Absorptive capacity on rural properties of farmers associated with an agroindustry cooperative

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Abstract

This article describes the process of absorptive capacity through the application of the theoretical model of Lane, Koka and Pathak (2006). It has been adapted to rural properties of cooperative farmers of an agroindustry organization in south-central Paraná, with the view that this process goes through the stages of recognition, assimilation and application of new knowledge in agricultural properties, which will be portrayed in the positive outcome of the cooperative organization. It is a qualitative research, of a descriptive nature and with cross-cutting, because the data collection occurred through in-depth interviews with five cooperative farmers who have over time experienced an evolution in productivity rates and profitability in agricultural activity. The results of the research were relevant both at the organizational level – because they offer directions to the management of the cooperative organization to be able to identify how the process of application of new knowledge is given, as well as the necessary improvement points – and for the dissemination and application of knowledge – as in the theoretical discussion, since they deepened the theory of dynamic capacities based on the agricultural reality, a sector of great regional and national importance in Brazil.

Keywords: Dynamic capacity. Absorptive capacity. Rural property. Agricultural Cooperative.

Capacidade absortiva em propriedades rurais de agricultores associados a uma cooperativa agroindustrial

Resumo

Este artigo descreve o processo de capacidade absortiva por meio da aplicação do modelo teórico de Lane, Koka e Pathak (2006) adaptado a propriedades rurais de agricultores cooperados de uma organização agroindustrial no centro-sul do Paraná, tendo em vista que esse processo passa pelas etapas de reconhecimento, assimilação e aplicação de novos conhecimentos nas propriedades agrícolas, o que se retratará no resultado positivo da organização cooperativa. Trata-se de uma pesquisa qualitativa, de natureza descritiva e com corte transversal, pois a coleta de dados ocorreu por meio de entrevistas em profundidade com 5 agricultores cooperados que têm em seu histórico uma evolução em taxas de produtividade e rentabilidade na atividade agrícola. Os resultados da pesquisa foram relevantes tanto em nível organizacional – pois oferecem direcionamentos à gestão da organização cooperativa para poder identificar como se dá o processo de aplicação de novos conhecimentos, além de pontos de melhoria necessários para a disseminação e aplicação de conhecimentos – como no tocante à discussão teórica, uma vez que aprofundaram a teoria das capacidades dinâmicas com base na realidade agrícola, um setor de grande importância regional e nacional no Brasil.

Palavras-chave: Capacidade dinâmica. Capacidade absortiva. Propriedade rural. Cooperativa agrícola.

Capacidad de absorción en propiedades rurales de agricultores asociados a una cooperativa agroindustrial

Resumen

Este artículo describe el proceso de capacidad de absorción a través de la aplicación del modelo teórico de Lane, Koka y Pathak (2006) adaptado a las propiedades rurales de los agricultores asociados a una cooperativa agroindustrial en la zona centro sur del estado de Paraná, teniendo en cuenta que dicho proceso pasa por las etapas de reconocimiento, asimilación y aplicación de nuevos conocimientos en las propiedades agrícolas, que se retratarán en el resultado positivo de la organización cooperativa. Es una investigación cualitativa, de carácter descriptivo y de corte transversal, porque la recopilación de datos se llevó a cabo a través de entrevistas en profundidad a 5 agricultores asociados a una cooperativa y cuya trayectoria revela una evolución en las tasas de productividad y rentabilidad en la actividad agrícola. Los resultados de la investigación fueron relevantes tanto a nivel organizacional pues proporcionan orientación para la gestión de la organización cooperativa para poder identificar cómo se da el proceso de aplicación de nuevos conocimientos, así como los puntos de mejora necesarios para la difusión y aplicación del conocimiento- como en lo referente a la discusión teórica, ya que profundizaron la teoría de capacidades dinámicas basadas en la realidad agrícola, un sector de gran importancia regional y nacional en Brasil.

Palabras clave: Capacidad dinámica. Capacidad de absorción. Propiedades Rurales. Cooperativa agrícola.

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INTRODUCTION

In recent years, agribusiness has sustained the Brazilian economy, being responsible for the surplus in its commercial balance; in addition, for every R$ 3.00 produced in Brazil, R$ 1.00 is linked to agribusiness (MAPA, 2016). The use of technology and innovations in the field have resulted in an increase in the productivity of rural properties and positive results in their performance. The production of grains has gone from 47 million metric tons produced in 92.1 million acres in 1976, to 207 million metric tons produced in 143.3 million acres in 2015, which represents an increase in productivity from 0.51 metric tons per acre to 1.44 metric tons per acre (CONAB, 2016).

According to the agribusiness projections of the Ministry of Agriculture, Livestock and Supply (MAPA, 2013, p. 3), "Brazilian agribusiness is heading toward the next decade with a focus on competitiveness and modernity, making permanent use of technology to achieve sustainability." This is why it is considered relevant for farmers to pay attention to new knowledge, so that they can identify its value, assimilate it and finally put it into practice, using it in their rural properties as a way to optimize their resources.

Thus, the properties that constitute the object of this study belong to cooperative farmers in an agroindustrial organization that has existed for 65 years in the state of Paraná which has more than 600 members. In 2015, it made more than R$ 2.5 million in revenues and has five industries which add value to the agricultural production of its members (COOPERATIVA A, 2015).

This agroindustrial cooperative provides all technical support through technical assistance and even has a foundation that conducts research and disseminates knowledge to the members of the cooperative. In addition, the cooperative's strategic planning includes a target to improve its members' returns on investment through improvements in productivity and add value to their agricultural production (COOPERATIVA A, 2015).

It should further be pointed out that this cooperative was awarded the 2013 Rally da Safra by the firm Agroconsult, in partnership with the Industrial Federation of the State of São Paulo (FIESP), for its high levels of productivity, with the average productivity of its corn production being superior to 4,451 kg per acre (11,000 kg per hectare), given that the national average was 1,945 kg per acre for the 2011/2012 crop and 2,258 kg per acre in Paraná during the same period, according to data from the National Food Supply Campaign (Conab) (PARANÁ COOPERATIVO, 2013). This productivity was the result of investment in research, the support provided by the technical assistance department that orients the cooperative members, the summer and winter crop rotations, and the technical expertise and professionalization found in the management of cooperative properties.

