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Titre: Title:	Analysis of Open Innovation Events Outcomes and their Impact on the Ecosystem
Auteur: Author:	Basile Thisse
Date:	2021
Type:	Mémoire ou thèse / Dissertation or Thesis
Référence: Citation:	Thisse, B. (2021). Analysis of Open Innovation Events Outcomes and their Impact on the Ecosystem [Master's thesis, Polytechnique Montréal]. PolyPublie. https://publications.polymtl.ca/9127/

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URL de PolyPublie: PolyPublie URL:	https://publications.polymtl.ca/9127/
Directeurs de recherche: Advisors:	Fabiano Armellini
Programme: Program:	Maîtrise recherche en génie industriel

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POLYTECHNIQUE MONTRÉAL

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Analysis of Open Innovation Events Outcomes and their Impact on the Ecosystem

BASILE THISSE

Département de mathématiques et de génie industriel

Mémoire présenté en vue de l'obtention du diplôme de *Maîtrise ès sciences appliquées*

Génie industriel

Août 2021

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Ce mémoire intitulé :

Analysis of Open Innovation Events Outcomes and their Impact on the Ecosystem

présenté par **Basile THISSE**

en vue de l'obtention du diplôme de *Maîtrise ès sciences appliquées*

a été dûment accepté par le jury d'examen constitué de :

Nathalie de MARCELLS-WARIN, présidente
Fabiano ARMELLINI, membre et directeur de recherche
Sophie VEILLEUX, membre

DEDICATION

To Jean-Marie,

ACKNOWLEDGEMENTS

I would like to thank my supervisor, Fabiano Armellini, for giving me the opportunity to work on this project and helping me in this journey. His advice and time have contributed a lot to the success of this thesis. I would also like to thank Carl St-Pierre for his help on the quantitative analysis and for sharing his knowledge and skills with me.

Finally, I would like to thank all the people who took part in the survey and helped me develop the survey.

RÉSUMÉ

Ce mémoire répond à la nécessité de mieux comprendre les événements d'innovation ouverte pour attirer davantage de financements et créer de meilleurs événements en donnant à leurs organisateurs des recommandations pratiques basées sur des analyses empiriques. Les événements d'innovation ouverte sont d'une durée déterminée et sont organisés pour stimuler l'innovation, les partenariats et la résolution de problèmes. Par exemple, lors d'un hackathon, les participants ont un temps limité pour résoudre un problème et l'équipe qui a la meilleure solution l'emporte. Les promoteurs manquent souvent d'arguments pour prouver l'importance de leurs événements à de nouveaux partenaires et investisseurs. Il y a un manque d'instruments validés empiriquement pour mesurer les résultats des événements et leur impact sur l'écosystème d'innovation. Les relations entre le design et les résultats des événements d'innovation ouverte ainsi que leur impact sur l'écosystème d'innovation sont encore peu étudiées. Ce mémoire vise à participer à combler ces lacunes en analysant les relations entre le design des événements d'innovation ouverte, leurs résultats et leur impact sur l'écosystème d'innovation. Des données empiriques primaires ont été collectées auprès de 122 participants par le biais d'une enquête en français et en anglais. Des analyses statistiques quantitatives ont été effectuées pour valider l'instrument de mesure et mettre en évidence les relations entre le design des événements d'innovation ouverte, leurs résultats et l'écosystème d'innovation. De nouveaux construits ont été validés pour mesurer la poursuite du projet, les opportunités de carrière pour les participants, la satisfaction des participants et leur intention de participer à nouveau. Deux construits ont été assemblés pour mesurer l'impact sur l'écosystème d'innovation en mesurant la création de valeur pour les individus et les organisations. Il a été démontré que certains éléments de design ont un impact sur les résultats des événements, avec le rôle modérateur de la motivation intrinsèque des participants. En particulier, l'impact positif de la présence de mentors sur la continuation du projet, la satisfaction du participant et leur intention de participer à nouveau a été démontré. Les résultats soulignent également l'impact positif des événements d'innovation ouverte sur l'écosystème d'innovation. La satisfaction des participants a un impact positif sur l'écosystème d'innovation et les opportunités de carrière suite aux événements créent de la valeur pour les individus de l'écosystème. Cette thèse ajoute à la littérature sur les événements d'innovation ouverte en donnant des arguments factuels pour organiser de meilleurs événements avec plus d'impact.

ABSTRACT

This thesis follows the need to have a better understanding of open innovation events to attract more funding and create better events by giving their organizers practical recommendations based on empirical analyses. Open innovation events are time-limited events organized to stimulate innovation, partnerships and problem solving. For example, during a hackathon, participants have a limited amount of time to solve a problem and the team with the best solution wins a reward. Promoters often lack arguments to prove the importance of their events to new partners and investors. There is a lack of empirically validated instruments to measure the events outcomes and impact on the innovation ecosystem. The relations between open innovation events design and outcomes and their impact on the innovation ecosystem are still under-studied. This thesis aims to participate to close these gaps by analyzing the relations between open innovation events design, outcomes and their impact on the innovation ecosystem. Primary empirical data have been collected from 122 solvers through a French and English survey. Quantitative statistical analyses have been performed to validate the instrument of measure and highlight the relations between open innovation events design, outcomes and the innovation ecosystem. New constructs have been validated to measure the project continuation, the career opportunities for solvers, the solvers' satisfaction and intention to participate again. Two constructs have been assembled to measure the impact on the innovation ecosystem by measuring the value creation for individuals and organizations. Some design elements have been shown to have an impact on the events outcomes with the moderating role of the solvers' intrinsic motivation. In particular, the positive impact of the presence of mentors on project continuation, participant satisfaction, and their intention to participate again was demonstrated. The results also highlight the positive impact of open innovation events on the innovation ecosystem. The satisfaction of participants has a positive impact on the innovation ecosystem and the career opportunities following the events create value for the individuals in the ecosystem. This thesis adds to the open innovation events literature by giving factual arguments to organize better events with more impact.

