



IV SINGEP

Simpósio Internacional de Gestão de Projetos, Inovação e Sustentabilidade
International Symposium on Project Management, Innovation and Sustainability

ISSN: 2317 - 8302

Modelling expansion, production diversification and financial performance in Brazilian agro-industrial cooperatives.

FELLIPE SILVA MARTINS

UNINOVE – Universidade Nove de Julho
silvamartinsfellipec@gmail.com

WAGNER CEZAR LUCATO

UNINOVE – Universidade Nove de Julho
wagner.lucato@gmail.com

DIRCEU DA SILVA

UNINOVE – Universidade Nove de Julho
dirceuds@gmail.com

Agradecemos à Universidade Nove de Julho pelo apoio financeiro durante a realização da pesquisa. Agradecemos ao programa PROSUP/CAPES pelo apoio financeiro durante a realização da pesquisa.



IV SINGEP

Simpósio Internacional de Gestão de Projetos, Inovação e Sustentabilidade
International Symposium on Project Management, Innovation and Sustainability

ISSN: 2317 - 8302

MODELLING EXPANSION, PRODUCTION DIVERSIFICATION AND FINANCIAL PERFORMANCE IN BRAZILIAN AGRO-INDUSTRIAL COOPERATIVES.

Abstract

This paper aims at integrating diversification strategies (horizontal, lateral and vertical integration) and expansion strategies (operation area and membership) to financial models in Brazilian agro-industrial cooperatives, as current literature suggests that both are important to cooperative financial results. Several studies have tried to assess the importance of diversification in the agricultural cooperative financial outcomes, but not entirely successfully. To attempt this, we used Structural Equation Modelling to combine these three concepts in a working model. The findings suggest that while expansion is directly responsible for both the financial output and the diversification strategy appearance, no hard evidence was found to support that diversification of production in an agro-industrial cooperative leads to positive financial results. A few adaptations in measurement variables for diversification were done since they are treated as business sensitive, and slight distortions could be present. Nonetheless this paper contributes both theoretically and practically to the development of the agro-industrial production studies.

Keywords: Agro-industrial cooperatives, diversification, financial results.



1. Introduction

Agro-industrial cooperatives are widely diversified, highly complex businesses with internal structures different from traditional firms (CHADDAD; COOK, 2004; ILIOPOULOS, 2014). Despite these differences, in Brazil these cooperatives are among the top companies in the agribusiness competitors. Agro-industrial cooperatives are today the backbone of agribusiness in Brazil, showing notably industrialised structures with billions of dollars in income each year (OCB, 2014). Their diversification period may be traced back to the end of the 1980s, when the impoverished and low technological Brazilian agribusiness geared itself towards exports (MARTINELLI ET AL., 2010). Current economic stagnation and increased competition are leading agro-industrial cooperatives to rethink strategies and consider whether diversification strategies and expansion should be continued.

Even within this economic crisis, the sector has been reaching new levels of production and gains each year (OCB, 2014). However, increasing costs, obsolete legislation, pressure from global markets, and competition against non-cooperative companies have hindered further financial performance. Also, due to the differences in character and structure, they lack the same flexibility in decision making, and structure and strategy shifting as do traditional firms (HENEHAN; ANDERSON, 1994; REYNOLDS, 1997; CHADDAD; ILIOPOULOS, 2013).

Thus, in order to survive, Brazilian agro-industrial cooperatives need to assess which diversification and expansion strategies have better financial outcomes. Literature suggests that cooperatives and traditional firms have entirely different approaches and reasons to diversification and that no overall model for cooperatives is available due to the complexity of the matter (HENDRIKSE; VAN OIJEN, 2002; HENDRIKSE; SMIT; DE LA VIETER, 2007). On the other hand, previous research advocates that agro-industrial cooperatives be treated and modelled as any firms in terms of financial assessment (HENDRIKSE; VEERMAN, 2000).

Several studies try to model and understand Brazilian agro-industrial cooperatives from a financial point-of-view, but with limited success (MARTINS, 2013). We propose the use of Partial Least Squares Structural Equation Modelling (SEM-PLS), adding production diversification strategies and area-membership expansion strategies to integrate a new model to assess these inter-relations. Our goal is thus to verify the effect of both expansion and diversification strategies on the financial performance of Brazilian agro-industrial cooperatives. We gathered data from 67 Brazilian agro-industrial cooperatives, with total revenues higher than US\$ 50 million dollars each (adjusted in 2013 figures). All of these cooperatives are located in the southern and south-eastern areas of Brazil, in which they constitute a cluster of highly dynamic agricultural businesses.

The findings suggest that the relationship between expansion and financial performance and between expansion and diversification is strong. However, we could not find support to believe that the horizontal, lateral and vertical diversification strategies impact financial performance in any significant way – i.e., what the economic literature on cooperatives prescribes as an existing relationship (be it linear, curvilinear, etc.) does not find basis on actual, real-world data. Hence we can affirm that the role of diversification on the financial outcomes of Brazilian agro-industrial cooperatives is only marginal, but present no causal relation.

This paper is intended to offer three main contributions. First, it presents a theoretical contribution by integrating concepts in the agro-industrial financial models that have not been otherwise employed as previous models employed only correlation and simple regressions (MENEGÁRIO, 2000; BIALOSKORSKI NETO, 2002; FERREIRA; BRAGA, 2004;



FAJARDO, 2006; MARTINS, 2013). Second, there is a methodological contribution, by using a method (SEM-PLS) that has not been employed before with the object in study (Brazilian agro-industrial cooperatives), with successful results. Third, this paper suggests results and general principles that can be readily applied by practitioners in agro-industrial cooperatives management and planning.

