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ARTICLE

Family farm succession: evidence from absorptive capacity, social capital, and socioeconomic aspects

Sucessão familiar rural: evidências da capacidade absortiva, capital social e aspectos socioeconômicos

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Abstract: Farm succession is a process socially built from the preparation of the successor and the farm to meet a family business' expectations. This study aimed to identify how social capital, absorptive capacity, and socioeconomic characteristics influence farm succession. The survey was conducted sampling 82 soybean and corn Brazilian farmers. The questionnaire measured socioeconomic characteristics, Absorptive Capacity (AC), and Social Capital (SC). To test the influence of AC, SC, and socioeconomic characteristics on farm succession, Spearman correlation coefficient (rs) was performed. Results showed that the absorptive capacity can influence farm succession through acquisition, assimilation, use, and transformation of external knowledge into decision making, supporting the definition of successors. Results also suggested that social capital plays an important role to form relationship networks, stimulating discussions, and supporting the designation of successors. The socioeconomic characteristics 'percentage of family income from the farm, participation in courses and lectures, and being a cooperatives member' also presented a significant positive correlation with farm succession. Issues related to the capacity to absorb external knowledge, social and symbolic capital and generational transference can be fundamental in the continuity of the family farming business.

Keywords: knowledge, socioeconomic characteristics, successor, participation, cooperative, networks.

Resumo: A sucessão rural é um processo social construído a partir da preparação do sucessor e da fazenda para atender às expectativas da família. O objetivo deste estudo foi identificar como capital social, capacidade absortiva e variáveis socioeconômicas influenciam na sucessão rural. A amostra foi composta por 82 produtores brasileiros de soja e milho. O questionário mediu características socioeconômicas, capacidade absortiva (CA) e capital social (CS). Para testar a influência da CA, CS e características socioeconômicas na sucessão rural, foi utilizado o coeficiente de correlação de *Spearman* (r_s). Os resultados mostraram que a capacidade absortiva afeta a sucessão rural através da aquisição, assimilação, transformação e exploração de conhecimento externo, podendo auxiliar na definição de sucessores. Os resultados também sugeriram que o capital social desempenha um papel importante na construção de redes de relacionamento, estimulando a discussão e a definição de sucessores. As características socioeconômicas – percentual da renda familiar da propriedade, participação em cursos e palestras, e associação a cooperativas – também apresentaram correlação positiva e significativa em relação à sucessão na propriedade. Questões relacionadas à capacidade de absorção e conhecimento externo, capital simbólico e social, e transição geracional podem ser fundamentais na continuidade dos negócios rurais familiares.

Palavras-chave: conhecimento, características socioeconômicas, sucessor, participação, cooperativa, redes.

1. Introduction

Farm succession is a process socially built including the preparation of the successor, in addition to the farm, to meet a family business' expectation. Factors such as agrarian and labor legislation, mechanization, changes in the product price and cost of production, price of land,

and the feeling of marginalization concerning society can affect the farm succession process (Fischer & Burton, 2014). Succession is the transmission of the managerial control of the farm (Chiswell, 2018), and may involve one successor family member (Joosse & Grubbström, 2017) or multiple successors (Cassidy & Mcgrath, 2014; Grubbström et al., 2014, Zagata & Sutherland, 2015). In managerial transitions at organizational contexts, symbolic capital is visible when there is resistance from current managers to transfer the leadership to new successors, especially when the personal effort dedicated to working is associated with identity and self-esteem. Former managers fear for the loss of recognition and social status by perceiving themselves as retirees and unproductive (Conway et al. 2016).

Current evidence has revealed that the lack of farm succession planning negatively affects land use, agribusiness sustainability, and food security (Zou et al. 2018). Farm succession is crucial for the development and transmission of innovations in agriculture (Potter & Lobley, 1996). In Brazil, as the number of retiree's farmers grows, the migration of young people to cities is increasing, illustrating a scenario of concern regarding the efficient use of land, development, and adoption of innovations in agriculture and expansion of agribusiness. To serve an increasingly competitive market, farmers need to continually update their crops and position their production in value chains (Potter & Lobley, 1996). For these authors, planning and implementing farm succession is essential to positively innovate and motivate the expansion of agribusiness. Any failure in the succession process can generate losses and damages to the farm.

In general, farm size has positively correlated with the presence of a successor. It is also observed that the higher the educational level of the farmer, the lower the probability of succession on newer farms and the greater the probability of succession on older farms (Bertoni & Cavicchioli, 2016a). According to Kruger et al. (2020), accountability and management processes could be related to family farm succession. To Morais et al. (2017) successors aim autonomy in decisions, financial independence, good living and working conditions, agricultural credit, and education and leisure options. The biggest barriers to farm succession are often related to access to land and credit (Eistrup et al., 2019). The succession is linked to expansion strategies and the lack of a successor leads to periods of stagnation, drop in productivity, technological backwardness, or even abandonment of agriculture (Wheeler et al., 2012). To avoid this, the family discussion about farm succession and the division of labor among children helps young people position themselves professionally in agriculture. Thus, farmers' children learn, collaborate, and recognize their rights and duties within the activity from an early age (Keating & Little, 1997).