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LIST OF SYMBOLS AND ABBREVIATIONS

OI Open Innovation

PCA Principal component analysis

SDT Self-determination theory

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CHAPTER 1 INTRODUCTION

Since its beginnings, the concept of open innovation has evolved a great amount. From its first definition by Chesbrough (2003) as a firm-centric paradigm used by companies to lower their innovation cost by leveraging outside resources, the concept is now widely used and recognized outside the boundaries of the firm. Open innovation has become a key factor in innovation ecosystems to produce more value for a larger number of actors, innovation does not need to be a zero-sum game anymore. Open innovation becomes more and more important for businesses and ecosystems with the evolution of societies towards shared economies where organizations will have to maintain their rate of innovation by combining internal resources with external opportunities and ideas coming through different channels (Malas et al., 2018; West & Gallagher, 2006; Yun & Liu, 2019).

One particular form of open innovation is used more and more to create a maximum amount of value for a maximum amount of people and in a small amount of time: open innovation events. In fact, open innovation often takes place during these special events organized to foster innovation and value creation. These events stimulate innovation and are organized to solve precise problems (Chowdhury, 2012), usually organized as innovation competitions or crowdsourcing to win a prize from a company or sponsor (Zheng et al., 2011). Open innovation events can act as catalysts for the creation of value that can transform an entire industry (Cohendet et al., 2020). It is thus vital to study open innovation events and their impact on the innovation ecosystem (West & Wood, 2008).

These open innovation events are an efficient way to find solutions to complex problems but the factors leading to their success are still unclear. More specifically, there is a lack of instruments developed to measure their outcomes and how these outcomes are achieved. Their impact on the innovation ecosystems is also under-studied and remains unclear. Even though these events are predicted to hold a key role in the future, their organizers are still missing empirical research to help them improve their events and increase their impact. This research aims to add to the open innovation events literature by giving new instruments to measure open innovation outcomes and their impact on their innovation ecosystem as well as clarifying how to achieve these outcomes and improve their impact on the ecosystem. This thesis is a first step to giving empirical results to improve the understanding of these events and justify their importance. In summary, the first goal of the research is the validation of new constructs to measure the outcomes of the open innovation

events and the second goal is to understand how the design of these events impacts their outcome and the innovation ecosystem. These two goals are linked because validated constructs for the outcomes are needed to find relations between events' design, outcomes and the innovation ecosystem.

To fill the gaps mentioned above, a research project was established by 4POINT0[1] to develop and test new indicators of open innovation event outcomes, develop factual arguments for specialists and promoters to diffuse open innovation events, and generate recommendations about best practices of open innovation events organization and promotion.

This thesis is part of the 4POINT0 project and specifically aims to provide quantitative results on open innovation events outcomes and their impact on the innovation ecosystem as well as studying the influence of the events design and the participants' motivation. This thesis follows the qualitative work of Gagné et al. (2021) on open innovation events outcomes that inspired part of the literature review and the conceptual model in this thesis.

This thesis is aligned with 4POINT0 that aims to develop open innovation events outcomes to improve these events and help attract more funding to make better events with more impact on the innovation ecosystem. The 4POINT0 team members participated in the research to share their knowledge and experience in open innovation events. The researcher of this thesis (Basile Thisse) has participated and won the Coopérathon 2019, an open innovation competition in Montréal. Since open innovation events are still under-studied some of the decisions in this thesis result from the researcher's experience and his discussions with the 4POINT0 team and other open innovation experts when the literature was missing. From this experience, Basile suggested that the design of open innovation events can play an important role in the creation of new start-up that have the potential to impact the entire innovation ecosystem. His Coopérathon experience also made him realize how important intrinsic motivation was in order to perform during and after the event.

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[1] "4POINT0 intends to answer the following question: How can Canada benefit from its strength in science and technology, build dynamic innovation ecosystems to keep abreast of these disruptive technologies and hence contribute to innovation and strong economic development? The team brings together professors from Canadian, American, French, Italian and English universities, in addition to partners from different backgrounds: governments, private companies, innovation intermediaries, associations, etc. Team members study innovative collaborative ecosystems through multidisciplinary and cross-sectoral approaches." (from the 4POINT0 website)

This research is the result of primary data collected from 122 open innovation event participants through an online survey distributed in Canada and worldwide. The data collected have been processed and analyzed using Stata 16 to validate the hypothesis and present new propositions. These empirical results contribute to the open innovation event literature by giving new constructs to measure the events outcomes and impact on the innovation ecosystem, finding new relations between events design, participant motivation and outcomes and between outcomes and open innovation ecosystem.

This thesis starts with a literature review (chapter 2), followed by the methodology used to create the survey, collect the data and verify the different variables and instruments (chapter 3). Chapter 4 presents and discusses the results, followed by the conclusion (chapter 5), which summarizes the results, presents the research limitations and the recommendations for future research.

CHAPTER 2 LITERATURE REVIEW

This section presents the definition and the state of the literature for the different concepts needed in this research. It is organized in five sections: open innovation events, open innovation events outcomes, open innovation events design, solver motivation and a summary at the end.

2.1 Open innovation events

2.1.1 Definition and evolution of open innovation and open innovation events

Open innovation has been introduced by Chesbrough (2003), p. 35 as "a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology". Since 2003, this concept has had an important impact on innovation practices. At its early stage, OI was primarily a firm-centric concept adopted to use external competencies and ideas to improve firms' internal innovation mechanisms, technology and, capabilities (Piller & West, 2014). This new way of innovation is used by many companies and offers a great number of advantages such as reducing R&D costs (Lampel et al., 2012), capitalizing on innovation ecosystems (Chesbrough, 2006), enabling firms to reach "economic and sustainability innovation performances goal" (Rauter et al., 2019, p. 226), eliminating technological bottlenecks for firms and whole ecosystems to stimulate innovation (Masucci et al., 2020) and boosting the performance and diversity of entire networks of innovation (Wang et al., 2012).

The definition of open innovation has been redefined as "a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model" (Chesbrough & Bogers, 2014, p. 29). This new definition supports that open innovation is not exclusively firm-centric anymore and that it also impacts consumers, industries and, societies. Open innovation has since become a wider concept developed beyond the scope of firms analyzed at "inter-organizational level, intra-organizational level, extra-organizational and at industrial, regional and society level" (Bogers et al., 2017, p. 10).

