# Open innovation driven by hackathon: A social innovation case

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## ABSTRACT

Worldwide, the digital transformation has had a rapid impact on all types of organizations, whether industrial, commercial or service providers, including non-governmental organizations. In this context, organizations struggle to sustain their innovation efforts. A hackathon is one of the tools that can help the search for innovation in alignment with the principles of open innovation. It consists of an event in which participants collaborate intensively for a short period of time on projects focused on solving problems and generating ideas. These events encourage creative experimentation and can be challenge-oriented, including awards. Although the hackathon phenomenon emerged as an effective approach to foster innovation with digital technologies, it has gone beyond the field of computing and currently reaches other sectors that promote such events as a way to find solutions to real problems. This article presents a bibliographic study on hackathon and open innovation topics, and results from a field research carried out through the application of a hackathon for students in the business management course of a technology college in a third sector organization located in the city of São Carlos/SP, which had been suffering constant challenges to remain sustainable. The results show that this type of event can be an intense generator of ideas for problem solving in all, seven projects were created by a group of 47 students participating in a 32-hour marathon which had a positive impact on the institution.

## 1.    INTRODUCTION

The first industrial revolution started in England in the 18th century. The invention of machines marked the transition from the artisanal production paradigm to the series production paradigm, changing the social and commercial structure of the time with the emergence of industry. This change revolutionized not only the economy, with increased productivity, but also people's daily lives. Since then, industry has undergone changes in both its production and management systems. These transformations are not restricted to the industrial sector: they encompass all types of organizations, including those in the third sector.

Over the past three decades, the development of information technology (IT) and its integration into production processes has brought numerous benefits to organizations. The industrial sector has an eminent need for the development and application of innovative and disruptive technologies to adapt the current form of production in a scenario marked by competitiveness, an increasing demand for personalized products, greater complexity, and reduced costs. This new model is being discussed worldwide under the umbrella of industry 4.0 (HERMANN et.al., 2016). Furthermore, as noted by Porter (1989), with the opening of markets that occurred in the 90s, organizations had to resort to increasingly differentiated strategies lower costs to remain competitive.

The creation of competitive advantage is related to a company's ability to manage its resources in order to better position itself before their competitors (ITO, HAYASHI, GIMENEZ AND FENSTERSEIFER 2012).

As in industry, developing countries like Brazil increasingly need support from third sector organizations to cover for situations in which the government should act, but for some reason it

does not (LONGARAY, 2018). These organizations have the function of helping society prosper and evolve, aiming solely at the growth of the community without the prospect of profit. According to Tachizawa (2014), the construction of strategic partnerships, in the third sector, seeks social justice, which provides social transformation when combined with the aspiration for change. Within this context, such organizations are designed to use the financial resources collected through social actions to maintain their functioning, which is often precarious due to the lack of management support, and are unable to sustain the full development of their activities.

The manager is responsible for establishing the strategies he will focus on in order to achieve high performance, since it is necessary to be aware of changes and turn obstacles into opportunities.

In the various sectors of the economy, these perspectives are currently achieved through innovation, which basically consists in the successful creation of something new, so that global competitiveness is today defined by the ability that organizations have to innovate (Porter, 1989).

The development of new ideas has been the most effective way for organizations to differentiate themselves from each other, as they transform such ideas into actions that generate solutions for better results (REED, STORRUD-BARNES, & JESSUP, 2012).

Thus, the organizations' ability to innovate, given by practices and attitudes, by the ability to learn and adapt and by strategic and organizational skills, becomes a key factor in the relationship with the environment (TETHER, 2003).

One of the ways adopted by modern organizations has been the establishment of partnerships with other organizations through the expansion of relationships. This type of cooperation, known as open innovation, has allowed the reduction of research and development

costs as it and consists in the use of external knowledge to add value to the business (CHERSBROUGH, 2012).

Unlike closed innovation, in which the organization does not share information with the external market and its research and development department is used, solely within the organization, with an end in itself, open innovation, according to Chersbrough (2012b) is "a paradigm that assumes organizations can and must make use of both external and internal ideas, as well as external and internal ways to reach the market, as they search for technology advancements. This can bring advantages in several aspects, as the organization expands its strategic vision, receives new talents, and prevents flaws in its organizational culture".