2. Theoretical background

One of the economic branches most benefitted from the cooperative doctrine is the agro-industrial sector. It aims at helping small producers to enter the market (REARDON; TIMMER, 2007) and is in many countries a state strategic mechanism of control and economic adjustment (HENRY, 2005; GIANNAKAS; FULTON, 2005). Agricultural cooperatives emerged from the mere role of replacing middlemen (SCHNEIBERG; KING; SMITH, 2008), to be active coordinators in the local production capacity (SEXTON, 1986; FARIAS; RAMOS, 2009). They have finally become part of the top dynamic companies and are of great economic interest worldwide (VALENTINOV, 2007; SMITH; ROTHBAUM, 2013).

In Brazil, the term “agro-industrial cooperative” serves as an umbrella category for agricultural, dairy and animal husbandry cooperatives, as usually all of these three different productions are found in conjunction (MARTINS, 2013). They also range from the most basic farmers’ purchasing cooperatives to the most competitive industrial ones.

Particularly in Brazil, cooperatives have gained wide attention from public bodies and investors, as they have become increasingly important in the national economy. Data from 2013 demonstrates that there are currently 1561 agricultural-husbandry cooperatives in operation. Additionally, these cooperatives combined have had US\$ 5.4 billion in exports (2013 figures). Moreover, approximately 50% of all soya and corn in Brazil is produced within these cooperatives. With such earnings and decades of development, agricultural-husbandry Brazilian cooperatives have diversified their activities for several reasons.

Furthermore, they also generate roughly 160.000 direct jobs. Brazilian agricultural cooperatives’ influence is so deep in the southern and south-eastern areas that 55% of the working force of Parana state is presently hired in the state’s cooperatives (OCB, 2014). Since the 1990s Brazilian focus shifted from industrial machinery and electronic production to agribusiness (ABBEY; BAER; FILIZZOLA, 2006), and its dependence on the agribusiness results in the international market only grows (PEINE, 2013). That is the main reason why it is of paramount importance to understand the diversification strategies in the Brazilian agro-industrial cooperative scenario in light of this business orientation (KUMAR; GAUR; PATTNAIK, 2012).

However, one cannot study diversification isolated from its inception. The economic literature offers a few insights on how diversification develops in agricultural cooperatives. General agricultural cooperative literature posits that cooperatives diversify their activities to lower their risk, whenever in face of economic crises, to improve dominance in a geographical area, to expand their business horizons, to take chances at new business opportunities, or in case of doubtful climatic conditions, among several other situations (MARTINS; LUCATO, 2014). That means that there are too many reasons and possible outcomes for diversification strategies in cooperatives, yet cooperatives seem eager to diversify their activities.

To make matters worse, Hendrikse and Van Oijen (2002) state that there are no overall diversification models that fit cooperatives, due to the extreme variation in formats, structures, property rights, and firm coordination. After Hendrikse and Van Oijen’s work, several



attempts to model cooperatives in specific branches appeared (HENDRIKSE; SMIT; DE LA VIETER, 2007; RITOSSA; BULGACOV, 2009; DENG; HENDRIKSE, 2013). Most of them, however, only endeavour to offer theoretical, untested models.

As for generic diversification concepts, Ansoff (1957) studied business performance through their market positioning and divided possible strategies them into four quadrants (market penetration, product development, market development and diversification). Prymon (2011, 2014) analysed Ansoff's work and stated that only the quadrant 'diversification' is actually susceptible to being performed unilaterally by any company, since the remaining present the need for external cyclical characteristics to be implemented.

Applying Ansoff's principles to agricultural cooperative diversification thus takes three different possible approaches, according to their orientation. Horizontal (or concentric) diversification occurs when a cooperative diversifies its production without departing from their core business (LIU; HSU, 2011). On the other hand, lateral (or conglomerate) diversification takes place when a cooperative decides to diversify their operation beyond its original scope, sometimes towards business opportunities having no relation whatsoever to their core (ZHOU, 2010). Finally, vertical diversification (or integration) is the case when a cooperative decides to absorb the next processing stages in a supply chain, incorporating their production and assimilating the benefits of the added value (RAUDSZUS; SCHIERECK; TRILLIG, 2014).

However, diversification approaches are not the only one that find support in the theory as being capable to have positive impact on the financial outcomes of cooperatives. The expansion of a cooperative production basis, namely the area in which it operates and the sheer number of its associates, is also a fundamental factor for its financial success. Economic literature of cooperatives defines these as two main drivers for economies of scale, which in turn can enhance the cooperative situation in the market. Also, the longer cooperatives have been active in the market, the higher the possibility of them having a more professionalized board, acquired human and intellectual capital, which could also be crucial to its future development.

The combination of horizontal, lateral and vertical integration approaches, with the area and membership expansion may prove an interesting picture of the Brazilian agricultural cooperative model and provide thought-provocative insights about its market.

3. Conceptual model and research hypotheses

Despite its importance within the Brazilian economic panorama, most studies only adapted methodologies from other areas (mostly from the USA and Europe) to understand financial performance of the Brazilian agricultural cooperatives. This is a potential limitation in these studies, considering that there are extensive differences in market dynamics, local legislation, regional clusters and influence of macroeconomic shifts among countries.

To overcome such limitations, we proceeded to carry a bibliometric research, which determined that 42 papers analysed the financial outcomes in Brazilian agricultural cooperatives. Among these, only 8 papers cited diversification as a possible independent variable, and 4 of them studied the relationship clearly explored the relationship between diversification strategies and financial outcome. However, only one paper attempted to model this relationship by employing logistic regressions and correlations on a simple directional approach, reaching limited results (FERREIRA; BRAGA, 2004). This conclusion was reached by Martins (2013), who has also shown that using correlations and simple regression may not be enough to understand and model diversification in Brazilian agricultural cooperatives and that an integrated approach is necessary.



Few papers deal with structural productive factors in cooperatives, be them linked to the diversification strategies or geographical area and membership arrangements. Thus, three pervasive constructs emerge from the literature: a) Diversification Strategies (DIV); b) Area-Membership Expansion (EXP); and c) Financial Performance (PERF). However dealing directly with constructs is impossible, since they are “conceptual abstractions of phenomena that cannot be observed directly” (SUDDABY, 2010, p. 346). To circumvent this limitation, constructs are tied to measurable variables, taken as a proxy for the construct itself.