In Brazil, farm succession is commonly analyzed with qualitative approaches. However, Alcântara & Machado Filho (2014), Coradini (2015), Costa & Ralisch (2013), Matte et al. (2015), Santana & Costa (2004), Mendonça et al. (2013) and Morais et al. (2017), Morais et al. (2018) have proposed quantitative approaches for these studies. Quantitative analysis allows regressing binary variables to examine the factors affecting succession (Bertoni & Cavicchioli, 2016a), while qualitative analysis address research methods typically developed by the social sciences. It is expected that interdisciplinary studies using consolidated theoretical models could result in more comprehensive analyzes (Suess-Reyes & Fuetsch, 2016).

This study goes beyond previous literature by incorporating absorptive capacity and social capital in farm succession studies. The ability to acquire, assimilate, transform and exploit external knowledge is called absorptive capacity (AC) and can result in innovation and greater organizational flexibility (Zahra & George, 2002; Micheels & Nolan, 2016). When the work environment is stimulating, dynamic, and innovative, the family business becomes more attractive to farm successors (Bertoni & Cavicchioli, 2016a), facilitating the adoption of innovative

technologies in the farm (Micheels & Nolan, 2016). The diversity of knowledge transmitted through generations can innovate the family business through the absorptive capacity. Yan et al. (2019) demonstrated that farms that adopted more innovative practices had better cooperation and communication with other farms, acquired and shared knowledge between employees, and encouraged creative environments. The social construction involved in the transfer of ownership to the next generation must be considered in farm succession (Fischer & Burton, 2014). This involves economic characteristics, social norms, and a sense of identification that may be related to social capital (SC) (Gasson & Errington, 1993). Social capital is the willingness of individuals and groups to obtain information, influence, and nurture solidarity with other social actors through the structure and content of existing relationships (Adler & Kwon, 2002).

The social capital and absorptive capacity can influence farm succession in addition to socioeconomic characteristics related to the farmer, his family, and farm (Bertoni & Cavicchioli, 2016a). The objective of this study was to identify how social capital, absorptive capacity, and socioeconomic characteristics influence farm succession.

2. Absorptive Capacity (AC) and Social Capital (SC)

Absorptive Capacity is the ability of the company to identify, assimilate and exploit external knowledge to achieve profit (Cohen & Levinthal, 1989, 1990). It is a dynamic ability to create and use the knowledge that raises the organization's ability to gain and sustain a competitive position (Zahra & George, 2002). There are three dimensions: (a) ability to identify relevant new knowledge; (b) ability to assimilate this knowledge; and (c) the ability to apply such knowledge for commercial goals (Cohen & Levinthal, 1990; Roberts et al. 2012). The volume of external knowledge captured is dependent on the absorptive capacity, which is transformed into innovation that determines the performance of the company (Egbetokun & Savin, 2014).

The absorptive capacity has been used in studies about innovation in agriculture, mainly by Tepic et al. (2012), Gellynck et al. (2015) and Micheels & Nolan (2016). Our work is based on the AC model developed by Zahra & George (2002) and Micheels & Nolan (2016). According to Zahra & George (2002), AC dynamics have two dimensions: potential absorptive capacity (PAC) and realized absorptive capacity (RAC). PAC offers more strategic flexibility and adaptability in changing environments, sustaining competitive advantages in dynamic industry contexts. RAC is visible in the exploration of innovations and other factors that create competitive advantages (Zahra & George, 2002).

RAC is initiated after assimilating knowledge and integrating individuals into an organization. In this transformation step, previous and acquired knowledge are combined in a process of recoding, incorporation, and conversion that allows new competencies by changing strategy. In the exploration step, the organization's competencies effectively change to implement knowledge, creating routines that allow exploration for a longer period. The new competencies with the routines will bring the competitive advantages that will result in innovation, flexibility, and better organizational performance (Zahra & George, 2002). According to the authors, PAC makes the organization receptive to new knowledge, and RAC leverages the knowledge absorbed. The proportion of these dimensions suggests variation in value creation from existing knowledge.

The relationship networks influence the absorption of knowledge through integration mechanisms that connect and share information. At the same time, power relations within the organization direct the way knowledge is applied and resources are allocated (Todorova & Durisin, 2007). In

agriculture, farm succession and the formation of joint ventures for information exchange and business partnerships are also facilitated by informal relationships (Ingram & Kirwan, 2011).

