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Why do small businesses innovate? Relevant factors of innovation in businesses participating in the Local Innovation Agents program in Rondônia (Amazon, Brazil)

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Abstract

This study aimed to present the most relevant cognitive factors that influence innovation in activities of small businesses participating in the Local Innovation Agents program in Rondônia (Amazon, Brazil). Cognitive maps were used as a methodological approach for the study of a group of small businesses within the context of the project. The results indicated the existence of 14 relevant factors mentioned by the businesses assessed, highlighting two influence factors mentioned by all participants in some casual relationship, therefore, a consensus: "need for survival" and "knowledge and experience". These factors indicate, respectively, motivation and innovation process management of the companies studied. The different relations among the factors allowed identifying two groups within the program. They differed primarily in regard of willingness to innovate and development of learning levels that influence innovation activities resulting from the interaction with the program's agents.

Keywords: Innovation factors; Cognitive maps; Small businesses; Cognition for innovation

Introduction

Innovation that results in an endogenous economic development is an alternative paradigm to the neoclassical mainstream economic theory. It is very effective in explaining inequalities between nations. It has grown in importance also for the theory of organizations, whose main objective is to understand the sources of innovation within organizations (Bastos, Souza, & Costa, 2008; Goodhew, Cammock, & Hamilton, 2005; Pundt, 2015; Swan, 1997), and support organizational and institutional environments in which innovations occur (Braga & Forte, 2016; Conceição, 2008; Mais, Carvalho, & Amal, 2014; Possas, 2008). Discussions involving relationships between institutions and entrepreneurial and innovation activities are still a fertile field for discussion due to the evident existing gaps.

However, recent studies on innovation (Carvalho, Silva, Póvoa, & Carvalho, 2015; da Silva Néto & Teixeira, 2011, 2014; Desidério & Popadiuk, 2015; Rodrigues et al., 2014) have focused on presenting the types of innovations performed, their development processes or measurement mechanisms, but neglected to discuss the reasons why a business decides whether or not for the development of innovation activities. Moreover, this lack of debate is even more evident when the study *locus* are micro and small businesses (MSBs), which have received little attention in innovation studies despite political and economic incentives and the important role they play in economic and social development (Forsman, 2011; MDIC, 2013).

An example of such political and economic incentives to MSBs in Brazil is the Local Innovation Agents program (LIA program). It was created in 2009 by the Brazilian Support Service for Micro and Small Businesses (Sebrae) to promote innovation in the business sector and consolidate a culture of

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innovation through a continued practice of innovation activities in small businesses under the monitoring of selected and trained agents for such purpose. From 2012, the program has expanded due to the support of the National Scientific and Technological Development Council (CNPq). According to CNPq (2015), over 90,000 businesses in Brazil were served up to the end of 2014. The program has an investment forecast of R$ 320 million for the period 2015–2020.

Other incentives to facilitate access to programs and projects for the development of innovations and the improvement of small business management are the Federal Supplementary Law no. 123/06, also known as General Law of Micro and Small Businesses, Law no. 10,973/04, known as the Innovation Act, and Law no. 5798/06, known as Law of the Good (BRASIL, 2004, 2006a, 2006b).

Nevertheless, a survey conducted by the Ministry of Development, Industry and Foreign Trade of Brazil (MDIC, 2013) evidenced that, despite the significant number of businesses, which impacts consequently on job opportunities and participation in income, Brazilian micro and small businesses are not representative in terms of productivity, affecting the ability to perform effectively the role of inducing economic development.

The low response of the segment to measures such as those mentioned opens room for discussions about the possibility of the problem not being institutionally related to the incentive structure, including legal incentives, but more connected with the cognitive behavioral attitude of MSB entrepreneurs.

From this controversy, and in order not to exhaust any questioning or discussion possibility and contribute to a greater understanding of the causes of this undesirable dynamic, this research discusses what cognitive structure factors influence the innovative behavior of small business' entrepreneurs by understanding the most relevant cognitive factors influencing innovation activities of small entrepreneurs participating in the LIA program in the state of Rondônia (Amazon, Brazil).

This study understands innovation as a process of creation and social appropriation favored by an intangible dimension related to behavior, freedom of communication, risk-taking culture and practice of creativity techniques, understanding innovation per the society's broad sense, and the effects the stimulus to innovation may exert on a creation and distribution of income (Bin, 2008), more aligned to the reality of small businesses (Bachmann & Destefani, 2008).

In this context, this study is an interesting proposal for discussion of innovation motivated by social processes based on the individual and collective learning provided by experiences and sharing of meanings derived from them. It is influenced by, and subsequently influences, values, beliefs, rules and social standards, focusing on the cognitive aspects of the individual in face of the decision to innovate.

Innovation and learning in the small business environments

García-Morales, Lloréns-Montes, and Verdú-Jover (2007), in a quantitative study involving small and large businesses, showed a high correlation between learning ability and innovative capacity, and innovation activities and business performance. Organizational learning appears to be one of the innovation background processes that best responds to the understanding of the dynamics of small businesses (Moraes, 2013).

