Revue Internationale des Sciences de Gestion
ISSN: 2665-7473
Volume 7 : Numéro 1

Turnover: A generator of technical efficiency in Agro-industrial SMEs in Cameroon

La Rotation du Personnel : Un générateur d'efficience technique dans les PME Agroindustrielles au Cameroun

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Date submitted : 22/12/2023

Date of acceptance : 08/02/2024

To cite this article :

AZEBAZE KENFACK F. P. & TAKOUDJOU NIMPA A. (2024) «Turnover: A generator of technical efficiency in Agro-industrial SMEs in Cameroon», Revue Internationale des Sciences de Gestion « Volume 7 : Numéro 1 » pp : 648 - 672

Abstract:

Staff turnover has been the subject of several mixed debates in the world, in Africa and in Cameroon. This study aims to evaluate the degree of technical efficiency of agro-industrial SMEs (Small and Medium-sized Enterprises) in Cameroon while showing the effects of staff turnover on their degree of efficiency. To realize this study, data from 103 SMEs in the agro-industrial sector in Cameroon were gotten from the National Institute of Statistics (NIS) of Cameroon from 2018 to 2022. The DEA (Data Employment Analysis) method was used to measure the efficiency and the Tobit regression used for analysis with both DEA technology models, the Constant Scale Return model and the Variable Scale Return model. The results show firstly that, SMEs in the agro-industry sector in Cameroon have a low level of technical efficiency. Secondly, the technical efficiency of these SMEs is significantly and positively influenced by turnover as such, a low level of turnover improves the technical efficiency of agro-industrial SMEs in Cameroon. To improve their technical efficiency, SMEs are recommended to keep a low turnover.

Keywords: staff turnover, Technical efficiency, Agro-industry, DEA method, Tobit model

Résumé :

La rotation du personnel a fait l'objet de plusieurs débats mitigés dans le monde, en Afrique et aussi au Cameroun. L'objectif de cette étude est d'évaluer le niveau d'efficience technique des PME agroindustrielles au Cameroun tout en montrant l'effet de la rotation du personnel sur leur degré d'efficience. Pour se faire, nous avons utilisé les données provenant de l'Institut National de la Statistique (INS) du Cameroun de la période de 2018 à 2022 d'un échantillon de 103 PME du secteur agroindustriel. La méthode DEA a permis de mesurer l'efficience et la régression Tobit à servir d'analyse suivant les deux technologies du modèle DEA : le modèle à Rendement d'Echelle Constants et le modèle à Rendement d'Echelle Variables. Nous parvenons aux résultats selon lesquels : d'abord, les PME du secteur de l'agro-industrie au Cameroun de notre échantillon ont un faible niveau d'efficience technique. Ensuite, la rotation du personnel a une influence significative et positive sur l'efficience technique de ces PME. En d'autres termes, un faible niveau de rotation du personnel améliore l'efficience technique des PME agroindustrielles au Cameroun. Ce résultat suggère que, pour améliorer leur efficience technique, les PME doivent maintenir à un niveau bas la rotation du personnel.

Mots clés : Turn-over, efficience technique, agro-industrie, Méthode DEA, Modèle Tobit.

Introduction

Turnover remains one of the key factors determining an enterprise's performance. It is the indicator that sums up the extent of staff turnover in an organisation, as well as the costs associated with the departure and arrival of these people. Business professionals are increasingly interested in this phenomenon because of its practical importance for both the employers and employees. However, staff turnover remains a central topic not only in management research but also in organisation (Griffeth et al., (2000); Park and Shaw (2013) and Heavey et al., (2013)). Staff turnover corresponds to all movements of staff in and out of the organisation over a given period, which is generally a year. In practice and in literature, staff turnover is usually associated with employee departures (Larose, 2003).

Since enterprises invest significant amount of time and money in recruiting, selecting and training their workers, they in return want them to be productive. Indeed, according to Somaya and Williamson (2008), the costs associated with these processes are estimated between 100% and 150% of the annual salary budget for highly qualified employees. In the medium term, staff turnover reduces not only human capital, but also an enterprise's productivity (Chendroyaperumal and Bhuvanadevi, 2010). This is because when an employee departs from an enterprise, he takes with him skills specific to the enterprise. This is why many studies have showed that staff turnover is a weakness for an enterprise that should be avoided.

However, most studies on turnover, whether conducted in the health sector or in industries, show that the organizations' efficiency and productivity are negatively impacted by turnover. (Bluedorn (1982); Dalton and Todor (1979))). It can be observed for example, that efficiency or the achievement of organisational objectives can be hampered when turnover reduces work output and familiarity with standard operating procedures. Under conditions of high turnover, the ratio of outputs to inputs will decrease similarly to productivity due to the increase in recruitment and training cost, while outputs will reduce during orientation and familiarisation with the new job system (Alexander et al., 1994). Thus, turnover has its costs and benefits, the net impact on efficiency would then depend on the level and nature of the turnover. When an enterprise is overstaffed, it is expected that the reduction in the enterprise's workforce will significantly improve their efficiency. However, when an enterprise starts to downsize, it can also have a number of negative consequences. This is demonstrated by Alexander et al. (1994), who argue that turnover can undermine the basis of organisational control by weakening the normative foundation on which important control rest.