Open innovation becomes more and more important for businesses and ecosystems with the evolution of societies towards shared economies where organizations will have to maintain their

rate of innovation by combining internal resources with external opportunities and ideas coming through different channels (Malas et al., 2018; West & Gallagher, 2006; Yun & Liu, 2019). It is easier said than done and organizations have to find original ways to use open innovation to maximize its benefits. Open innovation activities mainly take four different forms: "crowdsourcing", "coopetition", "science-based", and "network" (Lee et al., 2019).

To summarize, open innovation started as a firm-centric paradigm supposed to foster innovation and reduce cost but it has evolved as a larger concept used at small and large scale that is supposed to play an essential role for the next ten years in developed economies (Bogers et al., 2018). However research has struggled to catch up with its evolution and there is still a lack of research on its performance effects (Gagné et al., 2021) and outside the firm environment (Santos, 2015). Recent research highlighted that both the study and the practice of open innovation are still at an early stage (Yuan & Gasco-Hernandez, 2019) and that research needs to expand on the organizational and systematic level (Castellaci et al., 2005).

One way of doing open innovation has gained popularity in practice and research in the last years: open innovation events (OI events) (Wang et al., 2012). These events stimulate innovation and are organized to solve precise problems (Chowdhury, 2012), usually organized as innovation competitions or crowdsourcing to win a prize from a company or sponsor (Zheng et al., 2011). This new form of open innovation is pretty different than the firm-centric way and is a perfect way to gather different actors from different industries (Korpeoglu & Cho, 2018). Open innovation events are thus a great way for organizations to find new ideas to innovate at a smaller cost and have a better understanding of their customers' and partners' needs (Marais & Schutte, 2009).

Open innovation events take different forms and have different goals depending on the complexity and the skills required for the problem that the promoters or the industry want to solve (Gagné et al., 2021). Hackathons and crowdsourcing activities are the two main forms that open innovation events take. Hackathons are a worldwide phenomenon used by hundreds of organizations in a wide range of contexts from civic and urban hackathons to educational and corporate hackathons (Pe-Than et al., 2020). Crowdsourcing comes from the contraction of Crowd and Outsourcing and means "outsourcing to the crowd". Instead of solving problems internally, firms can seek solutions from an outside crowd usually by an open call online (Schenk & Guittard, 2009). It is an effective method, mostly used online, where firms publish problems to the public who can select them and

submit a solution (Jeppesen & Lakhani, 2010). Beyond hackathons and crowdsourcing, open innovation events can take a lot of various forms such as citizen science conferences, virtual design competitions, or consortiums. Science conferences and consortiums differ from the other open innovation event because they focus more on creating new partnerships and exchanging knowledge where open innovation events such as crowdsourcing and hackathons focus more on solving problems and creating value through new solutions and companies.

There are five types of actors in open innovation events: sponsors, promoters, intermediaries, solvers, and seekers (Gagné et al., 2021). The role of sponsors is mainly to fund the event but they can get involved in their organization (Cummings et al., 2013; Lampel et al., 2012). Promoters organize the event and are in charge of creating and maintaining cooperation in ecosystems by fostering relationships between stakeholders (Cummings et al., 2013). Intermediaries are organizations responsible for creating an innovation ecosystem to create and stimulate collaboration between stakeholders (Cohendet et al., 2020). Solvers solve seekers' problems by collaborating with other stakeholders (Enkel & Bader, 2016; Hossain, 2018). Seekers present their problems and challenges to the ecosystem to find new solutions and ideas (Dabrowska et al., 2019; Deutsch, 2013). Most attention and studies are focusing on the organizations and solvers' benefits while neglecting the outcomes for the solvers (Pavlidou et al., 2020). Understanding solvers' challenges and outcomes is a key element to design and organize events with a better impact on the open innovation Ecosystem.

But despite their recent success, there is a lack of research and understanding on open innovation events. Because they have evolved rapidly without being scaled up or institutionalized, they still need more practical policies and control mechanisms to have concrete impacts (Yuan & Gasco-Hernandez, 2019). There is a need for more empirical research and better data to motivate the different participants to take part in open innovation events and give them factual arguments on why they should participate and contribute (Bacon et al., 2019; Noh, 2015). More specifically, there is still a lack of understanding of how outcomes are reached and the required conditions to achieve these different outcomes (Pe-Than et al., 2020). This research aims to close this gap by providing empirical results to understand the factors required to achieve these various outcomes.

Researchers think that better data will lead to a better understanding of the open innovation events outcomes and impacts which will lead to more funding and accessibility. This should improve the events and their impact on their ecosystems (Gagné et al., 2021).

2.1.2 Impact on the innovation ecosystem

The innovation ecosystem concept has a different number of definitions but for the sake of this research, innovation ecosystem is defined as "a way of making interdependencies more explicit, […] focuses on understanding coordination among partners in exchange networks that are characterized by simultaneous cooperation and competition" (Adner & Kapoor, 2010, p. 309). The ecosystem concept adds a new way to consider industrial interactions. Instead of only focusing on the interactions between existing institutions, it also focuses on the heterogeneity of stakeholders. The concept of innovation ecosystem proposes a broader view of the interactions between heterogeneous actors (companies, organizations, informal individuals) to understand how they co-create value together (Adner & Kapoor, 2016; Autio & Thomas, 2014; Cohendet et al., 2020). The literature is still scarce and needs to be improved to have a better understanding of innovation ecosystems (Gomes et al., 2018).

Open innovation events play a key role in creating and maintaining these innovation ecosystems since they create a bridge between formal actors (institutions, companies or governments) and informal actors (individuals or communities) to enable them to co-create value. Cohendet et al. (2020), p. 6 suggest that open innovation events are part of the "middleground" defined as "a common platform facilitating different forms of creation and knowledge exchange in the ecosystem". Thus open innovation events act as a bridge (or middle ground) between the formal actors (or upperground) and the informal actors (or underground). They also state that open innovation events can act as catalysts to transform an entire industry and innovation ecosystem. It is thus vital to study open innovation events and their impact on the innovation ecosystem (West & Wood, 2008).