Thus, one of the basic principles of open innovation is the recognition that not all components of innovation originate from internal sources and that knowledge from external sources can make an organization's efforts broader and more effective. (WITZEMAN et al., 2006). Interactions among organizations play an important role and can spark interest for innovation that arises from partnerships, alliances, cooperation, joint ventures and networked organizations. One of the ways for organizations to interact is through the promotion of hackathon events, that is, an event in which participants collaborate intensively, for a short period, in projects focused on solving problems and generating ideas. Tandon et al. (2017) point out that hackathon refers to an event in which small groups of participants work intensively for a short period to generate and implement an idea in real situations. Hackathons encourage experimentation for creativity and can be challenge-oriented, including awards. Although the hackathon phenomenon emerged as an effective form of encouraging innovation with digital technologies, it eventually grew beyond the area of computing and reached other sectors that promote these events as a way to find solutions to real problems.

Thus, the objective of this work was to carry out a bibliographic review on the theme and, subsequently, to present results of a case study that consisted in the application of a hackathon for business management students, to search for solutions for the main challenges faced by a third sector institution located in the city of São Carlos, São Paulo State, Brazil.

## 2. LITERATURE REVIEW

### 2.1. OPEN INNOVATION

The difficulty of companies to remain innovative by using only their internal resources was noted by Chesbrough (2003), who pointed out that a variety of solutions are constantly emerging in different places in the research and development (R&D) departments of these companies. Thus, Open Innovation, a term coined by this author, assumes that useful knowledge and innovation is widely distributed, and organizations should explore the sources of external knowledge as a fundamental issue in the innovation process.

Chesbrough (2003) defines open innovation as the innovation process in which industries and organizations promote open ideas, thoughts, processes, and research, in order to improve the development of their products, provide better services for their customers, increase efficiency and reinforce the added value. It is the combination of internal and external ideas, as well as internal and external paths for the market, in order to advance the development of new technologies in products and processes.

Open innovation, as a more democratic type of platform, allows for the exploitation of sustainable ICT solutions across industries as a larger pool of resources are included in the development process (SOLTANI, 2014).

More and more, there has been a transition from a closed model of research, where only the research and development (R&D) department develops solutions, to an open and interactive model of seeking solutions by organizations that want to remain competitive (CHESBROUGH, 2003).

One of the basic principles of open innovation is the recognition that not all components for an innovation originate from internal sources in the organization and that knowledge from external sources can make internal efforts broader or more effective (WITZEMAN et al., 2006). Interactions among organizations play a relevant role and spark interest for innovation that arises from partnerships, alliances, joint ventures and networked organizations.

Figure 1 exemplifies the difference between closed or traditional innovation and open innovation.

Figure 1: Open innovation and closed innovation
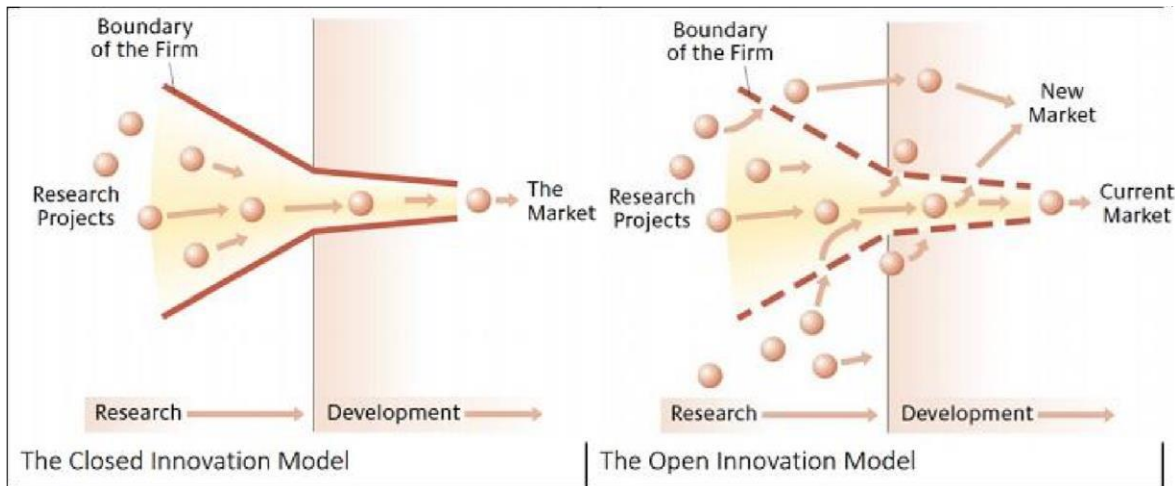


Source: Chesbrough (2003)

Open innovation is related to the establishment of cooperation agreements with other organizations. Gradually, organizations are forced to join with other organizations or educational

institutions, in order to develop or absorb new technologies, develop new products, or simply keep attune with the latest technological developments (VANHAVERBEKE, 2008).