For the purposes of this research, the definition for the three constructs employed is presented on Table 01.

Table 01 – Constructs and definitions

Construct	Definition	References
Diversification Strategies (DIV)	Diversification is the amount of variation in productive activities in a agricultural-husbandry activity. It deals with the core activity and any other subsequent productive activities the cooperative decides to take on. It is commonly believed that diversification is good for cooperatives and that it increases financial performance. Diversification is a construct, composed of independent variables.	Fajardo (2006); Ritossa & Bulgacov (2009); Ritossa, Ferreira & Predebon (2010); Serigati & Azevedo (2013)
Area-Membership Expansion (EXP)	Cooperatives usually start as small ventures, with local farmers uniting to enter a market and eliminating middlemen. As the number of associates and the operation area grows, cooperatives become larger, more complex organizations. It is commonly believed that expansion of area and membership is good for the cooperative and that it increases financial performance. It is also composed of independent variables.	Crúzio (1999); Bialoskorski Neto (2002); Souza & Bialoskorski Neto (2004); Serigati (2008); Ritossa & Bulgacov (2009); Serigati & Azevedo (2013)
Financial performance (PERF)	It is the set of indices commonly found in the economical-financial literature as proxy variables to assess a company's or a cooperative's situation in a given market. This construct is composed of several dependent variables.	Carvalho & Bialoskorski Neto, 2008; Khatchatourian & Treter (2010); Andia, Garcia & Bacha (2011)

Hypotheses

The theoretical links between financial outcomes and area-membership expansion emerges from the economic literature that theorises that economies of scale appear when the same industrial structure has an intensive use (TEECE, 1982; BARNEY; CLARK, 2007). Within the field of cooperative studies, literature has been prolific in terms of studying the economic aspects, especially considering economies of scale.

The early cooperative economical theorists (EMELIANOFF, 1942; ROBOTKA, 1947, PHILLIPS, 1953) have examined in detail how cooperatives are dependent on the production of its associates and the second wave of theorists (HELMBERGER; HOOS, 1962; ROYER, 1978; LADD, 1982) have refined previous models including associate opportunistic



behaviour, weight of associate decision, and how cooperatives could extract more value from their economic structures. Specifically applied to modern agricultural cooperatives, studies as Porter and Scully (1987), Torgerson, Reynolds and Gray (1998), Nilsson (2001) show a clear relationship between the area-membership expansion and the financial performance of cooperatives.

In Brazil, the first author to address the theoretical links between the expansion of area and membership of an agricultural cooperative and its financial performance was Crúzio (1999), immediately followed by Bialoskorski Neto (2002). This idea was later expanded in Souza and Bialoskorski Neto (2004). More recently, Serigati (2008) and Ritossa and Bulgacov (2009) theorised that area-membership expansion could follow an inverted u-shape function, according to which economies of scale appear along with the said expansion, but with transaction costs would also be present.

Finally, Serigati and Azevedo (2013) propose the idea that the number of associates in an agricultural cooperative may be associated with an increased Herfindahl-Hirschmann Index (a common indicator of diversification). They also posit that the expansion of the cooperatives may be linked to its human capital, which, in turn, can be a source of financial performance. Since there is clear evidence that there is a relationship between area-membership expansion and financial performance and also between, we posit that:

Hypothesis 1: The area-membership expansion (EXP) positively affects the economical-financial performance (PERF) of agro-industrial cooperatives.

Since the economies of scale are usually linked using the profit and already existing structure to foster new businesses, this is believed to have led to the appearance of diversification in the early agricultural cooperatives (VITALIANO, 1983; SCHROEDER, 1992). A few authors have tried to model the relationship between expansion and diversification in Brazil. They have successfully showed a theoretical link between them, but they failed to present an integrated view of different kinds of expansion variables with Ansoff's three diversification orientations (FERREIRA; BRAGA, 2004; FAJARDO, 2006).

Thus diversification is believed to increase life span in a cooperative since it lowers risks, and since its presence does not affect directly core business, but it rather improves the overall use of resources in a cooperative, we posit that:

Hypothesis 2: The area-membership expansion (EXP) positively affects the diversification (DIV) strategies of agro-industrial cooperatives.

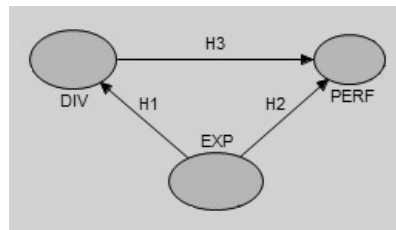
As a consequence of the previous two hypotheses, and in the light of Hendrikse and Van Oijen's work, as well as the subsequent attempts to operationalise their theoretical contribution (HENDRIKSE; SMIT; DE LA VIETER, 2007; RITOSSA; BULGACOV, 2009; DENG; HENDRIKSE, 2013), we posit that:

Hypothesis 3: The diversification strategies (DIV) positively affect the economical-financial performance (PERF) of agro-industrial cooperatives.

The relationships among the three hypotheses can be better viewed in the Figure 01, which represents graphically the model to be tested.



Figure 01 - Hypotheses



4. Method

Structural Equation Modelling (SEM) first appeared in the 1980s as a form of soft modelling, aiming at dealing with complex models, containing non-adherent to multivariate normal distributions data (MACKENZIE; PODSAKOFF; PODSAKOFF, 2011). Soon, the first SEM methods and software packages were implemented (WOLD, 1985). However, they were applied to structural models based on covariance or maximum likelihood estimation, which implied vast amounts of data to fit such models, and its use was restricted mostly to hard sciences. With the introduction of the first Partial Least Square (PLS) methods, new possibilities were open, as PLS is more prone to be applied to situations with fewer cases in the models (HWANG ET AL., 2010; WONG, 2010), as well as or testing striving models with no sufficient theoretical support (HAIR ET AL., 2013).