Innovation capacity has often been compared to business activities related to formal research and development (R&D) and new products (Kirner, Kinkel, & Jaeger, 2009). This linear model of innovation emphasizes the scientific and technological knowledge and perceives formal R&D efforts as an indicator of the technological progressiveness of businesses. Regarding small businesses, the current literature suggests that innovations do not necessarily result from formal R&D. They result from daily business developments, customer collaboration and optimization processes (Hirsch-Kreinsen, 2008). Bachmann and Destefani (2008) argue that patent number and percentage of revenues applied to R&D are not adequate indicators for micro and small businesses because this stratum of businesses generally does not spend on R&D, does not have PhDs and professors as employees and does not register patents.

In the case of Brazilian MSBs, given the management difficulties faced by such organizations and the difficulties in measuring results, Sebrae (2011) considers the use of knowledge on new ways to produce and market goods and services as innovation along with any change involving a significant level of novelty for the business. Sebrae assesses the cognitive effort to innovation regardless of measurable R&D results, sales increase, market shares, cost reductions or improved operating methods of these organizations.

The innovation paradigm adopted by the LIA program to serve Brazilian small businesses was the Oslo Manual, published by the Organization for Economic Cooperation and Development (OECD, 2005, p. 55). It presents innovation as "the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations."

The consequences of this concept are that innovation should take place on a systematic basis and obtain the expected results in its planning (Barbieri, Vasconcelos, Andreassi, & Vasconcelos, 2010), associating innovation with the creation of value capable of producing differentiation and make organizations more competitive in the market. Tidd and John (2015) stated that the innovation process, however, is complex and requires some knowledge and ability in order to establish relations and identify opportunities so that they may be well-used.

The process of innovation in MSBs, then, is favored by organizational structures and by an intangible dimension related to behaviors, freedom of communication, risk-taking culture and practice of creativity techniques (Bachmann & Destefani, 2008). Reis, Carvalho, and Cavalcante (2009) considered such intangible dimension as a learning environment that combines the expertise and the use of ideas from employees for the generation and implementation of innovations, as shown in Fig. 1. From this model, the process as a whole involves the dynamic between experiential learning and mental models.

Kolb's theory of experiential learning (1984) assumes that all knowledge results from the interaction between the abstract

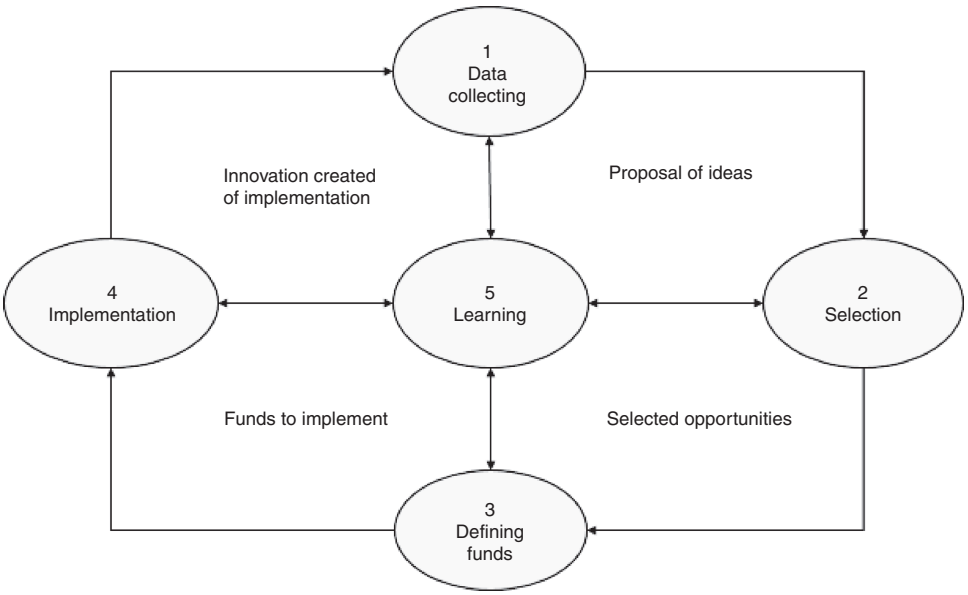

Fig. 1. Innovation process management in MSBs.
Adapted from Reis et al. (2009).

concepts of theory and experience. A person within a natural and cultural context is able to learn from conscious thoughts on its experiences. Thus, "learning is the process whereby knowledge is created through the transformation of experience" (Kolb, 1984, p. 38). That does not mean that every experience results in learning because the appropriation of knowledge from experience, especially mental knowledge, demands a continuous process of action and reflection (Pimentel, 2007) not always possible.

In the logic of this discussion, learning is a fundamental requirement for processes of innovation arising from the construction of social capital able to promote the necessary changes in institutional arrangements due to the convergence of ideas about the formation of collective and creative solutions. Innovation, therefore, is conceived as a social process (Felipe, 2008), in which cognitive aspects determine and guide organizational and subsequently institutional changes, generating innovations from individual learning and sharing of the meanings of these experiences with the collective.