Among the various tools used by open innovation, such as the: search for external technologies (in universities, research laboratories), the acquisition of intellectual property, crowdsourcing, crowdfunding and competitions, tournaments such as hackathons are powerful tools for Open Innovation to be applied quickly and efficiently, bringing benefits to organizations.

### *2.2. HACKATHON*

For Briscoe (2007), hackathons originally arose so that computer programmers and others involved in software development could collaborate intensively on software projects over a short period of time.

Nowadays, these events cover a variety of fields to encourage experimentation and creativity, and can be oriented to challenges. In this sense, the name hackathon derives from other nomenclatures such as ideathon, hackday, hacktec, hackfest, each with its own specificity, but all sharing the purpose of being a marathon in which the participants generate solutions to the problems presented.

For Alba et al. (2016), highly prestigious institutions in the world, such as NASA and the World Bank, carry out hackathons as a way of involving citizens in solving problems. Hackathons can be performed as a face-to-face event, remotely or in a mixed way, over the internet. NASA has achieved excellent results in its annual hackathons because they take place remotely and allow a large number of people to participate.

For Komssi et al. (2015), a hackathon starts with the ideation and formation of teams, which can be organized in person or online, prior to the event or even upon its start. Collecting and developing ideas in advance will provide more time for coding. The organization of the teams can take place by choosing the participant or whoever is responsible for organizing the hackathon, based on the ideas or technologies that interest them.

Grijpink (2015), in an article by global consultancy McKinsey titled "Demystifying the Hackathon", claims that the best hackathons share some characteristics:

- <u>Customer focus:</u> a hackathon focuses on a single customer journey, which supports a clear business target, such as speed, revenue growth or an innovative customer experience.

- <u>Multifunctionality:</u> hackathons bring people from different areas of the business together to seek different ways of working on a problem. Participants may include specialists in user experience, customer service, sales and graphic design, as well as programmers. This diversity leads to collective thinking and deeper and faster collaboration.

- <u>Start from scratch:</u> Successful hackathons challenge participants to come up with a method to solve a consumer need. There is an "intentional irreverence" in this disruption: assuming that everything can and must be challenged.

- <u>Focus on results:</u> sessions that start with ideas and end with a functional prototype that people can see and touch, such as clickable apps or a 3D printed product. Other possibilities are developing paths for production and implementation of solutions, such as a roadmap of capabilities to bring the final version to the market, in a predetermined time.

•     <u>Iteration and continuity:</u> when the team agrees to a basic experience, the developers work on a model that the group refines and reevaluates in continuous cycles, until the new process or application meets the desired criteria.

Figure 2 illustrates the main stages of a hackathon event which, after all the event's organization and dissemination period, begins with the presentation of a challenge to the participants, usually linked to real problems of an organization or society. The organizers start with team building dynamics, a step that can be skipped when teams are formed in advance. During the event, the teams are oriented by experienced people, called Mentors, and receive help in formatting, validating the idea and creating the prototype. In this process, several Design Thinking techniques can be used, such as the Business Model Canvas, empathy map, interviews, prototyping tools, among others. At the end of the event, the teams present a pitch of their project to a panel of judges, in a quick presentation of no more than five minutes. The best projects are awarded prizes in recognition for their efforts.

