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PROPOSAL FOR THE CREATION OF A CLUSTER TO BOOST SUSTAINABLE ECONOMIC DEVELOPMENT IN SAO TOMÉ THROUGH ORGANIC COCOA CULTIVATION[1]

[1]Andrea Mara Pimenta-Alonso
Department of Economy and Finances
ESIC University
Camino de Valdenigriales, S/N
28223, Pozuelo de Alarcón, Madrid
Spain
E-mail:
andreamara.pimenta@esic.university

[2]Ibrahim Prazeres
Department of Management and Mediterranean Institute for Agriculture
Environment and Development
Universidade de Évora
Largo dos Colegiais, 2, 7004-516 Évora, Portugal
E-mail: gibaedy@gmail.com

[3]Maria Raquel Lucas
Department of Management and Mediterranean Institute for Agriculture
Environment and Development and CEFAGE
Universidade de Évora
Largo dos Colegiais, 2
7004-516 Évora, Portugal
E-mail: mrlucas@uevora.pt

[1]Andrea Mara Pimenta Alonso, PhD in Agricultural and Environmental Sciences from the University of Évora (Portugal), Agricultural Engineering, and Degree in Spanish Philology both from the Federal University of Paraná (Brazil), is a Professor in Macroeconomics, Applied Mathematics and Computer Science at ESIC University.

[2]Ibrahim Prazeres, PhD candidate in Agribusiness and Sustainability, is an invited assistant at the Management Department-Universidade Évora and collaborator of MED-Mediterranean Institute for Agriculture, Environment and Development. He held a degree in Applied Communication in Marketing-Advertising-Public-Relations from Lusófona University, a Master in Management-Marketing from Universidade Évora and a Pos-graduation qualification in Program and Project Management from ISCTE-Business School.

[3]Maria Raquel Lucas, PhD in Management, is Associate Professor at the Department of Management-Universidade de Évora, visiting professor of Warsaw University and researcher in MED-Mediterranean Institute for Agriculture, Environment and Development and collaborator at CEFAGE-UÉ. She has more than 200 scientific publications and more than 100 mentored students (MSc and PhD).

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***ABSTRACT**. This article aims to evaluate the advantages and disadvantages of creating a cluster of small and medium entrepreneurs within STP's organic cocoa production. To this end, the study carried out mixed research, both qualitative and with multiple case studies. The qualitative approach focused on the production of organic cocoa in STP, seeking explanations for the clustering phenomenon and responses to the research questions so as to understand them in temporal, local and cultural contexts. The quantitative data originated from case studies of clusters in Portugal, Spain and Brazil. The results revealed that the improvement of economic efficiency and the size of cluster-participating companies are the most important advantages. It is clear that an organised sector increases the welfare of the regions where it is established. The most important disadvantages are the need to invest in administrative structure and technical support and the need to dismantle negative biases on innovation initiatives.*

KEYWORDS: industrial cluster, competitive advantage, agro-industry, organic cocoa, São Tomé and Principe (STP).

JEL classification: L52, O13, Q01 Q13.

Introduction

Sao Tome and Principe (STP) is an African island country with a Human Development Index of 0.618, ranking 138 out of a total of 191 countries (UNDP 2021–2022, 2022). According to the World Bank, the per capita GNP was US$ 1,960 in 2019 and its total unemployment rate in that same year was 14.1%; in 2021, it was 15.9% (São Tomé and Príncipe: general aspects, 2022). Despite the artisanal and not very technified agriculture in STP, it represents around 12% of GDP. Cocoa is the main source of this country's exports, embodying close to 70% of the total exports (Oficina de Información Diplomática del Ministerio de Asuntos Exteriores, Unión Europea y Cooperación del Reino de España, 2022). In this scenario, establishing cooperation networks or clusters is one of the best territorial strategies for increasing the competitiveness of the agro-industrial sector. According to Porter (1990), this type of formation efficiently facilitates the linkage of farmers and companies from one territory to the global supply chains (Chavarría *et al.,* 2000). For An *et al.* (2022), the improvement of a country is related to its economic development and depends on human well-being (HDI); this author believes that green development, through technological innovation, brings social well-being to society.

FAO (2010) defines an agrarian cluster as a concentration of producers, agroindustries and support institutions that participate in the same agricultural subsector, which interact and build networks when facing challenges and while seeking common opportunities. For this organisation, the cluster approach recognises that all actors in the agricultural value chain are more innovative and successful when they relate to supporting institutions and other actors in the supply chain through the promotion of vertical and horizontal links between local agricultural enterprises, as well as the supportive relationships between these and accompanying organisations (eg local governments, research institutes and universities) (FAO, 2020).

The formation of clusters is the main pivot of policies to promote territorial development in both Europe and Latin America, as clusters are the base for examining efficiency in production, distribution, commercialisation, and practices that are economically sustainable and that respect the environment (Pimenta-Alonso, 2021). In addition, clusters receive aid and subsidies from the national governments, although they must follow a series of guidelines proposed by the body responsible for these policies at a national level (Pavelkova *et al.,* 2021).

Thus, this study analyses the possibility of success when implementing the cluster organisation to innovate and professionalise the cocoa sector in the country. The main objective is to evaluate the advantages and disadvantages of forming a cluster of small and medium entrepreneurs in the production of organic cocoa (OC) in STP. The country has been chosen due to the important role of organic cocoa for national exports, the smallholder producers' income, the livelihood of many rural families, the development of local microeconomies, and the positive international image of the country as a high-quality producer; an addition reason is that OC producers are organised in two cooperatives, engaged with the development and innovation of the sector. CECAB was created in 2004, became operational in 2005, and has been autonomous since 2012; CECAC11 was formed in 2011. They concentrate the vast majority of OC producers (2139 in CECABB and 1135 in CECAC11). Both are funded by IFAD (Fund for the Development of Agriculture) and PAPAC (Project to Support Commercial Agriculture) and supported by various non-governmental organisations and the Center for Agricultural and Technological Research (CIAT). Each of the cooperatives brings together different associations organised by geographic zones, which receive cocoa seeds from farmers in two distinct periods (August–September and February–March). Other private producers also contribute to the production of organic cocoa, most notably Satocao, a cocoa exploration company supported by a Swiss investment fund in 2010, and Kennyson at Roça Diogo Vaz, active since 2014, and which has recently created a project for a future chocolate factory and its respective store. Other smaller investments (Prazeres, Lucas, 2020) have also contributed to the rehabilitation of cocoa production and the improvement of the quality of life in rural communities.

Apart from an important research issue (cluster formation as a pivot of sustainable development) in an understudied country, the value of this study is that it provides insight into the relevance of an innovative cluster for the OC industry in STP, while highlighting the favourable conditions and opportunities for that creation and its effect on the competitiveness and improvement of well-being in households involved in this production.

In what follows, the paper first presents an outline of the state of relevant literature (section 1), followed by an explanation of the method developed and applied (section 2). The results are presented in section 3. The cluster proposal creation and its discussion are presented, respectively, in sections 4 and 5. The conclusions are formulated in last section.

1. Theoretical Background and Research Hypotheses

Since the emergence of the cluster concept with Porter (1990), in its three dimensions (geography, network, and institutions), up to the current global value chain approach, cluster analysis has assumed academic and political relevance in regional economic development (Lazzeretti *et al.,* 2014; Wolman *et al.,* 2014) and has become a central research topic in management, economics, economic geography, urban planning, sociology, political science, and agribusiness (Speldekamp *et al.,* 2020). However, there are divergences in the literature

regarding the complexity of the interrelationships in these three dimensions, and how clusters generate innovation and economic growth (Speldekamp *et al.,* 2020).

The essence of cluster formation, their organisation and the development of their participants' innovation and competitiveness can be based on the following basic principles (ETCI, 2003; Lis *et al.,* 2019; Rigelski *et al.,* 2022; Khalifa *et al.,* 2023): i) concentration of organisations operating in the same related sectors; ii) organisations' interaction and cooperation stimulating innovation and competitive positioning; iii) vertical and horizontal relationships that link the cooperating parties; and iv) the existence of formal and informal communication channels and trusting relationships between the members, which result in the construction of close and lasting bonds between the cluster members.