In a macro level, innovation is considered determinant to economic growth and patterns of relationships established between organizations, resulting in long-term institutional changes guided by such relationships (Vermeulen, Van den Bosh, & Volberda, 2007). However, changes in mental models and individual behavior patterns are needed for this to occur. They begin at the micro level, i.e., within businesses. Such changes, in turn, may be driven by factors that influence learning, development of mechanisms to facilitate communication, creation of effective channels of information, skill transfers and accumulation and sharing of knowledge within and between organizations (OECD, 2005). This creates shared meaning systems that arise from interaction processes between the members of the organization and those integrating the cognitive pillar (Vermeulen et al., 2007).

Tverski (1993) addressed cognitive aspects from cognitive maps and mental models by which individuals establish their position in relation to the external environment, configuring the way by which their language, communication and interaction is constructed together with other individuals or groups.

The concept of mental modes is presented by Senge (1995, p. 221) as "images, assumption, and stories which we carry in our minds of ourselves, other people, institutions, and every aspect of the world." That is, they are representations of a reality internalized over time by the social life of the individual. They determine how this person sees the world.

The individual continually uses its mental models for the exploitation of resources aiming to solve recurrent problems. As the external environment changes, the simplified reality of the environment contained in mental models experiences a mismatch between the expected result and the actual result of the action, causing the individual to keep correcting its choices using the same subset of available answers or looking for new solutions outside the established mental model (Seri, 2001), thus promoting a new level of learning. This process contributes to the emergence of novelty. However, it requires time and effort.

Jensen, Johnson, Lorenz, and Lundvall (2007) highlighted two types of models that characterize the process of learning and innovating. The first model is called STI (Science, Technology, Innovation), which implies that the codified knowledge and the scientific ways to obtain access, produce and use such knowledge are dominant in innovation processes. The second model is called DUI (Doing, Using, Interacting), which implies a knowledge not codified and difficult to be transferred (tacit knowledge) and tries to build structures and relations that enhance and use learning by doing, learning by using and learning by interacting. According to Oliveira and Torkomian (2009), learning by doing and learning by using arise from the accumulation of experience in production and from its incremental

innovations in products and processes. It is able to characterize informal/unstructured mechanisms that create internal innovative capabilities to businesses. Learning by interacting stems from the business' relations with knowledge sources external to it, such as competitors, suppliers, universities, customers etc., in this case, the LIA program.

It is assumed, therefore, that mental models play an active role in receiving, interpreting and constructing a meaning of experiments, working as an evaluation and selection tool of stimuli from the external environment and forming a mental image of the world which, in turn, defines behavior (Seri, 2001). Thus, according to Felipe (2008), the concepts of learning by doing, by using and by interacting can only be effective learning when, by changing the form of perception of reality by individuals, it results in concrete actions that increase their capacity to act on the environment, leading them to different practices.

Addressing the specific nature of the cognitive dimension raised by Pondé (2005) regarding the capabilities supporting the learning process, mental models affect the perception of reality in such a way that the individual learning will be determined by the influence levels of these individual mental models, which are in turn influenced by the resulting learning, given that the process is continuous and that mental models fit the new experiences.

To the extent that mental models significantly interfere with the view that individuals have of the world around it and how they share the meanings of its experiences, a greater emphasis on the cognitive aspects is important in innovation studies. This is because such interferences affect both the direction and the flow of innovations due to effects on the ability of interacting and cooperating, crucial for triggering learning processes (Felipe, 2008; Kim, 1993; Seri, 2003).

In the same line of thought, if the motivating principle for investments in innovation is to create differentiation and gain a competitive advantage, enabling an increased profitability (Tidd & John, 2015), small businesses have their most precious source on organizational learning. Organizational learning has even historical assumptions in its literature that are very close to the assumptions existing on the concepts of innovation, such as its positioning as a key to competitiveness and survival of organizations, its individual and collective aspects of the phenomena and its relation with the culture of organizations and its paradoxical dynamics (Souza, 2004).

Method

This research is as an applied and qualitative approach with descriptive purposes. Data collection was performed in the natural environment of the individuals under study, which allowed theoretical and interpretive analyses and assumptions about the cognitive factors of innovation in a group of businesses participating in the LIA program, leading to the design of the cognitive maps (Creswell, 2010, 2013; Flick, 2009).

Procedures for cognitive mapping (Laukkanen, 2012) and the use of content analysis (Bardin, 1977) were adopted as a research strategy seeking to understand the dynamics of innovation within the group context.

Study cases

In this study, a number of businesses was selected. They participated in the Local Innovation Agents program during the biennium 2012–2014 in the state of Rondônia, located in the northern region of Brazil, specifically in the western Brazilian Amazon. They were monitored by the authors of this study, who were extension agents of the program during the specified period. Six businesses were chosen as study cases among the 50 businesses served by the program.

The methodology of the LIA Program foresees the monitoring of the participating businesses by the Local Innovation Agent during a period of two years. The evaluation of the businesses evolution within this period is provided by an instrument called Innovation Radar. This instrument was developed by Sawhney, Wolcorr, and Arroniz (2006) and adapted by Bachmann and Destefani (2008) to apply the reality of Brazilian MSBs. It measures how innovative a company is in various aspects such as the provision of new products and/or services, the creation of conveniences and amenities in the relationship with customers, the modernization of processes and the efforts aiming the implantation of an innovation environment among the collaborators. The values attributed by the Innovation Radar for the degree of innovation of businesses ranges from 1 to 5.

