

Determinants Affecting the Efficient Use of Food Assistance for the Creation of Productive Assets by Internally Displaced Persons for Sustainable Empowerment in Sanmatenga Province of Burkina Faso

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Abstract

In response to the consequences of the security crisis and climate change on food and nutrition security, the World Food Programme (WFP) initiated the Food Assistance for Asset Creation (FFA) program. This program aims to strengthen the resilience of vulnerable communities and households in the Sanmatenga province. The present study was conducted to analyze the factors influencing the efficient use of this assistance, with the goal of sustainably increasing the resilience level of vulnerable populations. Data were collected via mobile phone using the Kobocollect application from 367 beneficiaries, including both host communities and internally displaced persons, spread across ten villages in the communes of Boussouma, Korsimoro, and Ziga. The data analysis relies on descriptive statistics, and the Data Envelopment Analysis (DEA) method is used to calculate efficiency scores, along with a censored Tobit regression model to identify the explanatory factors of efficiency. The results reveal an average efficiency score of 60.83% for the vegetable garden of Foutirgui and 77.03% for the rice-growing basin of Goaragui. The analysis of efficiency determinants shows a significant influence, at the 5% level, of several variables. Thus, age, experience, literacy, training, membership in a farmers' organization, and access to agricultural information had a positive effect on efficiency, while household size only had a negative effect. In addition to the empirical analysis variables, the adverse effect of pedoclimatic factors on the production level is also noted.

Keywords

Food Assistance, Productive Assets, Efficiency, Sustainable Empowerment, Burkina Faso

1. Introduction

The population of Burkina Faso was estimated at nearly 20,505,155 inhabitants in 2019 [1]. The agricultural, forestry, pastoral, fisheries, and wildlife sector employs 63.3% of the active population [2]. This population primarily engages in traditional and rainfed agriculture, which is exposed to Sahelian climatic and health hazards: erratic rainy seasons, floods, locust invasions, epizootics, and high price volatility [3]. Although the economy is dominated by the agricultural sector, food and nutritional security remains one of the major issues in Burkina Faso. This situation is explained by several factors, including insecurity and conflicts that lead to forced population displacement, climatic and economic shocks at local and global levels, as well as the impacts of the Russo-Ukrainian crisis [4]. The annual increase of 11.4% in the number of internally displaced persons between 2022 and 2023 is likely to exacerbate these problems [5]. Particularly in the Central-North region, nearly 40% of the land is cultivated for vegetable farming, and a significant part of the fields are almost inaccessible due to insecurity [6]. In this context, the World Food Programme (WFP), in partnership with the Government of Burkina Faso, is implementing initiatives aimed at strengthening the resilience of vulnerable communities. Its efforts focus on increasing their incomes, improving access to infrastructure and basic social services, and building assets, in order to sustainably consolidate their livelihoods. In this context, the Food Assistance for the Creation of Productive Assets (FFA) initiative occupies a central place. It specifically aims to develop agricultural assets intended to directly or indirectly enhance the food security of targeted communities and to promote sustainable management of natural resources [7]. To ensure the profitability of these assets, the operator must acquire a level of expertise that allows them to optimally manage technical and economic challenges simultaneously [8]. Consequently, sustainable strengthening of the resilience of populations necessarily relies on efficient management of these resources. It is therefore crucial to identify the factors that may hinder their optimal use.

2. Materials and Methods

2.1. Presentation of the Study Area

The study was conducted in the Sanmatenga province, in the Centre-North region of Burkina Faso. The Centre-North region is located between the parallels 12° 40'1; 14° North (N) and the meridians 0° 15; 25° West longitude (W). The sample covers ten villages from three municipalities, including six villages from the Bous-

souma municipality (Damiougou, Foutirgui, Goaragui, Guilla, Tanhoko), three villages from the Korsimoro municipality (Boalin, Sabouri-Tansobdogo, Wara), and two villages from the Ziga municipality (Niongtenga, Pissiga) (**Figure 1**).

