



THREE PILLARS FOR KNOWLEDGE CREATION IN HACKERSPACE

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Abstract

Organizational knowledge is an essential element for all sorts of organizations once it increases and evolves organizational practices and processes. In this context, a 'space maker', also called hackerspace, is an important research object since knowledge arises from the relationship between members and activities executed in them. This article aims to explore how emotions impact the process of knowledge creation in hackerspaces. For this, qualitative research was conducted, in which interviews were conducted with members of a hackerspace. The outcomes indicate that social life, expertise, and hackerspace's infrastructure together shape three pillars which support knowledge creation inside hackerspaces. In this sense, our main contribution to the knowledge management area is that organizations could closely look at those three pillars to be more innovative and competitive.

Keywords: Knowledge Management; Emotions. Social life; Expertise; Infrastructure.

TRÊS PILARES PARA A CRIAÇÃO DE CONHECIMENTO EM HACKERSPACE

Resumo

O conhecimento organizacional é um elemento essencial para todas as organizações. Tal conhecimento aumenta e evolui na medida em que as organizações estruturam suas práticas e processos. Nesse contexto, um "espaço maker", em particular o hackerspace, é um importante objeto de pesquisa, uma vez que o conhecimento surge das relações entre os membros e atividades que são realizadas. Nesse sentido, o objetivo deste artigo é identificar como as emoções impactam no processo de criação do conhecimento em hackerspaces. Para tanto, foi conduzida uma pesquisa qualitativa, na qual foram conduzidas entrevistas com membros de um hackerspace. Os resultados apontam que o convívio social,

a expertise e a infraestrutura são os três pilares que sustentam a criação do conhecimento em ambientes do tipo hackerspaces. Nesse sentido, a nossa contribuição é que as organizações olhem esses pilares para que sejam mais inovadoras e competitivas no mercado em que atuam.

Palavra-chave: Gestão do Conhecimento; Emoções; Convívio Social; Expertise; Infraestrutura.

1 INTRODUÇÃO

Knowledge is one of the most relevant resources for organizations achieving innovation and sustainability in their products and services. Knowledge is defined by Davenport, Eccles, and Prusak (1997) as the combination of information and experience, considering its context, interpretation, and reflection. Therefore, knowledge creation comes from an earlier, complex process, which involves the transformation of information.

Since knowledge is an important asset within organizations, it helps to leverage competitive advantage in the active market. According to Grant (1996), to achieve such competitiveness, organizations need continuous improvement and innovation in their production processes. However, for such growth and innovation, knowledge is the foundation which allows such activities. Thus, it is vital that knowledge processes and practices aid to structure knowledge through Knowledge Management (KM). Although knowledge presents itself as an economic and fundamental resource for organizations (Drucker 2017) - understanding this knowledge expands the organization's economic dimension - generating a social good impacting directly in the modern society context (Yu, Xiao, & Bo, 2018; Mari, 2006; Young, 2011). These dimensions of knowledge can be associated and combined with emotions.

Human factors, in particular emotions, is a relevant research topic once it might impact knowledge. Tenório, Ferrarezi, Alaranta, and Fulk (2017) present a literature review about human emotions and their influence on knowledge sharing, for example. In turn, Vidotti, Pinto, Bortolozzi, Tatto, and Tenório (2016) demonstrate the influence of positive emotions in organizations. Becker et al. (2019) present an exploratory bibliographic study on the influence of emotions on the creation of knowledge within the software industry. In short, recent research seeks to identify and understand the impacts of human emotions in the process of creating and maintaining knowledge, both at individual and organizational levels. However, there are not many studies that investigate the influence of emotions in the creation of knowledge in non-profit environments focused on producing technologies.

Therefore, this paper investigates how individual human emotions impact the knowledge creation process within a non-profit organization whose aim is 'innovation for innovation,' namely, a hackerspace. Hackerspaces are considered community and cooperative laboratories to spread learning, especially in the area of innovation, generating likely results for the society in which they operate (LUNDBJERG; VON DER OSTEN; KANTO; BJØRN, 2017; BECKER; TENORIO; SARTORI, 2021).