In the literature, cluster formation has advantages and benefits but also negative effects. The main advantages of a cluster are: i) the innovation, cooperation, and partnership between the scientific community and the economic agents, which induces economic and social development (Ivanová *et al.,* 2016; Otsuka *et al.,* 2020); ii) the competitive advantages for business and the economy (Lorincová *et al.,* 2016a; Espino-Rodriguez *et al.,* 2022); iii) the reduction of business running costs at different organisational levels and the consequent increase in creativity, innovation, and performance (Májková *et al.,* 2017); iv) the increase in entrepreneurial motivation and business development; v) the access to resources and opportunities to make decisions and carry out joint promotional actions that result in value creation and increased competitiveness of firms, particularly those micro, small and medium-sized (SMEs) (Kordos *et al.,* 2016) due to their limited resources and lack of technological and managerial training (Otsuka *et al.,* 2020). Among the most listed negative effects of integrating a cluster are (Havierniková *et al.,* 2018): i) pollution as a result of industrialisation; ii) weakening of competition resulting from the creation of undesirable economic groups; iii) increase in prices; iv) stagnation of creativity by automatic "groupthink"; v) failure to implement new technologies; vi) unfavourable location and inflexible legal regulations or excessive consolidation or discontinuity of technique and technology; vii) reluctance to cooperate with partners or collaborators and excessive desire for independence; viii) difficulty in transmitting innovation, ideas, knowledge, and skills to participants; ix) lack of trust in partners; x) coordination difficulties; and, xi) unfavourable changes in external operating conditions associated with economic crisis, drop in demand for network products or production, economic, and political risks (Havierniková *et al.,* 2016).

As mentioned before, the benefits of a cluster can be at a micro and macroeconomic level. In the first, the advantages of the cluster participants are the reduction of risk and costs, the increase in the level of specialisation and commercial support (Akhmadeev *et al.,* 2019), and entrepreneurship development (Jankowiak, 2020). At the macroeconomic level, as a common benefit for the region or the country, the benefits may result from the characteristics of the groups, their geographic concentration, the existing cooperation and the cluster's leadership role, which is essential for strengthening operational synergies (Bojar, 2007; Hakimovich *et al.,* 2020).

For Akhmadeev *et al.* (2019) the implementation of cluster projects is the most promising form of state activity (in relation to spending public funds or simply mobilising the public and public resources). For the region itself, the positive consequences of a cluster are increase in the level of attractiveness, improvement of competitiveness and innovation (Hiroyuki *et al.,* 2015; Popelo *et al.,* 2021), development of small and medium-sized companies (Podbiralina *et al.,* 2020), creation of a culture of entrepreneurship and innovation (Lorincová *et al.,* 2016b; Makarevich *et al.,* 2020), and involvement of scientific and research

infrastructures. The latter attracts qualified human resources, increases the use of technologies, spreads the exchange of knowledge, and induces the creation of pioneering companies and new jobs (Speldekamp *et al.,* 2020). For the country, the benefits listed in the literature include economic improvement (GDP, employment, and value of exports) and an increase in the level of innovation, productivity, and competitiveness, as well as general progress in the quality of the business environment (Matveev *et al.,* 2016). Particularly in the agricultural context, other important challenges such as sustainability and the use of resources, the volatility of weather conditions, the perishable nature of products, regulatory complexity, food safety, consumer lifestyle trends, environmental concerns, and the large number of interest groups involved, lead to contemplating the creation of productive and competitive agricultural clusters, which are seen as essential to achieving efficient, sustainable, and robust agro-food and agro-industrial chains (Tapia *et al.,* 2015). The natural and climatic conditions, labour resources, experienced specialists in the agricultural sector, and scientific and technical potential contribute to creating favourable conditions and opportunities for cluster formation (Hodjamuratova *et al.,* 2019). In today's period of increasing globalisation and food security issues, these agro-clusters enable all participants to emerge and expand the opportunities to adapt to different changes (Saidov, 2021).

Considering the topic and objectives of the research and the literature review, the following research questions were formulated:

Q1) Does STP have the conditions (resulting from the characteristics of existing groups, geographic concentration, and contributed to cooperation) to form a cluster and for all entities operating in the OC complex to be vertically integrated?

Justification: The cluster is seen as a development tool for taking advantage of the territorial concentration; creating strong and lasting formal and informal relationships; promoting greater flexibility and efficiency of operations, and better performance of all its participants (Makarevich *et al.,* 2020).

Q2) Does the expected significant increase in innovation and competitiveness of companies and a regional macroeconomic benefit justify the formation of an OC cluster in STP?

Justification: Although the development of promotion policies points out cluster formation as the most appropriate way to achieve regional economic well-being, it is necessary to verify whether these benefits extend to the starting point of these cooperation chains (the producers) and as such can be observed as a direct result in their financial profitability (ROE) and in the company's growth (Pimenta-Alonso, 2021).

Q3) Is there a collaboration and leadership/governance of the OC value chain capable of strengthening operational synergies?

Justification: The benefits of a cluster result from the characteristics of the groups, their geographic concentration and cooperation (Wolman *et al.,* 2014) as well as the existing collaboration and leadership in the cluster, which are essential to strengthening operational synergies (Bojar, 2007).

Q4) Are there formal and informal communication channels and trusting relationships between potential partners which enhance the construction of close and lasting bonds between cluster members?

Justification: The formation and organisation of a cluster assumes the existence of formal and informal communication channels and trusting relationships between the members, which result in the construction of close and lasting bonds between the cluster members (Sheffi *et al.,* 2019; Speldekamp *et al.,* 2020).

Q5) Do local authorities help, financially and institutionally, to overcome existing barriers (environmental and local community)?

Justification: Financial, institutional, and regulatory support from local authorities is necessary when forming a cluster so as to overcome environmental, economic, and social barriers linked to the local community (Matveev *et al.,* 2016; Sobandith, 2019).

2. Methodology

To achieve the main objective and respond to the hypotheses raised concerning the behaviourof companies incorporated into an agro-industrial cluster, mixed research was used, one qualitative and another based on the study of multiple cases. This connection between the multiple case study and the qualitative analysis was used because it provides a deep understanding of the problem of OC cluster creation in STP in a separate manner. The qualitative approach focused on the OC in STP, seeking to understand personal views and finding explanations for the phenomenon of cluster formation and their understanding in the temporal, local, and cultural contexts in order to answer to research questions. For Malhotra (2019), this approach seeks to scrutinise a given topic, providing an in-depth understanding of the subject and, in a flexible and versatile way, collecting information about ideas and perceptions. According to the same author, the option for this method allows the researcher to acquire and develop knowledge as the study unfolds, which coincides with the purpose of the present study. The semi-structured interview, which is considered one of the most important instruments in qualitative research (Yin, 2016), was carried out with a nonprobabilistic convenience sample of six specialists in the sector and used in data collection. It was supported by a guide organised into the five topics of research questions and conducted face-to-face during January–February 2023. The interviews included producers (2), certification bodies (1), cooperative representatives (2), chocolate industry representatives (1), and government agencies (1). For data analysis, the interviews were transcribed and analysed using NVivo12 software. All the results obtained, as well as the additional comments and information collected during the interview process, were integrated and discussed.

In the multiple case study, which followed the approaches of Cabeleira (2017), Caja (2015), Fayos *et al.* (2013), Fayos *et al.* (2017), Pimenta-Alonso (2021), Pittaluga (2014) and Sagarpa (2017), a quantitative approach was used to analyse the cases from clusters constituted in Portugal, Spain, and Brazil. These countries have been chosen as a source of information due to the great importance they designate to the agglomeration policy as a means of encouraging sustainable rural development. Brazil shares with STP the Portuguese cultural influence and the economy based on the primary sector, and its experience in this sector could be of great value.

For Gundermann-Kröll (2013), the case study, within social research, is one of the basic pillars which contributes to understanding the behaviour patterns of the companies in question. The main concept of this methodology is to build the theory from the case, using the cases to inductively develop the theory (Eisenhardt, 1989). On the other hand, the logic of replication must be considered, which, in addition to providing the theory with a general and universal character, allows the case study to be applied to similar environments, obtaining the same results, offering reliability and validity criteria, and providing greater objectivity to the investigation (Eisenhardt *et al.,* 2007; Yin, 2016).

Eisenhardt's (1989) recommendation was considered when selecting the number of clusters to be studied. The study establishes that 4 to 10 cases must be analysed in an

investigation, thus 6 cases were considered. On the other hand, the choice of clusters was based on the level of organisation and the amount of information offered. By consulting official (IBGE – Brazil) and academic-financial databases (AMADEUS – Portugal and SABI – Spain), secondary data was collected for the period between 2010 and 2020 (according to their availability), and with a quantitative approach, their analysis was carried out.

For the 6 clusters studied, 2 in Portugal, 2 in Spain and 2 in Brazil, the variables of Financial Profitability and Number of Employees were chosen for companies associated with the cluster, in comparison to the data on the established companies in the region with OECD, which indicated whether participating in a cluster represented a competitive advantage for companies.

Statistical analysis was carried out: i) using simple regression models for each of the variables using time as a regression, evaluating the trend for each of them; ii) with each model validated in terms of the significance of the parameters using the t-test and together using the F test and the coefficient of determination (R2); iii) with the variables studied being the original ones from the database and their increments.

The chosen variables are defined as follows.