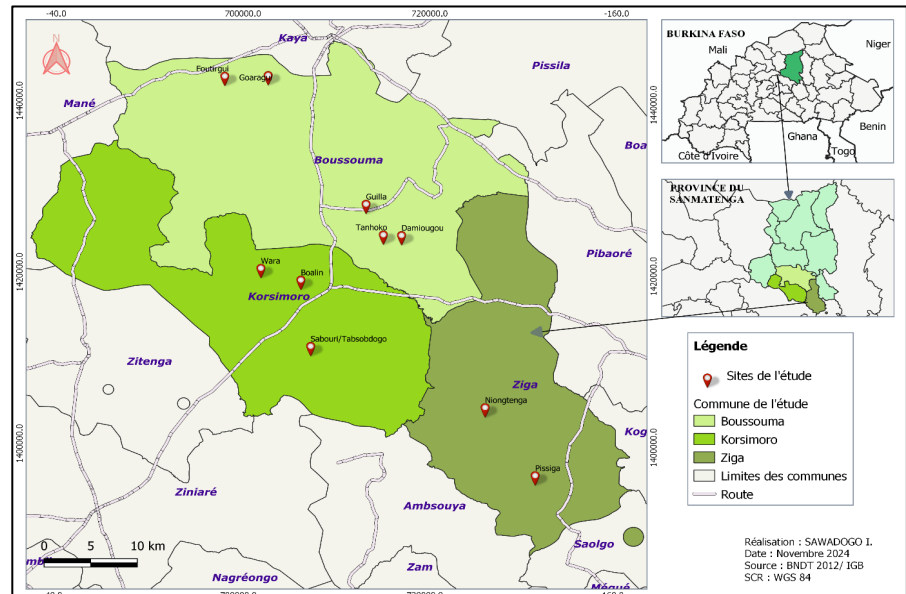


Figure 1. Map of study area.

2.2. Study Material

This study was conducted among recipients of food assistance for the creation of productive assets. It includes host communities and internally displaced persons. The equipment used for conducting the study mainly consists of a smartphone equipped with the KoboCollect application, which is used for administering the questionnaire.

2.3. Methods of the Study

2.3.1. Sampling

For the determination of the factors influencing the efficiency of the beneficiaries of the FFA program, four criteria guided the selection of villages to be surveyed: security accessibility, the presence of IDPs benefiting from the FFA program, the duration of WFP intervention, and the creation and use of productive assets. Indeed, regarding the accessibility criterion, the villages chosen were those that had not experienced terrorist attacks and were accessible from the town of Kaya. Additionally, the selected villages hosted IDPs who had benefited from the program for at least two years. With respect to the duration of intervention, the villages considered were those that had benefited from the FFA program interventions since 2022 or earlier. As for the creation of productive assets, it mainly concerns the distributed inputs and the work of recovering or developing land intended for agricultural production by host communities and internally displaced persons. The recovered or developed land was utilized during the 2022-2023 agricultural season.

In the identified villages, the surveyed individuals were chosen from among the beneficiaries of the FFA program. These beneficiaries include host communities and IDPs who participate in FFA activities for resilience. The selection of respondents was done randomly, taking into account their status as food assistance recipients in terms of livelihoods, as well as their involvement in carrying out agricultural production activities during the 2022-2023 wet agricultural season on land recovered or developed under the FFA program. Given that there are often multiple beneficiaries within the same household, only one beneficiary was chosen. Thus, emphasis was placed on household diversity to account for the variability of different characteristics of the respondents.

2.3.2. Data Collection

The collection of primary data focused on both quantitative and qualitative data. It was conducted through surveys carried out with the beneficiaries of the FFA program. In addition to the surveys, semi-structured interviews were conducted with the organizations responsible for the implementation and monitoring of the FFA program activities, namely ten representatives from the Village Development Committee (CVD) offices of the identified villages, as well as WFP partner organizations, particularly the Regional Directorate of Agriculture, Animal Resources, and Fisheries of the Central North (DRARAH-CN), including the WFP Focal Point and seven officers from the Technical Agricultural Support Units (UAT) in the study area, and the AVAD Association through the Resilience Project Officer. These interviews allowed for the preliminary collection of qualitative data on the management of the FFA program.

2.4. Data Analysis

The primary data collected from the Kobocollect application were transferred to the KoboToolbox platform. These data were then retrieved in the Microsoft Excel 2016 spreadsheet for the creation of graphs and the conduction of various statistical analyses. Three types of statistical analyses were performed on the collected data, namely descriptive statistics, efficiency score measurement, and econometric modeling. Descriptive statistics were used to summarize the sociodemographic, economic, and institutional characteristics of the beneficiaries, the characteristics of the agricultural extension services (FFA), as well as the contribution of the FFA to the empowerment of beneficiaries in the Sanmatenga province. IBM SPSS software was used to determine the values of statistical parameters, including means, standard deviations, percentages, etc.