Technologies, when thought critically, extrapolating their mercantilist functions, can influence the creation of innovations that provide benefits to society as a whole (MATTOS, 2014). This critical thinking, regarding ways of working and creating technologies, has driven the emergence of organizations that seek to promote technological knowledge, such as maker spaces and, in particular, hackerspaces, in an environment that is different from the traditional business technology laboratory (BECKER; TENÓRIO, 2018).

Considering this scenario and the importance of hackerspaces for the knowledge society, it is necessary to understand how knowledge is created in these spaces to solve real problems, which are often innovative proposals using technology as a means and the impact of

relationships to this knowledge creation. Thus, based on the findings of the research carried out by Becker and Tenório (2018), the way in which knowledge is created in these organizations can direct other organizations towards a virtuous and sustainable cycle of innovative solutions to society's problems.

In these environments, where learning is pervasive, the belief is that people should discover and gain knowledge rather than passively receiving it as in traditional institutions (PAPERT, 2020). As community spaces, young people can benefit from many opportunities to experience an engaging, joyful and pedagogically appropriate form of learning. As examples of maker culture environments, the following can be mentioned: hackerspaces, makerspaces, TechShops and FabLabs (GIANNAKOS; DIVITINI; IVERSEN, 2017). These spaces belong to the Maker culture and focus on the global community for innovation. Thus, its activities involve designers, engineers from different areas, artists, programmers and scholars from other areas that stimulate the capacity of future inventors, innovators and people who want to change and improve the world where they live (GIANNAKOS; DIVITINI; IVERSEN, 2017). This article analyzes only one of these environments, namely the hackerspace.

This work is organized into six sections. Following this introduction, the next section presents a review of the literature in which it considers the themes of knowledge creation and human emotions. The third section presents the research methodology. The fourth section presents the results and discussions of this research. Finally, the fifth section presents the conclusion, followed by bibliographic references.

2 KNOWLEDGE CREATION AND EMOTIONS

Knowledge Management (KM) processes go through people. The capacity of individuals and organizations to generate, organize, and modify information and knowledge on economic assets is an essential aspect of KM (Nonaka, Von Krogh & Voelpel, 2006). Knowledge is the internal state of human beings resulting from the entry and processing of information during the learning and execution of tasks (Takeuchi & Nonaka, 2009). Organizational knowledge offers the ability to create knowledge and disseminate it within the organization, which incorporates it into products and services (Takeuchi & Nonaka, 1997).

Knowledge management appropriates the concept of knowledge as an input to manage, discover, map, classify, capture, distribute, create, multiply and retain knowledge efficiently, effectively and effectively (DRUCKER, 2017).

Davenport e Prusak (1997) argues that knowledge is the mixture of experiences, values, information and insights that lead to the incorporation of new experiences and information by individuals. This knowledge originates in the person and can be applied in different ways and in different contexts. Similarly, Wiig (1994) presents knowledge as practical understandings, i.e., experiences that people have that enable them to function intelligently in an organizational and social context. Knowledge, therefore, is inherent to the person and can be explained in different ways, inside and outside organizations. In this sense, knowledge is present in all activities carried out by people and organizations (WIIG, 1997; BECKER, TENORIO & SARTORI, 2021).

Therefore, after the many concepts presented, it appears that knowledge is in people and knowledge management can contribute in several ways to make it more accessible for organizations and for other people. Carletto (2006) adds that Knowledge Management is a continuous learning process within organizations and occurs from the synergy of data, information combined with people's ability to use them to carry out and to improve their activities.

From this context, KM is a way of systematically set up for organizational knowledge, being seen as a set of varied activities with the function of stimulating the creation, capture, organization, diffusion, use, and exploitation of available organizational knowledge (Campos, 2014; Pinto et al. 2017). For this to occur, individuals must interfere in the process. Such individuals, in turn, are endowed with emotions that influence this dynamic.