ROE (%): Return on equity (ROE) for clusters in Portugal and Spain

Measures the ability of the company' s own funds to generate benefits. It is calculated by dividing a company' s net profit at the end of a period between the equity at the end of the previous period, measured as a percentage.

$$ROE = \frac{Net\ profit\ (t)}{Equity\ (t-1)} x\ 100$$

NT: Number of workers for clusters in Portugal, Spain and Brazil

Represents the average number of workers in the companies as a function of time.

Table 1. Multiple case study: details of the studied clusters

Country	Region	Cluster name	Participating companies
Portugal	Centre	InovCluster (Association of the Agro-industrial Cluster of the Centre)	More than 174 associates, of which 136 were companies and entities such as associations or cooperatives, universities, R+D institutions related to the agro-industrial and agro-food sector and several municipalities in the Centre region.
Portugal	North and Centre	PortugalFoods	More than 140 companies which were the umbrella brands of the Portuguese Agrofood Sector promoted by the Pole of Competitiveness and Agrifood Technology.
Spain	Vale do Ebro	FOOD+i	More than 90 participating companies, knowledge centres and other entities related to innovation.
Spain	Galiza	CLUSAGA (Galician Food Cluster)	More than 140 companies, including some sector cooperatives, universities, job placement companies and R&D institutions.
Brazil	Rio Grande do Sul	APLVRP (APL of the Agroindustry and Food of the Family Agriculture of the Vale do Rio Pardo)	Over 165 familial agroindustries and 90 institutions from the 23 municipalities of Vale do Rio Pardo, among which are municipal governments and agricultural research entities, universities, unions, associations, government entities, banks, etc.
Brazil	Rio Grande do Sul	APL AFVT (APL of the Family Agroindustries of the Vale do Taquari)	Made up of 20 municipalities in the region, more than 60 agro-industrial companies and 10 collaborating entities (municipal governments and agricultural research entities; universities, unions, associations, government entities, banks, etc.)

Source: own elaboration.

EM: Number of companies for clusters in Brazil

Represents the evolution of the number of agrarian companies in the region of influence of the cluster, in the country as a whole (Brazil). The total number of agrarian companies and the number of agrarian microenterprises were distinguished by the peculiarities of the studied clusters.

The multiple case study had as protagonists the clusters detailed in *Table 1*.

From this data collection, the results obtained from the statistical analysis are exposed in section 4 of this article.

3. Results

Below are the results obtained from the statistical analyses carried out in the case studies for the European and Latin American clusters.

As the data sources are different, it was decided to split the analysis into two different parameters. On the one hand, the analysed data obtained from the study of European clusters, and on the other hand, the data obtained from the study of Brazilian clusters.

3.1 European Clusters

For the European clusters, the evolution of the financial profitability and the number of employees in the companies that formed part of the cluster were studied in comparison with the data of the region where they are inserted, and with the data provided by the OECD, as a whole, representing the evolution of these data from the level of developed countries perspective.

3.1.1 Study of the evolution of Financial Profitability

The summary of the data obtained on the financial profitability of the companies belonging to the European clusters, in comparison with that of the regions, and with those of the OECD companies, is shown in *Table 2*.

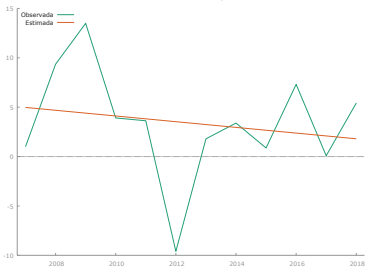
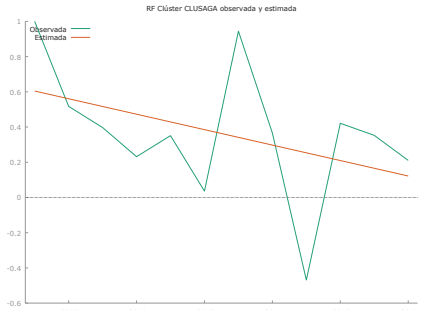
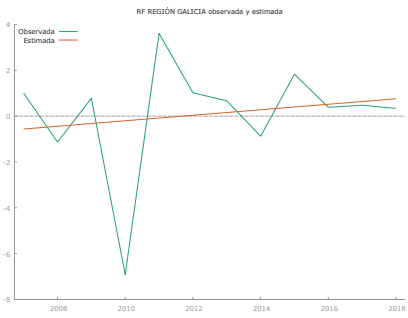
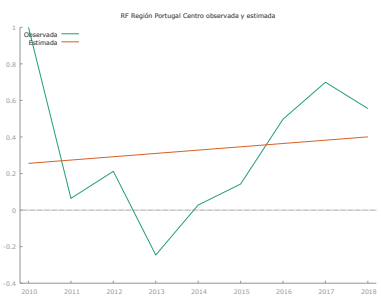
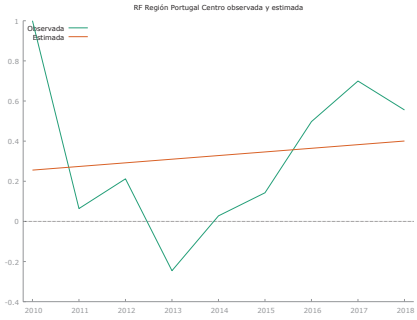
Table 2. Data on Financial Profitability (ROE) of the companies in the cluster compared to the region and the OECD

YEAR	2010	2011	2012	2013	2014	2015	2016	2017	2018	AVERAGE ROE (%)
FOOD+i	7,95	7,37	-19,5	3,65	6,89	1,77	14,86	0,17	11,02	3,80
VALLE EBRO REGION	18,57	-17,99	20,82	6,14	-122,65	14,67	23,91	80,65	7,41	3,50
CLUSAGA	6,82	10,33	1,06	27,8	10,77	-13,8	12,4	10,38	6,2	8,00
GALICIA REGION	-116,03	60,56	17,09	11,22	-14,75	30,67	6,48	7,96	5,64	0,98
INOVCLUSTER	6,31	0,62	-1,02	4,16	3,45	5	2,99	1,78	-0,91	2,49
PORTUGALFOODS	11,06	8,96	4,02	0,5	10,01	6,33	8,4	3,89	1,11	6,03
PORTUGAL CENTRO REGION	6,57	0,42	1,39	-1,61	0,18	0,94	3,27	4,6	3,65	2,16
OECD REGION	7,81	6,8	6,49	6,61	7,96	7,58	7,78	7,59	6,14	7,20

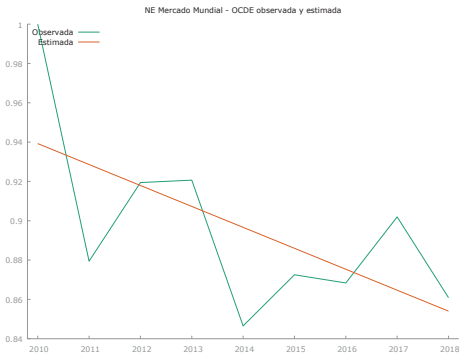
Source: adapted from SABI (2020) and AMADEUS (2020).

As illustrated, the behaviour of the companies in the clusters was much better than that of the region where they were established. The average financial return obtained by the CLUSAGA cluster (8%) is noteworthy, compared to less than 1% in the region of Galicia, although it is the only segment that achieved a better average than the OECD.

In this sense, *Figure 1* shows the evolution of Financial Profitability (ROE) for the clusters in comparison with the study regions.

CLUSTER FOOD+i	REGION – VALLE DEL EBRO
	
CLUSTER CLUSAGA	**REGION – GALICIA**
	
CLUSTER INOVCLUSTER	**REGION – PORTUGAL CENTER**
	
CLUSTER PORTUGALFOODS	**REGION – PORTUGAL CENTER**
	

WORLD MARKET – OCDE



Source: own elaboration.

Figure 1. **Graphs of the Financial Profitability of the Clusters and study Regions. Estimated and Observed VARIABLE AGAINST TIME**

The graphs on the financial profitability of the companies in the clusters show a worrying descending line at the end of the studied period and the same phenomenon, only more pronounced, appears in the OECD region. On the other hand, the regions that contain the clusters show an ascending line, but with financial returns much lower than the companies in the clusters.

To assess the robustness of the regression and the main metrics, *Table 3* includes the regression model and its evaluation.

Even though it is not possible to speak about trends in many cases, since R^2 does not fully explain the model, as a summary, it is safe to say that all clusters have better average percentages of ROE in relation to the region where they are inserted. Two of the clusters have an ROE very similar to the OECD, and the other two are below.