Measuring the impact of open innovation events on the innovation ecosystem is not trivial and hasn't been intensively studied yet (Bacon et al., 2019; Gomes et al., 2018). In fact, there is a gap between understanding open innovation events in theory and understanding their practical impact on their innovation ecosystem (Gagné et al., 2021).

A central concept in innovation ecosystem and open innovation events is the concept of "shared value". It can be defined as "policies and operating practices that enhance the competitiveness of a company while simultaneously advancing the economic and social conditions in the communities in which it operates" (Kramer & Porter, 2011, p. 66). Following this definition, "value creation does not have to be a zero-sum game and can therefore benefit an entire ecosystem" (Gagné et al., 2021, p. 20). Shared value is at the heart of open innovation events and having a better understanding of open innovation events impacts on the ecosystem will lead to better events that create more value (Lampel et al., 2012). Value creation for different actors and thanks to collaborative process (Ritala et al., 2013) is a central goal of innovation ecosystems (Liu & Stephens, 2019). The concept of shared value is an abstract concept often hard to precisely measure. In the open innovation context, the shared value created by the event can be measured by the value created for individuals and organizations at the same time. It is considered that shared value is created if it benefits the individuals and the organizations together. Measuring shared value is still at its exploratory phase since no validated construct has been proposed in the literature.

It is expected that innovation ecosystems satisfy different types of actors at the same time such as formal and informal entities or stakeholders alone and entire communities and companies (Piantoni, 2021). Shared value created by innovation ecosystems can be seen as created by (and for) companies and communities (Kramer & Porter, 2011). Shared value can be considered by its main function of "creating value for the company (or other entities) through the creation of value for stakeholders, benefiting the society at large" (Piantoni, 2021, p. 15). Given the fact that some structural characteristics of the innovation ecosystem such as its actors and structure can affect shared value creation and that shared value can be seen as created for the stakeholders and organizations (Piantoni, 2021), it seems logical to measure the impact of the open innovation events on the innovation ecosystem by measuring the shared value they create at two different levels, the individuals and the companies composing that innovation ecosystem.

On the innovation ecosystem side, the concept of shared value can thus be used to measure the impact of the innovation events. On the innovation event side, there also needs to be measurable concepts that impact the innovation ecosystem. The event outcomes are the measure of its success and reflect the performance of the event. Open innovation events outcomes are presented in the section below.

2.2 Open innovation events outcomes

Indicators of open innovation events success (or OI events outcomes) can be measured by a large number of concepts. Some are common to all actors and some are specific to some actors. Some indicators common to all actors are: solvers' satisfaction (Fuller et al., 2011), new contacts and partnerships (Meulman et al., 2018), new solutions created and problems solved (Dabrowska et al., 2019; Deutsch, 2013) and solvers' retention for future events (Decker et al., 2015; Lakhani et al., 2007; Nolte et al., 2020a; Wang et al., 2018; Zheng et al., 2011). For solvers: new talents identified (or recruitment) (Lampel et al., 2012), long-term benefits and general satisfaction (Lampel et al., 2012), project sustainability after the event (Carruthers, 2014; Nolte et al., 2018; Pe-Than et al., 2020).

Most of the existing studies focus on one type of event at a time and examine singular outcomes (Nolte et al., 2018; Pe-Than et al., 2020; Pe-Than et al., 2018). Most research also focuses on student and civic hackathons or crowdsourcing activities while work on different types of open innovation events is still rare (Nolte et al., 2018). Most of the focus has also been on the benefits for promoters while outcomes for solvers have been neglected (Pavlidou et al., 2020; Zheng et al., 2011). This research aims to assess these issues.

In summary, research on open innovation events outcomes is still "scarce and fragmented" (Nolte et al., 2018) and more research is needed to understand and measure their impacts and outcomes (Suominen et al., 2019). Due to this lack of comprehension more and more promoters are facing challenges to justify and ensure the success of their open innovation events (Acar, 2019).

There is not a specific set of outcomes recommended in the literature for solvers nor standardized ways to measure them. The literature provides different qualitative results indicating the important outcomes in specific open innovation events and for specific solvers. Project continuation has been highlighted as an important outcome for solvers in the scope of hackathons (Cobham et al., 2017; Nolte et al., 2018; Pe-Than et al., 2020) but only from qualitative results not quantitative. There needs to be a quantitative analysis of project continuation to confirm these results. Solver retention didn't receive much attention in the literature while it is clear that experienced solvers contribute to more successful events (Medina & Nolte, 2020). The career opportunity for solvers is an important indicator of success for open innovation events and a reason why solvers attend these events (Chowdhury, 2012; Gagné et al., 2021; Lampel et al., 2012; Nolte, 2019; Suominen et al.,

2019). Other outcomes are also important for the success of open innovation and the solvers like the grants received, the long-term benefits (visibility, credibility, potential collaboration), the pleasure taken during the event, the association to a bigger cause, the motivation and energy given by the event (Gagné et al., 2021). The grants received have already received a lot of attention but the others have recently been introduced and still need to be conceptualized to be measured effectively.

2.2.1 Project continuation

The project continuation (or solution sustainability) is an important outcome for solvers and refers to the existence of the solvers' project after the end of the event (Carruthers, 2014; Nolte et al., 2018; Pe-Than et al., 2020). It is common for civic and student hackathons to foster the continuation of the project after the event (Cobham et al., 2017; Nolte et al., 2018). In the case of student hackathons, project continuation is defined as the creation of a "sustainable and effective student enterprise" and it is not rare that these events act as catalysts to initiate students to entrepreneurship (Cobham et al., 2017). In the case of corporate hackathons, the continuation of the project can lead to the improvement of existing products or the development of new ones (Nolte et al., 2018). Thus project continuation represents the fact of turning the abstract project from the event into a concrete project that can have "real life" impacts and applications such as the creation of new start-ups (Medina & Nolte, 2020). In some cases, start-ups found after an open innovation event were more successful (Nolte, 2019).