Several authors have tried to explain why turnover affects the performance of an organisation (Kacmar et al., 2006; Shaw et al., 2005 and Morrow and McElroy, 2007). For them, it seems that unexpected turnover creates staff shortages and/or the use of less experienced employees. Cascio (1995) notes that most of the productivity inefficiencies associated with replacement workers occur in the first third of the learning cycle. For him, although the learning time varies according to the type of job, organisations can recover their operational efficiency fairly quickly.

However, some authors have questioned the underlying principles behind the notion that turnover is unfavorable for the organization. (Dalton et al., 1979, 1981; Muchinsky and Morrow 1980; Staw 1980). Dalton and Todor (1979) put forward a convincing theory according to which a certain level of turnover tends to be healthy for the organisation. A moderate level of turnover infuses 'new blood', new ideas and keeps the organisation from becoming stagnant. Since there are both costs and benefits associated with turnover, the relationship between turnover and efficiency can vary under different conditions. The relationship between turnover and technical efficiency in enterprises is further highlighted by these mixed results, with technical efficiency being considered as a performance criterion. This study in the Cameroon's agro-industrial sector, which makes up a significant proportion of the national economy is mainly represented by small and medium-sized enterprises (SMEs) (*Recensement general des entreprises*, 2016). These SMEs have been weakened and are underperforming with time (RGE, 2016). This may be due to poor management of human resources caused by the movement of people (in and out of the company). In Cameroon, the unemployment rate is 13.1% and underemployment is 75.8%, according to the ILO[1]. Young people who represent 55% of the unemployed and are aged between 15 and 34, represents a third of the total population and 60% of the potentially active population, would prefer to put their skills at risk or leave?

Several studies have evaluated the correlation between turnover and business performance in several sectors and in different countries (see Wynen and Kleizen (2017); Meier and Hicklin (2008); Lee, (2017); Chow et al. (2002); Luciana and Ciro (2015) ...), but none in Cameroon yet

[1] International Labour Office, in: Cahiers Economiques du Cameroun (2012), *Dynamiser le marché du travail : Point sur la situation économique du Cameroun*, n°3, Janvier

specifically in SMEs in the agro-industrial sector. This study, which empirically examines the effect of turnover on the technical efficiency of agro-industrial SMEs in Cameroon, thus adds to the existing literature on the relationship between turnover and performance in organisations especially in SMEs in the agro-industrial sector in Cameroon, which represent an important sector of development. We will first look at the level of technical efficiency of these SMEs and then highlight the effect of staff turnover on this degree of efficiency. After this introductory section, the remaining part of the article is organised as follow: while section two reviews past literature, section three presents the methodological framework; section four will present the results and finally, the conclusion will be addressed in section five.

1. Technical efficiency and staff turnover

In this section, we shall firstly discuss the concept of technical efficiency and secondly review the work on the relationship between staff turnover and technical efficiency.

1.1. Measuring technical efficiency

The performance of an enterprise can refers to several criteria. One of these is efficiency, which is an internal measure of enterprise performance (Johnson and Scholes, 1997). It is formulated as a measure of the distance between an observation and a target. The interval which separates this observation (enterprise) compared to others in the same sector is used as a measure of performance (Broussau, 2004). The concept of technical efficiency was introduced in literature by Koopmans (1951), who defined it as follows: "a production unit is technically efficient if it is possible to increase any of its outputs without reducing at least one other output or increasing at least one input; or if it is not possible to reduce any of its inputs without increasing at least one other input or reducing at least one output". Farrell (1957) goes on to say that, technical efficiency measures the way in which an exploitation gives more importance to the inputs that optimally enters the production process. However, there are several types and methods of efficiency.

Debreu (1951), koopmans (1951) and shephard (1953) are considered to be the fathers of the theoretical literature on efficiency. Subsequently, Farrell (1957) introduced the concepts of economic efficiency and allocative efficiency and devised a method for decomposing economic efficiency into two components: allocative and technical. He also applied linear programming techniques to the empirical measurement of technical efficiency. In his work, Farrell identified an efficient limit against which the performance of production units could be measured. As such, many authors have tried different techniques to evaluate the maximum production and efficiency gains following these different pioneering works. However, researchers have mainly focused on two methods for calculating efficiency: Stochastic Frontier Analysis (SFA) and Data Envelopment Analysis. The SFA method, is still seen as a parametric approach to estimating efficiency, it is an econometric technique for estimating technical efficiency introduced by Aigner and Chu (1968), Meeusen and Broeck (1977) and Aigner et al (1977). Contrastively, the DEA method, seen as a non-parametric approach to estimate efficiency, determines the limit at the top of the observations rather than a regression plane at their centre. This method has two technologies: the constant returns to scale technology of Charnes et al (1978) and the variable returns to scale technology of Banker et al (1984). Since the work of Farrell (1957) on the definitions of technical and allocative efficiency, non-parametric methods have known great success. In addition, the works of Charnes et al., (1978) and Banker et al., (1984) on the DEA method has shown that it is considerably the most effective for measuring the relative efficiency of a decision unit (DMU) which uses several inputs to produce several outputs.