*Figure 2: Steps of a hackathon*
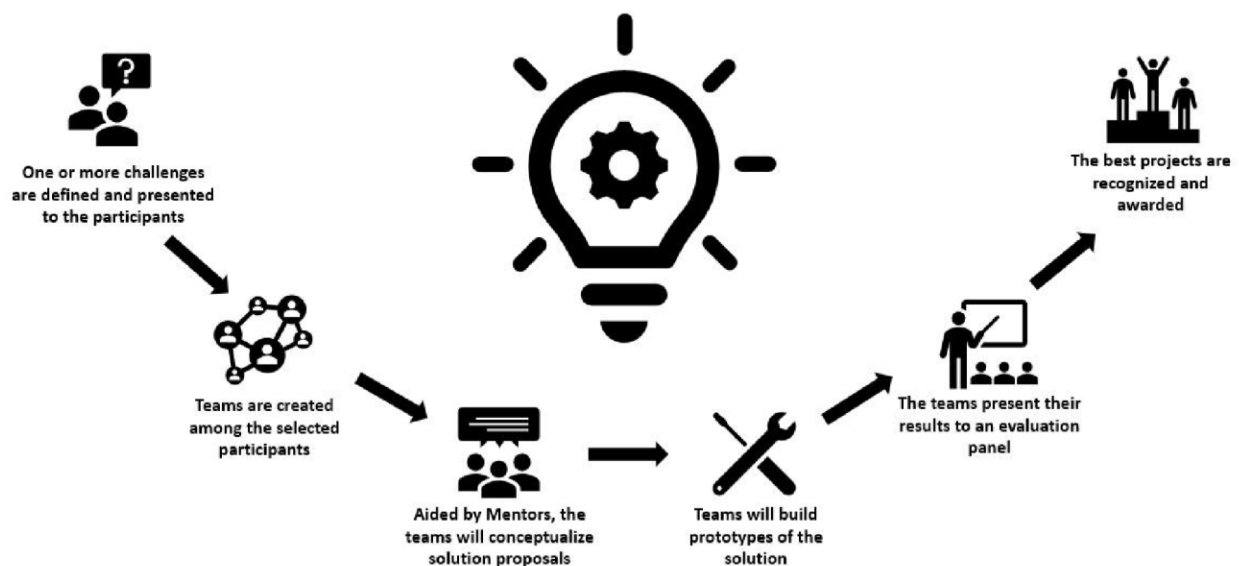
Source: The authors

## 3. METHODS

The research procedure used in this specific work started with a Bibliographic Review, to the state of the art, to give rise to the knowledge domain already available and establish a Basic Theoretical Reference on the theme. The review was accompanied by a case study carried out through the application of a hackathon developed by professors and students of a College of Technology, to search for solutions to problems presented by a third sector organization.

A random, exploratory and descriptive research was developed, with a qualitative focus. The qualitative approach is suitable when the researcher seeks to deeply explore a complex social phenomenon, not through numbers, but through direct involvement with the individuals surveyed and their personal experiences, capturing these experiences in the language of the individuals themselves (SAMPIERI et al, 2006).

## 4. CASE STUDY: THE APPLICATION OF A HACKATON AS AN OPEN INNOVATION TOOL IN A THIRD SECTOR ORGANIZATION

The participating entity is a non-profit organization founded in October 2017, in the Cidade Aracy district of the city of São Carlos, SP. Their Project serves approximately one hundred children and adolescents, aged between five and sixteen years. The project began with a small group of children at the program coordinator's home, which soon grew into a home of their own.

Currently, the entire program runs with the support of volunteers who have the mission of providing the socially disadvantaged public with all the tools necessary for the discovery of talents, intelligence and potential, being a reference for the formation of individuals prepared and

committed to personal, family, and social development. In this sense, participants are provided with classes on theater, reading, sports activities, English, tutoring and meals. In addition, training is given in garden management, dressmaking and sewing, among others.

Like most non-governmental institutions, there is a shortage of human and financial resources, which the NGO constantly relieves by promoting fundraising actions such as clothing bazaars, pizza sales, receiving donations of groceries and clothing, albeit informally and without precise control.

In a meeting with professors and students, the NGO described their challenges and asked for help, since the participating college is a public institution that teaches courses in the business management area. Teachers linked to INOVA CPS projects from RJI (Full-Time Scheme) and AAPs disciplines (autonomous project activities) from Fatec/ CEETEPS suggested that a hackathon event be held to generate ideas for the challenges described by the NGO.

To carry out the event, the NGO presented the various difficulties and challenges that should be addressed by the hackathon participants, among which were the following: their vegetable garden was in a precarious situation and in a small space; the school library had a limited collection and no control over the loans; the monthly bazaar had low adherence due to insufficient publicity; the impossibility of receiving donations and financial resources from society; the inexistence of a computer lab; lack of visibility of the NGO's works through a website and social networks. In addition, different social problems were identified in the institution participants, mainly students with learning disabilities, parents' absence, relationship problems, lack of adequate food, among others.