Thus, SEM comprises a set of methods intended to test conceptual and theoretical models, especially when multiple interactions between factors are in play (GEFEN ET AL., 2000). Among them, the Partial Least Square (SEM-PLS) branch of methods has been successfully employed for its capabilities in eliciting predictions, along with testing and building theory (HAIR ET AL., 2013). SEM-PLS has also been used for decades in organizational and management research (SOSIK; KAHAI; PIOVOSO, 2012).

Running a SEM-PLUS model is done by separating the procedures in two parts. The first part is the measurement model, in which proxy variables are taken from the literature to measure effects. These effects are united in constructs which can be arranged in relationships in the second part, the structural regression model (HAIR ET AL., 2013). As described in the conceptual model section, this work builds upon the three constructs commonly found in the literature (structural model) and measures their effects by associating them with variables (measurement model). The following sections describe the variables associated with each construct.

Financial performance (PERF) variables

Several authors argue that the financial assessment of a company can be interpreted by using a 'tripod' composed of liquidity, debt and profitability indices (KAPLAN, NORTON, 1992; BARNEY; HESTERLY, 2007), in addition to eventually include other indices according to specific analyses. Carvalho and Bialoskorski Neto (2008) analysed the performance of agricultural cooperatives in the state of São Paulo using factor analysis and reached the same conclusion for cooperatives, i.e., that the three groups of financial indicators that have the most impact on the financial evaluation of such cooperatives are essentially the same as in traditional firms.

Hence, we selected the following financial indices to compose the Financial Performance (PERF) construct: Current ratio (CUR), Return on sales (ROS), Return on capital employed (ROCE), Net operating income (NOI) and Net debt (DEBT – reverse coded). That is, a variable was selected to compare size (NOI), two variables for productive



output performance (ROS and ROCE), and the remaining DEBT and CUR to compose the traditional financial analysis. A last variable (Global performance -GLP) was included. This was devised by Martins (2013) as a weighted variable that combines profit, liquidity and debt (also reversed coded) in a single index, ranked from the best to worst performance in a given group of cooperatives.

Area-membership expansion (EXP) variables

Since the name of the construct is self-explaining, we chose three variables related to time, area and associates. For this study we selected Company operation in years (AGE) as a proxy for cooperative longevity (GIMENES; URIBE-OPAZO 2001a; SOUZA; BIALOSKORSKI NETO, 2004; SERIGATI, 2008). It should be noticed that conjoint purchasing only cooperatives were excluded from this study so that this variable strictly measures operation time in both purchasing from associates and passing production on to the supply chain. As for the area (AREA), the self-evident variable measures the number of product purchasing venues (from associates) as a basis (Ferreira, 2002). The third variable is also self-explaining, but we only used the number of active associates – only those in constant contact with the cooperative and that have sold to or bought from the cooperative in the past three months.

Diversification Strategies (DIV) variables

As for the lateral and horizontal diversification strategies, one often employs the Herfindahl index (or the Herfindahl-Hirschmann variant). However, a component of this index (percentage of participation of each business unit in the total business – the weight of each different business) is confidential and could not be obtained from any of the studied cooperatives. Hence, because of this limitation, this work only used the number of businesses as a source of horizontal diversification measure and lateral (N). We are aware that this is a limitation, but previous works have found that the distortion between using this adapted proxy and the original Herfindahl Index is often not significant.

Regarding vertical diversification, there were no accepted measurements of vertical diversification in cooperatives found in the literature. Therefore, we developed a questionnaire that measures the diversification into 5 cumulative phases: 1) Purchase from associates and reselling; 2) Pre-processing (turning associate production in raw products, such as oils, flour, etc.) and reselling; 3) Manufacturing (final product) and reselling; 4) Distribution of final products (wholesale); and 5) selling final products directly to final customers. Again, we are mindful of the eventual limitations in the results of this variable. It was nonetheless tested by a group of specialists, and deemed adequate for the purposes of this study. On the Table 02, all the variables and its associated constructs are listed.

Table 02 – Constructs and variables

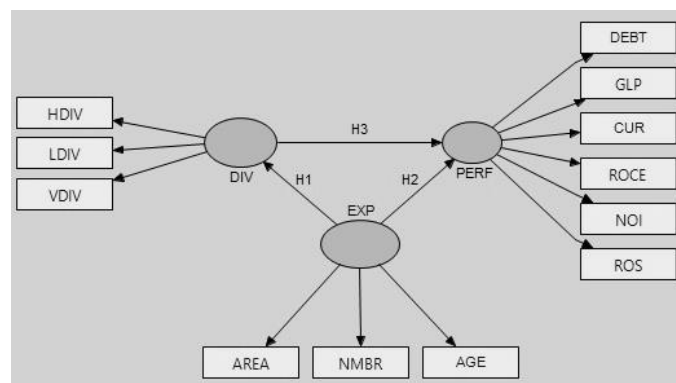
Construct	Variables
Diversification Strategies (DIV)	Horizontal diversification (HDIV)
	Lateral diversification (LDIV)
	Vertical diversification (VDIV)
Area-Membership Expansion (EXP)	Area of operations (AREA)
	Number of cooperative members (NMBR)
	Company operation in years (AGE)
Financial performance (PERF)	Net debt (DEBT)
	Global performance* (GLP)



Current ratio (CUR)
Return on capital employed (ROCE)
Net operating income (NOI)
Return on sales (ROS)

Those constructs (structural model) and variables (measurement model) are combined in the research model to be tested. The final model can be visualized according to Figure 02.

Figure 02 – Research model



To obtain the data needed to test the model, a questionnaire was devised. The questions were multiple-choice, in which the production managers had to choose among the best options (for the diversification variables). As for the financial performance variables, production managers were asked to send a copy of the cooperative's yearly balance sheet and statement of income. The expansion variables are self-evident and production managers had no trouble obtaining them from databases.