Social Capital is an informal value corresponding to the stakeholder's counterpart of a company that promotes the cooperation of individuals to start or maintain the business (Fukuyama, 2001). It is composed of resources from networks of relationships, such as economic, cultural, or symbolic capital (Bourdieu, 1980), and based on social structures such as communities, religious groups, or families (Coleman, 1988). These structures or networks are composed of norms that facilitate cooperation searching for the maximum benefits for the social group involved in the business (Putnam, 1993).

Social actors who use SC have better access to sources of relevant information, greater levels of influence, power, and control, and enjoy solidarity from other members of the network (Adler & Kwon, 2002). These authors define SC as the disposition of individuals and/or groups in structures that sustain relationships among social actors, providing information and increasing influence and solidarity among them. This work, like Micheels & Nolan (2016), adopts this definition of social capital. In a cooperative farmers' environment, social capital is also obtained and accumulated from the social relations of the cooperative perspective and can influence the future of regional agricultural development (Akahoshi & Binotto, 2016).

Both AC and SC can contribute by increasing people and community's knowledge and level of specialization. In the agricultural sector, AC and SC can be decisive for the future of agribusiness, technological advancement, and the continuity of agriculture through farm succession.

Absorptive capacity studies allow organizations to be open to knowledge, assimilation of new information, exploration of innovations, and provide advances (Cohen & Levinthal, 1990; Zahra & George, 2002). About social capital, the relationships, structure, influence, and information also contribute to the formation of individuals and groups well informed for decision making and positioning according to changes (Adler & Kwon, 2002), including the agricultural sector (Narayan & Pritchett, 1999). Socioeconomic variables, CA, SC, and farm succession make up the analysis model adopted in this article. The model is represented by Figure 1 and was adapted from Micheels & Nolan (2016) research model. Bertoni & Cavicchioli (2016a) argue that farm, farmer, production, and the external environment significantly influence the possibility of farm succession. These factors are the control variables, identified in the center of Figure 1.

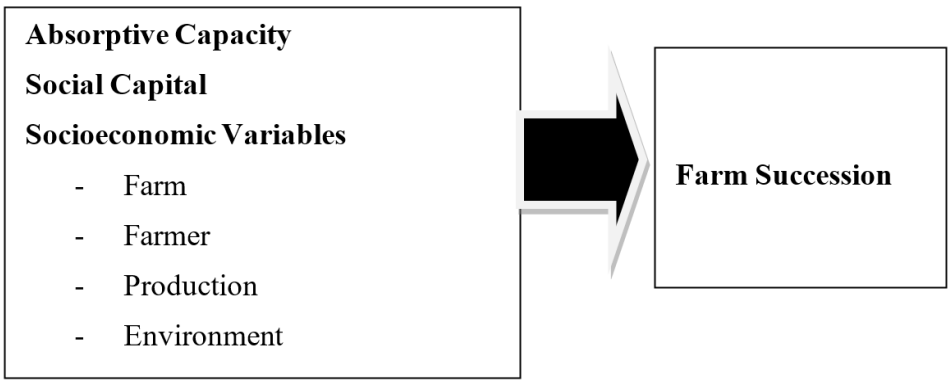

Figure 1. Model of Succession Analysis in Farms. Source: Adapted from Micheels and Nolan (2016)

3. Method

This paper aimed to identify how social capital, absorptive capacity, and socioeconomic characteristics influence farm succession. It is an exploratory and descriptive study a questionnaire was applied to farmers based on Micheels & Nolan (2016) and Bertoni & Cavicchioli (2016a). The AC questions, following Micheels & Nolan (2016) addressed farmer's information collection, perception of market signals, how information is registered, communicated, fulfilled, and finally implemented. The CS variables seize cooperation, confidence, and community vision and involvement.

The soybean and corn farmers were the samples. These crops play an important role in the economy of the states of Mato Grosso and Mato Grosso do Sul (Instituto Brasileiro de Geografia e Estatística, 2017), Brazil. The farms selected for sampling followed non-probabilistic criteria and access.

Considering the difficulty of accessing farmers in each state and the lack of a contact list or total of farmer numbers, we surveyed four agricultural cooperatives, five agricultural unions, some agricultural extension agents, rural communities, agronomists, and representatives of input suppliers for the production of soy and corn. The questionnaire was hosted on the SurveyMonkey® virtual platform and the link was sent to the main contacts of each organization. They were responsible to send the link for farmers or their contacts to us. In some cases, farmers indicated others as possible research participant. The questionnaire was also applied in a personal interview. We collected 109 answers (21 online and 88 personal). Incomplete questionnaires (27) were discarded. Data collection was performed from August to November 2017. We are aware of the limitation that non-probabilistic sampling does not fully equal the representativeness of the whole farmer population. Therefore, our results must be viewed with care.