The definition of study cases followed the criteria of intentional non-probabilistic critical case sampling. According to Flick (2009), it is an option for studies seeking to reveal a field of study from its extremities. It is recommended for groups characterized by a long developmental process, such as the LIA program, or for failure or success of an intervention. The option for few cases, giving priority to depth, is preponderant.

The entrepreneurs that had passed the three evaluations provided for in the Innovation Radar methodology of the LIA program were considered as a criterion for the choice of study cases. The first evaluation was before the beginning of activity monitoring (R0), the second evaluation was one year after the monitoring (R1) and the third evaluation was at the end of the activity cycle (R2).

Considering such criterion, six critical cases were selected for this research. The cases formed two groups (Group A and B). Group A consisted of three businesses (S01, S02 and S03) which achieved the greatest development in innovation levels: S01 raised its overall innovation index from 2.5 to 3.4, S02 raised the score from 2.6 to 3.7, and the company S03 raised its degree of innovation from 3.2 to 4.1.

Group B consisted of three businesses (S04, S05 and S06) which showed no significant innovation during the monitoring process. S04 raised its overall innovation index from 1.7 to 2.3, S05 remained stagnant at 2.2 during the period, and the company S06 raised its degree of innovation from 1.8 to 2.3.

In the profile of the entrepreneurs participating in the research, there was a predominance of females (5 out of 6) and an average age of over 40 years. Education varied between high school (3), undergraduate (1) and graduate (2). All businesses operated for more than 10 years in the market, ranging from 11 to 23 years. Therefore, they are already established enterprises, which guarantees some homogeneity among analysis units.

Table 1
Interview stages for the design of causal maps.

Stage	Descriptive
Interview 1	Non-directly data collection, extracting of "anchor" factors, key issues of area and knowledge of jargon.
Interview 2	Verification of collected factors, their classification and ordering according to level of importance.
Interview 3	Establishment of causal links between factors using successive discussions around a set of common "anchors".
Interview 4	Display of maps to the participant in order to validate them.

Adapted from Vergara (2010).

Method procedures

Causal maps developed from studies by Laukkanen (1994), known as Comparative Causal Mapping (CCM), were used in this study. Laukkanen's causal comparative mapping addresses especially the comparative analysis of the managers' belief structures on the effectiveness of their behavior, between individuals of the same group, between different groups of subjects, or between different moments over time. It was applied in this work to allow a better view of the cognitive differences between groups.

Data collection used documental data of the LIA program to establish the innovation levels of the participating businesses and their development during the monitoring by Local Agents of Innovation. It also served as a basis for the selection of case studies. Open interviews with managers were also conducted to identify basic concepts. After the interviews, semi-structured interviews were used to identify the causal links between related concepts following the steps shown in Table 1 as recommended by Laukkanen (2012).

The interview 1 was conducted in an open and unstructured way. There was only a primary questioning asking the interviewee to talk about innovation in the context of its business activity in order to capture its general understanding of the topic. As the interviewed constructed its views on the subject, new questions were introduced when needed to better clarify the topics under discussion, asking the respondent, for example, to better clarify its position on innovation as a routine "break" or to better detail what it considered a business innovation. Each interview took about an hour and a half. The interviews were later transcribed and sent electronically to the respondents, who validated the transcripts.

The data analysis process required the use of systematic procedures for the processing of collected data, assuming the content analysis technique as a method to analyze messages from interviews aiming to achieve an understanding of meanings regarding the proposed objectives (Bardin, 1977). This step had the technological support of the NVivo software, version 10, already validated by Bazeley and Jackson (2007) and Biazzin (2015) for the consolidation of interview transcripts.

The content captured from S01 to S06 during the interview 1, after the transcription was validated, was superimposed in such a way that allowed the visualization of natural language units (NLU) that were common to interviewees, i.e., raw data of original concepts (Laukkanen, 1994). The identified NLUs shared were used as a basis for the preparation of a standard term vocabulary (STV), which is the codification of shared NLUs into terms that allow comparisons in a content analysis study (Laukkanen & Wang, 2015). This is because the same NLU, being an individual expression, may contain different meanings among those surveyed. The interview 2 was then conducted to collect the shared NLU meanings and their correspondence with a STV (relevant factor) representative of all individuals surveyed.

"In principle, raw mapping data could be processed manually, at least if the data volume is small" (Laukkanen, 1994, p. 329). However, for the organization and the processing of the data collected, the CMAP3 (v. 3.1.2), a general-purpose database software, was adopted to facilitate the analysis and the interpretation of causal relations. It was developed by Laukkanen specifically for processing causal comparative mapping tasks. Despite its functionality, CMAP3 is limited as a data analysis tool because it does not have a built-in capability for the visual design of causal cognitive maps. This is why the IHMC CmapTools software (v. 1.6) was adopted for the graphic design of maps following the recommendation by Laukkanen and Wang (2015) and also by Biazzin (2015).