5. Results

Originally 152 questionnaires were sent to cooperatives found in the Brazilian south, south-eastern and middle-western states' cooperative associations' listings. Since the level of responsiveness from the middle-western states' cooperatives was low, they were eliminated from the final sampling. Also, low income cooperatives were eliminated (below R\$ 50 million annually, roughly R\$ US\$ 25 million, adjusted to 2013 figures). We obtained 67 complete answered questionnaires (approximately 44%). Regarding their origin, 40 cooperatives are located in the southern area and the remaining 27 in the south-eastern area. Also 15 cooperatives (22.4% of total sampling) had income higher than R\$ 1 billion (roughly US\$ 500 million, 2013 figures).

As for set size pre-requisites and statistical power in SEM-PLS models, there is no general consensus (WESTLAND, 2010). However, a rule of thumb of 10 times the largest number of structural paths linked to a single construct (HAIR ET AL., 2013) suggests that at least 20 companies should be added to the study (since the construct Performance receives two paths, from the Diversification and Expansion constructs, see Figure 01). Marcoulides and Saunders (2006) suggest at least 52 cases for a maximum 2-arrow receiving model.

The response level, then, was satisfactory as data from 67 companies was obtained, which satisfies both suggestions. Using the statistical software G*Power with the given parameters (sample = 67; maximum number of paths = 2) for the proposed model, we verified



that the sample size for the analysis is clearly adequate, as it carries a statistical power of 98.9% ($1-\beta$ error probability).

The first step in evaluating the proposed SEM-PLS model is verifying whether the Average Variance Extracted is higher than 0.5 (FORNELL; LARCKER, 1981). Since it is not, it means that probably a few variables should be eliminated from the model. After doing one by one and verifying again the AVE levels, a few variables were removed (construct EXP: AGE; construct PERF: DEBT, CUR). After the removal, we obtained the required minimum AVE levels (DIV = 0.57; EXP = 0.75; PERF = 0.55).

Next, we verified the internal consistency of the model by also measuring the Cronbach's α and Composite Reliability. Regarding Cronbach's α , the minimum required level for exploratory research is 0.6 and seeing that all three constructs obtained higher levels than the required (DIV = 0.63; EXP = 0.68; PERF = 0.81) we proceeded to gauge the Composite Reliability. As for Composite Reliability, the least required is between 0.7 and 0.9. We obtained DIV = 0.79; EXP = 0.86; PERF = 0.82. These measures confirm the model's internal consistency.

The following step is to analyse the discriminant validity according to the cross loadings. The factor loading of each variable should be higher in the corresponding construct. If a variable presents a higher factor loading in other than the original construct it should be removed from the model. As can be seen in the Table 03, all variables are perfectly aligned to their corresponding constructs.

Table 03 – Constructs and variables

	EXP	DIV	PERF
AREA	0.893296	0.500779	0.893296
NMBR	0.846154	0.272644	0.553191
HDIV	0.168261	0.518703	0.141854
LDIV	0.379120	0.829533	0.247000
VDIV	0.422884	0.874802	0.366045
GLP	0.208752	0.131394	0.730983
NOI	0.707640	0.449862	0.834365
ROCE	0.219751	0.041812	0.621797
ROS	0.276951	0.103112	0.766577

From now on, we move to the structural model. The following step is to evaluate the Pearson's Coefficient of Determination (R^2). Only arrow-receiving constructs (which work as a dependent variable) are affected. The R^2 evaluates the portion of the variance of the endogenous variables, i.e., it indicates the structural model quality. According to Cohen (1988), R^2 levels close to 0.13 indicate medium effects and levels close to 0.26 are considered high effects. R^2 levels obtained were DIV = 0.21 and PERF = 0.38, which demonstrates that the relationships in model have considerable effect.

We also need to verify whether the t-tests for the relationship between each variable and their corresponding construct. According to the Table 04, each relationship was > 1.96 , been deemed adequate. This indicates that all the variables are adequately linked to their constructs.

Table 04 – Measurement model t-tests

	DIV	EXP	PERF
HDIV	2.686654		
LDIV	6.135669		



VDIV	13.454056		
AREA		25.091769	
NMBR		18.690715	
GLP			3.648543
NOI			10.263160
ROCE			3.309068
ROS			4.133698

As a consequence, we need to verify whether the paths linking the constructs (hypotheses H1, H2 and H3) truly exist. That is done by another t-test, in which the H0 is that the regression coefficients, thus the path and the hypothesis associated with them, are different from zero, being significant. The results obtained are presented in the Table 05.

Table 05 – Path coefficients

Hypothesis	Path	T-test	Result
H1	EXP → DIV	4.26	Accepted
H2	EXP → PERF	5.03	Accepted
H3	DIV → PERF	0.87	Rejected

Since the t-test result for the H3 was lower than 1.96, H3 is rejected, which means that the path suggested in the literature does not find support in the data obtained. H1 and H2 are sustained since their result was significant.

The last two tests to execute are Stone-Geisser indicator (Q^2), which reveals the predictive validity of the model (i.e., it evaluate how accurate the model is or how close the model is to reality), and Cohen's Indicator (f^2) which evaluates the weight of each construct in the model (i.e., how useful it is to explain the model). The results are found in the Table 06.