The questionnaire measured socioeconomic characteristics, AC and CS. In the questions addressing AC and CS, a five-point Likert scale was used, ranging from "Strongly disagree", "Partially disagree", "Disagree or agree", "Partially agree" to "Strongly agree". Variables related to succession and socioeconomic aspects used in the questionnaire are presented in Table 1, and AC and CS variables, Table 4 and Table 5 (presented in section 4.2). The questionnaire was pre-tested with four-grain farmers and no substantial changes were necessary.

Two items measured farm succession: The first one was about designated successor and the second if the family discusses the succession of the farm. This item considers the initial stages of succession while the business did not have a predefined successor. Family discussion is assumed to be the proper start to the succession process (Keating & Little, 1997).

In general, the data was negatively skewed. Hence, to test the influence of absorptive capacity, social capital, and socioeconomic characteristics on farm succession, the Spearman correlation coefficient (r_s) was performed. Spearman correlation is recommended when data follow a non-normal distribution, and for ordinal variables. The two succession variables were correlated with socioeconomic variables, AC and CS. Before the analysis, the reliability of the scales used to measure AC and CS was investigated using Cronbach's α coefficient. A Cronbach's α coefficient higher than 0.7 indicates that the different items can be summed and that the median can be used to represent these constructs (Hair et al. 2010). The analysis was performed with STATA 13 software.

Table 1. Description of Succession and Socioeconomic Variables

Category	Variable	Definition	Reference	Measurement Unit
Succession Variables	Succession Discussion	The family discusses the succession of farm	Keating & Little (1997)	Yes
				No
	Succession	Designated successor	Micheels & Nolan (2016)	Yes
				No
Socioeconomic Variables	Age	The age of the farmer	Bertoni & Cavicchioli (2016a)	years
	Gender	The gender of the farmer	Bertoni & Cavicchioli (2016a)	Male
				Female
	Experience (years)	Experience in the farm	Micheels & Nolan (2016)	years
	Children in the Farm	The number of children over 15 residing on the farm	Bertoni & Cavicchioli (2016a)	Number of children
	Children Education	At least one child completed high school	Bertoni & Cavicchioli (2016a)	Yes
				No
	Farmer Education	Farmer Education Level	Micheels & Nolan (2016)	Incomplete elementary school
				Complete primary education
				Incomplete high school
				Complete high school
				Incomplete technical school
				Complete Technical School
				Incomplete Higher Education
				Complete Higher Education
				Incomplete post-graduation
				Complete Post-Graduation
	Family on the farm	Number of family generations on the farm	Kerbler (2008)	Number of generations
	Relatives Employees	Number of family members employees on the farm		Number of people
			Micheels & Nolan (2016)	Yes
				No
	Training (hours)		Micheels & Nolan (2016)	Number of hours of training
	Cooperativism	Member of Agricultural Cooperative		Yes
				No

Source: Literature review (2018).

Table 1. Continued...

Category	Variable	Definition	Reference	Measurement Unit
Socioeconomic Variables	Age	Age of farm since its foundation or acquisition by the family	Bertoni & Cavicchioli (2016a)	years
	Location	The state of Brazil in which the farm is located	Micheels & Nolan (2016)	State
	Size	Farm size in hectares	Micheels & Nolan (2016)	Own (hectares)
				Rented or leased OF third parties (hectares)
				Rented or leased FOR third parties (hectares)
	Farming operation	Main farming operation	Adapted from Micheels & Nolan (2016)	Dairy production (cattle)
				Beef production (cattle)
				Agriculture
				Other (please specify)
	Income	Percentage of family income from the farming operation	Adapted from Micheels & Nolan (2016)	1% to 25% of income
				26% to 50% of income
				51% to 75% of income
				76% to 100% of income
	Agricultural career phase	The current stage of my agricultural career	Micheels & Nolan (2016)	I am just getting my farming operation
				I am expanding my farming operation
				I am maintaining my farming operation at a steady level
				I have started to reduce or scale down my farming operation
				I plan to sell my farming operation in the near future
	Employees	Number of employees (temporary and permanent employees)	Micheels & Nolan (2016)	Fixed - Nº of people
				Temporary - Nº of people
				Total - Nº of people

Source: Literature review (2018).

4. Results and Discussion

4.1 Description of the Sample

The continuous variables related to the farmer/farm are presented and described in Table 2.

Table 2. Descriptive Statistics of Continuous Variables

Variable	Median	Standard deviation	Min	Max
Age of Farmer (years)	51	14.44	19	81
Farmer Experience (years)	18	12.17	0	50
Hours of Training and Lectures (per year)	30	65.60	0	360
Size in Hectares	355	3,263.34	12	20,000
Number of employees	4	25.00	0	185
Family Generations on farm	2	0.93	0	4
Relatives working on the farm	2	1.53	0	8
Age of farm since its foundation or acquisition by the family (years)	31	16.07	7	77
Children over 15 years living on farm	0	0.92	0	4

Source: Research data (2018).