Research on project sustainability after open innovation events is scarce and mostly limited to civic, student and corporate hackathons. Most studies have been focusing on the impact of the teams' characteristics on project continuation (Cobham et al., 2017) but studies focusing on the events' design and individual attitudes are missing (Nolte et al., 2018).

Some factors contribute to increasing project continuation. In the context of a student hackathon, the duration of the event can contribute to project continuation. Events with an extended duration are more beneficial. The optimal event for project continuation is considered to be "a 48-hour event spread over three days" (Cobham et al., 2017). The origin of the project, the solvers' motivation, activities before, during and after the event and solvers' continuation intentions could influence the project continuation in the case of hackathons. Involving stakeholders such as mentors or members of the local start-up ecosystem before, during and after the event seem to have a positive impact on

the project continuation. Facilitating contacts between solvers and seekers (company owner, start-up CEO, …) is important for project continuation. The solvers' motivation can also play a role in project continuation but there seems to be a trade-off between personal goals and project continuation (Nolte et al., 2018). There seems to be "a disparity between the intention to continue projects after a hackathon and their actual continuation" (Carruthers, 2014; Nolte et al., 2018; Pe-Than et al., 2020). For this reason, this research only focuses on the actual project continuation and not the solvers' intentions to continue working on their projects.

In summary, project continuation is an important outcome that can be influenced by many different factors. Promoters should be aware of it when planning their events and some promoters are already looking at ways to effectively help solvers "translating the spurt of activity during the event into long-acting start-ups" (Chowdhury, 2012). But there is still a lack of understanding on how open innovation events contribute to project continuation and entrepreneurship (Nolte, 2019).

2.2.2 Solver retention

Solver retention for future open innovation events does not seem to have been receiving attention in the open innovation literature. In fact, no definition or study on solver retention has been found in the literature. This concept needs to be gathered in other literature and adapted to the open innovation literature. This research aims to be a starting point to study solver retention in open innovation events.

Definitions and information on customer retention can be found in the business and marketing literature. Its definition and measurement differ between industries and companies (Aspinall et al., 2001) but many researchers agree that it is an important aspect of business that can "can yield several economic benefits" (Ang & Buttle, 2006). Two main metrics are used by companies to measure customer retention: raw metrics and sales-adjusted or raw-adjusted metrics. Where the raw metrics focus on retaining a fixed number of customers despite their value and sales-adjusted or raw-adjusted metrics focus on retaining customers that bring more profit to the company (Ang & Buttle, 2006; Aspinall et al., 2001). It is vital for organizations to find their definition of customer retention and the ways to measure and sustain it (Aspinall et al., 2001).

Finding a way to measure solver retention in the context of open innovation events is important and will be done in this research to close this gap in the literature. Promoters should focus on solver

retention by creating an experience for solvers (Fuller et al., 2011) and paying close attention to their satisfaction (Pavlidou et al., 2020). Retention should be represented by a single variable but more by three indices, namely, customer satisfaction, likelihood to recommend, likelihood to use/contribute again (Aspinall et al., 2001; Stratigos, 1999). These indicators come from literature external to the open innovation literature and it would be interesting to test if they could suit open innovation events as well.

Factors that contribute to solver retention are also unknown but solvers supported by a mentor seemed to be more satisfied and more interested to contribute to the organization that organized the event (Nolte et al., 2020a). So the presence of mentors during the event could be a factor positively impacting the solver retention.

2.2.3 Career opportunities

New talent identification is an important indicator of success for promoters, sponsors, seekers and solvers (Lampel et al., 2012). Recruitment of participants and offering them new career opportunities after the event is also a best practice for promoters (Gagné et al., 2021). In the scope of this research, recruitment represents the new job opportunities and positions for the open innovation participants and not the recruitment (in the sense of enrollment) of participants for the event itself as it could be used in the literature. Researchers found that open innovation events are an efficient way to find new employees. In fact, many start-up founders and company directors participate in open innovation events to find new employees. Many solvers also participate to find employment (Nolte, 2019; Suominen et al., 2019). Solvers perceived the open innovation events as a way to gain knowledge and skills which can lead to new employment offers or promotions (Chowdhury, 2012; Nolte et al., 2018). Open innovation events can have a direct or indirect effect on career opportunities for solvers. It seems reasonable to study the career opportunities for solvers as an important outcome and look for factors that influence this outcome. Career opportunity has already been measured in a quantitative study by Olson et al. (2017) but only using a one-item construct. It would be interesting to improve the literature by validating a more elaborated construct with multiple items. New talents identification is an important aspect of design competitions (Lampel et al., 2012) but the recruitment of new talents is not directly mentioned. There is room for improvement to understand how to measure and improve the recruitment of new talents during open innovation events and propose more career opportunities.

Unfortunately, there is a lack of research on the factors that contribute to the recruitment of solvers and more job opportunities. Even though researchers agree that the recruitment of new participants is a key outcome, there does not seem to be any research on the open innovation event's characteristics that lead to career opportunities thanks to the event. Briscoe (2014) found that finding employment was one of the main reasons for participants to attend a hackathon and Nolte (2019) found that start-up founders participate in hackathons with the intention to identify new talents that could lead to employment. It seems that events with start-up founders lead to more career opportunities for the participants but this relation hasn't been validated through quantitative analysis yet. This research aims to validate some of these relations between event's design and career opportunities and contribute to the literature as a first step to identify how to foster career opportunities for solvers.

2.3 Event's design

Open innovation events vary by their design depending on the goals the organizers want to achieve. The design elements include the configuration of the event (online or offline), the format (competitive or not), the duration, the characteristics of the participants recruited or the environment that the promoters create for the solvers (Gagné et al., 2021).

To optimize the outcomes of their event organizers need to pay close attention to their design (Zheng et al., 2011) and "should provide an environment for participants that fosters the desired outcome". But the large number of choices makes it difficult for new promoters to choose the right ones without any guidelines (Nolte et al., 2020b). Some research has focused on open innovation events design and has given recommendations to promoters to improve their design (Nolte et al., 2020b; Pe-Than et al., 2018). Researchers agree that the design is a key aspect to organize a successful event and achieve the desired outcomes but its effect on the outcomes is still under-researched and "the study of hackathon design elements in particular is practically non-existent" (Pe-Than et al., 2018; Suominen et al., 2019; Zheng et al., 2011). Researching how to designing better events is a priority for researchers and stakeholders but still needs to be done (Zheng et al., 2011).