This DEA approach therefore remains the most widely used technique in non-parametric methods, since it takes into account the errors that may affect the data. In addition, this approach gives any deviation from the operating inefficiency frontier. As mentioned above, technical efficiency is a performance criterion. It is therefore an overall measure of an enterprise's performance. It refers to the ability of firms to transform available inputs into the maximum acceptable output (Chapelle and Plane, 2005).

The DEA approach has been used in many different contexts of firm production and has also been applied extensively to examine technical and allocative efficiency in various industries (Simar and Wilson, 2007). It is a non-parametric instrument that objectively assesses the relative efficiency of a set of units in terms of a variety of criteria using linear programming methods. It is also a well-known method for analysing the efficiency of decision units with multiple inputs and outputs in a specific period (Chiu et al., 2017).

The majority of non-parametric techniques for estimating production limits are based on envelopment methods (Cazals et al., 2001). These non-parametric methods do not require assumptions about the functional form of inputs and outputs and the distribution of error terms

(Chapelle and Plane, 2005). However, in a management context, mathematical programming is commonly used to evaluate a set of possible options with a view to selecting the best one (Banker et al., 1984).

1.2. Staff turnover and technical efficiency: theoretical framework and empirical studies

Human capital, perceived as a worker's intellectual baggage and know-how, is the only source of constant performance for SMEs (Moloumba, 2024). Indeed, some theories have tried to explain the relationship between turnover and performance and have given both positive and negative reasoning between the two (Lee and Jiménez 2011). Human capital theory insinuates that turnover negatively affects Performance due to organisational turbulence as well as a loss of ideas and know-how that employees have deployed through experience and training (Ployhart et al. 2014). Another theory that explores this relationship is social capital theory. According to this theory, high turnover rates can be expected to disrupt social ties and negatively impact trust between employees. On the contrary, good professional relations and social comfort within the company have positive effects on performance (Sabri, 2018). These theories have also been used to defend the negative effect of turnover. Indeed, staff turnover can increase human capital if newly recruited employees not only replace their predecessors but are also assigned to a position that matches their skills. In this case, rotation allows not only employees, but also organisations to be more competitive through improved prospects for advancement and promotion (O'Toole and Meier, 2003). Staff mobility can be an opportunity for employees to seek a better match between their aspirations, skills and the organisation they work for (Moynihan and Pandey 2008). Contradictory developments in these theories show that turnover is contingent on the context (Ton et al, 2008).

Turnover is of growing interest to business managers because they believe it promotes versatility and reduces monotony. Although some authors believe that staff rotation is beneficial to the organisation, most studies have shown the opposite. Several studies have been conducted with mixed results.

Dalton and Todor (1979) examined the relationship existing between turnover and performance in organisations in a positive light from organisational, economic, social and psychological points of views. Their arguments showed that turnover could be beneficial or detrimental for the organisation depending on the degree of turnover. Indeed, the authors show that high levels of turnover can have negative impacts on company's performance, but they also found positive effects when turnover is low. The authors attest that, from an organisational point of view, turnover leads to a good climate in the company and can bring long-term gains. That said, very low turnover rates can lead to stagnation and the development of closed minds that are inaccessible to new ideas and learning. From an economic point of view, they show that the mobility of people improves a country's production. From a social point of view, they argue that the positive effects of turnover are linked to the development of individuals who, by being highly mobile, are able to progress rapidly in their careers and find places where they can use their potential, which leads to less inequality. Finally, psychologically methods aimed at informing employees under stress or pressure to leave can increase a number of undesirable behaviours. Dalton and Todor (1979) also question the harmful effects of turnover. The authors therefore mention that turnover can have positive effects if the turnover rates are not too high. Abelson and Baysinger (1984) followed the same reasoning, according to them, the majority of companies wish to retain high-performing employees and those whose departure will only cause slight organisational reorganisation. So, when the enterprise loses high-performing employees, it faces dysfunctional turnover. For other employees, turnover is functional. The research of Abelson and Baysinger (1984) is interesting due to the fact that the authors have shown that turnover in an enterprise is a multi-level phenomenon and also relies on the characteristics of the enterprise.