In this study, the DEA method in variable returns to scale mode was used. Thus, each beneficiary was considered a decision-making unit (DMU) that transforms inputs into outputs. This method provides a composite assessment of household efficiency by simultaneously synthesizing several partial efficiency measures. It allows identifying which households have the best practices among the studied sample based on each household's distance from the efficiency frontier [9]. The distance separating inefficient households from the efficiency frontier (where the best

practices are located) is measured using the efficiency score.

The calculation of efficiency scores in this study is based on the input-oriented model. In an input orientation, the DEA model minimizes inputs for a given level of outputs; in other words, it indicates by how much an organization can reduce its inputs while producing the same level of outputs. The rationale for choosing this method is that it aligns with farmers having control over inputs rather than outputs, which are mostly related to climatic hazards. In an output orientation, the DEA model maximizes outputs for a given level of inputs. In other words, it indicates by how much an organization can increase its outputs with the same level of inputs [10]. According to [11] (or the Charnes, Cooper, and Rhodes (CCR) method), the efficiency of a decision-making unit “k” is the solution to the following problem:

$$\text{Maximise } TE_k = \frac{\sum_{r=1}^s u_r y_{rk}}{\sum_{i=1}^m v_i x_{ik}} \quad (1)$$

under
constraints:

$$\frac{\sum_{r=1}^s u_r y_{rj}}{\sum_{i=1}^m v_i x_{ij}} \leq 1 \quad j = 1, \dots, n$$

$$u_r, v_i > 0 \quad \forall r = 1, \dots, s; i = 1, \dots, m$$

with:

1. TE_k is the technical efficiency score of the decision-making unit “k” using m inputs to produce s outputs;
2. y_{rk} is the amount of output r produced by “k”;
3. x_{ik} is the amount of input i consumed by “k”;
4. u_r is the weight of the output r ; v_i is the weight of the input i ;
5. n is the number of households to be assessed; s is the number of outputs;
6. m is the number of inputs.

Efficiency scores were determined using the Win4DEAP2 software. The model variables are divided into inputs and outputs. The inputs selected are those mainly used for production on land reclaimed or developed under the FFA program. These include cultivated areas, seeds used, fertilizers (both organic and mineral), and labor in terms of agricultural workers. As for the outputs, these are the products and crop residues obtained to meet the needs of the beneficiaries.

In this part of the study, the aim is to establish the relationship between the level of efficiency (efficiency score) in the use of FFA and the variables related to the sociodemographic, economic, and institutional characteristics of the FFA program beneficiaries. The predominant method in the literature for finding the determinants of efficiency gaps among farms is Tobit regression analysis [12] [13], because efficiency scores are censored at the maximum value of efficiency scores, which range between 0 and 1. The Tobit regression model takes the form of the equation below:

$$TE = \begin{cases} \alpha + \beta X_i + \varepsilon_i, & \text{if } 0 < TE \leq 1 \\ 0, & \text{otherwise} \end{cases} \quad (2)$$

with:

TE is the efficiency score or the dependent variable;

α is a constant that represents the value of the y-intercept;

β is the vector of coefficients affecting the explanatory variables;

X_i refers to the set of explanatory variables;

ε_i constitutes the model error term, which differs from one observation to another.

The Stata software was used for modeling. The variables selected to explain the efficiency of FFA use are described in **Table 1**.

Table 1. Variables used in the Tobit regression model.

N°	Variable	Codes	Type	Items
Explained variable				
1	Efficiency score	TE	Quantitative	Between 0 and 1
Explanatory variables				
2	Gender	Sex	Qualitative	0 = Female; 1 = Male
3	Age	Age	Quantitative	---
4	Level of education	Educ	Qualitative	0 = None 1 = Quranic 2 = Literate 2 = Primary 3 = Secondary 4 = University
5	Experience	Exp	Qualitative	1 = Less than 5 years 2 = Between 5 and 10 years 3 = More than 10 years
6	Household size	Size	Quantitative	---
7	Farmers' organization	Orga	Qualitative	0 = No; 1 = Yes
8	Access to information	Info	Qualitative	0 = No; 1 = Yes
9	Access to training	Train	Qualitative	0 = No; 1 = Yes
10	Access to extension service	Exten	Qualitative	0 = No; 1 = Yes
11	Land size	SizeL	Quantitative	
12	Access to credit	Credit	Qualitative	0 = No; 1 = Yes

3. Results

3.1. Sociodemographic and Economic Characteristics of Beneficiaries

The characteristics of the FFA beneficiaries are summarized in **Table 2**. The aver-

age age of the farmers was 47.67 years, with an average household size of 13 people. The membership rate in a Farmers' Organization (OPA) was 33.15%. All farmers (100%) had access to land, with an average farm size of 2.76 hectares. Access to agricultural credit concerned 7.90% of farmers, while 79.02% had access to training. Access to agricultural extension services reached 94.27%, and 63.76% of farmers had access to agricultural information.