Table 3. Financial Profitability of the clusters and study regions: regression model and its evaluation

ENTITY/REGION	STATISTICAL MODEL	EVALUATION
FOOD+i CLUSTER	$Y = -1100.64 + 0.546896T$ $R^2_{adjusted}: = 0.189$ ds = 0.289690	There is a positive trend in its ROE. The growth line is marked by a large amount of peaks and falls. The null hypothesis is rejected, despite having a low R^2.
EBRO VALLEY REGION	$Y = 108.425 - 0.0540909T$ $R^2_{adjusted}: = -0.020$ ds = 0.0610218	The observation reveals a graph depicting a descending trendline with negative data points, significantly deviating from the desired outcome. The null hypothesis is not rejected.
CLUSAGA CLUSTER	$Y = -417.323 + 0.208794T$ $R^2_{adjusted} = 0.075622$ ds = 0.151480	The data exhibits an ascending line in its ROE, although it cannot be considered a trend due to the irregularity of the data. The null hypothesis is not rejected.
GALICIA REGION	$Y = -125.725 + 0.0622404T$ $R^2_{adjusted} = 0.054811$ DS = 0.0486329	An ascending line is discerned, although accompanied by pronounced negative values throughout the entire time frame. The null hypothesis is not rejected.
INOVCLUSTER CLUSTER	$Y = 1017.69 - 0.505333T$ $R^2_{adjusted}: = 0.427825$ ds = 0.191247	The data reveals a negative trend, marked by notably lower values when compared to the OECD benchmark. The null hypothesis is rejected.
PORTUGALFOODS CLUSTER	$Y = -64.6190 + 0.0324144T$ $R^2_{adjusted}: = -0.089236$ ds = 0.0552180	The data displays an ascending line but with irregular periods of ups and downs. The null hypothesis is not rejected.
PORTUGAL CENTER REGION	$Y = -551.527 + 0.274199T$ $R^2_{adjusted}: = 0.387615$ ds = 0.111352	The region shows a positive trend although with low data. The null hypothesis is rejected.
OECD REGION	$Y = -152.554 + 0.0763607T$ $R^2_{adjusted}: = 0.797$ ds = 0.0134142	A positive trend, characterised by multiple growth phases is discerned within the data. The null hypothesis is rejected.

Source: own elaboration.

3.2 Study of the Evolution of the Number of Workers

Regarding the number of workers in the European clusters, *Table 4*, shows the evolution of this variable for the European clusters, in comparison with that of the regions where they are established and with the global data from OECD companies.

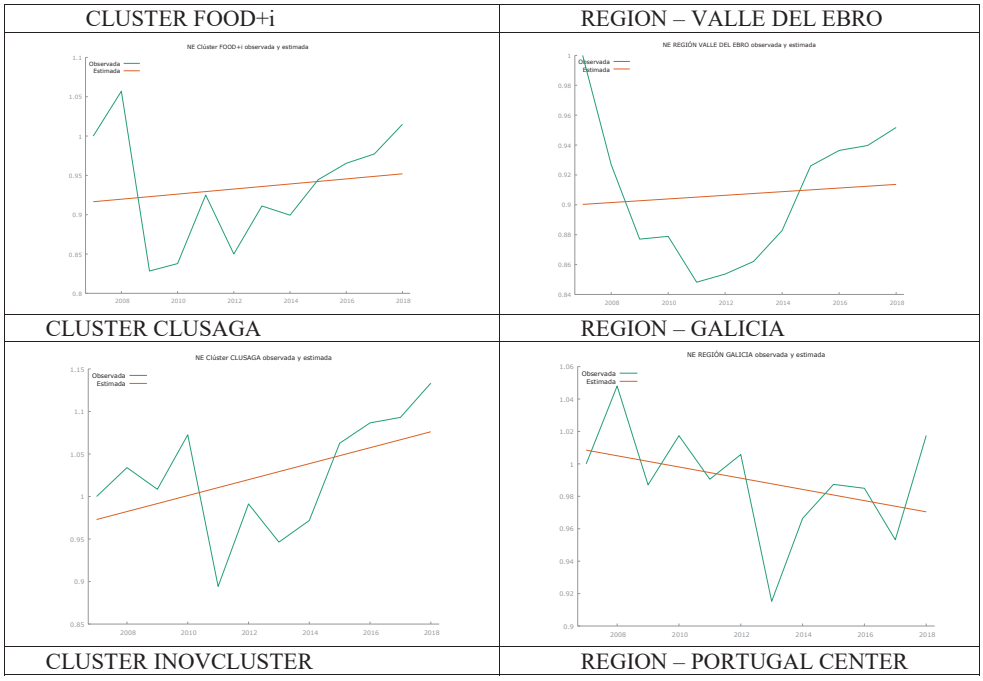
Table 4. Data on the Number of Employees of companies in the European clusters compared with the region and with the OECD

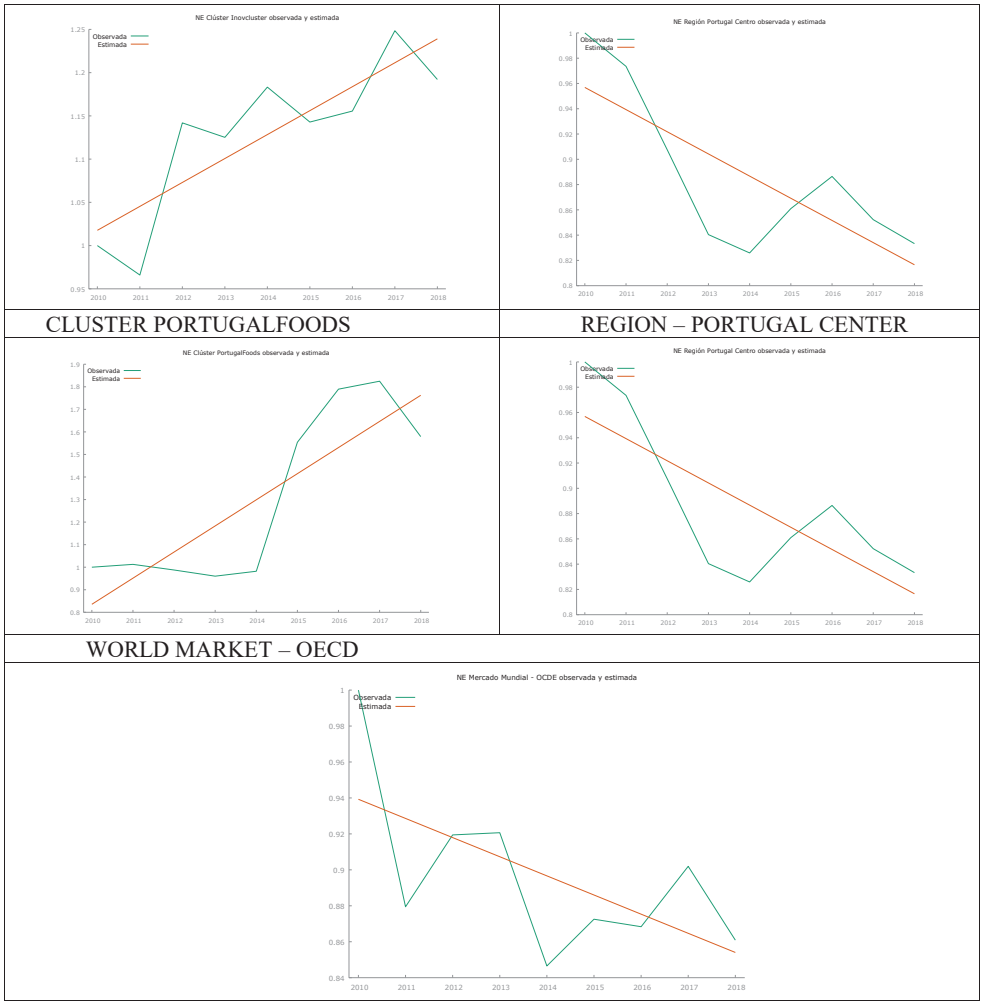
YEAR	2010	2011	2012	2013	2014	2015	2016	2017	2018	GROWTH
FOOD+i	139,34	153,34	141,37	151,52	149,58	157,08	160,55	162,53	168,8	21%
VALLE EBRO REGION	17,11	16,51	16,62	16,79	17,19	18,03	18,23	18,3	18,53	8%
CLUSAGA	99,37	82,85	91,84	87,68	90,03	98,45	100,67	101,27	105	6%
GALICIA REGION	17,99	17,6	16,67	18,32	18,04	18,53	17,98	19,09	18,22	1%
INOVCLUSTER	23,88	23,07	27,27	26,87	28,26	27,29	27,6	29,82	28,47	19%
PORTUGALFOODS	84,59	85,65	83,54	81,23	83,07	131,46	151,38	154,36	133,59	58%
PORTUGAL CENTRO REGION	12,96	12,62	11,77	10,9	10,71	11,16	11,49	11,05	10,8	-17%
OECD REGION	25,68	22,59	23,61	23,65	21,74	22,41	22,3	23,16	22,11	-14%

Source: adapted from SABI (2020) and AMADEUS (2020).