According to Wang and Ahmed (2007), the companies with the greatest capacity of absorption demonstrate a strong capacity to learn from partners, integrating external information and transforming it into knowledge that is incorporated by the company. In this sense, it is based on the assumption that rural properties can be understood as kinds of companies, because they need to have managerial administration that will generate surpluses and profits.

Based on this premise of seeking to disseminate knowledge among farmers who are members of an agroindustrial cooperative, this study proposes to use the theory of dynamic capabilities with a focus on absorptive capacity to answer the following guiding question:

How does the process of recognizing, assimilating and applying new knowledge work in rural agricultural properties run by cooperative farmers in an agroindustrial organization in South Central Paraná?

Thus, this article seeks to identify the sources of knowledge and the way in which farmers recognize its value, and assimilate and apply this knowledge, with the objective of improving the performance of their rural properties, by adapting the model proposed by Lane, Koka and Pathak (2006) to agricultural activity.

Thus, this article is organized in the following manner: a) its theoretical framework based on the theory of dynamic capabilities, concentrating on absorptive capacity; b) a research methodology which utilizes a qualitative approach and is descriptive in nature; c) a discussion and analysis of the data; and d) final considerations.

THEORETICAL REFERENCES

Dynamic capabilities

The theory of dynamic capabilities originated from the Resource-Based View (RBV) Theory, since according to Barney (1991), a company's resources include its assets, capabilities, organizational processes, attributes, information, knowledge, etc., or in other words, all the resources that are controlled and which enable a company to create and implement strategies to improve its efficiency and effectiveness given that, in the language of traditional strategic analysis "resources are the strong points that a company can use to create or implement its strategies" (BARNEY, 1991, p. 101).

However, RBV does not take into account the dynamics of an environment, thus Priem and Butler (2001) made some critiques of this theory, because RBV does not appear to satisfy the criterion of empirical content required of theoretical systems, because it does not consider the dynamics of the environment that surrounds these companies. Eisenhardt and Martin (2000) state that the logic is that RBV does not adequately explain how and for what reason certain companies have a competitive advantage in situations characterized by quick and unpredictable change. Give this, they present the theory of dynamic capabilities which is based on RBV, but complements it with the dynamics of the environment that surrounds these organizations.

The works of Teece and Pisano (1994) and Teece, Pisano and Shuen (1997, p. 516), precursors of the studies of dynamic capabilities, define dynamic capabilities as the ability of a company to "integrate, construct and reconfigure internal and external skills to adjust to environments that change quickly." Dynamic capabilities, therefore, reflect the capability of an organization to achieve new and innovative forms of competitive advantage, depending on its trajectory and position in the market.

Given that, according to Grzeszezeszyn (2015), "organizations evolve in the sense that they are confronted with challenges from the market, or more specifically customers, suppliers of new materials or technologies that improve their activities, or even knowledge accumulated internally." That is why it is important to add the value of your resources to your previous and new knowledge.

Dynamic capabilities are classified into three categories by Teece, Pisano and Shuen (1997): a) Processes; b) Position; and c) Path. Wang and Ahmed (2007, p. 10), on the other hand, define dynamic capabilities as the "behavioral orientation of a company to constantly integrate, reconfigure, renovate and recreate its resources and capabilities, and more importantly, update and reconstruct its basic capabilities," in response to a changing environment to achieve and sustain a competitive advantage.

Based on empiric results from various studies, Wang and Ahmed (2007) identify three main factors that make up dynamic capabilities: a) adaptive capability; b) absorptive capability, also known as absorptive capacity; and c) innovative capability. These three forms of capability or capacity, when combined, explain the mechanisms that link advantages in internal resources to competitive advantage based on the company's external market. Since this article is focused on absorptive capacity, we will describe the theoretical references specific to this capacity.

Absorptive capacity

Absorptive capacity first appeared in organizational research, and was introduced by Wesley Cohen and Daniel Levinthal in an article published in 1989 in the *Economic Journal*, with absorptive capacity referring to one of the fundamental learning processes of a company: its capacity to identify, assimilate and explore dynamic environmental knowledge. According to Lane, Koka and Pathak (2006, p. 833), "to develop and maintain absorptive capacity is fundamental to the long-term survival of a company, because absorptive capacity can reinforce, complement, or reorient a company's knowledge base."

Cohen and Levinthal (1990, p. 128) refer to absorptive capacity as the capacity of a company to "recognize the value of new external information and assimilate and apply it for commercial ends. It is the capacity to evaluate and utilize external knowledge, which in great part is due to the previous level of knowledge." Companies with greater absorptive capacity demonstrate a great capacity to learn with partners, integrating external information and transforming it into knowledge that is incorporated by the company (WANG and AHMED, 2007).

The concept of absorptive capacity is based on the assumption that an organization needs to have related knowledge before assimilating and using new knowledge, because previously accumulated knowledge increases the capacity to absorb new knowledge in memory, or in other words, the acquisition of knowledge is the capacity to record it and use it (COHEN and LEVINTHAL, 1990).

Zahra and George (2002) calculate that absorptive capacity is a multidimensional construct and propose that is consists of four component factors: a) the acquisition of knowledge; b) assimilation; c) transformation; and d) exploitation. Absorptive capacity highlights the importance of interacting with external knowledge, combining internal knowledge and absorption for internal use.