Table 2. Sociodemographic and economic characteristics of FFA beneficiaries.

Variables	Items	Frequency (%)
Sex	Male	49.05%
	Female	50.95%
Level of education	None	53.15%
	Quranic	13.35%
	Literate	18.26%
	Primary	9.26%
	Secondary	5.99%
Residence status	Host	85.83%
	PDI	14.17%
Main activity	Cereal production	98.4%
	Breeding	1.08%
	Maraichage	0.54%
Information access channel	Radio	93.16%
	Television	8.99%
	Social networks	5.55%
	Call center (Garbal, 321)	2.56%

3.2. Efficiency of Use of the Foutirgui Market Gardening Area

The cultivated area is on average 0.04 ha. The average yield in onion production is estimated at 14,323 kg/ha for farmers in the market gardening perimeter (**Table 3**).

Table 3. Descriptive statistics of onion production inputs and outputs.

Items	Mean (St.dev.)
Inputs	
Land size (ha)	0.04 (± 0.02)
Seeds (kg/ha)	66.25 (± 44.75)
Organic fertilizer (cartloads /ha)	55 (± 23)
Mineral fertilizer (kg/ha)	987 (± 509.25)
Workforce (persons)	3.81 (± 1.48)
Outputs	
Onion production (kg/ha)	14 323 ($\pm 7 636$)

The average efficiency score of the operators within the Foutirgui vegetable perimeter is estimated at 60.83% with a median score of 56.70%. Efficiency scores range from 28 to 100%. The majority of producers (83.33%) have an efficiency score between 0.25 and 0.75 (**Figure 2**).

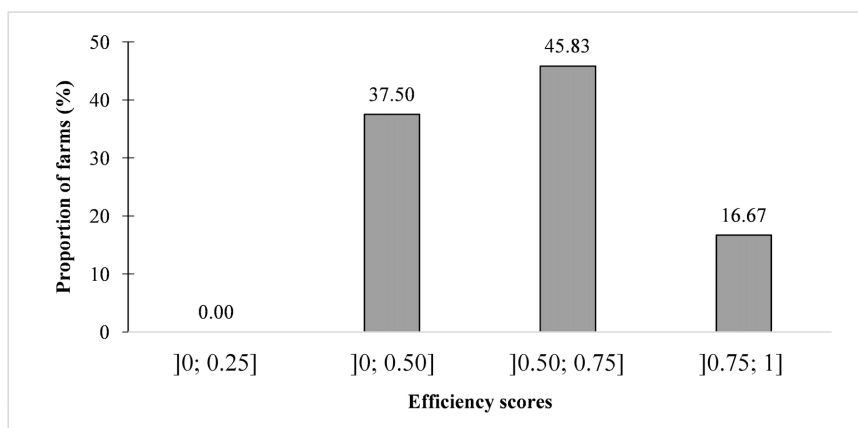


Figure 2. Distribution of market garden operators within the perimeter according to efficiency score.

3.3. Efficiency of Use of the Rice Lowland of Goaragui

In the lowland rice-growing area of Goaragui, each producer has one to three plots, each measuring 625 m². For an average farm size of 0.09 ha, producers use 70.44 kg/ha \pm 33.33 kg/ha of rice seeds for the nursery, 7.56 cartloads/ha \pm 12 cartloads/ha of organic fertilizers, and 454.89 kg/ha \pm 305.78 kg/ha of mineral fertilizers. The fertilizers used include manure and compost as organic fertilizers, and NPK and urea as mineral fertilizers. The labor used averages about 5 workers per farm (**Table 4**).

Table 4. Descriptive statistics of inputs and outputs in the lowland rice field.

Items	Mean (St.dev.)
Inputs	
Land size (ha)	0.09 (\pm 0.03)
Seeds (kg/ha)	70.44 (\pm 33.33)
Organic fertilizer (cartloads /ha)	7.56 (\pm 12)
Mineral fertilizer (kg/ha)	454.89 (\pm 305.78)
Workforce (persons)	4.71 (\pm 1.87)
Ouputs	
Rice production (kg)	3944.44 (\pm 2341.44)
Crop residues (bundle of sticks)	1154.11 (\pm 1971.02)

The efficiency score of lowland rice farmers in Goaragui averages 77.06% with a median score of 78.50%. Efficiency scores range from 27.70% to 100%. More than half (58.06%) of the lowland rice farmers have an efficiency level with a score

between 75% and 100% (Figure 3).