Regarding job creation and business growth, the benefits of belonging to a cluster are clearly visible, as the number of workers in these companies grew from 6% in the case of CLUSAGA to 58% in the case of Portugal Foods, while, in this same period, companies in the study regions and even in the OECD showed a negative trend, losing up to 14% of their workers.

In *Figure 2* it is possible to observe the graphic evolution of the Number of Workers for the European clusters, in comparison with the study regions.





Source: own elaboration.

Figure 2. **Graphs of the Number of Workers for the European Clusters and the Study Regions. Estimated and Observed Variable versus Time**

The graphs of this variable display the cluster's positive job creation trend, much more favourable than the regional and OECD graphs.

To evaluate the robustness of the regression model and the key metrics associated with the " Number of Workers" variable for the European clusters, *Table 5* presents the regression model and its corresponding assessment.

Table 5. Number of Workers for the European clusters and the study regions: regression model and its evaluation

ENTITY/REGION	STATISTICAL MODEL	EVALUATION
FOOD+i CLUSTER	$Y = -5.55603 + 0.00322497T$ $R^2_{adjusted} = -0.071929$ ds = 0.00630207	An increase in employment is observed, rising from an average of 137 employees in 2009 to 168 in 2018, although the trend line is not marked. The null hypothesis is not rejected.
VALLE EBRO REGION	$Y = -1.54084 + 0.00121630T$ $R^2_{adjusted} = -0.090276$ ds = 0.00407267	This region shows a slight upward line, with a soft increase in the average number of employees since 2012. The null hypothesis is not rejected.
CLUSAGA CLUSTER	$Y = -17.8574 + 0.00938230T$ $R^2_{adjusted} = 0.165911$ ds = 0.00525469	The cluster shows a positive trend. The null hypothesis is rejected.
GALICIA REGION	$Y = 7.95093 - 0.00345912T$ $R^2_{adjusted} = 0.047404$ ds = 0.00278078	A decreasing line is observed, but with stable data. The null hypothesis is not rejected.
INOVCLUSTER	$Y = -54.6247 + 0.0276827T$ $R^2_{adjusted} = 0.659449$ ds = 0.00681681	The cluster exhibits a positive trend, demonstrating a 20% growth in the average number of employees across its companies over the years The null hypothesis is rejected.
PORTUGALFOODS CLUSTER	$Y = -232.026 + 0.115851T$ $R^2_{adjusted} = 0.661450$ ds = 0.0284088	Positive trend with a total growth of 58% in the average number of employees. The null hypothesis is rejected.
PORTUGAL CENTER REGION	$Y = 36.2143 - 0.0175410T$ $R^2_{adjusted} = 0.529975$ ds = 0.00554132	The data displays a negative trend, interrupted by a solitary period of minimal growth occurring between 2014 and 2016. The null hypothesis is rejected.
OECD REGION	$Y = 22.3523 - 0.0106533T$ $R^2_{adjusted} = 0.307678$ ds = 0.00499141	The region, symbolising the behaviour of the global market, exhibits a declining trend, spanning from an average of 25.6 employees in 2010 to 22.1 in 2018. The null hypothesis is rejected.

Source: own elaboration.

In the analysis of the evolution of the number of workers in the companies of the European clusters, a distinct positive trend is evident, leading to the rejection of the null hypothesis in the majority of cases. These findings substantiate that clusters consistently outperform their respective regions and the OECD.

3.3 Brazilian Clusters

For the Brazilian clusters, the evolution of the number of agrarian companies, in

general, their number of workers and the number of agrarian micro-companies and their respective workers were studied with the objective of verifying whether in the regions with better cluster organisation, as is the case in Rio Grande do Sul, the influence of the cluster increased the number of companies and workers in this sector.

3.3.1 Study of the Evolution of the Total Number of Agrarian Companies and their Workers

The data concerning the evolution of the number of agrarian companies as a whole and of their workers in Brazil and, particularly, in the state of Rio Grande do Sul, can be seen in *Table 6* and *Table 7*, respectively.

Table 6. Evolution of the number of agrarian companies in Brazil and in the study region (Rio Grande do Sul)

Variable	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	GROWTH
EM_TO_RS	1696	1604	1707	1784	1767	1857	1949	1968	2017	2411	2609	54%
EM_TO_BR	84996	88128	88823	93481	87554	90501	89634	88563	87546	89367	90927	7%

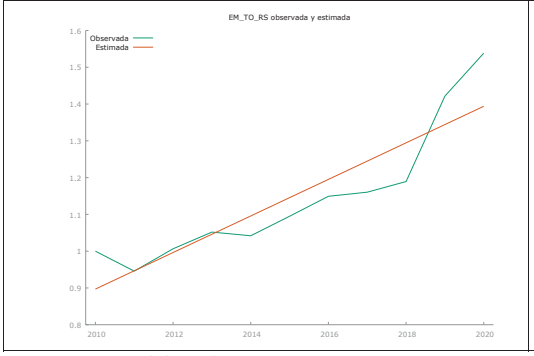
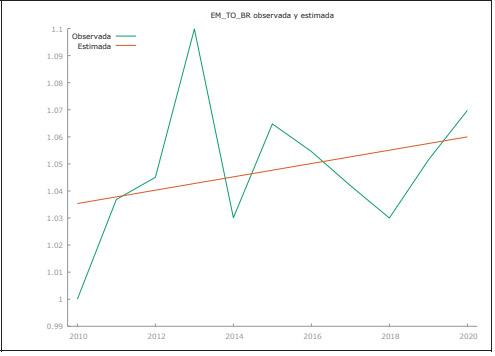
Source: adapted from IBGE (2023).

Table 7. Evolution of the number of workers in agrarian companies in Brazil and in the study region (Rio Grande do Sul)

Variable	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	GROWTH
TB_TO_RS	X	X	X	15465	15839	X	18948	18719	X	19495	19970	29%
TB_TO_BR	429495	447104	463111	462796	462266	470820	458557	469628	464782	473084	483439	13%

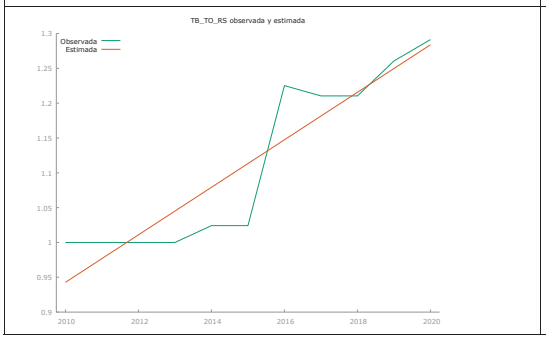
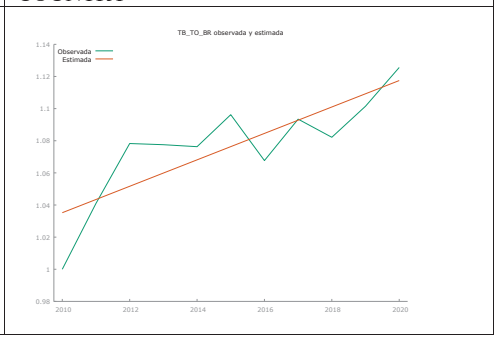
Source: adapted from IBGE (2023).

Observing the evolution of the total number of agrarian companies and their workers shows that the results obtained in the region, with a growth of 54% in the number of companies and of 29% in the number of workers, are much better than the results of the country, which only grew, in a period of 10 years, 7% and 13%, respectively. In view of this, *Figure 3* and *Figure 4* graphically demonstrate the evolution of these variables.

TOTAL NUMBER OF AGRICULTURAL COMPANIES – REGION	TOTAL NUMBER OF AGRICULTURAL COMPANIES – COUNTRY
	

Source: own elaboration.

Figure 3. **Graphs of the Number of Agricultural Companies in Brazil and in the Study Region (Rio Grande do Sul). Estimated and Observed variable against time**

WORKERS OF AGRICULTURAL COMPANIES REGION	WORKERS OF AGRICULTURAL COMPANIES COUNTRY
	

Source: own elaboration.

Figure 4. **Graphs of the Number of Workers in Agricultural Companies in Brazil and in the study region (Rio Grande do Sul). Estimated and observed variable against time**

In the case of the graph for the region of Rio Grande do Sul, it is worth noting that it is formed by a broken line. Due to the lack of data collection by the official research institute, it is only possible to intuit its trend line and observe that, despite the lack of continuity of information, the growth data are favourable.

To evaluate the robustness of the regression and the key metrics associated with the evolution of the number of agrarian companies in Brazil and the study region, both *Table 8, Table 9* incorporate the regression model and its respective evaluation.