In combining their ideas with the original ideas of Cohen and Levinthal (1990), Lane, Koka and Pathak (2006, p. 856) suggest the following more detailed definition of absorptive capacity:

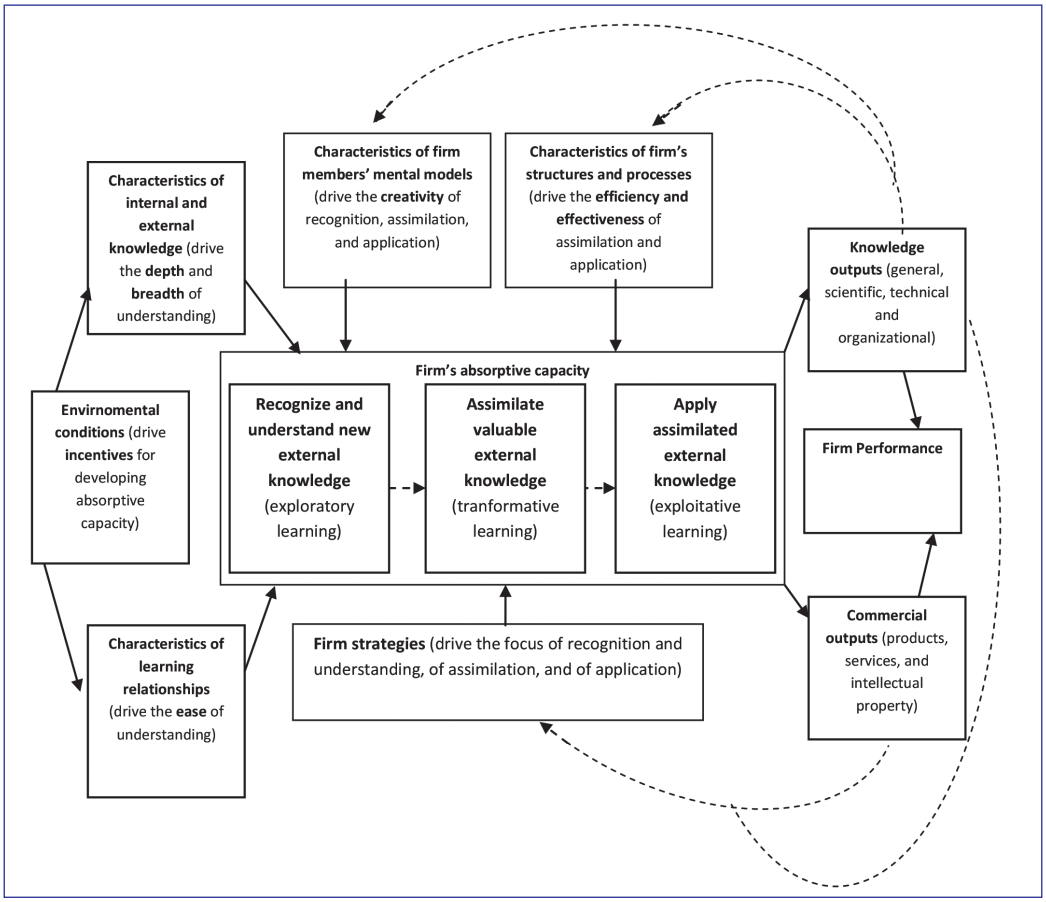
> Absorptive capacity is the capacity of a company to use outside knowledge through three sequential processes: (1) recognizing and understanding potentially valuable new knowledge which can be received by the company through exploratory learning; (2) assimilating valuable new knowledge through transformative learning; and (3) using assimilated knowledge to create new knowledge and commercial applications through commercial applications of exploitative learning.

Absorptive capacity refers to the capacity of a company to recognize value in external knowledge, assimilating it and applying it for commercial ends, but its antecedents are key to absorptive capacity, and these antecedents include previous related learning, which normally involves basic knowledge and experience, and organizational factors such as having a communications and knowledge dissemination structure (FLATTEN, ENGELEN, ZAHRA et al., 2011).

Lane, Koka and Pathak (2006) further elaborate a process model of absorptive capacity, including its antecedents and its results (Figure 1).

Figure 1

Process model of absorptive capacity, including its antecedents and its results



Note: The text in bold indicates the name of the construct or construct dimension. The text in parenthesis indicates the construct's (the dimension's) relationship with absorptive capacity.

Source: Lane, Koka and Pathak (2006, p. 856).

Based on the model in Figure 1, Lane, Koka and Pathak (2006) present a multidimensional vision of absorptive capacity, which originates from the three same dimensions employed in Cohen and Levinthal's seminal model of 1989, which just separates the processes, because each of these processes requires different dimensions within an organization.

METHODOLOGICAL PROCEDURES

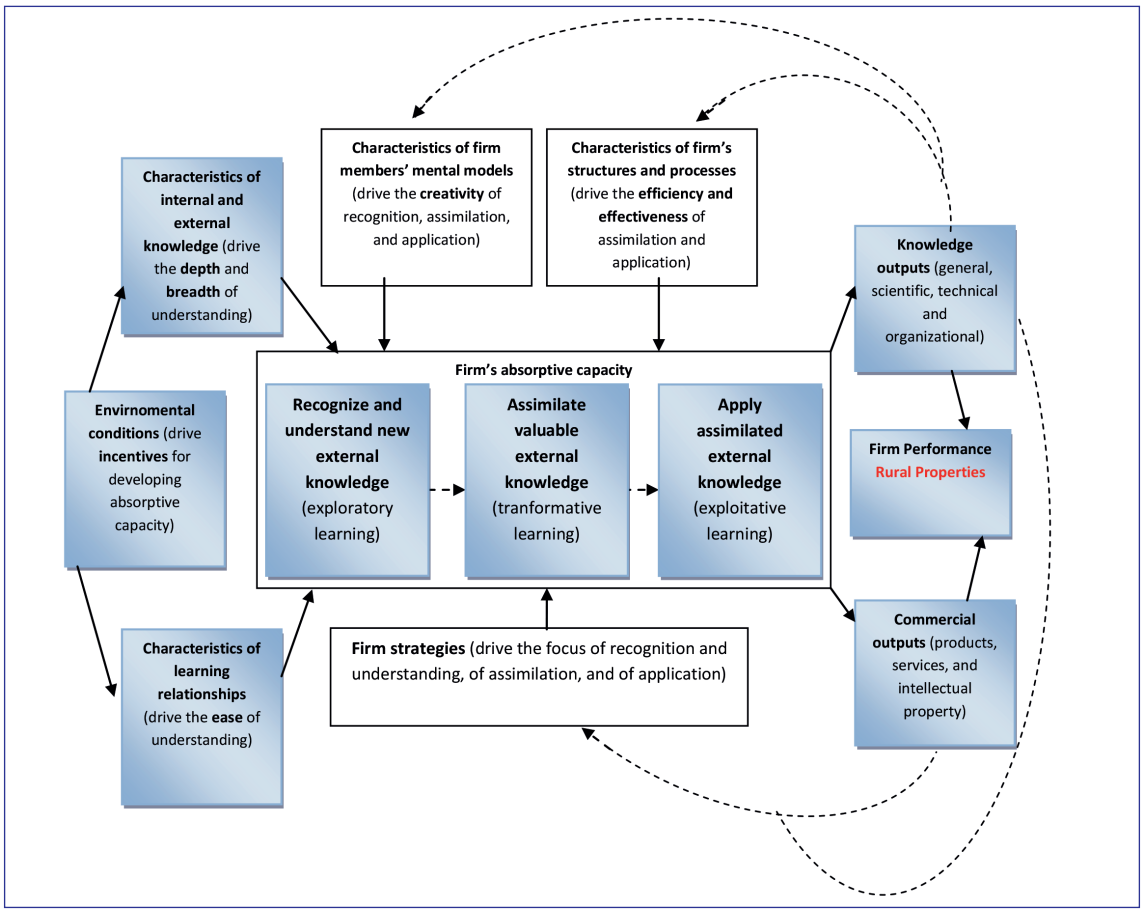
In this study, we address the strategic theme of absorptive capacity in rural properties of farmers who belong to an agroindustrial cooperative. These rural properties can be classified as organizations or companies, given that they should generate positive financial results for their owners.