Table 06 – Model predictability

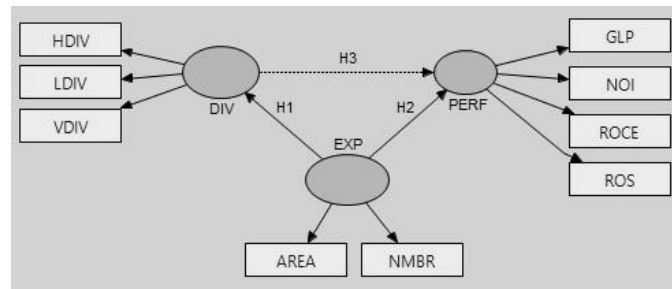
	Q^2	f^2
DIV	0,100757	0,197059
EXP	0,254657	0,254657
PERF	0,097145	0,300558

Ideal Q^2 values are over zero, and according to Henseler et al. (2009), values close to 0.02, 0.15 and 0.35 mean that the model prediction respectively is low, medium and high. The results retrieved allow us to understand that the model does indeed measure what was supposed but that its reliability is only medium to high. The reference f^2 values, according to Cohen (1988) are 0.02, 0.15 and 0.35 for respectively low, medium and high relative importance in the model. Since all constructs have achieved at least 0.19, constructs are considered medium-high to high important to the model.

Once all the adequacy testes have been finished, the final model is ready. The main differences between the research model and the final model is that a few variables had to be removed (had no relation to the model as it is) and that the path coefficient associated with the H3 is non-significant. The final model is presented in Figure 03 (dotted line indicates rejected hypothesis).



Figure 02 – Final model



With that in mind, we rejected the H3, and thus, the impact of the diversification strategies on the financial outcomes of Brazilian agricultural cooperatives cannot be confirmed.

6. Discussion and conclusions

Agricultural-husbandry cooperatives widely differ from traditional firms, as they have different historical backgrounds, and are usually regarded as a different kind of business. Literature, however, states that cooperatives have gotten closer to traditional firms (MARTINS, 2013), but still the differences in property rights, group decision making, and legislative limitations on use of their profits, among several other hindrances dissociate them.

Since Hendrikse and Van Oijen's work (2002) it has been debated whether the diversification strategies take its toll or enhances financial performance in cooperatives. A few attempts have been made to model such diversification impact on the agricultural cooperative financial outcomes, but not entirely successful. We attempted in this paper to assess the importance of such diversification strategies in real-world data, obtained from a considerable sample of Brazilian agro-industrial cooperatives, but such relationship (H3) could not be confirmed.

We could, nonetheless, confirm that there are two different axis of actions in cooperatives: the expansion of its basic resources (area and membership) certainly contribute to cooperative economies of scales, which in turn cause cooperatives to both diversify production activities and enhance their financial performance. The relationship between diversification and financial results is only marginal and there is no support to believe that there is a causal relationship as suggested in the literature.

This paper contributes to the theory as finally integrating diversification, expansion and financial performance in a model, and also by providing evidence that diversification strategies do not necessarily have the same outcome as predicted in the literature. Cooperative managers should be aware that implementing horizontal, lateral or vertical diversification approaches to their business portfolios must be carefully weighted and several studies and simulations must be carried out beforehand. We also suggest that the diversification possibilities be weighted again against specialization possibilities.

A second contribution is methodological. As far as we could examine, through bibliometric research, this was the first time a structural equation modelling method was applied to diversification of production and operation expansion in Brazilian agricultural cooperatives. We hope this study make way for more complete models, including more variables, which were not included due to its business sensitive nature.

As for the results obtained for the H3, there could be many explanations for that lack of evidence – while the literature appoints diversification as a means of earning extra income



employing unused resources, it could also be a cause for an increase in transaction costs (HARTE, 1997), heightened problems related to the agency theory (COOK, 1995), corporate governance theory (HOLMSTRÖM, 1999) or property rights theory (FULTON, 1995). Any of these problems may tag along an agricultural cooperative expansion and full professionalization of the board and its strategic development.

An alternative explanation is that while cooperative internal structure and legislation has been keenly and frequently updated in other countries, as in the U.S. (CHADDAD; COOK, 2004), Brazilian laws still oblige cooperatives to transact exactly as they did a few decades ago. Nilsson, Kihlén and Norell (2009) affirm that the new cooperative models have taken over, and that traditional cooperatives (like maybe the Brazilian ones) have difficulties in surviving and fitting the modern markets (as their American and European counterparts).

7. References

- ABBEY, L. A.; BAER, W.; FILIZZOLA, M. Growth, efficiency, and equity: the impact of agribusiness and land reform in Brazil. **Latin American Review**, v. 7, n. 2, p. 93-115, 2006.
- ANDIA, L. H.; GARCIA, R.; BACHA, C. J. C. A influência dos fatores econômicos e jurídicos sobre o desempenho das empresas do agronegócio brasileiro – Período de 2003 a 2005. **RESR**, Piracicaba, v. 49, n. 4, p. 875-908, out/dez, 2012.
- ANSOFF, I. Strategies for Diversification. **Harvard Business Review**, v. 35, n. 5, p. 113-124, set./out. 1957.
- BARNEY, JAY B.; HESTERLY, W. S. **Strategic management and competitive advantage: concepts and cases**. Upper Saddle River, NJ: Pearson/Prentice Hall, 2008.
- BARNEY, J. B.; CLARK, D. N. **Resource-based theory: Creating and sustaining competitive advantage**. Oxford: Oxford University Press, 2007.
- BIALOSKORSKI NETO, S. **Estratégias e cooperativas agropecuárias: um ensaio analítico. Agronegócio Cooperativo: reestruturação e estratégias**. Viçosa: UFV/ DER, 2002.
- CARVALHO, F. L.; BIALOSKORSKI NETO, S. Indicadores de avaliação de desempenho econômico em cooperativas agropecuárias: um estudo em cooperativas paulistas. **Organizações Rurais & Agroindústrias**, Lavras, v. 10, n. 3, 2008.
- CHADDAD, F.; COOK, M. L. Understanding new cooperative models: an ownership-control rights typology. **Applied economic perspectives**, v. 36, n. 3, p. 343-360, 2004.
- CHADDAD, F.; ILIOPOULOS, C. Control rights, governance, and the costs of ownership in agricultural cooperatives. **Agribusiness (special issue Cooperative Values in Internationalized Operations)**, v. 29, n. 1, p. 3-22, 2013.
- COHEN, J. **Statistical power analysis for the behavioral sciences** (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum Associates, 1988.
- COOK, M.L. The future of U.S. agricultural cooperatives. **American Journal of Agricultural Research**, v. 77, p. 1153–1159, 1995.
- CRÚZIO, H. DE O. Por que as cooperativas agropecuárias e agroindustriais brasileiras estão falindo? **RAE – Revista de administração de Empresas**, São Paulo, v.39, n. 2, p. 18-26, abr./jun. 1999.
- DENG, W.; HENDRIKSE, G. W. J. Product Diversification of Cooperatives and Corporations Evidence from the Netherlands. In: Economics and Management of Networks Conference (EMNet 2013), **proceedings**, Agadir, Morocco. 2013
- FAJARDO, S. The new pattern of the agroindustrial development and the cooperatives from Paraná State. **Caminhos de Geografia**, v. 17, n. 4, p. 31-47, 2006.