Since emotions are inherent from the individuals, those emotions might impact and influence the knowledge creation process once the knowledge is information processed by the empirically cognitive (Takeuchi & Nonaka, 1997). Thus, knowledge creation might be influenced by different factors from one individual to another, especially when linked to emotional factors. In this context, the motivations of individuals can be considered fundamental in the process of knowledge creation. Thus, motivation is a relevant element in the use of resources to achieve an objective (Balancho & Coelho, 2001), representing an internal factor that initiates, directs and integrates a person's behavior (Frese & Gielnik, 2014). In this way, motivation is directly linked to people's emotions, as they present themselves in all situations, both personal and professional.

Scherer (2009) highlights the emotions arise from emergent and dynamic processes based on subjective evaluation through emotions such as satisfaction, pride, hope, relief, anxiety, fear, hopelessness, shame and boredom (Ahmed, van der Werf, Kuyper, & Minnaert, 2013; Mega, Ronconi, & Debeni, 2014; Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011). Therefore, emotions influence individuals and their behaviors once they are processed and change according to subjective assessments, which can positively or negatively influence an individual's mental performance (Rueda, Santos, & Lima, 2012; Siqueira & Gomide Jr., 2004). Weiner (1986) integrated emotions into his motivational model, based on causal attributions. The interdependence between emotions and people's professional performance has been proven by many authors, including Druskat, Vanessa, and Gerald (2013), Lam and Kirby (2002), O'Boyle Jr., Humphrey, Pollack, Hawver, and Story (2011), Shooshtarian, Ameli, and Amini Lari (2013), Sy, Tram, and O'Hara (2006), and Wong and Law (2002).

In a successful event, the person experiences satisfaction and happiness, and when failure or negative results occur, they tend to experience frustration, sadness, and unhappiness. As stated by Fredrickson (2001) and Bandura (2006), such associations are explained by the fact that, when activated, positive emotions tend to expand the repertoire of actions derived from thoughts, i.e., they expand the mind and, thus, adversities are fought with intent. Neurologists' remarks that positive affection elevates states of dopamine, a neurotransmitter that produces positive effects on various aspects of cognitive processing (Ashby, Isen, & Turken, 1999; Fredrickson, 2001).

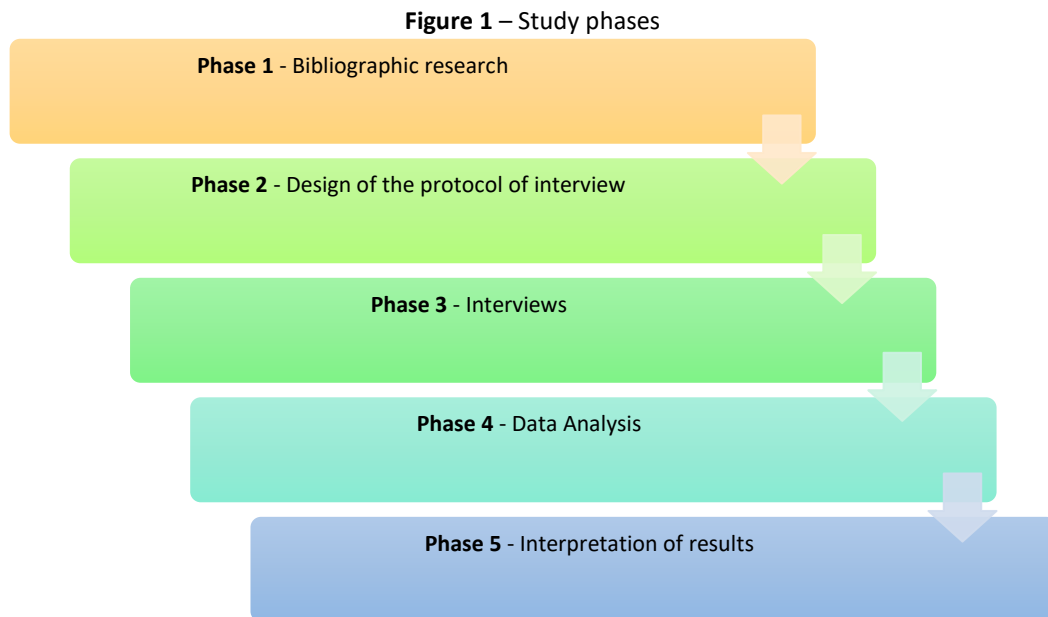
Emotions change according to the situations or feelings in which people are susceptible daily (Fredrickson, 1998). Therefore, the context ends up influencing the results, since the practice of knowledge creation requires a physical context, such as an environment, to create new knowledge (Nonaka, Toyama, & Konno, 2000). Thus, when knowledge is created in this environment, it raises an expectation that the human being has technical skills and skills aimed at self-knowledge in a way that makes it possible for a favorable climate for personal and collective growth. Still for these authors, relationships and group building are more significant than technology for the creation of knowledge. Von Krogh et al. (2001) states that technologies are important, however, alone they are insufficient to transform information into knowledge.