This is a descriptive study of a broad nature. As Hyman (1967) indicates, a descriptive study describes a phenomenon and registers the manner in which it occurs. The study was conducted in August and September 2016 and sought to portray the then current condition of rural properties. However, it was also necessary to take historic conditions into account, given that as described, absorptive capacity is influenced by its antecedents, namely previous knowledge that managers and employees have already acquired.

To understand how the processes of knowledge valuation, assimilation and application occur, we are using the theoretical model proposed by Lane, Koka and Pathak (2006), with an emphasis on the stages illustrated in Figure 2.

Figure 2

Adapted model of the absorptive capacity process, its antecedents and results, highlighting the stages addressed in this study



Source: Adapted from Lane, Koka and Pathak (2006).

Therefore, this is a qualitative case study that describes this situation and its context (YIN, 2010). According to Denzin and Lincoln (2006, p. 17) "qualitative research is a situated activity which places the observer in the world. It consists of a group of material practices and interpretations which give visibility to the world."

In this manner, the data was collected using semi-structured interviews in order to describe the current situation of rural properties, based on environmental conditions, their previous knowledge base and learning capacity, as well as the 3 sequential processes: a) recognizing and understanding new knowledge; b) assimilating knowledge; and c) applying knowledge. Godoi and Mattos (2010, p. 302) state that the interview is "an event in which dialogue is exchanged, which can promote methodological reformulation capable of enriching the practice of research and constructing new situations of knowledge."

Currently, the agroindustrial cooperative which constitutes the object of this study consists of 451 active members (COOPERATIVA A, 2015). To conduct semi-structured interviews in depth, 5 were selected based on their history of productivity, profitability and gross margin. These 5 were selected based on their great productivity to demonstrate which characteristics of absorptive capacity they present; moreover, these cooperatives were selected for their profiles (age, various sizes of cultivated crop area, education) in order to compare convergences and divergences in relation to absorptive capacity. It is understood that because this is a qualitative study, in-depth interviews with these 5 members represent an excellent case study and its results may be of use to the cooperative.

All of the interviews were recorded with permission from the interviewees and later transcribed in their entirety; subsequently content analysis was performed on them, making it possible to perform triangulation with the collected secondary data.

We used secondary data provided by the cooperative and its members to complement our interviews. These documents consisted of: a) the company's website; b) the intranet; c) annual reports from 2010 to 2015; d) internal information; e) internal and external issues of magazines; f) training and reports for technical events; and g) the history of profitability, productivity and gross margin for each member and family group. To Baxter and Jack (2008, p. 554), the use and assembly of a database improves the reliability of a case study, since it allows the researcher to locate and organize data sources, including "notes, important documents, tables, narratives, photographs and audio files, which can be stored in a database to facilitate their recovery at a later date."

The investigative portion of this field study was performed using in-depth interviews with 5 cooperative members selected for having a history of growing productivity, profitability and gross margin. The agroindustrial cooperative has a technical department which accompanies the evolution of individual members. Thus, it was possible to select the cooperative members with the best performance in order to identify the differences related to their absorptive capacities in terms of identifying new knowledge and putting it into practice to obtain the most positive results for agricultural activity.

The interviews took place between August 30 and September 16, 2016, with an average duration of 43 minutes. An interview script was prepared by the authors based on their experiences related to cooperativism and the theory of dynamic capabilities; the script begins with the socioeconomic characterization of the cooperative members, as well as their relationships with the agroindustrial cooperative that they belong to and agricultural activity, in addition to the family environment in agricultural, financial and commercial management in production, given that these points are the antecedents in the model of Lane, Koka and Pathak (2006). In other words, the environmental conditions in the cooperative's surroundings, its previous knowledge and its previous learning relationships will influence its capacity to absorb agricultural knowledge and practices.

Based on this collected material, the data was analyzed qualitatively through content analysis of the interviewee responses and their categorization from the perspective of Bardin (1977, p. 31) who states that: "content analysis is a group of communication analysis techniques," or in other words, it uses systematic procedures and objectives to describe the content of messages, related to the presented theory of absorptive capacity, which makes it possible to triangulate information.

RESULTS AND ANALYSES

Profile of the interviewees

To characterize the interviewed cooperative members, this section presents information about their socioeconomic details, their relationship history with agricultural activity and with the agroindustrial cooperative to which they belong. Thus data related to gender, age, education, marital status, their children, the characteristics of their children, family history, rural activities, the area of their cultivated crops, number of employees, responsibility in terms of agricultural and financial management of the property, how many years they have been performing rural activity, whether their income comes exclusively from agriculture, how concerned they are about financial control and how to handle price fixing, as well as their use of agricultural credits.