After identifying the factors from the interview 2, the data were entered into CMAP3 and transformed into associative matrices. In the interview 3, respondents were asked to assess the relations of influence of such factors, attributing to them the values (−3) strong negative influence, (−2) moderate negative influence, (−1) weak negative influence, (0) no influence, (+1) low positive influence, (+2) moderate positive influence, or (+3) strong positive influence. They used their association matrix. The design of cognitive maps was made by the construction of causal relations between factors, analyzing their intensity and the factor of influence.

Analysis and discussion of results

The design of the maps began with the determination of the most relevant cognitive factors of the methodological procedures described above from the interviews 1 and 2, with which it was intended:

1. In the Interview 1, to understand the global conceptual construction of respondents regarding innovation and its influencing factors, capturing such factors with a minimal interference from the researcher;
2. In the Interview 2, to validate the captured factors from the content analysis of the previous interview, classifying them according to degree of importance to the respondent.

During the interview 1, factors such as the slowdown of the economy, interest rates, dollar exchange rate, inflation and changes in the tax and legal environment (for example, the enforcement of an electronic invoice program and the approval of new government measures requiring updates and improvements in technology and equipment performance) were stressed by respondents as factors that influence the flow and the direc-

Table 2
Relevant factors identified and their shared meanings.

Relevant factors	Shared meanings
Need for survival	Need for staying in the market
Interpersonal relationship	Build relationships, interaction with interested parties (customers, suppliers etc.)
Concern for the client's well-being	Human attention; empathy; innovation to meet the needs of a customer
Requirements of the external environment	Environmental changes of the market (macro-institutional, legal)
Big picture	Systemic view; look and think the organization as a whole
Willingness to learn	Proactive in the pursuit of knowledge and learning
Implementation of new ideas, products and services	Search for novelties; get outside the pattern; take into account ideas suggested by interested parties
Involvement of people (team)	Attitude and collaborative disposition of employees in processes and innovative activities
Costs	Own finance; risk of investment in innovation
Opening of new markets	Geographic expansion; serve new customers; consolidation in the market
Knowledge and experience	Tacit knowledge about business processes; experience in a specific market
Growth and financial return	Profitability; return of innovation activities
Identifying and seizing opportunities	Search for opportunities; awareness of changing market needs
Commitment and responsibility	Maturity; commitment; acceptance of mistakes and failures in innovative processes

tion of innovative activities, since businesses ultimately direct efforts to implement processes that go beyond established legal requirements in an attempt to generate differentiation. Thereby, the legal, social and economic environments in which individuals and businesses are and the particularities of their field of expertise raise some concern.

In addition to such issues, it is worth mentioning that all respondents stressed the need to implement innovations as a way to keep up or catch up with competitors in a same line of business as a measure to avoid being at "the margin of the market".

The analysis of interview contents led to the identification of 14 NLUs that represent key concepts or relevant factors. They were validated, as the main topic for discussion, with each interviewee during the interview 2 in order to understand what each interviewee included in each factor and, consequently, to map the existence of a shared meaning between, as shown in Table 2.

The factors identified reflect the cognitive structure that influences the innovation activities of the group, highlighting important issues related to decision for innovation, taken into account in the management of innovation processes and implemented in innovative activities.

Among the relevant factors identified, the absence of factors related to investments in R&D and the presence of the factor "Costs" as representative of own financing and/or risk of investment, as well as the high number of *soft* factors corroborate the studies conducted by Hirsch-Kreinsen (2008) and Bachmann and Destefani (2008). According to these authors, innovation indicators related to small businesses should consider the dynamics of established relations for a collaboration between actors rather than the number of patents and the investment levels in research. Moreover, the shared meaning of the factor "Costs" related to innovation activities suggests the existence of hard mental models regarding the sources of public funding for innovation for small businesses, some of them already mentioned in this study, and frequently mentioned during the monitoring of the LIA program. The tendency to use own resources for innovation activities proved to be part of the group, which raised questions about the effectiveness of the model learning by interacting applied at this stage of the program.

The intangible dimension pointed out by Bachmann and Destefani (2008) and characterized by Reis et al. (2009) was also corroborated as a learning environment, specifically due to the presence of the *soft* factors "Interpersonal relationship", "Concern for the client's well-being", "Willingness to learn", "Involvement of people (team)" and "Commitment and responsibility".

However, the indication of the factor "Growth and financial return" as significant for profitability and return of innovation activities contradicts in part the concept adopted by Sebrae (2011), which takes the efforts toward innovation into account regardless of measurable results of increase in revenue, market shares and cost reduction, suggesting that, for the study group, difficulties in management and measurement of results, historically pointed to the MSB sector, would not interfere with the positive expected financial impact of the decision for innovation.

Causal relations

Aiming the identification of relations existing among the factors, respondents were asked to analyze the association matrix formed by the selected factors and identify the presence or absence of influence of one factor over another during the interview 3. If there is an influence, they were asked to assign the degree of intensity of such influence inside the already mentioned scale. A causal relations matrix was then design for each respondent.