Therefore, it is important to emphasize that there are several theories about emotions and their influence on people. Such theories are divided into psycho-evolutionary, cognitive or

appreciation and social approaches (Miguel, 2015). All these theories suggest that emotions influence people's professional lives and, in particular, knowledge creation.

3 RESEARCH METHOD

This article describes explanatory research adopting a qualitative approach to its nature and using procedures of bibliography and field research (Plano Clark & Creswell, 2015). The study has five phases, as shown in Figure 1.



Source: Prepared by the authors

In phase 1, identification of publications related to the topic of this research, carried out in the following databases: CAPES Journal Portal, Emerald Insight, and Science Direct. For this purpose, the following keywords were used in Portuguese: 'gestão do conhecimento' and 'emoções cognitivas'; 'emoções cognitivas' and 'hackerspace'; 'hackerspace' and 'conhecimento'; 'hackerspace' and 'gestão do conhecimento'. Also, the following keywords were searched in English: 'knowledge management' and 'cognitive emotions'; 'cognitive emotions' and 'hackerspace'; 'hackerspace' and 'knowledge'; 'hackerspace' and 'knowledge management'.

In phase 2, a semi-structured interview protocol addressed to understand details regarding knowledge, cognitive emotions, and KM processes and practices within a hackerspace. Table 1 shows the protocol of the interview.

Frame 1 – Semi-structured protocol of interview

| Question | Objective |
|--|---|
| 1. Name, age, undergraduate course / semester, University / Faculty? | Socio Economic profile. Identify the hackerspace participant area and the multidisciplinary environment. |
| 2. How long have you been attending the hackerspace? | Identify how long the interviewee has been part of the hackerspace community. |
| 3. What are your expectations attending the hackerspace? | Identify the participant's expectations regarding the hackerspace (e.g. friendships, professional, education). |
| 4. How did you hear about the hackerspace and why did you decide to participate? | Identify how the member learned about the hackerspace and what led him to participate. |
| 5. What is your motivation for attending the hackerspace? How was the process of joining the hackerspace? Can you sum up in some emotions how it feels to be participating in the hackerspace? | Identify the engagement and feelings that lead the member to remain in the hackerspace. |
| 6. Are you already doing an activity or working on any project in the hackerspace? If so, which one? How do you feel about these projects/activities? | Identify which activities the participant performs. |
| 7. Have you applied/used or use in your current project here in the hackerspace knowledge/result of other project/actions developed in the hackerspace? If so, how did you obtain information about this previous project? How did it feel to have access to and use this information? | Investigate whether new members use or have had access to knowledge created within the hackerspace and how that knowledge was registered. |
| 8. How do you feel about improving an idea? How do you feel when you see your idea being improved? | Identify how the new member feels when improving an idea of others and how it feels when another member improves his idea. |
| 9. Have you ever innovated any product created here (in the hackerspace)? | Investigate the interaction between member and created products. |
| 10. Have you helped another participant in a project that has generated new insights? How did you feel about that? Which project in the hackerspace? | Identify the influence of collaborative participation in the hackerspace for the creation of knowledge. |
| 11. As a member, did you propose a project for the other members of the hackerspace? How was the proposal received? How did you feel about that? | Verify whether the member interacts with the other proposed projects and how he feels about it. |
| 12. As a member, did you propose a project for the other members of the hackerspace? How was the proposal received? How did you feel about that? | Investigate whether the member interacts with the other proposed projects and how he feels about it. |