Based on Box 1, we can see that they are all men between the ages of 31 and 56, with different levels of education, ranging from an elementary and middle school education to graduate school, with most of those interviewed being married and having children.

Box 1

Socioeconomic information of those interviewed

PROFILE	MEMBER 1	MEMBER 2	MEMBER 3	MEMBER 4	MEMBER 5
Gender	Male	Male	Male	Male	Male
Age	56	55	47	41	31
Education	High School Diploma with Agricultural Technical Degree	Completed Elementary and Middle School	Completed Elementary and Middle School	Agronomic Engineer with Degree from the Federal University of Paraná (UFPR) Studied for MBA while in the cooperative	Agronomic Engineer and Administrator with Degree from the Federal University of Paraná (UFPR) Studied for MBA in Strategic Management
Marital Status	Married	Married	Married	Married	Single
Children	2 daughters	1 daughter and 1 son	1 daughter	2 daughters	No children
Characteristics of the children	A 24 year old daughter with a degree in Architecture and Urbanism. Another 20 year old daughter studying Design and Production in college	A 33 year old daughter with a degree in Biochemistry who lives in Maringá. Son studied Environmental Sciences but works with father. One grandchild (son of his daughter) is 6 months old	8 year old daughter	12 and 7 year old daughters	–
Family history	Grandfather was a pioneering immigrant (came in 1951) Mother arrived at 18 (she now is 83 years old) Father deceased Has 4 sisters	Father and mother are pioneering immigrants (both are still alive) Has 2 brothers	Father and mother are pioneering immigrants. Father died 3 years ago Mother still alive Has 3 brothers and 2 sisters	Father and mother are pioneering immigrants. Father is 71 years old. Mother deceased. Has 2 brothers	Grandparents were pioneering immigrants. Father is 58 and Mother is 54. They are the second generation that was born here. He has 1 sister.
Rural activity	Only agriculture. Tried pig farming, but abandoned it.	Only agriculture. Tried pig farming, but abandoned it.	Only agriculture. Tried cattle ranching , but abandoned it.	Only agriculture.	He takes care of the agricultural part. Sister takes care of dairy cattle.

Continue

PROFILE	MEMBER 1	MEMBER 2	MEMBER 3	MEMBER 4	MEMBER 5
Size of the area farmed	Total of 645 acres. All his own.	321 acres (40% rented, 60% his own)	Total of 415 acres. All his own.	Family Group with 39,500 acres in Piauí. 10,400 acres considered to be a summer area here in Paraná.	For agriculture there are 1,025 acres (593 acres of his own with the rest rented). Has dairy cattle in 257 additional acres.
Number of employees	2 employees	No, he and the son perform the work.	2 employees	60 in Piauí and 36 in Paraná	3 employees
Responsible for management of the property	He himself	Son helps in management of the property. Second year that they are working together, he's learning	He himself	Manages property with brothers and father as if it were a board.	He manages the agriculture with his father. His sister manages the dairy cattle.
Responsible for financial decisions	Wife helps in the financial decisions. When he wants to invest in machines, she helps him decide.	Talks with his son.	Talks with his wife, always together.	Definitions involve the 3 brothers and the father, but each one has his own account and oversees his own assets.	He decides together with his parents.
How long has he been performing rural activities	He stopped his studies at 18 years old. He lost his father at the age of 11. His mother managed this activity. He has four sisters, and felt the obligation to assume control at 19. He's been working in this activity for 37 years.	Since 1987	2 years since his father died. He has divided the areas among his siblings. They've worked together before.	He's a member since 1994, but assumed this activity only after returning from college in 1999.	Since 2003. Each year the father cedes more responsibility, but the decisions are always made jointly.
Dependence on income from rural activity	Yes, exclusively dependent.	Yes, but provides freight and collection services for other members.	Yes, exclusively dependent.	Yes, exclusively dependent.	Yes, exclusively dependent.
Concerned with financial control	From 1995 to 1996 performed managerial accounting using the services of an accountant.	Yes, controls it for client services and at home.	Yes, controls it with an accountant at home	Yes, has his own office, with his own employees who take care of cash flow and tax planning.	Yes, controls it at home.
How does he handle price fixing	Sells part of production in advance. Wife helps in sales positions.	Not much of an adept of anticipating sales. Prefers to make future sales 1 or 2 months before harvest.	Fixes 30% anticipated sales	Does not use this practice as a rule, accompanies the market daily.	Makes future sales of part of the production to provide collateral for the land that they acquire
Buying of agricultural credits	Yes	Yes, for 80% of the area	Yes, 100%	Yes, 100%	Yes, 100%

Source: Elaborated by the authors.

It may be observed that all have a very intense connection to the agroindustrial cooperative that they belong to, because their parents and grandparents were pioneering immigrants who founded the cooperative in 1951, with the interviewees being part of the second or third generation of descendents of the pioneers who continued to work in agriculture after they left Europe. We may also note the strong family relationships which influence decision making in regard to agriculture and finances, because the family incomes of all of the interviewed members depend exclusively on agricultural activity and they have assumed rural activity for a number of years.

These members create jobs and directly stimulate the local economy, because 4 of the 5 interviewees have registered employees who have worked for them for many years, not just sporadically or temporarily during the harvest, but rather for the entire year. Their properties vary in size, given that, among the interviewees, there are members with areas of 421 acres, with part owned and part rented, and even one member who has 10,400 acres of his own in Paraná as well as 39,500 acres of his own in Piauí.

This member with areas in Piauí has a profile that includes seeking "new agricultural frontiers" – a term that refers to farmers in various regions of Brazil who acquire land in regions denominated MATOPIBA (or MAPITOBA), which encompasses the states of Maranhão, Tocantins, Piauí and Bahia and which represents, according to MAPA (2016), great potential for increasing the food supply and becoming a world reference in the development of agribusiness.

In this way, this study has sought members of various sizes in terms of area, which can demonstrate their absorptive capacities in the development of agricultural activities, and who have been notable in terms of productivity, profitability and gross margin.