Alexander et al (1994) conducted a study in 333 hospitals in the United States to determine whether turnover reduces organisational effectiveness. Their results showed that the relationship between turnover and inefficiency in organisations was linear and positive.

McElroy et al. (2001) studied the relationship between turnover and branch lending profits and found that the relationship was negative.

Kacmar et al. (2006) in their research in the United States on the relationship between turnover and sales in a fast-food chain arrived at the same results, that is a negative relationship. It is the same results for the study of Siebert and Zubanov (2009) in the UK, who examined the relationship between turnover and productivity in 325 clothing retailers' shops between 1995 and 1999.

However, research on turnover has evolved and some authors have split turnover into voluntary and involuntary.

Lee (2017) wanted to know whether turnover is really harmful to a company by focusing on the type of turnover. Using panel data from 200 US federal agencies from 2010 to 2014, the author tested the hypotheses between different types of turnover, namely transfers, company performance, resignations and involuntary departures. He wanted to see the impacts of these various turnovers on performance. The results indicate that employee transfers have an inverted U-shaped relationship with performance. On the other hand, involuntary departures have a linear and positive relationship with performance. These results imply that a low level of employee transfers can increase performance and that involuntary turnovers (dismissal of unproductive employees) can improve performance. The author's research therefore reveals evidence of a positive and linear effect of involuntary turnover. Based on this logic, the author challenges the thinking that turnover is not beneficial for the organisation by showing that, turnover is also an important element of performance. In fact, he shows that turnover can be beneficial or disadvantageous for the company depending on the degree and type of turnover.

An (2019) investigated the impacts of voluntary, involuntary and absolute turnover rates on the performance of public enterprises, specifically in public schools. He examined the non-linear relationship between teacher's turnover and student achievement. Using data from 67 public schools in Florida, the results show that voluntary turnover has a negative linear relationship whereas involuntary turnover has an inverted U-shaped relationship, starting to increase and then decreasing at a certain level.

Wynen et al (2019) examined whether process compliance affects the relationship existing between turnover and organisational performance in the body responsible for unemployment benefits in Belgium. The authors use panel data from 30 divisions of this organisation. Using a System-GMM estimation, with turnover as the regressor of interest, and taking into account endogeneity arising from unobservable organisation-specific fixed effects as well as simultaneity problems concerning the turnover-performance relationship, their results show that turnover has no linear negative impact on performance.

Hur and Hawley (2020) in the United States analyse turnover in the US administration using data taken from the national survey of higher education graduates in 2003, 2006, 2010 and 2013. Using logistic regression, the authors conclude that a mismatch between the level of individual skills and the skills required for a position leads to significant internal mobility within the administration, which may reduce the administration's efficiency.

Chow et al (2002) examined the relationship between turnover and technical efficiency in state-owned manufacturing enterprises in Shanghai over the period 1989 to 1992. The authors first calculated the level of technical efficiency of each firm using the DEA method[2] , which is a non-parametric method of calculating technical efficiency, and later looked for the effect of turnover on these technical efficiencies. Their results lead to three conclusions: First, for public enterprises that are not expanding, the relationship between turnover and technical efficiency is U-shaped, i.e. efficiency decreases at low levels of turnover, but starts to increase after a certain level. Then, for small non-expanding public enterprises with less than 100 employees, their efficiency starts to increase when their turnover level is lower than that of medium and large enterprises. Finally, for medium and expanding public enterprises, the relationship between turnover and technical efficiency is positive and linear.

2. Methodology

This section presents firstly the econometric model and its variable and secondly, the sample and data analysis.

2.1 Econometric model and variables

The purpose of the study is to evaluate the effect of turnover on the technical efficiency of agro-industrial SMEs in Cameroon. For this reason, the DEA method was chosen to calculate the technical efficiency of SMEs because this method is a non-parametric model that does not need to estimate the cost or the production function to estimate the efficiency frontier. In fact, it is one of the most important and common models for evaluating technical efficiency and ranking Decision-Making Units (DMUs). Introduced since 1978 by Charnes et al, this method is still used to estimate the efficiency of DMUs. An enterprise is technically efficient when it is on its production possibilities limits. The basic efficiency calculation used in the DEA method is the ratio of output to input, but is only applicable to cases of single input and output (Guillén-Gosalbez et al., 2018). The method has some advantages: it does not require any assumptions about the functional form of the production, nor any restrictions on the distribution of the inefficiency term, unlike the parametric method. But one of its limitations is that it does not perform significance tests and statistical hypothesis tests (Amara and Romain, 2000); and also, does not take into account errors

[2] DEA in data envelopment analysis

and statistical noise (Jacobs et al. 2006). To calculate the technical efficiency of the agro-industrial SMEs in our sample, we therefore use the DEA method through its two technologies: the constant return to scale (CRS) model of Charnes et al. (1978) and the variable return to scale (VRS) model of Banker et al. (1984). The orientation here is input because we seek to minimise costs (input) for the same level of production (output) given the context faced by these SMEs.