The design of individual matrices for each participant allowed comparing the cognitive maps of the respondents by the distances between the causal maps of each individual. The formula for the calculation of distances is CD-Index = $ns/(ns + ni + nj)$, where ns equals the number of shared causal relations, and ni and nj represent the number of unique causal relations of that respondent. This index ranged from $0 \leq 1$, where 1 refers to a set of identical pairs between two respondents. Therefore, the closer to 1, the lower the distance. The calculation was performed by CMAP3. It is a relevant calculation because it assesses how much respondents agree or disagree about the possible causal relations among factors. The average distances among investigated cases are presented in Table 3.

These results confirm the actual existence of two distinct groups within the case studies, evidencing a greater degree of proximity between the belief structure of the relations established by the respondents in Group A (S01, S02 and S03). They showed the strongest evolution in the degree of global innovation

Table 3
Average distances among the individuals surveyed.

	Group A			Group B		
	S01	S02	S03	S04	S05	S06
S01	**1.000**	0.512	0.585	0.292	0.268	0.268
S02	0.512	**1.000**	0.709	0.290	0.222	0.419
S03	0.585	0.709	**1.000**	0.222	0.234	0.358
S04	0.292	0.290	0.222	**1.000**	0.172	0.517
S05	0.268	0.222	0.234	0.172	**1.000**	0.310
S06	0.268	0.419	0.358	0.517	0.310	**1.000**

after the LIA monitoring ended. There was, on the other hand, at a greater distance from the belief structure of the relations identified by respondents classified in the Group B (S04, S05 and S06) when compared with each other or with the individuals of Group A.

These data suggest that (i) some businesses participating in the LIA program were more receptive to the propositions of the agents, (ii) which resulted in the development of learning levels from the interaction experience (iii) and in the evolution of the global innovation level of such businesses by an action resulting from differentiated practices (iv) that contributed to develop shared meanings about the factors influencing innovation, generating an effective learning, according to the arguments provided by Felipe (2008).

While in others, it can be assumed that there was no thinking regarding action and appropriation of knowledge provided by the experience with the program, which is in line with Pimentel's arguments (2007). Since this distancing caused by the little sharing of beliefs is nonetheless an interference of cognitive aspects due to the interpretation that actors make of reality, their implications for innovation may be revealed by the weak performance of these businesses in the Innovation Radar. Apparently, they did not innovate due to ineptitude of interaction and cooperation.

Causal cognitive maps

From the associative matrix prepared by each respondent, 286 causal relations were generated, which would make the interpretation confusing and compromise their analysis in case a map with all relations was prepared. Therefore, we opted for the preparation of a combined causal map with fewer relations, contemplating a possible consensus among respondents about the most relevant factors and the causal relations established with them in accordance with what was suggested by other studies that used cognitive maps (Biazzin, 2015; Laukkanen, 1994; Laukkanen & Wang, 2015).

The only influence factors mentioned by all participants in any causal relation, therefore creating a consensus, were "Need for survival", with 40 established relations, and "Knowledge and experience", with 34 relations. Then, a cut was applied in CMAP3 considering only these two factors and relations, with a frequency greater than or equal to 4, established by them and with them. This was because such data was representative of over 60% of cases, reducing the number of causal relations to 16 and allowing the preparation of the map, which is shown in Fig. 2. The map evidences the relations between the factors and the intensities attributed to them within the cutoff limit.

Upon structuring the causal combined map (Laukkanen, 2012) among the six participating entrepreneurs, the average of causal relations between pairs of these factors was considered (Laukkanen, 1994). This average, automatically calculated by CMAP3, is obtained by the arithmetic mean between the weights assigned by each respondent to a specific causal relation. For example, the relation "Knowledge and experience" – "Interpersonal relationship" was selected by four respondents (S01, S03 and S05), where each assigned a weight to this relation (+2, +1, +2 and +2, respectively). Hence, the arithmetic mean of the assigned weight was +1.7 (Laukkanen & Wang, 2015).

Regarding the simplified causal map, except for the factors "Involvement of people (team)" and "Growth and financial return", which received influence only of factor "Knowledge and experience", and "Willingness to learn", which is influenced only by "Need for survival", all others are influenced simultaneously by both consensual factors, with only one unilateral influence without feedback. There is also the absence, in this simplified map, of the factors "Costs", "Requirements of the external environment", "Concern for the client's well-being" and "Commitment and responsibility".

The consensus only between "Need for survival" and "Knowledge and experience" indicate, respectively, the motivation and the management of innovation processes in the businesses studied. The strong positive influence of "Need for survival" on "Identifying and seizing opportunities" and "Implementation of new ideas, products and services" suggests a cognitive orientation of innovation activities due to necessity, an understanding synthesized by the entrepreneur S04 during the interviews: "Businesses only innovate when 'things get tough"'.

Moreover, the shared meaning of the factor "Knowledge and experience" as a tacit knowledge of and experience in market performance, as well as its influence on the other factors present in the map, suggests an approach to a learning environment as described by Reis et al. (2009) and its importance as a process of innovation management for small businesses, combining the expertise and the use of ideas from employees for the generation and implementation of innovations.