In terms of financial and agricultural management, all of these farmers use control systems and their own management and also request help from accounting offices and the agroindustrial cooperative to which they belong. Thus, the cooperative maintains specific departments to meet the needs of its members. In terms of financial management, the member services department has 4 account analysts who individually handle the financial health of their members, giving support in terms of credits and the planning of activities; in the agricultural area, there are 15 agronomists on call to provide technical assistance and directly handle the needs of member farmers. This department houses the controls and indicators of a program called Sinergia (Synergy), which measures individual results and team results achieved by each member and by each agricultural group (COOPERATIVA A, 2015). This issue demonstrates the concern of the cooperative with improving the indices of its farmer members.

Antecedents of absorptive capacity

This section demonstrates which are the antecedent factors that influence the absorptive capacity of cooperative members, because as in the model proposed by Lane, Koka and Pathak (2006), the environmental conditions, which are the incentives related to the development of absorptive capacity beyond the characteristics of learning relationships, which make the ease of comprehension of new knowledge and the characteristics of internal and external knowledge that are conducive to the depth and breadth of understanding of new knowledge, play a fundamental role. In this study, these factors are identified in rural properties from the perspectives of these farmers.

According to Ortiz, Donate and Guadamillas (2017, p. 59) the stronger, more frequent and closer that inter-organizational ties are, the greater the level of knowledge that will be available; to the extent that these types of links increase, the greater the probability that agents will be able to realize and conclude market transactions and cooperative agreements in the acquisition of knowledge.

In this way, all of the members emphasize the importance of the cooperative that they belong to and the research foundation is a form of disseminating knowledge among the members, and provides environmental conditions for the process of the exchange of information and learning from the point of view of these members.

Box 2

Environmental conditions for absorptive capacity among farmer members

Environmental conditions (incentives oriented towards the development of absorptive capacity)	[...] *the cooperative today has a FOUNDATION which is the right arm of the farmer members. Everything that is new and has to do with technology we ask the researchers* [...].	Member 1
	[...] *we have the FOUNDATION which makes all the difference. And if you talk directly with researchers, they are well aware of what has been happening this year. It's fresh information, this week's information* [...].	Member 2
	[...] *the FOUNDATION does a lot of research and tries to pass the best of it on to us/the members. This is really important* [...].	Member 3
	[...] *I think the following, I think the cooperative has very good diffusion, good penetration, the information generated by the cooperative is always transmitted to its members* [...].	Member 4
	[...] *we always monitor the FOUNDATION's results* [...].	Member 5

Source: Elaborated by the authors.

This confidence in the work and the information shared by the research foundation is an important point, since according to Castro, Diniz and Duarte et al. (2013), it is important that there is a cultural proximity, a strong connection and link, as well as a great degree of confidence between the information source and destination in order to facilitate the sharing and transfer of knowledge which offers agricultural results. In addition, those who receive this information, in this specific case the farmers associated with an agroindustrial cooperative in South Central Paraná, should have developed their absorptive capacity, which contemplates the acquisition, assimilation, transformation and exploitation of external knowledge (COHEN and LEVINTHAL, 1990; ZAHRA and GEORGE, 2002).

Among the farmer members, there already existed previous knowledge, because all of them have inherited this agricultural activity from their parents and grandparents, a result which is similar to that found by Sznitowski and Souza (2016), in which farmers shared in common previous knowledge (experience) in agriculture and this was the determinant factor in initiating their agricultural endeavors, but as identified in this study, those interviewed emphasized the need of evolution in rural activity and the need to improve its practices and processes, and therefore this is in line with the concept of Wang and Ahmed (2004), in which companies or organizations should be focused on innovation in terms of behavior and processes, which also applies to agricultural properties, as highlighted by this observation:

> [...] *But since my father always stayed with "the old basics," it was all different, there was no information on the climate, there was no information at all, we just knew what we had in terms of lime, fertilizer and seeds, and the rest time took care of [...] Today, if you want to stay in an activity, you have to* ***keep up with its evolution****, and that is what research is for*. (Member 2)

The members also observe the environmental evolution that is related to their customers' demands and this has led to a search for evolution and improvements in terms of agricultural processes, with a focus on meeting customer requirements. This corroborates the strategy or path that farmers have to choose in the opinion of Teece, Pisano and Shuen (1997), as demonstrated by the following statements:

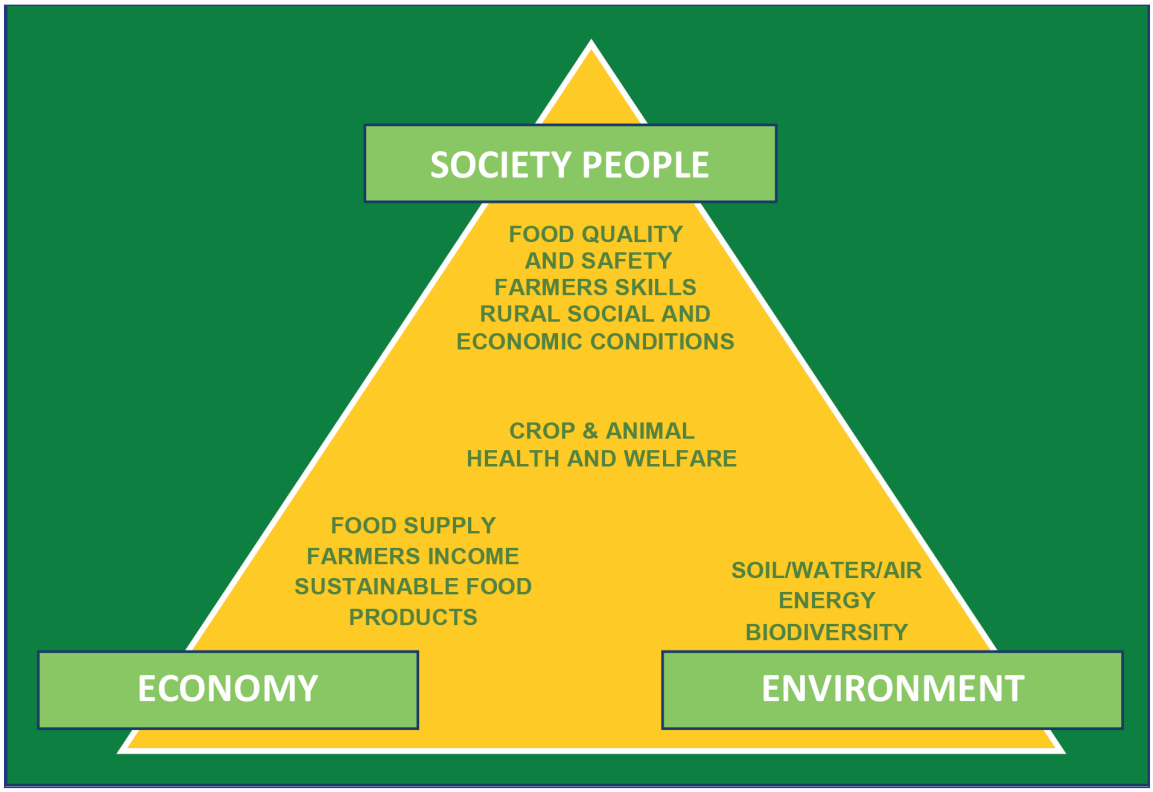
> [...] ***The market is more and more demanding****, and this makes firms more and more demanding. It is clear that this ends up interfering with us, because the quality that you have to take into account for firms has to be better.* (Member 1)
>
> [...] *We know that all of these customer demands, for example,* [to avoid] *microtoxins, you have to make all these applications to avoid them.* ***Customers are more and more demanding***. (Member 3)
>
> [...] ***This is the market, we have to produce what the customers want.*** [...] *It's a question of survival, it is no use producing something that no one is going to buy.*
> *It is the market, you have to adjust your prices, a product that has greater demand is going to have a better price, if you produce it you are going to spend more, you are going to have to make the calculation of whether it is worth it or not*. (Member 4)