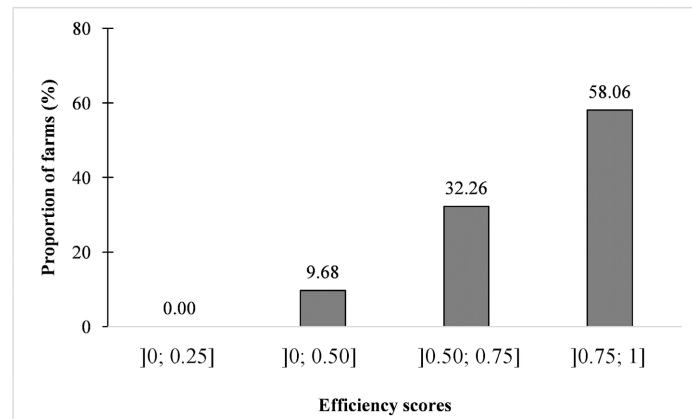


Figure 3. Distribution of lowland rice farmers according to the efficiency score.

3.4. Determinants of Efficient Use of the Vegetable-Growing Area

The results of the Tobit censored regression model estimation applied to the vegetable perimeter operators are presented in Table 5. These results show that the model is overall significant at the 1% level (Prob > chi² = 0.0000 < 0.01). Thus, the model is able to explain the efficiency of use through the various explanatory variables considered.

Table 5. Tobit regression model on the efficiency of market garden perimeter use.

Tobit Regression					Number of obs = 48	
Limits: Lower = -inf					Uncensored = 48	
Upper = +inf					Left-censored = 0	
Log likelihood = 56.551 06					Right-censored = 0	
					LR chi ² (5) = 92.09	
					Prob > chi ² = 0.0000	
					Pseudo R ² = -4.3818	
Efficiency Score	Coefficient	Std.Err.	t	P > t	[95% Conf.Interval]	
Age	-0.002 453 3	0.010 733	-2.29	0.027**	-0.004 617 8	-0.000 288 9
Exp						
Exp ₁	0.140 400 1	0.034 228 3	4.10	0.000***	0.071 372 2	0.209 428 1
Exp ₂	0.407 175 3	0.043 712 5	9.31	0.000***	0.319 020 6	0.495 329 9
Tail	-0.006 332 4	0.002 349 7	-2.70	0.010**	-0.011 071	-0.001 593 8
Size						
Oui	0.090 630 3	0.027 315 3	3.32	0.002**	0.035 543 8	0.145 716 8
Constant	0.602 075 1	0.071 568 3	8.41	0.000***	0.457 743 9	0.746 406 3
Var(e.TE)	0.005 548 8	0.001 132 6			0.003 676 4	0.008 374 9

Note: **p < 0.05; ***p < 0.01.

The equation of the functional form of the Tobit regression model on the use of the vegetable garden is written as follows:

$$TE = 0.602 - 0.002Age + 0.140Exp_1 + 0.407Exp_2 - 0.006Size + 0.091Train + \varepsilon_i$$

3.5. Determinants of Efficient Use of the Rice Lowland

The results of the censored Tobit regression model estimation applied to lowland rice farmers are presented in **Table 6**. These results show that the model is overall significant at the 1% level ($\text{Prob} > \chi^2 = 0.0010 < 0.01$). Thus, the model is suitable for explaining the efficiency of lowland rice use in Goaragui.

Table 6. Tobit regression model on the efficiency of lowland rice utilization.