It is important to highlight the relations established and the influence attributed to "Need for survival" +1.6 "Willingness to learn" +3 "Knowledge and experience" +1.8 "Involvement of people (team)", illustrative for understanding innovation as a

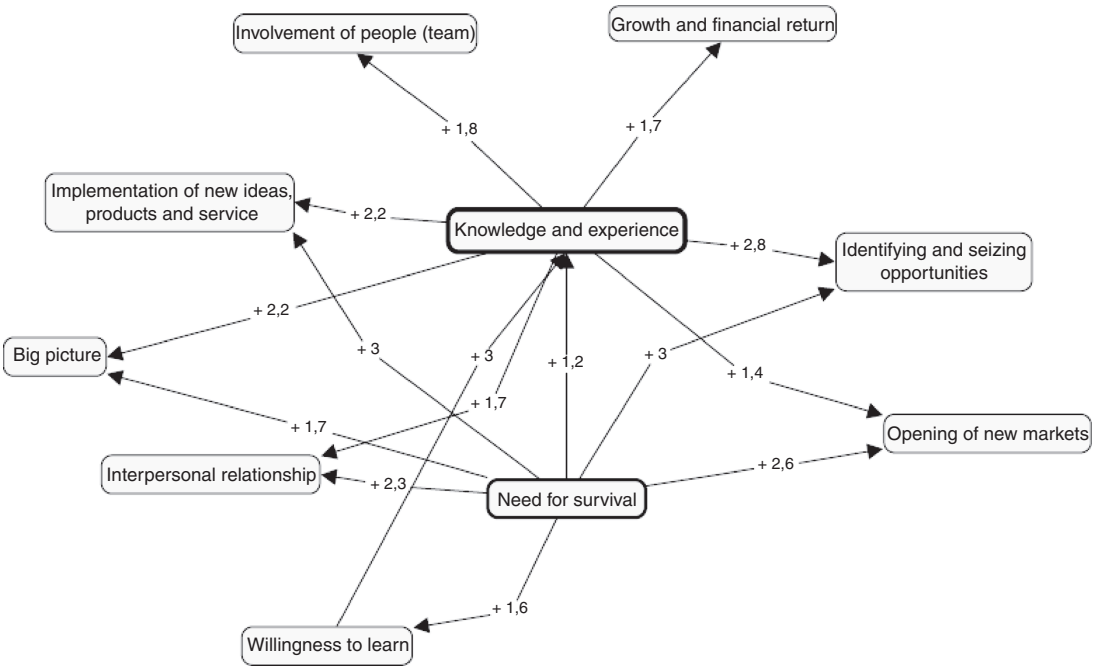

Fig. 2. Combined simplified causal map.

social construction based on learning, without, however, losing sight of the other factors interlinked to these and their contribution to the systemic view of the process.

Although the evaluation of relations leaves open the possibility of a variation from −3 to +3, in general, there were few cases with a negative evaluation in relations established between any of the factors. From this, it is understood that the study object – innovation – little allows constructing negative relations, as observed for other polemic topics, such as public policies, for example. Here, the relations appeared to be at most zero.

By analyzing the frequency of factors and causal relations constructed in each of the groups separately (Group A and Group B), as shown in Figs. 3 and 4, it was possible to observe a higher number of factors considered as consensus in each group. However, there were different factors between groups, emphasizing the previous discussion about the development of different learning levels among businesses participating in the study.

The consensual influence factors for the respondents S01, S02 and S03 were "Need for survival", "Knowledge and experience", "Involvement of people (team)", "Concern for the client's well-being", "Identifying and seizing opportunities" and "Implementation of new ideas, products and services". The relations established by these factors, mentioned unanimously by all members of the Group A, were "Concern for the client's well-being" <+1.8>. "Involvement of people (team)" and "Concern for the customer's well-being" <+2.6>. "Implementation of new ideas, products and services", suggesting an appropriation of concepts in which customer satisfaction became the core of innovative activities.

For the construction of the representative map of the Group A (Fig. 3), only the causal relations of the group with a frequency equal to or greater than 2 were considered because they represented concepts shared by most subjects. Thus, the map shows bilateral causal relations established solely by the group under study, involving "Concern for the customer's well-being" as an influence factor on "Implementation of new ideas, products and services" and "Involvement of people (team)", indicating a possible co-evolution between employee engagement and deployment of amenities for the benefit of the customers' well-being.

As for the Group B, the influence factors with consensus among respondents from S04, S05 and S06 were "Need for survival", "Knowledge and experience", "Willingness to learn" and "Costs". However, there are no causal relations between identified factors shared exclusively among all individuals belonging to this group, confirming the already mentioned distance among its members.

The illustrated map (Fig. 4) shows only the exclusive relations shared by at least two members of the group, which evidences a very limited number of relations. In addition, "Involvement of people (team)" as a factor influencing "Willingness to learn", and this influencing "Identifying and seizing opportunities" indicates that the manager is not very proactive when it comes to innovation, transferring to employees such responsibility. It may indicate a certain lack of direction of the entrepreneur of this group regarding the flow of innovation activities, contrary to what was observed for Group A.

Since the distancing found for Group B, influenced by the little sharing of beliefs, is nonetheless an interference from cognitive aspects due to the interpretation that actors make of reality, their implications for innovation may be evidenced by the weak performance of these businesses in the Innovation Radar. Apparently, they did not innovate due to an ineptitude of interaction and cooperation, crucial to trigger learning processes.