Table 8. Evolution of the number of agrarian companies in Brazil and in the study region (Rio Grande do Sul)

ENTITY/REGION	STATISTICAL MODEL	EVALUATION
TOTAL NUMBER OF AGRICULTURAL COMPANIES - REGION	$Y = -98.9080 + 0.0497036T$ $R^2_{adjusted} = 0.789938$ ds = 0.00799956	A positive trend is discernible, with a notable 54% growth over time. The null hypothesis is rejected.
TOTAL NUMBER OF AGRICULTURAL COMPANIES - COUNTRY	$Y = -3.91713 + 0.00246636T$ $R^2_{adjusted} = 0.001307$ ds = 0.00245038	In the country, a subtle upward line is observed, characterised by a modest growth of 7%. The null hypothesis is not rejected.

Source: own elaboration.

Table 9. Evolution of the number of workers in agrarian companies in Brazil and in the study region (Rio Grande do Sul)

ENTITY/REGION	STATISTICAL MODEL	EVALUATION
WORKERS OF AGRICULTURAL COMPANIES REGION	$Y = -67.5465 + 0.0341082T$ $R^2_{adjusted} = 0.824439$ ds = 0.00492514	A positive trend is evident, showcasing a growth of 29% in the number of workers during the years for which data has been measurable. The null hypothesis is rejected.*
WORKERS OF AGRICULTURAL COMPANIES COUNTRY	$Y = -15.4833 + 0.00822636T$ $R^2_{adjusted} = 0.645217$ ds = 0.00187807	A positive trend is evident, with a growth of 13% observed throughout the entire period. The null hypothesis is rejected.

Notes: *For statistical analysis purposes, in years when the sample was not representative, the country has omitted the data. To facilitate analysis, the values of the subsequent year have been utilised instead.

Source: own elaboration.

In the analysis of the evolution of the total number of agricultural enterprises in conjunction with their number of workers in the study region, a clear positive trend is discernible, leading to the rejection of the null hypothesis. The region's superior performance in comparison to the country is notably evident.

3.3.2 Study of the evolution of the number of agricultural microenterprises and their workers

The variables, evolution of the number of agrarian microenterprises and their workers in Brazil and in its region of influence, Rio Grande do Sul, are represented by the data in *Table 10* and *Table 11*, respectively.

Table 10. Evolution of the number of agricultural microenterprises in Brazil and in the study region (Rio Grande do Sul)

Variable	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	GROWTH
EM_MC_RS	1430	1341	1433	1498	1485	1569	1657	1663	1714	2114	2307	61%
EM_MC_BR	80288	83102	83749	88403	82470	85343	84567	83396	82332	84118	85604	7%

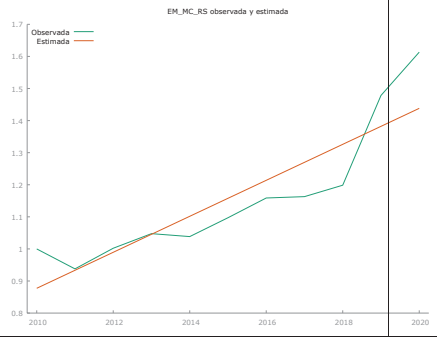
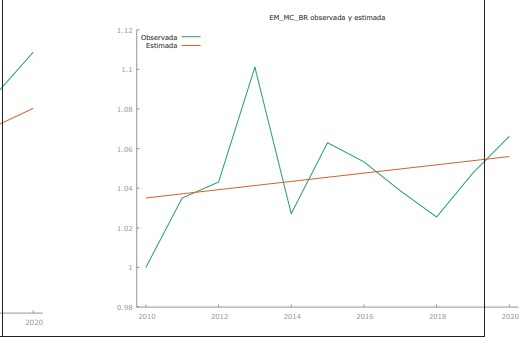
Source: adapted from IBGE (2023).

Table 11. Evolution of the number of workers in agricultural microenterprises in Brazil and the study region (Rio Grande do Sul)

Variable	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	GROWTH
TB_MC_RS	1969	1849	X	2180	2211	2311	2490	2498	2323	5533	3525	79%
TB_MC_BR	117532	124055	126212	129040	124104	127453	126974	125183	124797	126499	133681	14%

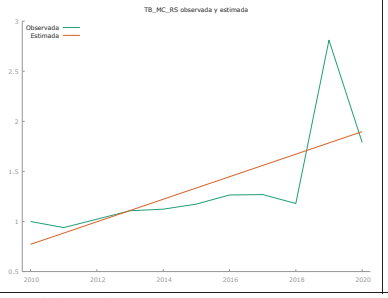
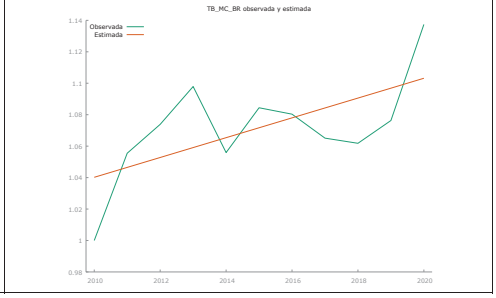
Source: adapted from IBGE (2023).

When reinforcing what the main objective of agrarian clusters in Brazil would be, it is clearly noticeable that the number of microenterprises in the region has grown well above the average growth of the country, with a 61% growth in Rio Grande do Sul against only 7% of Brazilian growth. The same happens with the number of workers in these companies, which grew by 79% in the region and 14% in the country as a whole. To graphically illustrate this growth, *Figure 5*, and *Figure 6* were constructed.

NUMBER OF AGRICULTURAL MICROENTERPRISES – REGION	NUMBER OF AGRICULTURAL MICROENTERPRISES – COUNTRY
	

Source: own elaboration.

Figure 5. **Graphs of the Number of Agricultural Microenterprises in Brazil and in the Study Region (Rio Grande do Sul). Variable Estimated and Observed Against Time**

WORKERS OF AGRICULTURAL MICRO-ENTERPRISES – REGION	WORKERS OF AGRICULTURAL MICRO-ENTERPRISES – COUNTRY
	

Source: own elaboration.

Figure 6. ***Graphs of the Number of Workers in Agricultural Microenterprises in Brazil and in the study region (Rio Grande do Sul). Estimated and observed variable against time***

The graphs in *Figure 5 and 6* show the evolution with a positive trend line for the number of micro-enterprises and their workers, their growth being much more pronounced in the region of Rio Grande do Sul than in the country.

To evaluate the robustness of the regression model and the key metrics associated with the evolution of the number of agricultural microenterprises and their workforce in both Brazil and the study region, *Table 12* and *Table 13* incorporate the regression model and its respective evaluation.

Table 12. Evolution of the number of agricultural microenterprises in Brazil and in the study region (Rio Grande do Sul)

ENTITY/REGION	STATISTICAL MODEL	EVALUATION
NUMBER OF AGRICULTURAL MICROENTERPRISES – REGION	$Y = -111.731 + 0.05608007T$ $R^2_{adjusted} = 0.763516$ ds = 0.00972022	A positive trend is evident, demonstrating a substantial growth of 61% during the period under investigation. The null hypothesis is rejected.*
NUMBER OF AGRICULTURAL MICROENTERPRISES – COUNTRY	$Y = -3.16896 + 0.00209364T$ $R^2_{adjusted} = -0.033006$ ds = 0.00253799	A smooth ascendent line is observed, characterised by small irregular ups and downs. The null hypothesis is not rejected.

Table 13. Evolution of the number of workers in agricultural microenterprises in Brazil and the study region (Rio Grande do Sul)

ENTITY/REGION	STATISTICAL MODEL	EVALUATION
WORKERS OF AGRICULTURAL MICRO-ENTERPRISES – REGION	$Y = -225.037 + 0.112455T$ $R^2_{adjusted} = 0.420387$ ds = 0.0391448	A positive trend is evident, showcasing a substantial growth of 79% over the studied period. The null hypothesis is rejected.*
WORKERS OF AGRICULTURAL MICRO-ENTERPRISES – COUNTRY	$Y = -11.9203 + 0.006454T$ $R^2_{adjusted} = 0.342788$ ds = 0.00258891	A positive trend is observed; however, the growth in the number of employees is comparatively modest at 14%, in stark contrast to the robust 79% growth seen in the cluster region. The null hypothesis is rejected.

Notes: *In years when the sample has not been representative, the country does not present the data. For statistical analysis purposes, the values of the following year have been used.

In the analysis of the evolution of the number of agricultural microenterprises in conjunction with their workforce in the study region, a clear positive trend is evident, leading to the rejection of the null hypothesis. The region' s superior performance compared to the country is notably evident.

Based on the results obtained, it is possible to confirm the Q2 hypothesis. This confirmation is supported by the observed increase in Return on Equity (ROE) and the growth in the number of workers within these companies, which are indicative of enhanced competitiveness within their respective markets. Additionally, it can be affirmed that innovation plays a significant role in this heightened competitiveness, as evidenced by the continuous training and action programs maintained by the clusters for their member companies.