For the hackathon, Fatec conceived a 32-hour event called Ideathon, which took place inside São Carlos Iguatemi Shopping Mall in August 2019. The event counted on the support of a local technology company and of the mall itself, which paid for the infrastructure through donations of T-shirts and gifts and the loan of the venue and sound equipment free of charge. Because it is a place of intense circulation, the institutions were exposed to more than four thousand people who visited the mall over the weekend.

The event involved more than two hundred and fifty people, with 47 students participating in the teams, eight mentors (managers, teachers, and businessmen), 4 referees, and visitors and observers.

During the opening session, the NGO director presented the program and the challenges to the participants. Soon thereafter, seven teams were formed and began the ideation stage of the projects. The volunteer mentors assisted the teams in modeling the projects using the Business

Model Canvas tool and Design Thinking techniques.

In total, seven projects were developed to generate solutions for the NGO, and the corresponding teams presented the pitch of their ideas at the end of the event. The presentations took place inside the mall's movie theater and were evaluated by a panel of four people who selected the three best projects.

The projects presented were:

1) <u>Godfather Donation:</u> Creation of a financial donation platform linked to the institution's website and with payment checkouts.

2) <u>Robot-Kids:</u> Didactic and pedagogical project for teaching robotics to NGO students using Arduino boards.

3) <u>Planting hope:</u> Project related to the institution's vegetable garden, in which students learn the art of growing different species by creating plant seedlings for selling to interested parties.

4) <u>ColorArt:</u> 24/7 online platform for cataloging clothes received as donations, cleaning and display of items for sale (permanently active, not just on bazaar days).

5) <u>Rare Jewelry:</u> project to restructure the school library as a way to enable students to take books home, inducing the responsibility of taking care of the material and integrating the student with parents.

6) <u>Friends of the Heart:</u> Through this project, students can develop theater plays based on the NGO's day-to-day activities and present them in partner companies and other places in the community, as a way to publicize the work performed at the institution.

7) <u>Heart Integration:</u> A project that opens the doors of the institution so that the children's families can learn crafts such as dressmaking and sewing, cooking and others.

It is worth mentioning that during Ideathon a businessman from the city, touched by the event, donated five computers to the Institution lab. In addition, the College was able to strengthen ties with the community and had its name associated to a successful event visible to more than forty thousand visitors who went to the mall. Indirectly, it is expected that the event helped strengthen and disseminate the entrepreneurial culture over the entire academic community.

After the event, the seven projects resulting from this Ideathon were implemented at the institution through the College's Enactus Team.

## 5. CONCLUSIONS

Bearing in mind that the digital transformation that affects today's society has generated profound impacts in all economic sectors, whether in industry, services or NGOs, organizations have been looking for ways to avoid obsolescence by innovating in their processes. Thus, one of the key perceptions of recent times concerns the way in which organizations have regarded innovation.

In face of the great challenge of not being able to innovate with only the people and internal knowledge, organizations can consider the concept of open innovation and seek beyond institutional limits in order to solve their problems. As presented in this work, there are different tools within the concept of open innovation that can be used to search for organizational solutions in an open system. Among these tools, the hackathon appears as a worthy strategic option for all involved, as it is carried out over a short period of time, allows for teamwork in the development of ideas related to real situations, and generates feasible solutions to the problems presented. In addition, it is financially viable, as it does not require large investments.

Fatec / CEETEPS, in order to apply the tool and analyze its results, developed the event Ideathon, which enabled the effective participation of people with different profiles. Students, employees, managers, teachers, entrepreneurs and enthusiasts joined oriented activities with the common goal of helping an organization in need of solutions. In addition to solving the problems of the organization, this project also contributed to a mutual learning environment where students and other participants were offered a learning opportunity based on real problems, within the scope of today's technology colleges, that is, the use of active methodologies and real experiences. Moreover, this event created opportunities for the formation of new partnerships and cooperation with companies, as it allowed a significant College/Market integration through the visibility given by advertising in the mall and in the media.

Events of this nature may include different types of organizations. Just as the NGO was the subject of this study, future events may be held in favor of startups, private companies or government offices, regardless of the market segment and size.

Future perspectives include the application of a hackathon in a company of the service sector.

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