When analyzing event's design from an outcome perspective, four elements stand out for their potential role to produce outcomes: the solver experience with OI events, the configuration (online

vs offline), the presence of mentors and the presence of stakeholders from the local start-up ecosystem during the event. The following paragraphs look at these four elements in more detail.

With the respect to **solver's experience**, open innovation events can be one-timers or recurring events happening at fixed time intervals. Some solvers have participated on multiple occasions to the same event or to different events and start to develop some kind of experience for open innovation events. It becomes clear that the experience of the participants can become an important design element for some promoters. Unfortunately, the impact of the solvers' experience on the events' outcomes is still unclear (Medina & Nolte, 2020; Nolte, 2019; Nolte et al., 2018). Medina andNolte (2020) have found that experience before a hackathon can have an impact on the continuation of the project but these results haven't been generalized. Logically, it seems that more experience should lead to better performances and thus better outcomes but it still needs to be validated by empirical data.

The **event configuration** should also play a role in their outcomes. Open innovation can be held online, offline or both at the same time when participants exchange on a platform after in-person activities (Gagné et al., 2021). In recent years, more and more events happen exclusively online and solvers never meet each other offline (Lampel et al., 2012; Shaikh & Levina, 2019). With the recent COVID-19 pandemic, most offline events have been canceled or have changed their configuration to an online configuration. Promoters often struggle to keep the participants motivated, to maintain a high level of interactions between participants and to keep a clear structure for the event. Due to the recent nature of this transition to online events, most of the challenges and ways to solve still haven't been studied. Recent research has shown that promoters "are looking to incorporate more online activities into their events" and proposes that future research investigate the impact of the event's configuration on their outcomes (Gagné et al., 2021). This is the gap this research aims to fill.

The **presence of mentors or coaches** during the event is recognized by researchers as a best practice for promoters and a key element for the event's success (Gagné et al., 2021; Lampel et al., 2012; Nolte et al., 2020a; Nolte et al., 2020b). In fact, building relationships is vital in the context of open innovation given its collaborative nature (Lampel et al., 2012; Pfitzer et al., 2013) and mentors can be an important relationship for solvers who want to be educated or seeking feedback for their ideas (Arena et al., 2017) or company (Nolte, 2019). The general definition for a mentor

in an open innovation event is “a "professional with work experience and background knowledge who answer questions from hackathon teams and provides guidance" (Ramatowski et al., 2017, p. 94). The mentors are in direct contact with the solvers and can have multiple roles like providing feedback, educate and guide the solvers, solve their problems and facilitate relations with new partners (Nolte et al., 2020b). Despite being recognized as an important element for an event’s success few research has been focusing on mentors and even fewer on their impact on the OI events’ outcomes (Medina & Nolte, 2020; Nolte, 2019). Some recent research on hackathons’ outcomes has found that providing mentors to solvers leads to more intention to continue working on their project and that solvers who have been more in contact with mentors perceived their experience as more satisfying (Medina & Nolte, 2020; Nolte et al., 2020a). Nevertheless, these are qualitative results that should be verified by empirical quantitative data.

The fourth element is about the **local start-up ecosystem**. In the scope of this research, the local start-up ecosystem has been defined as a network of people, entrepreneurs, organizations and start-ups fostering the creation and scaling of new start-ups. Creating connections between the local start-up ecosystem and the solvers is important to fulfill different solvers’ needs such as building relationships (Lampel et al., 2012), staying connected to their network and receive added value (Gagné et al., 2021). Given the collaborative nature of open innovation network effects are essentials to fulfill the desired outcomes of the events such as attracting more funding for solvers and offering more learning opportunities. But the network effects still need to be studied for open innovation events (Pavlidou et al., 2020). Researchers have suggested that involving the solvers in business accelerators or boot camps can have a positive impact on entrepreneurship and project continuation (Medina & Nolte, 2020). In the context of the Hacking Health hackathon, researchers have suggested that connecting the solvers to the start-up ecosystem was a good way to foster entrepreneurship and project continuation (Chowdhury, 2012). For solvers who already founded a start-up, open innovation events are an opportunity to find new employees and partners to grow their projects and develop new products by attracting funding or receiving feedback from new people (Nolte, 2019). Being in contact with actors from the local start-up ecosystem during the event seems to be an efficient way to fulfill these goals.

2.4 Solver motivation

The solver motivation to participate in open innovation events has been already studied and proven to play an important role (Acar, 2019; Fuller et al., 2011; Lampel et al., 2012; Von Krogh et al., 2012; Zheng et al., 2011). The solver motivation is usually measured by using the self-determination theory (SDT) developed by Ryan andDeci (2000). The self-determination theory stipulates that the motivation can be seen as "a continuum with intrinsic motivation at one end, extrinsic motivation at the other, and various forms of internalized extrinsic motivation, or more simply internalized motivation, in-between" (Ryan & Connell, 1989; Ryan & Deci, 2000). The difference between these three types of motivation (intrinsic, internalized and extrinsic) depends on the level of autonomy of the person measured by the degree of freedom from external influences (Ryan & Deci, 2000). Intrinsically motivated people are freer from external influence than extrinsically motivated ones. Prior works have shown that the SDT framework can be used to measure the solver motivation and that their motivation can be intrinsic, internalized or extrinsic (Acar, 2019; Fuller et al., 2011; Von Krogh et al., 2012). In fact, some solvers are interested in winning prizes (extrinsic motivation), challenge their capacities and solve problems (intrinsic motivation) or learn new things and develop new skills (internalized motivation) (Lampel et al., 2012; Zheng et al., 2011).