| | |
|---|---|
| 13. Do you believe that hackerspace projects create new knowledge for you? Could you give me at least two examples of this situation? | Validate the creation of new knowledge through the hackerspace. |
| 14. Do you feel that your knowledge is useful for the hackerspace? [Yes/no], why? | Validate the feeling of integration in the new member to the hackerspace. |

Source: Prepared by the authors

Phase 3 of this research comprised running the interviews. Thus, interviews were carried out with six invited participants through a message on the Telegram communication tool. The interviews were conducted individually and in person during the period from 01 to 03 May 2019, under the presence of the authors, with an average duration of 15 minutes. Although the researchers followed the script of interviews, the participants were able to express themselves to add their observations or suggestions on the topic investigated. This expression by the interviewee complies with Minayo (2013) and Plano Clark & Creswell, (2015) guidance that the semi-structured interview allows a dialogue, exchange, and sharing of perception and knowledge by the participants.

The object of study was a hackerspace located in the city of Maringá, Paraná, founded in 2013 with twenty-two active members. The projects developed in space are varied, ranging from robots to Styrofoam models. Survey participants were selected for convenience according to the members' availability schedule. Thus, all interviewed members were male and aged between 21 and 22 years. Also, all of them were electrical engineering students, three of them from the seventh semester, and one of them from the third semester.

Frame 2 – Profile of respondents

| Cod. | Interviewee | Time in <i>hackerspace</i> | Gender | Age | Profession |
|------|---------------------------------|-------------------------------|-----------|-----|------------|
| 1 | Electrical Engineering Student | 4 years | Masculine | 22 | Student |
| 2 | Electrical Engineering Student | 6 years | Masculine | 25 | Student |
| 3 | Graduated in Science Computing | 5 years | Masculine | 27 | Graduated |
| 4 | Security Student at information | 6 months | Masculine | 18 | Student |
| 5 | Science Computing Student | 3 years | Masculine | 23 | Student |
| 6 | Science Computing Student | 5 years | Masculine | 25 | Student |

Source: Prepared by the authors (2019)

In the fourth phase, the analysis of the interview responses was carried out. Thus, in the interviews, content analysis, suggested by Mendes and Miskulin (2017), was used, where the most recurrent words were found, using the KH Coder tool, and later placed on MS-Excel for the analysis of discourse, and then the results were interpreted by the researcher during the phase 5, the last one.

The content analysis served to highlight the interviewees' conceptions, allowing the participants' answers to be the focus of the main study. This type of analysis of the collected data causes the interpretation and association of information coming from different subjects,

but which, in the case of this study, are linked to practices for the creation of knowledge in a specific space.

Through the analysis developed, categories were recognized concerning the creation of knowledge such as: a) relationship network, with subcategories regarding friendship ties and motivational processes; b) action process regarding the interactive and collaborative environment. The research results are discussed in the next section.

4 RESULTS AND DISCUSSION

To investigate how knowledge creation takes place within hackerspaces, aspects were analyzed regarding the motivation of people to look for a shared environment that allows accomplishing projects of common interest. Was started investigating how each of the interviewed started on the hackerspace and how they got there. Was discovered that each interviewed member has a particular interest in the environment instead of they got there invited by a friend or colleague, i.e., a person from their relationship network.