The input-oriented DEA model under the CRS assumption is as follows:

$$Minimise \Theta - \mathcal{E}\sum_{r=1}^{s} Srk^{-} - \mathcal{E}\sum_{i=1}^{m} Sik^{+}$$

Constrained **(1)**

$$\begin{cases} \sum_{j=1}^{n} Xij\lambda j + Sik^{-} = \Theta kXik \\ \sum_{j=1}^{n} Yrj\lambda j - Srk^{+} = Yrk \\ \lambda_j,\ S^{-}_{rk},\ S^{+}_{ik} \geq 0\ \forall j=1,\dots,n;\ r=1,\dots,s;\ i=1,\dots,m \end{cases}$$

With yj and xj the r-vectors and the s-vectors of outputs and inputs for SME k, the matrices y and x are the s×n-matrices of outputs and the m× n-matrices of inputs for each SME. The parameter θ, which is the efficiency score, must be minimised; it expresses how much can be deducted proportionally (in percentage terms) from the inputs of SME k, so that it arrives at the best practice. For θ =1, the SME is declared efficient and participates in the definition of the limit. The n-vector λj sets the weights of all efficient SMEs that serve as a reference for SME k. S+r and S-i are respectively the input excesses and output deficits or non-negative deviation variables, ε is a small positive non-archimedean number so that maximising the deviation variables (S+r, S-i) remains a secondary objective compared to minimising the coefficient θ. This equation provides a clear separation between efficient and inefficient SMEs.

The VRS model is an extension of the CRS model which does not take into account constant returns to scale. A convexity constraint is added to the linear CRS programme. The linear programme under the VRS assumption that we have adopted is as follows:

$$Minimisew - \mathcal{E}\sum_{r=1}^{s} Srk^{-} - \mathcal{E}\sum_{i=1}^{m} Sik^{+}$$

Constrained **(2)**

$$\begin{cases} \sum_{j=1}^{n} Xij\lambda j + Sik^{-} = wkXik \\ \sum_{j=1}^{n} Yrj\lambda j - Srk^{+} = Yrk \\ \sum \lambda j = 1 \\ \lambda_j,\ S^{-}_{rk},\ S^{+}_{ik} \geq 0\ \forall j=1,\dots,n;\ r=1,\dots,s;\ i=1,\dots,m \end{cases}$$

With ∑λj = 1, the additional constraint introduced in the CCR model, ω a scalar between 0 and1. The presentation of these models enables us estimate the level of technical efficiency of SMEs in the agribusiness sector in Cameroon.

We mainly use a Tobit model for our econometric analyses. This model is used when there are a certain number of observations for which the value taken by the endogenous variable is zero. In our Tobit regression model, a variable called *EFFT** is assumed to depend on a number of independent variables grouped in the vector X, whose effects are grouped in the vector β. The observed values of *EFFT**, *EFFTi*, are* assumed to be the combination of the value predicted by the deterministic component of the model X'iβ, and a residual, εi, whose value varies randomly for each individual. However, it is assumed that the *EFFT** variable is not directly observable, but that the *EFFT variable is* observed instead. The Tobit model can therefore be written as follows:

$$EFFTi* = \alpha + Xi\beta i + \varepsilon i, \qquad \textbf{(3)}$$

Where *EFFTi** is the latent variable of the observed efficiency scores

βi is the k x 1 vector of parameters to be estimated

Xi is the k x 1 vector of explanatory variables

$\varepsilon i \sim N(0; \sigma)$

$$\begin{aligned} EFFTi &= 0\ si\ EFFTi* \leq 0 \\ &= EFFTi*\ si\ 0 \leq EFFTi* \leq 1 \\ &= 1\ si\ EFFTi* \geq 1 \end{aligned}$$

In addition, the random-effects Tobit model includes an equation linking the model's dependent variable, EFFTi*, to the independent variables, to which are added both a random effect and a residual:

$$EFFTit * = \alpha + Xit\beta i + vi + \varepsilon it \qquad \textbf{(4)}$$

$\forall i = 1 \ldots\ldots\ldots N, \ \forall t = 1 \ldots\ldots\ldots\ldots, ni.$

In the above equation, *EFFTit** represents the value that the continuous latent variable can take for the observation of individual i at time t, α represents the value of the intercept, *Xit* designates the set of independent variables as measured at time t for individual i, βi is the vector of coefficients affecting these variables to be estimated, vi represents the value of the random effect associated with individual i (this effect varies from one individual to another, but takes only one value for all observations made on the same individual). *εi* is the error of the model, which differs for each observation. *Vi* is distributed according to the law N (0, σv^2) and εi also follows a distribution N (0, $\sigma\varepsilon^2$). Our model can therefore be written as:

$$EFFTit^* = \beta_0 + \beta_1\, type_{it} + \beta\, zi_{2it} + \beta_3\, ba_{it} + \beta_4\, turn_{it} + \mathcal{E}_{it} \qquad \textbf{(5)}$$

With :

type, the type of company,

zi; the area where the company is based;

ba, the Branches of activity;

turn, staff turnover.