- FERREIRA, M. A. M.; BRAGA, M. J. Diversificação e competitividade nas cooperativas agropecuárias. **Revista de Administração Contemporânea**, v. 8, n. 4, p. 33-55, 2004.
- FORNELL, C.; LARCKER, D. F. Evaluating structural equation models with unobservable variables and measurement error. **Journal of Marketing Research**, v. 18, p. 39-50, 1981.
- FULTON, M. The future of cooperatives in Canada: property rights approach. **American Journal of Agricultural Economics**, v. 77, p. 1144-1152, 1995.
- GEFEN, D.; STRAUB, D.; BOUDREAU, M. C. Structural equation modeling and regression: Guidelines for research practice. **Communications of the Association for Information Systems**, v. 4, n. 1, art. 7, 2000.
- GIANNAKAS, K.; FULTON, M. Process innovation activity in a mixed oligopoly: the role of cooperatives. **American Journal of Agricultural Economics**, v. 87, n. 2, p. 406-422, 2005.
- HAIR, J. F.; HULT, G. T. M.; RINGLE, C.; SARSTEDT, M. **A primer on partial least squares structural equation modeling (PLS-SEM)**. London: SAGE Publications, Incorporate, 2013.
- HARTE, L.N. Creeping privatisation of the Irish co-operatives: A transaction cost explanation. In: NILSSON, J.; VAN DIJK, G. (Eds.). **Strategies and structures in the agro-food industries** (pp. 31-53). Assen (The Netherlands): Van Gorcum, 1997.
- HENDRIKSE, G. W. J.; VEERMAN, C. P. Marketing cooperatives and financial structure. Rotterdam: ERIM Report series, 2000.
- HENDRIKSE, G. W. J.; VAN OIJEN, A. A. C. J. Diversification and corporate governance. **Report Series Research in Management**, Rotterdam: Erasmus Universiteit of Rotterdam, 2002.
- HENDRIKSE, G. W. J.; SMIT, R.; DE LA VIETER, M. Orientation in diversification behaviour of cooperatives: an agent-based approach. In: CLIQUET, G.; TUUNANEN, M.; HENDRIKSE, G. W. J.; WINDSPERGER, J. **Contributions to Management Science: Economics and management of networks contributions**, p. 421-435. Springer Link, 2007.
- HENEHAN, B. M.; ANDERSON, B. L. Decision making in membership organizations: a study of fourteen U.S. cooperatives. **United States Department of Agriculture – Rural business-cooperative service report**, n. 94, p.01-103, 1994.
- HENSELER, J.; RINGLE, C. M.; SINKOVICS, R. R. The Use of Partial Least Squares Path Modeling in International Marketing. **Advances in International Marketing**, v. 20, pp. 277-320, 2009.
- HOLMSTRÖM, B. The future of cooperatives: A corporate perspective. **Finnish Journal of Business Economics**, v. 48, p. 404-417, 1999.
- HWANG, H.; MALHOTRA, N. K.; KIM, Y.; TOMIUK, M. A.; HONG, S. A comparative study on parameter recovery of three approaches to structural equation modeling. **Journal of Marketing Research**, v. 47, aug., p. 699-712. 2010.
- ILIOPOULOS, C. Stakeholder Participation in Co-operative Capital in Western Agricultural Co-operatives. In: GIJSENINCX, C.; ZHAO, L.; NOVKOVIC, S. (Eds.). **Co-operative Innovations in China and the West**, p. 81-9. Houndmills (UK): Palgrave Macmillan, 2014.
- KAPLAN, R. S.; NORTON, D. P. The balanced scorecard: measures that drive performance. **Harvard Business Review**, January-February, 1992.
- KHATCHATOURIAN, O.; TRETER, J. Aplicação da Lógica Fuzzy para avaliação econômico-financeira de cooperativas de produção. **Revista de Gestão da Tecnologia e Sistemas de Informação TECSI FEA USP**, v. 7, n. 1, p. 141-162, 2010.
- KUMAR, V.; GAUR, A. S.; PATTNAIK, C. Product diversification and international expansion of business groups. **Management International Review**, v. 52, n. 2, p. 175-192, 2012.