Thus, one of the interviewees reported that he got to know about the hackerspace through a colleague and that he found the proposal interesting and was motivated to start projects there.

The other five respondents told us that they were taken to the hackerspace because of class tasks. Then, some colleagues who were already members invited them to participate and accomplish their homework there. Was identified, in this case, that the relationship is crucial to the engagement of the members within the hackerspace. So, one of the engines which drive the engagement of these people is personal relationships (friendship) among them. Therefore, the network of relationships motivates people to participate in the same space and share knowledge in it.

The literature states that friendship (or collegiality), makes people feel motivated to participate in activities of common interest, which leads to the creation of new knowledge. In this process, there is the influence of human emotions (Menges, & Kilduff, 2015), since these relationships build groups and a favorable scenario for the creation of knowledge. Therefore, these relationships strengthen trust and, consequently, enhance the production of global results for an organization.

Von Krogh, Ichijo, and Nonaka (2001) affirmed that the technologies are essential. However, they are not humanly integrated, and they do not develop. It was identified that many members participated in the hackerspace motivated by specific needs, customarily related to job assignments, since six members are students. In short, students are seeking alternative environments as a way of obtaining help from more experienced members and, also, to be able to use a specific tool that, many times, is not available at their universities. Was observed in two quotes below:

[...] I came to make use of the hackerspace guys' tools and experience. Many tools that we need the university does not provide or those tools are hard to use [...] (Interviewee 2).

Another member pointed out the possibility of having access to the hackerspace and using the tools available there brings great satisfaction and motivation to work in projects:

“[...] working here you feel very satisfied and motivated to create, to make tech things work [...]” (Interviewee 4).

“[my] motivation was to have new knowledge” (Interviewee 6).

Similarly, the respondent 5 adds:

“[...] o obtain knowledge from more experienced people who may add in the future” (Interviewee 5).

Fredrickson (1998) highlights that satisfaction and motivation are positive emotions that awaken the ability to expand people’s momentary repertoires and create lasting personal resources (e.g., physical, intellectual, social, and psychological). Thus, it was observed that emotions of satisfaction and motivation did influence the process of creating knowledge within a hackerspace. Thus, it is observable that satisfaction goes beyond the physical environment of the hackerspace, but also the existing reception, as reported below by Interviewees 3 and 4.

I came to ask for help because I needed to make the plates for my work. They accepted and helped. At first, it was just to do my university work and complete my course, but now I always want to be here [...] I had several difficulties at the beginning, but the guys helped me a lot to find solutions to the problems that arose in my project. This is really cool; it really motivates me to create things. (Interviewee 4).

[...] The hackerspace is a lovely environment, and the guys who come here are very good. Here they try to embrace everything that comes. It is a bureaucratic environment; here, we have a lot of autonomy. I'm feeling very satisfied with that. (Interviewee 3).

It was also observed that the interaction among the hackerspace's members in a dynamic environment, and conducive to the exchange of knowledge, is a factor that leads its members to create knowledge. Thus, people's positive emotions contribute to cognitive processes and these processes can be associated with external factors such as local and dynamics exercised by third parties (Suchman, 1987).

Therefore, knowledge does not exist only in the cognition of individuals but is beyond it, and the practice of creating new knowledge requires an environment (Nonaka, Toyama & Konno, 2000). In this sense, people's expertise and social interaction contribute to the members' process of creating knowledge, as shown by the reports of the interviewed members, below.

[...] here come a lot of good guys [technically speaking], you feel very motivated to want to create [...]. (Interviewee 4).

The social interaction that people have and the way they help each other's projects was part of the motivation [...]The main emotion was the fascination. (Interviewee 1).