The measurement of turnover in our study was inspired by the work of Chow and Ngo (2002). We used average staff turnover (ASR) as follows:

$$\text{ASR} = \sum_{n=i}^{j} \frac{|\,\text{employesnj} - \text{employesnj} - 1|}{\text{N} - 1} \qquad \textbf{(6)}$$

With i ≤ n ≤ j and N= total number of employees

Finally, three control variables were introduced: the type of company, its branch of activity and its location.

2.2 Study sample and data

This study uses data from Cameroon's National Institute of Statistics (NIS) over a period from 2018 to 2022. The database constitutes 139 SMEs of the agro-industrial sector in Cameroon (all industries with a link to agriculture). As mentioned by Kembou (2014)[3] , this includes all agricultural production systems, from enterprises that supply goods to agriculture to those that transform agricultural raw materials into marketable finished products. However, the size of our sample is 103 SMEs out of a population of 139 SMEs that we had due to the lack of information from certain SMEs. The sampling method was the "purposive sampling technique ", which is fundamentally based on judgement and does not require any particular procedure or sampling frame. The characteristics of these SMEs are presented in the table below:

Table 1: Characteristics of the sampled agro-industrial SMEs

Branches of activity	VSES	%	PE	%	ME	%	Total	%
seed processing and the manufacture of starch products	0	-	1	1%	2	2%	3	3%
Cocoa, coffee, tea and sugar industry	1	1%	1	1%	3	3%	5	5%
Oilseed and animal feed industry	0	-	1	1%	0	-	1	1%
Manufacture of cereal-based products	0	-	1	1%	12	12 %	13	13%
Milk, fruit and vegetables and other food products industry	0	-	0	-	3	3%	3	3%
Beverage industry	1	1%	0	-	1	1%	2	2%
Textile and clothing industries	2	2%	0	-	2	2%	4	4%
Leather and shoe making industries	1	1%	2	2%	0	-	3	3%
Manufacture of wood products, except furniture	4	4%	6	6%	7	6%	17	16%
Paper industry	0		7	6%	10	10 %	17	16%
Manufacture of chemical and pharmaceutical products	1	1%	0	-	14	13 %	15	15%
Rubber and plastics industry	1	1%	6	6%	13	13 %	20	19%
TOTAL	11	11 %	25	24 %	67	65 %	103	100 %

Location zone	SMEs	%
Rural	17	16.50
Urban	86	83.50
	103	100

Source: INS data

[3] Agro-industry : zoom sur un secteur en plein expansion, Le Bulletin du GICAM N° 60, October 2014

The table shows that the SMEs in our sample are made up of several branches of activities: seed processing and manufacture of starch products, Cocoa, coffee, tea and sugar industry, etc. They are divided into Very Small Enterprises (VSE: 11%), Small Enterprises (SE: 24%) and Medium-Sized Enterprises (ME: 65%). Most of these SMEs operate in the rubber and plastics production (19%), wood industry (16%) and paper industry (16%) sectors. The majority are located in urban areas (83.5%) and are medium-sized (65%). The average turnover during our study period was as follows:

Table 2: Descriptive analysis of staff turnover in agro-industrial SMEs in Cameroon

Variable	Number of SMEs	Average	Standard deviation	Min	Max
Turn	103	0,3932039	2,248709	-21	33

Source: author's calculations based on NSI data

The table shows that turnover in agro-industrial SMEs in Cameroon is low (0.39). This means that the agro-industrial SMEs in our sample change an average of 0.39 people per year, which reduces certain costs, particularly recruitment and training costs.

3. Analysis and discussion of results

This section is established on two points: firstly, the results of the technical efficiency scores of agro-industrial SMEs and secondly, the results of the Tobit regression.

3.1 Technical efficiency of agro-industrial SMEs in Cameroon

As mentioned above, we used both the constant returns to scale (CRS) and variable returns to scale (VRS) models.