Most farmers researched have advanced age and significant experience in agriculture, as presented in Table 2. Some family members participate in the farm works, which are usually extensive, with many employees and large areas of cultivation. There are very few young people over the age of 15 living on farms. Results of Socioeconomic binary variables are presented in Table 3.

Table 3. Descriptive Statistics of Categorical and Binary Variables

Variable	Definition	Category	Percentage
Gender	Gender of the farmer	Male	92.7%
		Female	7.3%
Education	Farmer education level	Incomplete elementary school	20.7%
		Complete primary education	7.3%
		Incomplete high school	2.4%
		Complete high school	18.3%
		Incomplete technical school	0.0%
		Complete Technical School	1.2%
		Incomplete Higher Education	9.8%
		Complete Higher Education	28.0%
		Incomplete post-graduation	2.4%
		Full Post-Graduation	9.8%
Training		Yes	87.8%
		No	12.2%

Source: Research data (2018).

Table 3. Continued...

Variable	Definition	Category	Percentage
Cooperativism	Member of Agricultural Cooperative	Yes	75.6%
		No	24.4%
Location	The state of Brazil in which the farm is located	Mato Grosso	15.9%
		Mato Grosso do Sul	84.1%
Farming operation	Main farming operation	Agriculture	72.0%
		Mixed (agriculture and livestock)	28.0%
Income	Percentage of family income from the farming operation	1% to 25% of income	4.9%
		26% to 50% of income	7.3%
		51% to 75% of income	18.3%
		76% to 100% of income	69.5%
Agricultural career phase	The current stage of my agricultural career	I am just getting my farming operation	4.9%
		I am expanding my farming operation	37.8%
		I am maintaining my farming operation at a steady level	56.1%
		I have started to reduce or scale down my farming operation	0.0%
		I plan to sell my farming operation in the near future	1.2%
Succession	Designated successor	Yes	43.9%
		No	56.1%
Succession Discussion	The family discusses the succession of farm	Yes	62.2%
		No	37.8%
Children Education	At least one child completed high school	Yes	69.5%
		No	30.5%

Source: Research data (2018).

Results showed that the majority of the participants are men, members of agricultural cooperatives, and have attended training in recent years. In addition, their family income comes almost entirely from farm activity, which is expanding or stabilizing. The level of education of the farmers is divided between technical level and higher education (with or without post-graduation). Most of the farmers' children have high school (69.5%). Discussion on succession occurs in most households and many families already have a designated successor (43.9%). Among the women interviewed (7.3%), most discuss the succession issue at home and already have a designated successor (67%).

4.2 Descriptive Analysis of Absorptive Capacity and Social Capital

Absorptive capacity was divided into potential and realized absorptive capacity unlike Micheels & Nolan (2016). The Cronbach's α coefficient was above 0.7 for PAC and approximately 0.7 for RAC (Table 4).

Table 4. Median and Cronbach's α coefficient for the variables used to measure the absorptive capacity of the farmer

Absorptive Capacity (AC)	Median	Standard Deviation
Potential Absorptive Capacity (PAC)	4.00	0.60
People on the farm often interact with other farmers to acquire new knowledge	5.00	0.86
Our employees regularly visit employees of other farms	4.00	1.35
We informally obtain industry information through lunch conversations with company representatives or informal conversations	3.00	1.26
We periodically meet clients or business partners to acquire new information	4.00	1.18
Our employees have frequent contact with financial advisors (e.g. accountants)	4.00	1.40
We quickly recognize how changes in laws affect our farm	4.00	1.31
We are slow to recognize changes in our consumer market	3.00	1.34
We quickly recognize technical changes that can be implemented in the farm	4.00	0.98
We quickly understand new opportunities to serve business partners	4.00	1.07
We spend a lot of time talking to technical advisors to recognize the market changes	3.00	1.28
We quickly analyze and interpret changing market demand	4.00	1.14
Cronbach's α coefficient (PAC) = 0.7292		
Realized Absorptive Capacity (RAC)	4.00	0.49
We consider changes in market demand for new products and services	4.00	1.13
Our employees record knowledge to be used in the future	4.00	1.00
We quickly recognize the usefulness of new knowledge in farms	4.00	0.98
Our employees hardly share practical experiences from outside agriculture.	2.00	1.29
Every month we discuss with advisors how changes in the market can be used to make changes in the farm	3.00	1.35
We allocate a lot of time to the application of new information on farm	3.00	1.11
It is clear to everyone how activities on the farm should be carried out	4.00	1.04
Information provided by buyers falls on deaf ears on farm	2.00	1.26
We have a clear division of tasks and responsibilities	5.00	1.10
We always consider how to better apply knowledge	5.00	0.82
We directly use external information on farm practices	4.00	0.91
Our employees know the products and services of the farm	5.00	0.88
Adopting external information on the farm contributes to improved profitability	5.00	0.69
Cronbach's α coefficient (RAC) = 0.6980		
Cronbach's α coefficient (AC) = 0.83		
Median absorptive capacity (AC) = 4.00		

Source: Research data (2018).