4. Proposal for the Formation of the Cocoa Cluster in Santo Tomé and Príncipe

Bearing in mind the results obtained in this investigation and having evidenced, both theoretically and empirically, the benefits that participation in a cluster can provide to the companies that integrate it and to the region that hosts it, the proposal for the formation of the

cluster in STP is established here; an OC Cluster in STP as a sustainable growth strategy for the sector and the country.

For the establishment and formation of a cluster, several actors must work together towards a common objective, which is none other than to provide technical and administrative support to the sector in question, professionalising it and opening the way to new markets. The results of the qualitative study show that there are conditions resulting from the characteristics of the existing groups, namely the two OC cooperatives (CECAB and CECAC 11), and the geographical concentration of producers for the formation of an OC cluster in STP and vertical integration associated with the entities that operate in the different stages of the value chain. According to the experts interviewed, all male, averaging 44 years old, of whom half held an academic degree, there is not enough collaboration and leadership/governance capable of strengthening the cluster's operational synergies in the OC value chain. Although there is a concentration of producers in the two cooperatives, the various entities in the sector operate individually, with no agroindustries, accredited distributors, interaction between support institutions, or networks that allow the sector to face climatic, market and agronomic challenges and seek common opportunities. According to them, there are also no formal or informal communication channels that allow for the construction of a specific social network that supports group conduct, respect, mutual rights, and the recognition of expectations, privileges, and responsibilities. Even so, for these specialists, although there is a lack of connection between the sector and the university that promotes innovation and technological development, the vertical and horizontal links existing between the actors of the cooperatives, and between them and the General Directorate of Agriculture and associated entities (IFAD and PAPAC), have been beneficial to the sector.

According to Porter (1999) and Gonçalves (2000), the role of public administration is fundamental to promote the cluster strategy in a country and ensure the success of the initiative. In the case of STP, the specialists' opinion is that the local authorities do not have the means to be capable of dealing with the existing barriers, either financial or concerning the functioning of the institutions.

Using the studied countries as an example, the role that the state should play in relation to the support points, for the cluster, is as follows:

- Provide assistance for:
- Elaboration and execution of strategic plans;
- Finance the administration, management and coordination of two clusters;
- Develop projects that strengthen the innovative potential of the companies of the group;
- Develop a management and follow-up system for the actions promoted by the cluster.
- Promote a strategic vision consistent with the challenges of the future, oriented towards the market and gaining in efficiency and efficiency.
- Internationally consolidate companies, products and technologies of national origin.
- Develop projects, with national impact, that are based on supporting new products, solutions, qualifying traditional and family industries and promoting the dynamisation of new businesses.
- Develop research and technological development projects that allow an increase in the added value of the national product.
- Stimulate and strengthen collective, common, and cooperative projects, between companies and support entities.

• Keep the issue present on the national public agenda.

Table 14. Organisational model of two clusters in Portugal, Spain and not Brazil

Concept	Portugal	Spain	Brazil
Official nomenclature for clusters	ECC (Collective Efficiency Strategy)	AEI (Innovative Business Groups)	APL (Local productive farm)
Responsible national body	National Strategic Reference Table (QREN), through the Management Authority of the Competitiveness and Internationalisation Operational Program (COMPETE) The Agency for Competitiveness and Innovation (IAPMEI)	Ministry of Industry, Trade and Tourism, through the Apoio as Program AEI	Federal Government through the Brazilian Observatory of APLs (OBAPL) and two Regional Cores and two APLs.
Legal form of cluster	Association with support of administrative institutions	Non-profit private organisation	Public entity governed by the main support actors that make up the cluster (universities or research centres)
Technical support entities	Entities of the national scientific and technological system	Universities, research and innovation centres	Universities and research institutions
Administrative support entities	Regional administrations and national entities that represent the various subsectors that make up the agrifood sector	Regional public administration	Regional public administration, business associations and credit institutions
Objectives	Stimulate cooperation and network operation between companies and between these and other stakeholders relevant to the strategy (teaching and R&D, training, technological assistance and business associations, among others)	Maximise the turnover and profitability of the companies. Strengthen the growth, competitiveness and internationalisation of the cluster members	Promote economic development through the industrialisation of raw materials produced by family farming
Form of participation	Association	Association	Be established in the region of influence of the cluster
Participants	Companies and cooperatives related to the sector and that are established in the region of influence of the cluster	Companies and cooperatives related to the sector and that are established in the region of influence of the cluster	Companies, cooperatives and family farmers related to the sector that are established in the region of influence of the cluster

Source: own elaboration.

In *Table 14*, we can see a summary of how the clusters are organised in the countries of the cases studied, and the main characteristics of each one of them.

In the case of STP, due to the peculiarities of the country and the cultivation of organic cocoa as such, what is proposed is a mixed form of organisation between the 3 models presented in *Table 14*.

The main goals of the cluster are both the objectives sought by the European and Latin American clusters. In other words, in the first instance, to promote economic development through the industrialisation of organic cocoa produced by family and low-professional agriculture in STP, and, on the other hand, to maximise the business volume and profitability of the companies involved, boost the growth, competitiveness and internationalisation of cluster members, promoting the training and qualification of the sector's workforce and

proposing an international marketing strategy so that organic cocoa ceases to be a commodity and becomes a product known and desired in the world market.

In terms of the legal form of the cluster, as it is a new form of organisation in the country, it would probably be most appropriate to follow the Brazilian model, being a public organisation, management of which falls under the responsibility of the support institutions that will form part of the cluster. In STP, the technical support entities would be the two cooperatives (CECAB and CECAC11), the CIAT, which classifies and issues the certificate of origin linked to quality, and the suitable certification entities, empowered to do so and independent of all other interveners.

As for the form of participation, it could also be based on the model used in Brazil, where the only requirements are to be established in the region of influence of the cluster and belong to the corresponding sector, to benefit from the activities and facilities that the cluster offers.

Table 15. Cluster model proposal to be formed in STP

	STP
Sector	Agroindustrial – Biological cocoa culture
Responsible national body	Department of agriculture
Legal form of cluster	Public entity governed by the main support actors that integrate the cluster (universities or research centres , UNDP, FAO and Cooperatives)
Technical support entities	Cooperatives (CECAB and CECAC 11), CIAT and Certification Entities
Administrative support entities	General Directorate of Agriculture
Cluster objectives	Promote sustainable economic development through the industrialisation of biological cocoa produced by family farming and general agribusiness. Stimulate cooperation and network operation between companies and between these and other stakeholders relevant to the strategy – education and R&D, training, technological assistance and business associations, credit entities, among others. Maximise the turnover and profitability of the companies involved. Strengthen the growth, competitiveness and internationalisation of the members
Form of participation	Be established in the region of influence of the cluster
Participants	Companies, cooperatives and family farmers related to the sector and that are established in the region of influence of the cluster

Source: own elaboration.

The full proposal for forming the cluster in STP is summarised in *Table 15*, which exemplifies the institutions that already exist in the country and that could provide technical, scientific and financial support, in addition to national and regional administrative support.

5. Discussion

This study aims to evaluate the advantages and disadvantages of forming a cluster of small and medium-sized entrepreneurs, as indicated by Porter (1990), to boost the development and professionalisation of a given sector, in this case, the sector of organic cocoa production in STP. To this end, this investigation focused on five questions.

The first question assessed whether there were conditions, resulting from the characteristics of the existing groups and from the geographic concentration and cooperation, for the formation of an organic cocoa cluster in STP and the associated vertical integration of the entities that act in the different stages of the agro-food complex. The results of the qualitative study indicated that there is a geographic concentration of producers that is important enough for the country and that would justify the formation of the cluster. As previously mentioned, cocoa accounts for 70% of the country's exports and is the country's main source of income. This result confirms the research carried out by Prazeres *et al.* (2022a) and Sousa (2022), where the importance of this sector is clear in contradiction with the difficulties faced by the farmers in STP. For Prazeres and Lucas (2020), it is important to rethink the sector, which could include the creation of a PGI (Protected Geographical Indication) with effective official control and a collective promotion component that allows for greater efficiency or scale, and a cooperation strategy between supporting companies and institutions, which can be achieved by creating a cluster.

The second question aimed to confirm if there is a significant increase in innovation and competitiveness in companies participating in a cluster and regional macroeconomic benefit. The results obtained through the analysis of the financial profitability and the growth in the number of workers of the companies participating in European and Latin American clusters showed that the performance of the cluster-integrating companies is much better than that of the companies in the region and even better than the general behaviour of the OECD. These results are in line with the work of Porter (1999), Pimenta-Alonso (2021), Capó-Vicedo *et al* (2007), Jankowska (2015) and Makarevich *et al.* (2020). These authors claim that the cluster allows each member to benefit as if they were working on a large scale without sacrificing their identity. In addition, Porter (1998 and 1999) and Pimenta-Alonso (2021) state that the companies that acquire the most competitive advantages in a cluster environment are small and medium-sized companies. For Prazeres *et al.* (2020), creating knowledge and new skills, and improving existing expertise in research, science, and technology, with the consequent promotion of innovation, are essential requirements for the sector.