Constant Scale Returns (CRS)

Table 3: Technical efficiency of SMEs under the CRS orientation (under the CRS hypothesis)

Branches of activity	Number of SMEs	Mean	Std. dev	Min	Max
seed processing and the manufacture of starch products	3	0,1659351	0,076053	0,057023	0,241338
Cocoa, coffee, tea and sugar industry	5	0,3594238	0,3266342	0,060098	1
Oilseed and animal feed industry	1	0,9142792	0,084201	0,785003	1
Manufacture of cereal-based products	13	0,2699108	0,2107507	0,034445	1
Milk, fruit and vegetables and other food products industry	3	0,2186283	0,171965	0,006934	0,522358
Beverage industry	2	0,1675814	0,1210774	0,091943	0,488615
Textile and clothing industries	4	0,4100345	0,3099511	0,077259	1
Leather and shoe making industries	3	0,1797609	0,1540562	0,055741	0,553344
Manufacture of wood products, except furniture	17	0,4139269	0,3070439	0,038717	1
Paper industry	17	0,4184022	0,295303	0,063748	1
Manufacture of chemical and pharmaceutical products	15	0,3382612	0,2433979	0,0469	1
Rubber and plastics industry	20	0,4756636	0,3384569	0,050707	1
		0,36098399			

Source: authors based on data from INS Cameroon

The table above shows the total technical efficiency scores for the SME branches of activity in the agro-industrial sector in our sample, ranging from 0.9142792 to 0.1659351. The most efficient branch is the oilseed and animal feed industry, and the least efficient is grain processing and starch product manufacturing. On average, the total technical efficiency score is 0.36098399 (36.09%) for all industries. From this score, we can say that the agro-industrial sector in Cameroon has a low level of total technical efficiency. In other words, it would be possible to reduce 63.91% of the resources used in order to achieve the same production.

Table 4: Technical efficiency of SMEs under the VRS hypothesis

Branches of activity	Number of SMEs	Mean	Std. dev	Min	Max
seed processing and the manufacture of starch products	3	0,3665441	0,0778663	0,182335	.460453
Cocoa, coffee, tea and sugar industry	5	0,4658738	0,2865658	0,061923	1
Oilseed and animal feed industry	1	0,9254488	0,0728736	0,817367	1
Manufacture of cereal-based products	13	0,4967729	0,2403592	0,087294	1
Milk, fruit and vegetables and other food products industry	3	0,4119483	0,2623039	0,00917	0,729501
Beverage industry	2	0,2728008	0,137994	0,110554	0,59717
Textile and clothing industries	4	0,4336137	0,2987197	0,116761	1
Leather and shoe making industries	3	0,2196567	0,1967141	0,064243	0,675192
Manufacture of wood products, except furniture	17	0,5067536	0,3186387	0,042519	1
Paper industry	17	0,5447532	0,2811715	0,063748	1
Manufacture of chemical and pharmaceutical products	15	0,5614982	0,2854018	0,074314	1
Rubber and plastics industry	20	0,5779445	0,3155687	0,050724	1
		0,48196738			

Source: authors based on data from INS Cameroon

The results of the table present the pure technical efficiency scores according to the branch of activity of the agro-industrial SMEs. These scores vary between 92.54 and 21.96 respectively for the most technically efficient (oilseed and animal feed industry) and the least efficient (leather and shoe making industry). The average pure technical efficiency score for all the branches is 48.19%, showing that these branches are not efficient, and therefore the resources used could have been reduced by 51.81% for the same level of production.

3.2 Tobit regression results

In this section, the results of the Tobit regression are presented.

Table 5: Correlation between the variables

Variables	vrs_te	turn	ba	Type	zi
(1) vrs_te	1.000				
(2) turn	0.098	1.000			
(3) ba	0.139	0.091	1.000		
(4) type	-0.003	0.065	-0.003	1.000	
(5) zi	-0.021	0.017	-0.148	0.048	1.000

Source: authors using Stata 17

Table 5 shows the dependency relationships between the variables considered. It can be seen that there is a weak correlation (a weak linear relationship) between these variables.

The results of the Tobit regression on the efficiency of agro-industrial SMEs in Cameroon are shown in the table 6 below.

Table 6: Results of turnover estimation on technical efficiency

VARIABLES	CRS	VRS
Turn	0.00341	0.0116*
	(0.00621)	(0.00638)
Ba	0.0142***	0.0109**
	(0.00428)	(0.00440)
Type	-0.0850***	-0.0117
	(0.0204)	(0.0210)
Zi	-0.0270	-0.00164
	(0.0378)	(0.0389)
Sigma	0.0790***	0.0836***
	(0.00550)	(0.00582)
Constant	0.486***	0.441***
	(0.0734)	(0.0754)
Observations	412	412
Observations censored on the right	0	0
Observations censored on the left	0	0
Prob>chi2	0.0000	0.0322
LR chi2	29.62	10.55
Log likelihood	-61.74	-73.32
Pseudo R2	0.1935	0.0671

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: authors using Stata 17

Table 6 shows the results of the Tobit regression on technical efficiency for the CRS and VRS technologies. These results will be explained according to the two models for greater precision. Under the CRS hypothesis, still seen as total technical efficiency, we have Prob>chi2= 0.0000; Pseudo R2= 0.1935, which shows that the model is globally good and also, the sigma value tells us that the Tobit method is well suited and statistically significant.