> [...] *We planted more than half our conventional area with corn because of its profitability.* ***Management has to change****, just like the corn in the conventional part,* ***it changes the way we plant***. (Member 5)

To provide a basis for analyzing these statements based on a triangulation with the information provided by the cooperative, it is relevant to note that it is part of the SAI Platform (Sustainable Agriculture Initiative Platform). The SAI is an international entity created in 2002 by the food industry to actively support the development of and communication about sustainable agriculture throughout the world, involving various interested parties in the food chain. The SAI Platform supports agricultural practices and agricultural production systems that preserve the future availability of current resources and improve their efficiency, increasing the satisfactory meeting of environmental, economic and social requisites (SAI PLATFORM, 2016).

Figure 3

Principles and practices of sustainable agriculture



Fonte: SAI Platform (2016).

Given this, it may be noted that the environment that encompasses the interviewed farmer members generates propitious antecedents, which heighten the absorptive capacity of new knowledge and practices in rural properties as a way of responding to customer demands, so that they can stay in business as well as remain members of the agroindustrial cooperative that supplies them with all this structure.

Absorptive capacity in rural properties

This section demonstrates the steps of the theoretical model adapted from Lane, Koka and Pathak (2006), which seeks to identify the absorptive capacity from the perspective of these farmer members to explore, assimilate, and adapt new knowledge and practices. The members were unanimous in their statements related to the search for new practices and continual improvement, as represented in the statements below, when questioned about the importance of putting new knowledge into practice in rural properties:

> [...] *Some things are not easy to put into practice, because everything that is new has a high cost* [...] ***but it is important to always be improving***. (Member 1)

[...] ***It makes a difference, if you want to continue doing something, you have to keep up with its evolution**, this is what research is for*. (Member 2)

[...] ***It is important, because you have a reference point to start from**. Times and varieties, in this case. At least you have a choice of what you can do and when you can do it*. (Member 3)

[...] *It begins with the **diagnosis**, you have to know what is happening, what problem it is that you are facing and what is its cause*. (Member 4)

[...] ***There are innovations**. There are things that we hesitate to implement, so we try them out in a small area or watch when a neighbor tries them out*. (Member 5)

This way the interviewees demonstrate consistency in their responses, indicating that they are always seeking new knowledge in their area of activity (Box 3).

Box 3

Step 1 is absorptive capacity: recognize external knowledge

Recognize and understand new external knowledge (exploratory learning)	[...] *to see new machine technology, I generally go to fairs, almost every year I go to see new technology, in the areas of grains and machines* [...].	Member 1
	[...] *participate in FOUNDATION events and also field days. You can go to the Castro region, where you can find some things that you can still use, but you can't get anything out of other regions in Brazil, at least in terms of culture, you can't get much use out of them* [...].	Member 2
	[...] *I've already been to the United States as well, on technical trips.* [...] *It's just that they're more advanced in terms of techniques, climate, fertilizer formulas in which they're further along than we are, machines a bit as well* [...] *But if you're talking about being in the first world, we're there with them* [...].	Member 3
	[...] *formally we participate in a few events, when they have them, technical talks outside of the region in Piauí, Maranhão, Balsas,sometimes Bahia, a few days from the field in that region, that seed and fertilizer or pesticide companies promote.* *Here when they have something even outside of the cooperative, next month they're going to have a Rabobank event about the market* [...].	Member 4
	[...] *I participate in the agronomist group field days and meetings.* *I don't talk much with the researcher, but with the agronomist it's all much easier today with WhatsApp, sometimes I'm there in the field, I have a question, I take a photo and send it to him and he responds right away. It's more dynamic, quicker* [...].	Member 5

Source: Elaborated by the authors.

We can observe in Box 3 that, even demonstrating consistency in their responses in terms of their search for external knowledge, there is a point of divergence in their absorptive capacity; this is strongly related to the source of their information, with some focusing on local cooperative events and the research foundation, while others seek external knowledge through external entities and other regions of Brazil.

The second step of absorptive capacity is related to the assimilation of knowledge from the members' perspective (Box 4).