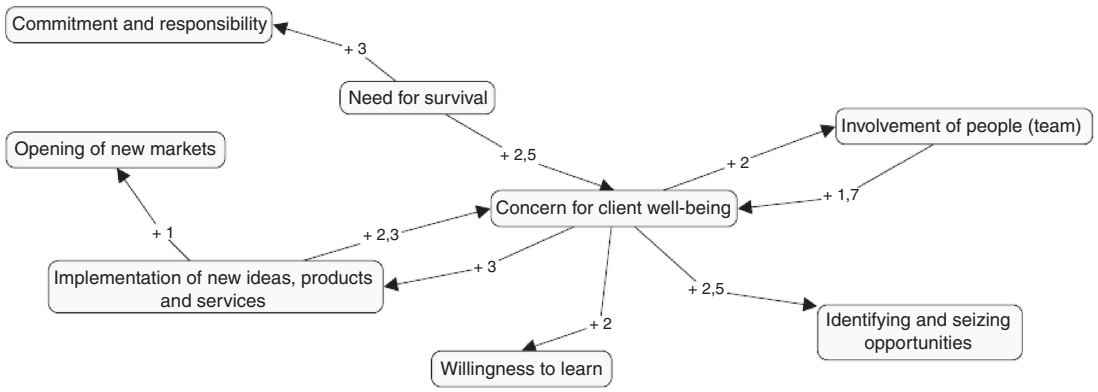

Fig. 3. Simplified causal map representative of the Group A.

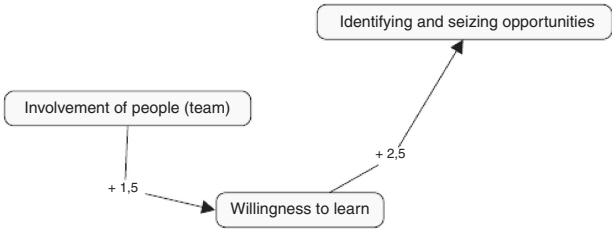

Fig. 4. Simplified causal map representative of the Group B.

Conclusions

Considering the objective of this study, i.e., to present the most relevant cognitive factors influencing the innovation activities of entrepreneurs of small businesses participating in the Local Innovation Agents (LIA) program in Rondônia (Amazon state, Brazil), the results indicated the existence of 14 relevant factors pointed out by the studied companies. There were two influence factors mentioned by all participants in some casual relationship, therefore, a consensus: "need for survival" and "knowledge and experience". These factors indicate, respectively, motivation and innovation process management of the companies studied.

Thus, answering the question formulated in the title of this study, the consensual factor "need for survival" allows assuming that small businesses seek to innovate by meeting and overcoming legal obligations established for the markets they operate and as a way to monitor or level with competitors of a same business field to avoid being "at the edge of the market". There is, therefore, an attitude little or non-proactive in relation to innovation. This helps us to understand the apparent inertia of this segment in face of government incentives, which was considered as a motivation in this study.

These results suggest the existence of a strong cultural conditioning of MSBs participating in the LIA program regarding paradigms related to difficulties in starting businesses and innovating in a country such as Brazil. Such difficulties could not be overcome during the monitoring cycle of LIA, raising questions about the efficacy of the learning by interaction model in this aspect of the program: would the monitoring performed by trained agents be sufficient to promote innovation in the small business sector? This experience has shown that it would not.

Because LIA is a national program, and considering the continental dimensions of Brazil and the great regional differences experienced by the companies, mainly the difficulty of access to broader markets and research and development centers by the Amazon region, it is essential to propose that the consolidation of an innovative culture in small businesses should take into account the regional differences and the cognitive aspects of the actors involved with the innovation process upon conceptualizing any public policy or incentive program. The individual's interpretation of the present institutional conjuncture will be determinant to its ability to interact and cooperate, which, as we have shown, is determinant to its innovation capacity.

This proposition is based on the different relations among the factors allowed identifying two existing groups within the program, differentiated primarily by willingness to innovate and by the development of learning levels that influenced innovation activities resulting from the interaction experience with the program agents.

On the same line of thought, the understanding of innovation in the context of the studied group tends to be much less technological and disruptive than organizational and incremental. It is mainly linked to adaptations of organizational structures for the improvement of its management processes, facilitating the deployment of amenities for customers. It can be defined primarily by a systematic search for information and knowledge of the market segment, involving *stakeholders* – suppliers, employees, managers, customers and the community – in significant business improvements or in the implementation of novelties, generating value (financial or otherwise) that makes them more competitive in the market.

As limitations to this study, geographical restrictions interfere with a broader analysis on the behavior of Brazilian MSBs in relation to innovation due to differences in realities and impossibility, at this point, of a comparative analysis of the reality of other regions.

Further studies can be conducted based on regional diversity, or increasing the number of companies researched. Further studies analyzing the learning levels in MSBs and the impacts on the diffusion of innovations influencing the distribution of income and local and regional development, besides further studies considering innovation levels in fields or specific organizational groups of small businesses, are needed.

Conflicts of interest

The authors declare no conflicts of interest.

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