- LIU, H. Y.; HSU, C. W. Antecedents and consequences of corporate diversification: A dynamic capabilities perspective. **Management Decision**, v. 49, n. 9, p. 1510-1534, 2011.
- MACKENZIE, S. B.; PODSAKOFF, P. M.; PODSAKOFF, N. P. Construct measurement and validation procedures in MIS and behavioral research: integrating new and existing techniques. *MIS Quarterly*, v. 35, n. 2, p. 293–334, **2011**.
- MARCOULIDES, G. A.; SAUNDERS, C. Editor's Comments – PLS: A Silver Bullet? **MIS Quarterly**, v. 30, n. 2, p. iii-ix, 2006.
- MARTINELLI, L. A.; NAYLOR, R.; VITOUSEK, P. M.; MOUTINHO, P. Agriculture in Brazil: impacts, costs, and opportunities for a sustainable future. **Current opinion in Environmental Sustainability**, v. 2, n. 5-6, p. 431-438, 2010.
- MARTINS, F. S. **Gerência de operações em cooperativas agropecuárias: fatores produtivos estruturais relevantes para o desempenho econômico-financeiro**. Master's thesis (Industrial engineering). 147 p. Universidade Nove de Julho, 2013.
- MARTINS, F. S.; LUCATO, W. C. Economic trade-offs amongst production diversification strategies in Brazilian south-eastern coffee cooperatives. **Independent Journal of Management & Production**, v. 5, n. 1, p. 83-105, 2014.
- MENEGÁRIO, A. H. **Emprego de indicadores sócio-econômicos na avaliação financeira de cooperativas agropecuárias**. Dissertação de mestrado (Economia Aplicada), ESALQ/USP, 137 p., Piracicaba, 2000.
- NILSSON, J. Organisational principles for co-operative firms. **Scandinavian journal of management**, v. 17, n. 3, p. 329-356, 2001
- NILSSON, J.; KIHLEN, A.; NORELL, L. Are traditional cooperatives an endangered species? About shrinking satisfaction, involvement and trust. *International food and agribusiness management review*, v. 14, n. 4, p. 101- 122, 2009.
- OCB (ORGANIZAÇÃO DAS COOPERATIVAS BRASILEIRAS). **Relatório OCB 2013**. Brasília: OCB, 2014.
- PEINE, E. K. Trading on pork and beans: agribusiness and the construction of the Brazil-China-Soy-Pork commodity complex. **The ethics and economics of agrifood competition**, v. 20, p. 193-210, 2013.
- PORTER, P. K.; SCULLY, G. W. Economic efficiency in cooperatives. **Journal of law and economics**, v. 30, n.2, p. 489-512, 1987.
- PRYMON, M. The Role of Diversification in Strategies of Global Companies –Research Results. In: AABRI Conference, 2011, Nashville. **Annals**. Nashville: 2011.
- PRYMON, M. A critical analysis of the concept of marketing strategies for small and mid-sized companies. **Economics, Management and Financial markets**, v. 9, n. 4, p. 255-261, 2014.
- RAUDSZUS, M.; SCHIERECK, D.; TRILLIG, J. Does vertical diversification create superior value? Evidence from the construction industry. **Review of Managerial Science**, v. 8, n.3, p. 293-325, 2014.
- REARDON, T.; TIMMER, C. P. Transformation of markets for agricultural output in developing countries since 1950: How has thinking changed? **Handbook of agricultural economics**, v. 3, p. 2807-2855, 2007.
- REYNOLDS, B. J. Decision-making in cooperatives with diverse member interests. **United States Department of Agriculture – Rural business-cooperative service report**, n. 155, p.01-18, 1997.
- RITOSSA, C. M.; BULGACOV, S. Internationalization and diversification strategies of agricultural cooperatives: a quantitative study of the agricultural cooperatives in the state of Parana. **BAR-Brazilian Administration Review**, v. 6, n. 3, p. 187-212, 2009.



- RITOSSA, C. M.; FERREIRA, J. M.; PREDEBON, E. A. Estratégias e indutores da internacionalização das cooperativas agropecuárias: o caso paranaense. **Revista Eletrônica de Ciência Administrativa**, v. 9, n. 2, p. 198-212, 2010.
- SCHROEDER, T. C. Economies of scale and scope for agricultural supply and marketing cooperatives. **Review of Agricultural Economics**, v. 14, n. 1, p. 93-103, 1992.
- SERIGATI, F. C. **Fidelidade e governança corporativa em cooperativas: um estudo empírico com as cooperativas paulistas**. 113 f. Dissertação (Mestrado em economia). Fundação Getúlio Vargas, São Paulo, 2008.
- SERIGATI, F. C.; AZEVEDO, P. F. Comprometimento, características da cooperativa e desempenho financeiro: uma análise em painel com as cooperativas agrícolas paulistas. **RAUSP**, v. 48, n. 2, p. 222-238, 2013.
- SOSIK, J. J.; KAHAI, S. S.; PIOVOSO, M. J. Silver bullet or voodoo statistics? A primer for using the partial least square data analytic technique in group and organizational research. **Group & Organization Management**, v. 34, n. 1, p. 5-36, 2012.
- SUDDABY, R. Editor's comments: Construct clarity in theories of Management and Organization. **Academy of Management Review**, v. 35, n. 3, p. 346-357, 2010.
- TEECE, D. J. Towards an economic theory of the multiproduct firm. **Journal of Economic Behavior & Organization**, v. 3, n. 1, p. 39-63, 1982.
- TORGERSON, R. E.; REYNOLDS, B. J.; GRAY, T. W. Evolution of cooperative thought, theory and purpose. **Journal of Cooperatives**, v. 13, p. 01-20, 1998.
- VALENTINOV, V. Why are cooperatives important in agriculture? An organizational economics perspective. **Journal of Institutional Economics**, v. 3, n. 1, p. 55-69, 2007.
- VITALIANO, P. Cooperative enterprise: an alternative conceptual basis for analyzing a complex institution. **American journal of agricultural economics**, v. 65, n. 5, p. 1078-1083, 1983.
- WESTLAND, J. C. Lower bounds on sample size in structural equation modeling. **Electronic commerce research and applications**, v. 9, n.6, p. 476-487, 2010.
- WOLD, H. Partial Least Squares. In: KOTZ, S.; JOHNSON, N. L. (Eds.). **Encyclopedia of statistical sciences**, p. 581-591. New York: Wiley, 1985.
- WONG, K. K. Handling small survey sample size and skewed dataset with partial least square path modelling. **Vue: The Magazine of the Marketing Research and Intelligence Association**, November, p. 20-23, 2010.
- ZHOU, Y. M. Synergy, coordination costs, and diversification choices. **Strategic Management Journal**, v. 32, n. 6, p. 624-639, 2011.