Extrinsic motivation to win prizes or other monetary rewards has received the most attention in the open innovation literature. And there is still a lot of contradictions around extrinsic motivation and its impact on the events' outcomes (Acar, 2019; Zheng et al., 2011). On the other hand, intrinsic motivation has received less attention even though it has been proven that "intrinsic motivation was more important than extrinsic motivation for contest solvers to participate in crowdsourcing contests" because the solvers are more focused on the problem and its constraints when intrinsically motivated (Acar, 2019). It seems logical because intrinsically motivated people take pleasure by doing the activity itself and have the highest level of autonomy. They perform tasks for their own sake and not for the reward or end result. This means that they will most likely perform their tasks very intensely and willing to take more risks (Acar, 2019; Ryan & Connell, 1989; Ryan & Deci, 2000; Zheng et al., 2011). There are still contradictions in the literature and some papers found that intrinsic motivation may not lead to better performances and higher participation levels (Roberts et al., 2006). For these reasons, this research focuses on the intrinsic motivation of participants.

Unfortunately, it seems that no study has examined the relation between events' design and motivation (Zheng et al., 2011). Concerning outcomes, some relations with intrinsic motivation have been found but still need to be validated by more quantitative data. In general, it is supposed that intrinsic motivation should have an impact on "innovation-related outcomes" (Acar, 2019; Ryan & Connell, 1989; Ryan & Deci, 2000) but it is still unclear how intrinsic motivation impacts solution sustainability (Medina & Nolte, 2020). Intrinsic motivation seems to have a negative impact on project continuation since intrinsically motivated solvers will be more focused on attaining personal goals than continuing to work on their project (Nolte et al., 2018). Finally, most studies have focused on the direct effect of motivation but not enough on the moderating effect of the motivation that could play an important role in the relations between events' design and outcomes (Zheng et al., 2011).

2.5 Summary of the literature

Open innovation events are an efficient way to foster open innovation and are a central element in innovation ecosystems. They can be seen as a middleground between informal and formal individuals and organizations that facilitate the creation of shared value for the entire ecosystem if they are managed correctly. To play that role and positively impact their innovation ecosystem it is critical that the events themselves must be performant and well managed. Their design and outcomes have been studied qualitatively but more empirical data and quantitative analysis are required to improve these events and give more rational arguments to the organizers. Understanding the relations between design and outcomes could lead to better events with more impact on the innovation ecosystem and more value created. The benefits for the solvers have received less attention than the ones for the promoters and sponsors while solvers are an important part of the ecosystem and should not be neglected. Table 2.1 gathers the main papers used in this research to identify the constructs serving as a foundation for the survey (it is not an exhaustive list of all the papers used). To gather these papers, specific keywords have been chosen to only isolate the pertinent ones. For open innovation events the keywords used were "hackathon", "crowdsourcing" and "open innovation competition". The keyword "event" hasn't been used since it was giving results out of the scope of open innovation. To find papers on the events outcomes the keywords used were "outcomes", "performance indicators", "goals" and "indicators of success". For the design of the event the keywords were "design", "organization", "planning" and

"workshops". For the impact on the ecosystem the keywords were "innovation ecosystem", "business ecosystem", "local ecosystem", "shared value", "value creation" and "middleground".

Table 2.1 Articles by themes and sub-themes

Theme	Sub-theme	Articles
OI events outcomes	Project continuation	(Carruthers, 2014; Nolte et al., 2018; Olson et al., 2017; Zheng et al., 2011)
	Solver retention	(Decker et al., 2015; Halvari et al., 2018; Lakhani et al., 2007; Nolte et al., 2020a; Nolte et al., 2018; Wang et al., 2018; Zheng et al., 2011)
	Career opportunities	(Nolte, 2019; Olson et al., 2017)
Event's design	Solver's experience	(Decker et al., 2015)
	Event configuration	(Gagné et al., 2021)
	Presence of mentors or coaches	(Nolte et al., 2020a; Wang et al., 2018)
	Local start-up ecosystem	(Chowdhury, 2012; Medina & Nolte, 2020; Nolte, 2019)
Solver motivation	Intrinsic motivation	(Acar, 2019; Lakhani et al., 2007; Lakhani & Wolf, 2003; Mair et al., 2015; Wang et al., 2018)
Impact on the innovation ecosystem	Shared value	(Gagné et al., 2021; Kramer & Porter, 2011; Piantoni, 2021)
	Middleground	(Cohendet et al., 2020)

CHAPTER 3 METHODOLOGY

3.1 Research framework

This research focuses on the relations between open innovation events design and outcomes as well as their impact on the innovation ecosystem through a quantitative study from events around the world organized in French and English (mainly events from Canada). This research aims to improve the open innovation events literature by analyzing how design elements impact specific OI events outcomes and how these outcomes impact the innovation ecosystem. This section presents the research goals, conceptual model and hypothesis deduced from the literature.

3.1.1 Research goals

There are two main goals that this research aims to achieve: analyzing the design and motivation elements that contribute to open innovation events success and analyzing the impact of open innovation events on the innovation ecosystem.

The general problematic is the following: **Few studies have analyzed the impact of the design elements and the intrinsic motivation of the solvers on events' outcomes and their impact on the innovation ecosystem in an open innovation context.**

The specific problematic is the following: **There is a lack of empirically validated constructs developed to measure open innovation events outcomes and their impact on the innovation ecosystem.**

These goals can be translated into two research questions, that are presented next.

Research question 1: What are the impacts of the events design and the intrinsic motivation of the solvers on the open innovation events outcomes?

This first research question comes from the importance of the events design and the lack of understanding of the impact of the design elements on the events outcomes. The extrinsic motivation of the solvers (mostly for winning prizes and grants) has received more attention than the intrinsic motivation which has been shown to have more impact on the quality of the solvers' solution than the extrinsic one (Acar, 2019). The moderating role of the intrinsic motivation hasn't received much attention compared to its direct impact on outcomes. Answering this research question could help the promoters to organize better events based on empirical recommendations

and attract more funding to increase the positive impact of their events on the innovation ecosystem.

Research question 2: How are the different open innovation outcomes impacting the innovation ecosystem?

This second research question is more explanatory and is a first step to understand how open innovation events impact the innovation ecosystem. To measure the impact on the ecosystem, the open innovation events can be seen as a middleground that will impact formal and informal actors and organizations (Cohendet et al., 2020). The impact is measured by the shared value created for individuals and organizations. Answering this research question is a first step in developing factual ways to measure the impact on the innovation ecosystem and the role of open innovation events.