The flow of knowledge in the absorptive capacity by Zahra & George (2002) is primarily the result of the social and financial effort to identify and obtain external knowledge through social interactions and relationships. Then. external knowledge is routinely analyzed and interpreted to be adopted. The AC variables of relationship and access to information (Micheels & Nolan. 2016) indicate a farmer aware of changes, who relates new information to his experience

and knowledge, evaluates impacts of changes in his farm, and, finally, adopts strategies and processes in his farming routine. For the social capital, Cronbach's α coefficient was higher than 0.7. The median values of SC responses were used to represent the construct (Table 5).

Table 5. Median and Cronbach's α coefficient for the variables used to measure the social capital of farmers.

Social Capital (SC)	Median	Standard Deviation
People on our farm spend a lot of time in social events with people from other farms	3.00	1.27
People on our farm spend a lot of time at events organized by the local community	3.00	1.16
Our employees have the same educational level as employees of neighboring farms, which facilitates social relations	4.00	1.17
I have informal networks with customers, suppliers, and competitors	4.00	1.07
Other farmers can rely on we will not take advantage of them. even if there is an opportunity	5.00	0.98
In general, people on our farm will always keep the promises they make to people outside the farm	5.00	0.86
If the farm is in search of a business partner, I will comply with my obligations even if there is no contract	5.00	0.83
I believe that the partner companies would support me in times of trouble, so it is only fair that my farm also supports them.	5.00	0.85
People on our farm share the same ambitions and visions as other people from other farms in the region.	4.00	0.93
People on our farm are motivated to achieve collective goals in the region	4.00	0.97
I consider that our farm's future is related to other firms in the region.	4.00	1.30
There are collective plans and strategies for the farm in my region	3.00	1.20
Local institutions provide important research and development support for my farm	4.00	1.33
People on our farm have already received training from University and local Colleges	2.00	1.30
On our farm, we receive lots of product and market information from local organizations	4.00	1.19
I receive more support from the Government and local organizations than from companies and industries	1.00	1.16
Establishing networks with suppliers and customers has a significant impact on developing new ideas in the farm	5.00	0.90
Establishing networks with suppliers and customers has a significant impact on the acquisition of resources	5.00	0.91
Establishing networks with suppliers and customers has a significant impact on the development of new activities in the farm	4.00	1.03
Cronbach's α coefficient (SC) = 0.78		
Median of Capital social (SC) = 4.00		

Source: Research Data (2018).

The farmer recognizes himself as the one who meets friends (other farmers) with the same educational level as him at events, and this facilitates his social relationships. The farmers' perception of the amount of knowledge they receive about the market and products from local organizations was also relevant. Probably the farmer's sources of information and his social groups allow social capital correlating with his decision by a successor, reaffirmed the social capital study proposed by Adler & Kwon (2002).

The results also confirmed Narayan & Pritchett (1999) by relating social capital to greater community participation and the formation of well-informed groups that make decisions and position themselves in times of change.

4.3 Correlations

The results for the Spearman coefficients (r_s) shown in Table 6 indicated that both the absorptive capacity and the social capital are positively correlated to the existence of a designed successor, the percentage of family income from farm activity, and the number of hours in lectures and training participation. Membership in cooperative is positively correlated to family discussion on farm succession.

Table 6. Spearman's coefficient for correlation between the constructs and socioeconomic variables with predefined successor and discussion about family succession

Variable	There is a designated successor	They discuss succession
Potential absorption capacity (PAC)	0.3312*	0.0357
Realized absorbed capacity (RAC)	0.3459*	0.0745
Social Capital (SC)	0.3232*	0.0542
Age	0.0203	0.0648
Education	0.0927	0.0949
Experience	-0.1086	0.1697
Age of farm since its foundation or acquisition by the family	0.145	0.0495
Young over 15 years of age residing on the farm	0.2017	-0.1115
Young that completed high school	0.0521	-0.1885
Size in Hectares	0.1018	0.1334
% of income from farm	0.2663*	0.0256
Number of employees	0.0877	0.1367
Number of generations that passed through the farm	0.2041	0.0402
Number of family members working on the farm	0.1131	0.0573
Hours spent with training and lectures	0.2482*	0.1099
Participation in Lectures	-0.0458	0.1706
Member of Cooperative	0.1019	0.2600*

* Variables with P <0.05. Source: Research Data (2018)

The positive results of correlations between AC constructs and designated successor indicated that farmers are open to acquire and assimilate external knowledge and apply it in the farm routines, supporting the farm succession. The positive correlation between "designated successor" and potential absorptive capacity probably suggested that experienced farmers are open to new knowledge within a context of changes in market demands, technologies, and management, relating to Kruger et al. (2020) suggestion. This is strengthened by scoring the correlation of some variables individually with succession since the positive ones are linked to the constant search for new knowledge and the formal and informal exposure to industry and retail. This points to PAC as relevant to the definition of a successor. Thus, it definitely explores the knowledge absorbed and determines a successor.