Box 4

Step 2 of absorptive capacity: assimilation of new external knowledge

Assimilate valuable external knowledge (transformative learning)	[...] *I talk a lot about new technology with my agronomist, and the agronomist helps me adapt* [...].	Member 1
	[...] *I identify new knowledge here, because our region is different. It's logical for you to experiment on a "little patch of sand" to see if it will work adapting something to this region. Everything's adapted* [...] *You have to adapt to your reality* [...].	Member 2
	[...] *if we can do it, we try something out, we test new products when we can, all of a sudden a researcher proposes something to us, gives us a suggestion, we test it to see what it's really like, because research is one thing and the field's another* [...].	Member 3
	[...] *part of the first diagnosis so that we can understand what can be done, and from there we usually perform tests, everything depends on the economic impact that it will have, if we're going to spend a lot on this, if it's going to have a big impact, we do various tests first to see if we're going to invest* [...].	Member 4
	[...] *I talk with the agronomist and directly with my father and mother, and we make a decision as to whether we're going to do it or not, if we see some advantage or not, and we talk with other members* [...].	Member 5

Source: Elaborated by the authors.

We can see from parts of Box 4 that the process of assimilating external knowledge is mentioned by all of the interviewees as something reflective, that is, it is discussed with the family, agronomists and other members. This detail is in line with the theoretical statements of Zahra and George (2002), given that absorptive capacity highlights the importance of interacting with external knowledge, combining it with internal knowledge and absorbing it for internal use.

The third and last step of Lane, Koka and Pathak's theoretical model (2006) involves the application of assimilated external knowledge, or in other words, when the learning process is exploited, with the interviewees relating their experiences with the external knowledge that they have obtained and put into practice on their properties (Box 5).

Box 5

Step 3 of absorptive capacity: the application of external knowledge

Apply assimilated external knowledge (exploitative learning)	[...] *technology today advances so quickly, for example, in terms of corn or even soybeans, with the arrival of whole soybeans, I try to create a crop refuge area, which I think is very important for agriculture* [...] *I picked up these ideas in events and I'm implementing them.*	Member 1
	[...] *rotating crops according to research suggestions. The latest thing that we're trying to do is use a vegetated drainage ditch, keeping the environment in mind [...] This is the latest thing that's come from outside* [...].	Member 2
	[...] *one thing that I didn't have was a GPS as an automatic pilot, I didn't have one and I'm liking it a lot and am using it today, it's a great advantage because I can make the applications, which helps me a lot. Many people don't have them, but when they do you're going to see a difference* [...].	Member 3
	[...] *in truth, every year there's a little change, last year we installed a piece of equipment to place the liquid inoculant directly in the juice, to not affect the treatment of the seeds* [...] *There are always adjustments in the use of fertilizer and planting procedures* [...].	Member 4
	[...] *recently it's soil conservation that's in demand, this part of the autumn planting, in which you harvest soybeans and plant something on top of them, when you plant barley and wheat you dry and plant. This wasn't done before to protect the soil so that it doesn't stay 4 months with nothing above it* [...].	Member 5

Source: Elaborated by the authors.

According to Lane and Lubatkin (1998), the knowledge of organizations and companies will converge making them capable of meeting the demands of their respective environments. In this sense, based on these interviews and the information provided, we can observe that the 3 steps of absorptive capacity are applied by these cooperative farmers, because they are always looking for new knowledge, assimilating it, adapting it and putting it in practice to respond to the demands of their environment.

CONCLUSIONS

This article addresses the theory of dynamic capabilities, with a focus on absorptive capacity based on the model of Lane, Koka and Pathak (2006) as applied to agricultural activity from the perspective of farmers within an agroindustrial cooperative in South Central Paraná, given that the agricultural and livestock sector is of great regional and national importance, and the evolution of knowledge should occur beginning at the micro-level – agricultural properties.

The theoretical basis for this study is the RBV, which guides the theory of dynamic capabilities, given that the theory of dynamic capabilities considers environmental dynamics, in addition to all internal and external resources, to be the driver of improvements in products and processes.

This study's results, which are focused on an answer to this problem, are illustrated in Boxes 3, 4 and 5, and indicate how the process of recognizing, assimilating and applying new knowledge in the rural properties of this agroindustrial organization's members takes place in the interior of the state of Paraná, revealing a strong link to, and the importance of, this cooperative to these farmers, as well as its research foundation which is a source of new knowledge for them.

Thus, this study contributes to demonstrating the importance of the application of the absorptive capacity approach to rural properties, given that farmers, as recipients of information and knowledge, are those who should recognize, assimilate and apply these new concepts to achieve better results on their properties.

The importance of having confidence in the information and knowledge from these sources should also be emphasized, and in this study these sources are the cooperative and the research foundation that it maintains for its members. The cooperative encourages the dissemination and application of knowledge so that its members can achieve greater productivity and profitability, because "strong" members will keep the cooperative "strong," or in other words, with members practicing economically sustainable production, the cooperative will also demonstrate sustainability in its forward progress.

The results also demonstrate that the putting into practice of this new external knowledge has led to positive results over the years, providing notable levels of productivity and profitability for these cooperative members. All are aware of the need for this continuous evolution in farming processes, as well as the dynamics and increasing demands of their customers. This is why they believe that the cooperative should continue disseminating knowledge and stimulate curiosity and entrepreneurship on the part of the members, including an emphasis on the application of specific training taking into account the member's profile.

In terms of the continuity of agricultural activity, all of those interviewed want to continue working in agriculture until they retire and pass their properties on to future generations. However, some are preoccupied with this succession process and are seeking alternatives for their children.

In terms of the limits of this study, it should be noted that this is a qualitative study which examines the responses of 5 members of this cooperative in terms of how the process of recognizing, assimilating and applying new knowledge occurs among these members as well as their points of convergence and divergence. Therefore, it would be of interest to next conduct a quantitative study that would analyze the absorptive capacities of all of the cooperative's members, including a quantitative questionnaire that could be further elaborated based on the data from this in-depth qualitative study.

As a suggestion for future studies, this line of research could be applied to other farmers and other cooperatives in the state of Paraná and in Brazil, to analyze and identify the process of absorptive capacity and its convergent and divergent points. This qualitative study also could be applied by enlisting the participation of the technical departments of these cooperatives to determine the difficulties that they face in disseminating best practices to farmers along with the dissemination and application of knowledge to improve the profitability of these cooperative members and promote sustainable practices in rural properties.

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