Tobit Regression					Number of obs = 31	
Limits:					Uncensored = 31	
Lower = -inf					Left-censored = 0	
Upper = +inf					Right-censored = 0	
Log likelihood = 16.553 83					LR χ^2 (7) = 24.21	
					Prob > χ^2 = 0.0010	
					Pseudo R ² = -2.7191	
Efficiency Score	Coefficient	Std.Err	t	P > t	[95% Conf.Interval]	
Instru						
<i>Instru₁</i>	0.178 749 6	0.094 212 1	1.90	0.070*	-0.015 694 6	0.373 193 8
<i>Instru₂</i>	0.241 049 2	0.086 992 5	2.77	0.011**	0.061 505 4	0.420 592 9
<i>Instru₃</i>	-0.017 358 2	0.121 473 8	-0.14	0.888	-0.268 067 9	0.233 351 5
<i>Instru₄</i>	-0.030 944 6	0.150 056 9	-0.21	0.838	-0.340 646 8	0.278 757 7
Size	-0.026 963 7	0.005 665 7	-4.76	0.000***	-0.038 657 1	-0.015 270 3
Orga						
<i>Oui</i>	0.134 698 1	0.060 818 2	2.21	0.037**	0.009 175 6	0.260 220 7
Info						
<i>Oui</i>	0.205 171 4	0.069 255 9	2.96	0.007***	0.062 234 2	0.348 108 6
_cons	0.886 555 4	0.093 225 5	9.51	0.000***	0.694 147 5	1.078 963
Var(e.TE)	0 .020 123 5	0.005 111 4			0.011 913 3	0.033 991 8

Note: *p < 0.1; **p < 0.05; ***p < 0.01.

The equation of the functional form of the regression model on the efficiency of lowland rice utilization is written as follows:

$$TE = 0.886 + 0.241Educ_2 - 0.027Size + 0.135Orga + 0.205Info + \varepsilon_i$$

4. Discussion

4.1. Efficiency of FFA Utilization

The average efficiency is estimated at 77.06% among lowland rice farmers and 60.83%

at the market gardening perimeter for onion production. It is generally well appreciated but reflects non-optimal use of production factors, with an average overall level of waste among rice farmers and market garden producers estimated at 22.94% and 39.17%, respectively. In other words, the overall waste level indicates the possible reduction in inputs if the explanatory factors of the regression model are controlled. In this regard, producers can increase their production without raising the level of inputs. Similarly high efficiency scores were obtained by [14] in Morocco (67%), [15] in Burkina Faso on millet farms in the Sahel region (71.23%), and [16] on the rice plains of Bagré (80%). On the other hand, it was relatively low (44%) on cereal farms in Burkina Faso according to the work of [17].

4.2. Determinants of the Efficient Use of FFA

The negative coefficient of the age of farmers (Age) implies a decrease in the efficiency level of older producers in the Foutirgui market gardening area. This can be explained by the fact that older individuals are attached to traditional production techniques and remain reluctant to adopt technological innovations. In other words, a farmer who ages by one year will see their efficiency level decrease by 0.2% in onion production. Meanwhile, young people are generally more able to collaborate with extension services and seek out information. Similar results have been obtained in Senegal and Burkina Faso [18] [19]. The household size (Size) of the beneficiaries shows an inverse relationship with the efficiency score of lowland rice and market garden operators because the variable has a negative coefficient. There is a strong relationship between household size and the number of agricultural workers. The correlation coefficient is 0.87 for onion producers and 0.91 for rice producers. This translates into an intensification of agricultural labor. Thus, the larger the household size, the more agricultural workers there will be on the same cultivated areas. Studies on farm efficiency in Morocco have reached similar results [14].

Experience (Exp) is positively correlated with the efficiency level of onion producers and is highly significant (1%). This indicates that farmers with at least 5 years of experience in market gardening are technically more efficient than those with fewer years of experience. The producer corrects past mistakes and thus adheres to the principle of learning by doing or learning through practice. These results are consistent with those of [20] on rice farmers in Mali. Access to training (Forma) positively influences the efficiency of onion producers in the Foutirgui market gardening area. Mastery of cultivation techniques is an essential factor not only for optimizing the use of inputs but also for ensuring maximum onion production while avoiding damage during the production process. Having benefited from training on nursery management and the production of biofertilizers under the FFA program, the farmers were able to optimize the quantities of seeds used and combat crop pests. These results are consistent with those of [12] on French agricultural farms.

The most educated producers (Educ) were likely to be more efficient because

they would be able to make better technical decisions. However, only literate producers showed a significant level of efficiency at the 5% threshold in rice production with a positive coefficient. This could be explained by the attachment of individuals who had attended at least primary school to non-agricultural activities in order to better utilize their school-acquired knowledge. This result is similar to that of [13] on the technical efficiency of family farms in Mauritius. On the other hand, other studies have shown that educated individuals tend to be more efficient in agricultural production because they are open to innovations and have the capacity to manage resources rationally [15] [19]. The positive coefficient of the variable (Orga) reflects the interest of peasant organizations in agricultural producers in relation to technical efficiency. Indeed, rice farmers who are members of a peasant organization are more efficient compared to those who have not joined. Membership in a peasant organization constitutes a significant leverage for improving efficiency. It is an indicator that captures the producer's openness to benefiting from the experience of others and from innovation, which helps minimize the use of inputs in farming operations. These results support the findings of [14] [20] and [21] in analyzing the determinants of technical efficiency of family farms in Mali, Cameroon, and Morocco, respectively.