The realized absorptive capacity, with the transformation and exploitation of knowledge stages, also presented a positive and relevant correlation with the designated successor. In this case, the correlation occurs through the use of acquired knowledge and strategies of adaptation

and flexibility facing market changes, which require innovation in the internal processes of production. The succession process is related to new phases of farm development (Potter & Lobley, 1996), and is considered fundamental to adapt the farm to a new reality (Wheeler et al., 2012). Given the absorptive capacity as a strategic organizational change process aimed at transforming external knowledge into better performance (Zahra & George, 2002), the results are in agreement with Wheeler et al. (2012) when presented the correlation between farm succession and farm expansion strategies. The results also confirmed Bertolozzi-Caredio et al. (2020) that succession has a major impact on farm improvement and innovation. Our results indicated that both social capital and the existence of a designated successor are positively correlated to PAC and RAC.

The results are confirming Andersen (2015) for RAC, but contradicting for PAC. According to his work, high levels of social capital in family businesses improve family relationships by increasing the acquisition and assimilation of knowledge but slow down transformation and exploitation of the knowledge. These results reinforced the impact of research on absorptive capacity in firms suggested by Andersen (2015). Given the importance of social factors throughout the process of knowledge absorption, our results also reinforced studies in AC as they corroborate with Todorova & Durisin (2007) and contributed to broadening the AC framework beyond the contributions of Lichtenthaler & Lichtenthaler (2009) and Patterson & Ambrosini (2015).

From the socioeconomic variables, the percentage of income from the farm and the hours in lectures and training were the only relations with the existence of a successor. These variables positively influenced the existence of a successor to take over the agricultural business. Succession is related to income differently from that proposed by Bertoni & Cavicchioli (2016a) as they used the total income of the families. This work considered the percentage of family income from farms and suggested that the higher this income, the greater the likelihood of continuity in agriculture. Likewise, the greater the economic well-being, the greater the chance of success in succession (El-Osta et al., 2007). Our result demonstrated that income positively influences succession (Facioni & Pereira, 2015).

Regarding the hours in lectures and training, they are also important to define a successor, confirming the positive effect of professional qualification in succession processes as Heleba et al. (2009) study. In the study, local cooperatives, unions, and associations are the institutions that promote professional training for agricultural workers through courses, lectures, and seminars. This suggests the commitment of these institutions to the issue of farm succession and continuity of farm activity in the region.

The farmer's participation in the cooperative was the only variable that correlated in a positive and relevant way with the discussion of family succession, although most of the sample affirmatively answered they discussed the succession. Possibly cooperative actions have stimulated discussions about family succession since the continuity of cooperatives is also related to the renewal of farms and inclusion of new members (Boessio & Doula, 2016). The importance of institutions to promote the succession debate in families is considered a starting point for the succession process (Keating & Little, 1997), but participating in a cooperative did not influence the social capital of the farmer, contradicting Akahoshi & Binotto (2016).

The SC variable was tested for influence over succession, being positively relevant to define a successor. Symbolic capital, a component of social capital, was significant to succession as proposed by Conway et al. (2016) and Grubbström & Sooväli-Sepping (2012). These results brought some insight about these situations being related to relationships with neighbors and other farmers, feelings on work continuity, and other non-rational impressions as identified by Fischer & Burton (2014). The SC and AC constructs proposed by Micheels & Nolan (2016) were relevant

for farm succession. The sample of this work was unique and regional. The variables of the CA and CS constructs that stood out the most were those of formal and informal relationship of farmers with neighbors, suppliers, technicians, lecturers, and cooperatives to obtain information.

Considering that this paper and others have searched quantitative socioeconomic characteristics to explain farm succession, the correlation was not explained by variables related to the farmer, his family, and farm. Other studies pointed that the farmer's age is more determinant for farm succession (Kimhi & Nachlieli, 2001; Mishra & El-Osta, 2008; Mishra et al., 2010) as well as the farm's size (Glauben et al. 2009; Ochoa et al. 2007; Souza et al. 2013), the farmer gender (Bertoni & Cavicchioli, 2016a), the farmer's education level (Kimhi & Nachlieli, 2001; Mishra & El-Osta, 2008; Mishra et al., 2010; Souza et al., 2013), his children's education level (Bertoni & Cavicchioli, 2016a), the farm's age (Bertoni & Cavicchioli, 2016a; Glauben et al., 2009) and the number of generations that have managed the farm (Kerbler, 2008). Other factors not mentioned in this research can also influence these aspects listed by Bertoni & Cavicchioli (2016b) study.