In the CRS method, the turnover variable is not significant and therefore has no effect on the technical efficiency of agro-industrial SMEs in Cameroon. This result corroborates that of Alexander et al (1994) who argue that the impact of turnover on efficiency depends not only on the level but also on the nature of turnover. This result therefore contradicts certain authors who believe that turnover has a negative influence on technical efficiency (Bluedorn 1982, Dalton and Todor 1979, Muchinsky and Turtle 1979) Pencavel (1972) McElroy et al. (2001) Kacmar et al. (2006) Siebert and Zubanov (2009)) and those who say that it is beneficial (Chow et al. (2002); Lee (2017) An (2019)). For these authors, turnover can be detrimental for an organisation when it is very high, and voluntary turnover is detrimental to the health of the company, whereas involuntary turnover has a positive influence on company performance. Furthermore, still in this model, the branch of activity variable (*ba*) has a significantly positive influence on the technical efficiency of agro-industrial SMEs at the 1% threshold. It is true that the influence is minimal, but the performance of these SMEs also depends on the branch of activity. For the type of company, it influences the technical efficiency of the SMEs in our sample, but the negative sign of its coefficient shows that it has a negative effect on technical efficiency. The location variable has no impact on the technical efficiency of agro-industrial SMEs in Cameroon.

As far as VRS technology is concerned, still referred to as pure technical efficiency, the table shows interesting results. From the table Prob>chi2= 0.0322; Pseudo R2= 0.0671, so the model is good overall. The statistics are significant and therefore the Tobit method is appropriate. Compared with the CRS model, whereby the variables branch of activity (*ba*) and type of company (*type*) are significant, the variables turnover (*turn*) and location area (*zi*) are not significant; it is seen that the variables *turn* and *ba* are significant and the variables *type* and *zi* are not. Therefore, according to the VRS technology, the type of firm and the location of the firm do not influence the technical efficiency of agro-industrial SMEs in Cameroon and therefore have no effect on them.

The results of the Tobit regression also observed under the VRS hypothesis in the table reveal that at 10% threshold, turnover has a significant and positive influence on the technical efficiency of SMEs. This implies that turnover improves technical efficiency in agro-industrial SMEs in Cameroon. This result is consistent with the work of Hur and Hawley (2020). According to them, managers must minimise the risk of turnover in order to ensure the smooth running of the organisation. Indeed, several authors have shown this positive relationship between turnover and firm performance (Dalton and Todor (1979); Chow et al. (2002); Lee (2017); An (2019)). We can say that our results go in the same direction as the idea of Dalton and Todor (1979), Hur and Hawley (2020) which, for them, very high turnover is a problem for the organisation,a certain level of turnover tends to be beneficial for the organisation. If we look at the average turnover of the SMEs in our sample, we see that it is low (0.39) people per year, which explains why a low level of turnover is beneficial for the organisation. Finally, in the VRS model we always have the branch of activity that positively affects technical efficiency at 5% threshold. Here, the branch of activity has a positive effect on the performance of agro-industrial SMEs in Cameroon.

Conclusion

Turnover can be detrimental to an enterprise in terms of loss of skilled staff and additional employment and training costs, or it can be an advantage in terms of good recruitment and reduction of unskilled staff. This research aimed at studying the effect of turnover on the technical efficiency of agro-industrial SMEs in Cameroon. In other words, it was a question of explaining the effect of turnover on the levels of total technical efficiency (CRS) and pure technical efficiency (VRS) of SMEs in the agro-industrial sector in Cameroon. To answer this question, a sample of 103 SMEs in the sector were selected. In order to obtain more precise results, the Tobit regression was carried out on total and pure technical efficiency and on the separate variables maintained. The results showed that, firstly agro-industrial SMEs in Cameroon are technically not efficient. Secondly, the Tobit regression results show that turnover has no effect on Total Technical Efficiency (TTE). However, variables such as the branch of activity and the type of enterprise have a significant effect, and although the type of enterprise is significant, it has a negative influence on technical efficiency. Conversely, turnover and industry have a positive effect on pure technical efficiency (VRS), which is interesting in the context of our study.

This result shows that it is desirable to maintain or reduce turnover to a low level in agro-industrial SMEs in Cameroon in order to monitor its effect on technical efficiency and, consequently, to be successful.

Our study is therefore a source for enriching the literature on the management of agro-industrial SMEs, by highlighting the effect of staff turnover on a company's performance. The analyses carried out tend to show that the SMEs in the sector studied did not rotate their staff frequently, which is not fatal for them but rather a sign of performance. This is a signal for the managers of agro-industrial SMEs to moderate their turnover in order not only to perform better but also to develop the sector.

Our research has its limitations, of course, like all human endeavours, the most essential of which is the size of the sample, which consists of 103 SMEs out of a large number in the sector. However, it covers a good number of SMEs, and given the positive effect of turnover on technical efficiency, further reflections on staff retention in SMEs in this sector would be more interesting.

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