Access to agricultural information (Info) positively influences the technical efficiency of rice farmers. Through information channels, mainly interpersonal exchanges and radio, producers listen to programs that facilitate learning good production practices and making better decisions in the use of inputs. This result supports the work of [22] on the effects of social services on the technical efficiency of agricultural holdings in Burkina Faso. These results show that owning a radio and being close to a rural dirt road can increase the technical efficiency of small farms.

However, the empirical analysis did not allow for the identification of the factors affecting the efficiency level of farms that have benefited from the construction of CES/DRS structures, which is due to the specificity of CES/DRS structures that need several years to have an impact on agricultural productivity. These structures are particularly used for food crop production (sorghum, millet, and cowpea). At this level, producers note that several pedoclimatic factors affect the efficient use of inputs. Pedoclimatic conditions encompass the combined influence of soil and climate. These conditions are critical in determining soil processes, properties, and SOC storage potential, impacting carbon sequestration. Pedoclimatic factors also significantly affect plant traits, particularly in organic farming. Favorable pedoclimatic conditions are essential for agriculture, attracting investments, and supporting agricultural activities in specific regions. Indeed, the planned quantities of seeds are multiplied due to repeated sowing following dry spells. Additionally, some soils are not suitable for the practice of half-moons and zai pits because the low water permeability of these soils leads to crop flooding, especially for sorghum. The early end of the rainy season, specifically the 2023-2024 agricultural campaign, also constitutes a major constraint as it significantly affects yields despite

farmers' control over other production factors. The work of [23] confirms the effects of drought and flooding on the inefficiency of agricultural production in Burkina Faso.

5. Conclusion

Climate change and the security crisis significantly impact livelihoods and make the populations of the Sanmatenga province vulnerable. In response to this situation, the food assistance program for the creation of productive assets was initiated to increase the resilience level of affected households. To this end, this study was conducted with the aim of analyzing the factors influencing the efficiency of the use of this assistance by the beneficiaries. The sociodemographic, economic, and institutional characteristics of producers, such as age, household size, experience, education level, training, level of organization, and access to agricultural information, are factors that significantly influence the efficiency level according to the censored Tobit regression model. The efficiency level shows a relatively high efficiency score in the use of the market garden area of Foutirgui (60.83%) and the lowland rice area of Goaragui (77.03%). Mastery of the sociodemographic and economic factors of the producers will help minimize the efficiency gap relative to the production frontier and, consequently, increase the level of empowerment of vulnerable people in the province of Sanmatenga of Burkina Faso. While it is undeniable that food assistance for the creation of productive assets serves as a springboard for food security, recommendations are necessary for its improvement. Thus, the populations benefiting from the FFA program should make greater use of agricultural extension and advisory services to improve their technical skills in agricultural production activities in order to adopt good practices. Regarding the World Food Program, it should organize more awareness sessions on good agricultural practices through radio broadcasting programs, given the security situation that does not allow large gatherings. As for the technical services of the Ministry of Agriculture, Animal Resources, and Fisheries, they must strengthen the local support network for producers and the use of information and communication technology (ICT) to increase the technical level of producers.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] INSD (2022) Cinquième Recensement Général de la Population et de l'Habitation du Burkina Faso. Institut national de la statistique et de la démographie (INSD), Ouagadougou, Burkina Faso, 133 p.
- [2] INSD (2022) Volume 2: Caractéristiques des ménages et de la population, Institut national de la statistique et de la démographie (INSD), Ouagadougou, Burkina Faso, 484 p.
- [3] PARM (2021) Evaluation des risques agricoles. Plateforme de gestion des risques agricoles (PARM), Burkina Faso, 106 p.