According to our results, the correlation analysis showed that most socioeconomic variables were not relevant to explain any of the succession variables. However, the methodological procedure of this study agrees with Bertoni & Cavicchioli (2016b) as it evaluated the influence of socioeconomic characteristics with quantitative data. It is possible that non-quantifiable and non-visible characteristics were neglected, such as cultural, social, or regional phenomena, which probably interfere with the succession processes in this researched group.

The absorptive capacity, acquisition, assimilation, transformation, and exploitation of external knowledge, in addition to inherent to the agricultural practice of commodities, can indicate the possibility of designating the successor as expansionist and flexible to follow the market. If the PAC dimensions (Cohen & Levinthal, 1990; Roberts et al., 2012) had been better developed, the results would be more significant.

5. Final Considerations Limitations and further research opportunities

This study aimed to identify how social capital, absorptive capacity, and socioeconomic characteristics influence farm succession. Results indicated that the farm succession was influenced by the absorptive capacity, social capital, the percentage of family income (from the farm), participation in courses and lectures, and being a cooperative member. The relevance of social capital to succession, as well as relationships with external people, symbolism, social norms, and trust seemed to be important for the construction of networks of relationships that allowed the farmer to discuss and designate a successor. These factors and characteristics can be fundamental for the discussion and the designation of a successor on the farm. In the same way, symbolic values can motivate farmers concerning the continuity of generations in their farms.

This work was innovative when compared to Micheels & Nolan's (2016) study because it related the existence of a successor to the constructs PAC, RAC, and SC to plan the succession and consequent expansion of farm business. In contrast to Bertoni & Cavicchioli (2016a) and other succession-related works, the results were groundbreaking in the use of CA and CS to predict farm succession, since surveys of family farms require the use of well-established theories and other areas (Suess-Reyes & Fuetsch, 2016). The study was also innovative in seeking structural, categorical, and theoretical correlations with the family discussion about succession, which is a key factor for the success of the process (Keating & Little, 1997).

In agriculture, different pressures shape the actions of farmers, since an imbalance between the maintenance of traditions, the urgency of technological updating, and the need for succession tend to make farmers flexible in their farm planning (Lequieu, 2015). Issues related to the capacity

to absorb external knowledge, social and symbolic capital, and generational transference can be fundamental in the perpetuation and productivity of family farming.

The main limitations of this study were related to the size and complexity of the questionnaire, as well as to the replicated socioeconomic issues of Micheels & Nolan (2016). The authors had a different focus on succession and did not address unquantifiable holistic factors. This lack of correlation between succession and several socioeconomic variables raises questions about the possible insipidity of the discussion of succession in the sample studied. Also raises doubts about how these farms are preparing the succession process and if any immensurable variables could influence. We suggested a qualitative approach similar to Bertolozzi-Caredio et al. (2020) to achieve a more dynamic and multidimensional vision of the succession process and surpass the limitation of the use of quantitative data and correlation analyses. These results offered small possibilities to create hypotheses and in the same way, they could not compare with other hypotheses from previous studies. The suggestion for the method is to develop a study with qualitative data through in-deep interviews or focus groups to deepen these results.

Another aspect is the use of this questionnaire with similar questions from original research without validation in Brazil and this represented a big challenge. As well as the "succession discussion" variable, which was affirmatively answered by respondents but had few correlations with the other variables. We suggested the use of a more simplified questionnaire with categorical variables common to the succession literature and Brazilian characteristics. This would broaden sampling and comparative capacity using qualitative methods with a broader approach to succession phenomena, for example, with case study work in the family business field as discussed by De Massis & Kotlar (2014).

Suggestion for future studies is to seek the use of different variables to compare the levels of succession process with agricultural cooperative members and non-members with theoretical models used here. It is also important to assess whether issues related to the perception of personal father success influence succession and how gender and innovation issues can influence succession in the farms. It is still suggested to explore other family members involved in the succession process, such as the possible successor.

Finally, considering the decrease in the rural population in Brazil (from 54.9% in 1960 to 15.6% in 2010 – Instituto Brasileiro de Geografia e Estatística, 2011), the importance of keeping families in the countryside should be more observed. Initiatives could arise from governments, communities, agricultural extension companies, cooperatives, unions, etc. Programs, courses, training, and events can be planned for farmers and their families to promote the transmission of knowledge, technical learning, and discussions on the succession of farms. These would support succession in rural communities to continue family farming, bringing possibilities to reduce rural migration and to improve innovation in agriculture.

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