The third question regarded the need to know if there is the possibility of collaboration and leadership/governance in the organic cocoa value chain, one that can strengthen operational synergies. The qualitative research found that despite the presence of technical and organisational support institutions and the quality of the cocoa produced, there is not enough collaboration and leadership to promote an organic cocoa value chain capable of strengthening collaborative bonds. Consequently, the sector still does not have a prominent presence in the international market, as this is usually the result of a strong, collaborative industry, with clear leadership (Bojar, 2007), which confirms results obtained by researchers such as Prazeres *et al.* (2022b). The differences in producers' attitudes toward cluster cooperation mainly depend on the perception of their benefits (Haviernikova *et al.,* 2019).

The fourth question sought to know if there are formal and informal communication channels and trusting relationships between potential partners, which enhance the construction of close and lasting bonds between cluster members. Once more, the proposed questionnaires revealed an evident lack of collaboration between the actors, besides the absence of a formal organisation in the sector, which prevents the formation of bonds of trust and win-win relationships between the interested parties (Sheffi *et al.,* 2019; Speldekamp *et al.,* 2020). Even with the presence of two cooperatives in the country, each producer fights alone for his subsistence (Prazeres *et al.,* 2022b; Sousa, 2022).

Finally, the fifth and last question investigated whether local authorities help, in financial and institutional terms, overcome existing barriers (environmental and local community). In this regard, according to the experts interviewed, local authorities do not have specialised institutions to provide administrative and financial support to this type of organisation. An obvious example of this is that in the countries studied, the body responsible for the distribution of funds, formal classification, and control of clusters is the Ministry of Industry (Pimenta-Alonso, 2021), however, in STP there are only 11 ministries. Authors such as Prazeres *et al.* (2022) confirm these data, arguing the need to create specialised bodies to boost the local cocoa industry, as a means of strengthening the economy (Makarevich *et al.,* 2020).

5.1 Theoretical Contributions and Implications

The theoretical contribution of this work meets the ideas and concepts of sustainable development through the formation of agro-industrial clusters while comparing models of this type of organisation currently in use in Europe and Latin America. Its direct implication would be for the implementation of these organisations in STP, specifically in the production of ecological cocoa in this country.

5.2 Implications for Economic and Business Policies

The findings from this research may be useful for policymakers, stakeholders, producers, cooperatives and other subjects in dealing with planning and joining cluster cooperation in a sector and product with high demand in foreign markets. The practical repercussions of the study deal with increasing competitiveness of the eco-friendly STP cocoa industry through innovation and provoking an effect of improvement in the life and well-being of all the people involved in this production.

The creation of the OC cluster would prevent today's lack of interaction between OC producers and processing value-added industries (chocolate factories), promoting modernisation and business performance, the adoption of new business models, and partnership networking. Also, it could have a positive impact on the activities of other sectors and agricultural products, including agricultural inputs.

One of the important tasks of national agrarian policy is to implement a new direction given the need to improve rural households' well-being. The establishment of an agro-cluster can be one of the key factors to achieve it. The constantly improving legal, organisational and economic relations between stakeholders participating in the cluster impose both institutional and structural changes in agriculture as well as readjustments in national economic and business policies.

A mutual integration process between cluster participants, with diversified levels of innovation in agricultural services, in cooperation and in competitiveness with network-related enterprises, in line with market principles of agricultural regulation, impose economic and business policies that combine the formation of a regulatory framework with a comprehensive service infrastructure and availability of highly qualified specialists.

5.3 Limitations and Future Research

Some limitations of this research should be pointed out. One limitation is the small sample size in the qualitative study. For future studies, researchers should base the analysis on a larger sample size to get more accurate results or even develop quantitative research with a sample size which allows statistical tests and the identification of significant relationships or connections within the set of variables.

Another limitation is the difficulty in finding real and objective data that can be used as an example for new organisations. Also, the lack of specific literature on the topic in comparable geographies and sectors did not allow us to discuss in detail the results obtained, their implications, or comparison with previous studies.

Further proposals for future research work would be to seek information from companies present in the few African clusters and compare their results with the regions studied in this paper. Additionally, considering the major food security and poverty problems in Africa and particularly in STP, future studies recommended in this area should focus on conceptual development of agro clusters as well as in cluster impact assessment methodologies. This would provide insights into whether cluster creation brings the intended consequences of improving economic, social, and environmental conditions, achieving Sustainable Development Goals (SDG).

Conclusions

A cluster is based on a group of interrelated companies, institutions, and other types of organisations, including scientific ones, concentrated in a certain sector. They are essentially created to establish cooperation, share resources, and exchange experiences and knowledge in order to obtain a competitive advantage in the market. Participation in the cluster grants, particularly for small and medium-sized companies and entrepreneurs, but also territories, benefits that they would not have in isolation. However, participation in clusters is also burdened with negative effects resulting from the nature of cooperation and the specificity of the cluster operation.

The sustainable development of the OC sector depends largely on increasing its innovation and competitiveness. Despite some ongoing measures for agricultural infrastructure development, particularly in the OC sector, and the national economic policies, an important factor in this direction is the establishment of one OC cluster in STP. The organisation of this agro cluster could play an important role in the development of the sector, as well as contribute to achieving one of the more important SDGs, Zero Hunger.

Based on the results obtained, it is possible to propose the formation of an OC cluster in STP as a way of specialisation and strengthening of the main local industry and sustainable economic growth of the territory through professionalisation and increased competitiveness of the producing companies. The joint and monitored search for responsible agricultural production that respects the environment and promotes quality and social well-being also causes an increase in the supply of quality jobs and, consequently, an improvement in the HDI of the local population.

In STP, developing an OC cluster and increasing producers' competitiveness is an important factor in improving the well-being of villages where more than 60 percent of the country's population lives in poor situations. In this regard, the study demonstrates that in addition to providing improved technologies, managerial training and basic rural

infrastructure development, an OC cluster can create favourable conditions to mobilising stakeholders into various groups, promoting their collective actions for innovations. It also reveals the importance of government support in cluster formation and implementation of an appropriate regulatory framework.

There is a strong interest in developing countries such as STP to transform agriculture from its heavy dependence on staple commodities to increased production of high-value products that can meet the quality requirements of chocolate industries and export markets. No consolidated strategy, however, has been developed in the country to facilitate this. One OC cluster which synergistically links all the stakeholders holds the key to achieving the necessary transformation and SDG goal.

As a disadvantage of cluster formation in this country, one can mention the need to invest public funds in the creation of public bodies to manage the sector, organise all the actors involved and finance new projects. A science agenda, which provides guidance on where strategic investments should be made, as well as facilitating the alignment of actions and resources to improve the value of using that investment, is recognised as important. It is also worth mentioning the social and cultural barriers and rejection that this new initiative may provoke in companies that are already in the sector.

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PASIŪLYMAS SUKURTI VEIKSMŲ GRUPĘ, KURI SKATINTŲ TVARŲ SAN TOMĖ EKONOMIKOS VYSTYMĄSI EKOLOGIŠKAI AUGINANT KAKAVĄ

Andrea Mara Pimenta-Alonso, Ibrahim Prazeres, Maria Raquel Lucas

SANTRAUKA

Šiuo straipsniu siekiama įvertinti mažų ir vidutinių verslininkų klasterio sukūrimo STP ekologiškoje kakavos gamyboje pranašumus ir trūkumus. Straipsnyje buvo atlikti mišrūs tyrimai – tiek kokybiniai, tiek keletos atvejų tyrimai. Kokybinis požiūris buvo sutelktas į organinės kakavos gamybą STP, ieškant klasterizacijos reiškinio paaiškinimų ir atsakymų į tyrimo klausimus, kad juos būtų galima suprasti laiko, vietos ir kultūros kontekstuose. Kiekybiniai duomenys gauti iš Portugalijos, Ispanijos ir Brazilijos klasterių atvejų tyrimų. Rezultatai atskleidė, kad svarbiausi pranašumai yra ekonominio efektyvumo didinimas ir klasteryje dalyvaujančių įmonių dydis. Akivaizdu, kad organizuotas sektorius didina regionų, kuriuose jis įsisteigęs, gerovę. Svarbiausi trūkumai yra poreikis investuoti į administracinę struktūrą ir techninę paramą, taip pat poreikis panaikinti neigiamą šališkumą inovacijų iniciatyvoms.

REIKŠMINIAI ŽODŽIAI: pramonės klasteris; konkurencinis pranašumas; žemės ūkio pramonė; ekologiška kakava; San Tomė ir Prinsipė (STP).