Was observed that the hackerspace is an environment in which the expertise of people and the social interaction among the participants are the engines of motivation for the creation of new knowledge since people socialize their knowledge. This is aligned with Nonaka, Toyama, and Konno (2000) who report that the environment provides insights for the production of new knowledge. Thus, creating or inventing new things, and even sharing what has been learned, creates a virtuous cycle of sharing, as noticed in the quotes below.

Here everyone exchanges information concerning tools [sharing knowledge], do you know? One is helping the other to grow and acquire knowledge. I had access [to knowledge] through conversations

with the guys. There is always someone here to help, give me some tips on how to use a particular tool and what to do with it or within the project. So, I noticed that my work has improved a lot. (Interviewee 2).

The guys [hackerspace members] help so much each other. They really share what they know, that is really cool. In my project, I have used a lot of stuffs. So, I have learned a lot here [...] Thus, accessing this knowledge of our group is an excellent opportunity to improve my tech skills [...]. (Interviewee 3).

The [founding member of the hackerspace] is always around and helps people to think differently and find a solution to their problems. They teach how to use the tools. That's really good. (Interviewee 4).

Being an interdisciplinary environment, the hackerspace brings together people from different courses and areas of knowledge, which makes the environment even more promising for sharing knowledge and its application in different areas. The space is for social interaction, and there are people from different areas of study and work, which encourages the creation of interdisciplinary knowledge:

"[...] So, for example, the guy who is in Computing, as is my case [...] you see it in class, and when you go out and talk to your friends it's about that, and when you talk at work it's about computing in general. And now when you come here, you increase this range of content, because you are with people from other courses, other faculties, who have had other experiences. So that's basically it, for me I think that's the most interesting part." (Interviewee 2)

"I realized that there was much more to it than university. There was this issue of you can produce your stuff, based on interdisciplinarity, especially in the hackerspace. I thought that in electrical I was going to learn only electrical stuff. That's why I saw that there was a lot of computing in hackerspace. I learned chemistry stuff, I learned things that I think I could never learn any other way than in hackerspace." (Interviewee 6)

In fact, it was observed that an interactive and collaborative environment - in which its members are willing to help each other – that triggers the motivation for the development of projects and, consequently, the creation of new knowledge. It happens once positive emotions emerge from a dynamic process based on a subjective evaluation Scherer (2009). This subjective evaluation considers the environment and individuals as influencing the cognitive process. Furthermore, this subjective evaluation brings emotions such as satisfaction, pride, hope, and relief (Ahmed, van der Werf, Kuyper, & Minnaert, 2013; Mega, Ronconi, & Debeni, 2014; Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011).

In this context, positive emotions such as motivation, fascination, and satisfaction increase the desire to learn more, create new things, and share what has been learned. These emotions, when associated with personal relationships among members generates values, as shown in Interviewee 2's statements: in his fourth statement that mentions the exchange of tools, making an analogy to sharing both tools and knowledge, and how much it impacted the creation of knowledge related to the member's project in the hackerspace. Similarly, Interviewee 4 mentions that in the hackerspace, everyone is willing to help each other, and this motivates members to invent and create new knowledge and also makes them want to continue participating in the organization, creating new knowledge and sharing the acquired knowledge. Also, they have an interest in bringing other friends to participate by creating a virtuous cycle of knowledge creation.