- [4] CILSS (2023) Cadre Harmonisé d'identification des zones à risque et des populations en insécurité alimentaire et nutritionnelle. 10 p.
- [5] SP/CONASUR (2023) Enregistrement des personnes déplacées internes du Burkina Faso: Situation au 31 mars 2023, Ouagadougou, 1 p.
- [6] FAO (2021) Burkina Faso Centre-Nord, Est, Nord et Sahel: Sécurité alimentaire et analyse des risques. Ouagadougou, Représentation de la FAO au Burkina Faso (Bulletin juin 2021), 3 p.
- [7] PAM (2017) Assistance Alimentaire pour la création d'Actifs (3A) pour lutter de façon durable contre l'insécurité alimentaire, 2 p.
- [8] Debruyne, M. (2010) Valeur, Performance et efficacité productive de l'entreprise agricole. *La Revue des Sciences de Gestion*, **243**, 89-102.
<https://doi.org/10.1051/larsg/2010030>
- [9] Harbouze, R.P.H.L.G., Belabes, K., Raki, M., Bouaziz, A. and Ruelle, P. (2009) Efficacités économiques comparées des systèmes de production dans différentes situations d'accès à la ressource en eau Application dans le périmètre irrigué du Gharb, Maroc.
- [10] Huguenin, J. (2013) Data envelopment analysis (DEA) un guide pédagogique à l'intention des décideurs dans le secteur public. IDHEAP Chaire Finances Publiques, 88 p.
- [11] Charnes, A., Cooper, W.W. and Rhodes, E. (1978) Measuring the Efficiency of Decision Making Units. *European Journal of Operational Research*, **2**, 429-444.
[https://doi.org/10.1016/0377-2217\(78\)90138-8](https://doi.org/10.1016/0377-2217(78)90138-8)
- [12] Ghali, M., Daniel, K., Colson, F. and Latruffe, L. (2014) Diagnostic de l'efficacité technique des exploitations agricoles françaises: Une analyse de l'efficacité d'utilisation des ressources énergétiques et exploration des déterminants relevant des pratiques agricoles. <https://www.researchgate.net/publication/273761655>
- [13] Ndiaye, M. (2018) Analyse de l'efficacité technique des exploitations agricoles familiales à Maurice. *European Scientific Journal*, **14**, 143-160.
<https://doi.org/10.19044/esj.2018.v14n9p143>
- [14] Khoali, S., Lakhyar, Z., Laamari, A. and Houda, F. (2023) Analyse de la performance et de l'efficacité des exploitations agricoles de la région Tadla. *African & Mediterranean Agricultural Journal*, **140**, 75-94.
- [15] Seogo, W. and Sawadogo, W.J. (2020) Technical Efficiency Analysis of Millet Production in the Sahel Region of Burkina Faso. *Journal of Social and Development Sciences*, **11**, 10-18. [https://doi.org/10.22610/jsds.v11i1\(s\).3057](https://doi.org/10.22610/jsds.v11i1(s).3057)
- [16] Ouédraogo, S. (2012) Efficacité technico-économique de la production du riz sur la plaine aménagée de Bagré (Burkina Faso): Approche frontière stochastique. *Revue CEDRES*, **54**, 81-94.
- [17] Ky, H. (2017) Efficacité de la production céréalière au Burkina Faso. *Revue CEDRES-ETUDES*, **64**, 124-138.
- [18] Ndiaye, I. and Diallo, M.A. (2022) Efficacité technique des exploitations agricoles familiales de mil dans le Bassin arachidier du Sénégal. *Agronomie Africaine*, **34**, 199-213.
- [19] Sawadogo, M., Savadogo, K. and Zahonogo, P. (2022) Technologie de Cultures Associées et Efficacité Technique des Ménages Agricoles au Burkina Faso. *Tropicultura*, **40**, 1-21. <https://doi.org/10.25518/2295-8010.2061>
- [20] Coulibaly, A., Savadogo, K. and Diakité, L. (2017) Les déterminants de l'efficacité technique des riziculteurs de l'office du Niger au Mali. *Journal of Agriculture and Environmental Sciences*, **6**, 88-97.
- [21] Ndada, A.K., Ntsama, S.N.E. and Nyore (2021) Analyse des Déterminants de L'efficacité Technique des Exploitations Familiales Rizicole dans la Région de l'Extrême

Nord-Cameroun. *Global Journal of Human-Social Science*, **21**, 5-18.

- [22] Savadogo, K., Combarry, O.S. and Akouwerabou, D.B. (2016) Impacts des services sociaux sur la productivité agricole au Burkina Faso: Approche par la fonction distance output. *Mondes en développement*, **174**, 153-167.
<https://doi.org/10.3917/med.174.0153>
- [23] Dieng, M.D. and Nacanabo, A. (2022) Perception des agriculteurs sur les chocs climatiques et efficience de la production agricole au Burkina Faso. *Région et Développement*, **55**, 55-73.
<https://regionetdeveloppement.univ-tln.fr/wp-content/uploads/2-dieng.pdf>