vliet, J., Schut, A., Reidsma, P., Descheemaeker, K., Slingerland, M., Van der Ven, G. & Giller K. (2015). De-mystifying family farming: Features, diversity and trends across the globe. *Global Food Security*, 5( ): 11-18. DOI:10.1016/j.gfs.2015.03.001.

Velten, S., Leventon, J., Jager N. & Newig J. (2015). What is sustainable agriculture? A systematic review. *Sustainability*, 7 (6): 7833-7865. DOI:10.3390/su7067833.

Vilain, L., K., Boisset, P., Girardin, A., Guillaumin, C., Mouchet, P., Viaux, F., & Zahm, F. (2008). La méthode IDEA, Guide d'utilisation, Troisième édition Educagri, Dijon, France. 339p.

https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.creseb.fr/voy_content/uploads/2023/08/methode_IDEA4_indicatateurs_durabilite_exploitations_agricoles.pdf&ved=2ahUKEwir3K_bm_uOAxWAUqQEHT0EKOIQFnoECBYQAQ&usg=AOvVaw2GIiaf4qKtdfXdB_XZ2CgM

Zahm, F., Viaux, P., Vilain, L., Girardin, P. & Mouchet, C. (2008). Assessing farm sustainability with the IDEA method – From the concept of agriculture sustainability to case studies on farms. *Sustainable developpement*, 16 (4) : 271-281. DOI:10.1002/sd.380.

Copyrights