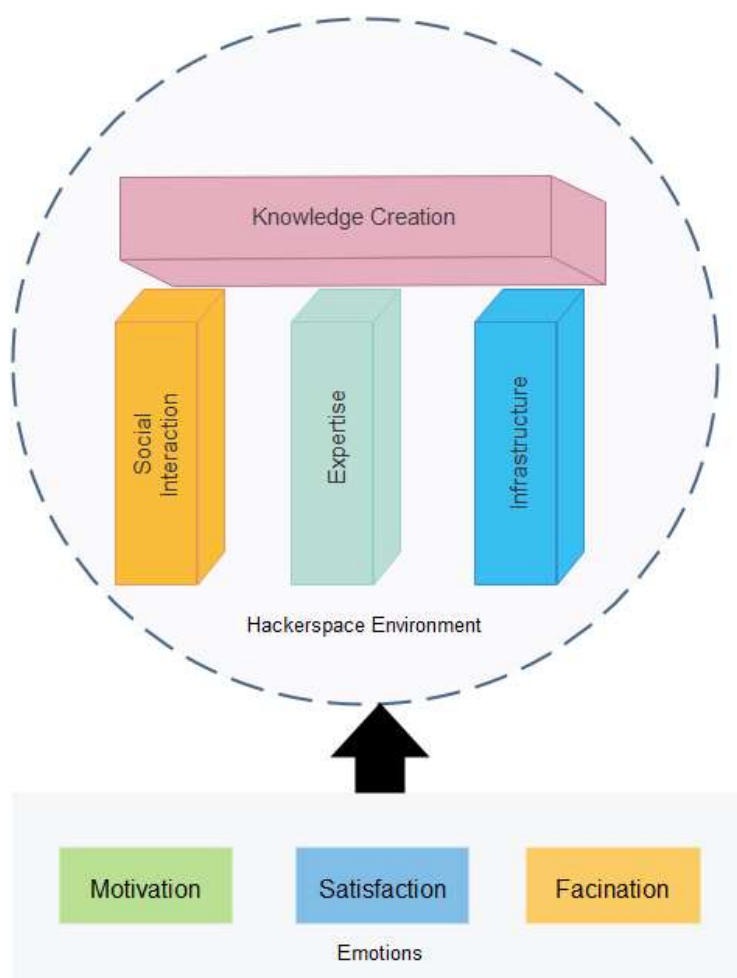
In this sense, our findings are aligned with the KM perspective, which suggests that the environment and interaction influence the creation of knowledge leading to a path to generate

innovation (Picinin, Kovaleski & Raimundi, 2010; Strauhs et al., 2012). Therefore, KM, practices such as the creation, sharing, and application of knowledge (Dalkir, 2013) could provide conditions for the organizations to create new knowledge that can be incorporated and disseminated, enabling the generation of new products, services and innovative systems (Strauhs et al., 2012; Takeuchi & Nonaka, 1997).

Therefore, it was observed in our findings that within hackerspaces, knowledge creation considers the environment through three pillars, namely: Social Interaction, Expertise, and Infrastructure, as shown in Figure 2.

Finally, our main contribution in this paper is twofold. First, environments such as hackerspaces (or maker spaces) are exciting places to accomplish research once those environments are rich in knowledge and engagement by their members. And, second, organizations could learn more regarding the emotions of hackerspaces' members to try to improve the engagement of their employees.

Figure 2- Three pillars of knowledge creation in the hackerspace



Source: Prepared by the authors

5 CONCLUSION

This article aimed to identify how emotions impact the knowledge creation process in a hackerspace. The analysis of the interviews allowed us to understand that hackerspace users

narrated that the relationship network structured on friendship bonds and motivational processes reflects on motivation, engagement, and positive emotions. As for the process of acting in the proposal of the interactive and collaborative environment, this study illustrated that the hackerspace participants consider the infrastructure of the place and its proposal.

Thus, from the discourse analysis it was highlighted that the identified emotions found three pillars that support the creation of knowledge in a hackerspace-type environment. The first pillar refers to the 'social interaction' promoted by the interaction of hackerspace members, favoring and providing opportunities for the exchange of experience and \ the creation of new knowledge in such an environment. The second pillar concerns 'expertise', which is a motivating factor for the creation of new knowledge within a hackerspace since less experienced members learn from more experienced ones. The third and final pillar refers to the infrastructure offered by the hackerspace that stimulates and drives knowledge through tools and equipment, often created by its members. Thus, the contribution of this research is to demonstrate the three pillars, identified here, so that other organizations can rethink their modus operandi concerning innovation and sustainability in the market in which they operate, inspired by the pillars for the creation of knowledge of hackerspace-type environments.

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