3.1.2 Hypothesis and conceptual model

3.1.2.1 Impact of the design on the outcomes

As highlighted by Pe-Than et al. (2020) there is still a lack of understanding on how open innovation outcomes are reached and the required conditions to achieve these different outcomes. But despite the lack of guidelines available promoters should pay close attention to their design to optimize the outcomes of their events (Zheng et al., 2011). Events' design is a key aspect to organizing successful events and achieve desired outcomes but its effect on the outcomes is still under-researched and should be a priority for researchers (Pe-Than et al., 2018; Suominen et al., 2019; Zheng et al., 2011). These facts lead to the first hypothesis:

Hypothesis 1: *The design elements have an impact on the open innovation event outcomes.*

Impact on the project continuation

The exact impact of the solvers' experience on the events' outcomes is still unclear (Medina & Nolte, 2020; Nolte, 2019; Nolte et al., 2018) but Medina andNolte (2020) have found that experience before a hackathon can have an impact on the continuation of the project but these results haven't been verified with empirical data:

Hypothesis 1a: *Solvers with more experience in open innovation events have a higher chance to continue working on their project after the event.*

Some recent research on hackathons' outcomes have found that providing mentors to solvers leads to more intention to continue working on their project (Medina & Nolte, 2020; Nolte et al., 2020a) and could have a positive impact on project continuation (Nolte et al., 2018):

Hypothesis 1b: *Solvers in contact with mentors during the open innovation event have a higher chance to continue working on their project after the event.*

Researchers have suggested that connecting the solvers with the local start-up ecosystem and involving them in business accelerators or bootcamps can have a positive impact on entrepreneurship and project continuation (Chowdhury, 2012; Medina & Nolte, 2020; Nolte et al., 2018):

Hypothesis 1c: *Solvers in contact with the local start-up ecosystem during the open innovation event have a higher chance to continue working on their project after the event.*

Impact on the intention to participate again

Solvers supported by a mentor seem to be more satisfied and more interested to contribute to the organization that organized the event (Nolte et al., 2020a):

Hypothesis 1d: *Solvers in contact with mentors during the open innovation event have a higher chance to participate again in open innovation events.*

Impact on the career opportunities

New talents identification is an important indicator of success for promoters, sponsors, seekers and solvers (Lampel et al., 2012) and is often perceived by participants as an efficient way to find new work opportunities and recruitment (Chowdhury, 2012; Nolte et al., 2018). The presence of mentors and actors from the local start-up ecosystem seems to lead to more recruitment and work opportunities for solvers (Nolte, 2019):

Hypothesis 1e: *Solvers in contact with mentors during the open innovation event have a higher chance to be recruited after the event.*

Hypothesis 1f: *Solvers in contact with actors from the local start-up ecosystem during the open innovation event have a higher chance to be recruited after the event.*

3.1.2.2 Moderating role of the intrinsic motivation

In general, it is supposed that intrinsic motivation should have an impact on "innovation-related outcomes" (Acar, 2019; Ryan & Connell, 1989; Ryan & Deci, 2000) but it is still unclear how intrinsic motivation impacts solution sustainability (Medina & Nolte, 2020). It seems that no study has examined the relation between events' design and motivation. Most studies have focused on the direct effect of motivation but not enough on the moderating effect of the motivation that could play an important role in the relations between events' design and outcomes (Zheng et al., 2011).

Hypothesis 2: *The intrinsic motivation of solvers has a moderating effect on the relation between open innovation design and outcomes.*

The solvers' motivation can also play a role in project continuation but there seems to be a trade-off between personal goals and project continuation. Intrinsic motivation seems to have a negative impact on project continuation since intrinsically motivated solvers will be more focused on attaining personal goals than continuing to work on their project (Nolte et al., 2018).

Hypothesis 2a: *The intrinsic motivation of solvers has a negative moderating effect on the project continuation after the open innovation event.*

3.1.2.3 Impact on the innovation ecosystem

Since open innovation events can be seen as part of a "middleground" and that their role is to gathered formal and informal actors to create value it seems logical to think that their performance will impact the innovation ecosystem (Adner & Kapoor, 2016; Autio & Thomas, 2014; Cohendet et al., 2020). But there is "a gap between theoretical understanding of open innovation events and how they actually impact their ecosystems" (Gagné et al., 2021):

Hypothesis 3: *Open innovation events have a positive impact on the innovation ecosystem.*

Hypothesis 3a: *Open innovation events create shared value for the individuals in the innovation ecosystem.*

Hypothesis 3b: *Open innovation events create shared value for the organizations in the innovation ecosystem.*

3.1.2.4 Control variables

Some other variables, discussed in the following paragraphs, are also suspected to have an influence on the Open Innovation events outcomes.

The event's duration – Open innovation events tend to become longer, more recurring and spread over multiple days. This could influence their outcomes (Lampel et al., 2012; Medina & Nolte, 2020). For example, organizing longer events is a best practice for promoters (Gagné et al., 2021). The event's duration has an impact on the project continuation for student hackathons and the optimal duration to increase project continuation is considered to be "a 48-hour event spread over three days" (Cobham et al., 2017).

The event's location – The influence of the event's location on the event's outcomes hasn't been studied yet but it seems logical that the country in which the event is organized might have an influence on the outcomes since the outcomes can vary depending on different factors related to its location. In fact, the location and its characteristics can positively or negatively impact the economic growth, productivity growth and innovation that will have an effect on open innovation events and their outcomes.

The event's type – Open innovation events take different forms (hackathons, crowdsourcing activities, …) and have different goals depending on the complexity and the skills required for the problem that the promoters or the industry want to solve (Gagné et al., 2021).

The time between the solvers' participation in the survey and their participation in the event – The effect of the time between the event and the survey on the event's perceived outcomes hasn't been studied yet but it seems logical to assume that a long time after the event the solvers will be less excited about the event and that the initial buzz will not be there anymore.

These variables are coded as control variables to make sure that their influence on the hypothesis is control and does not disturb the results.

The conceptual model (Figure 3.1) summarizes all these hypothesis:

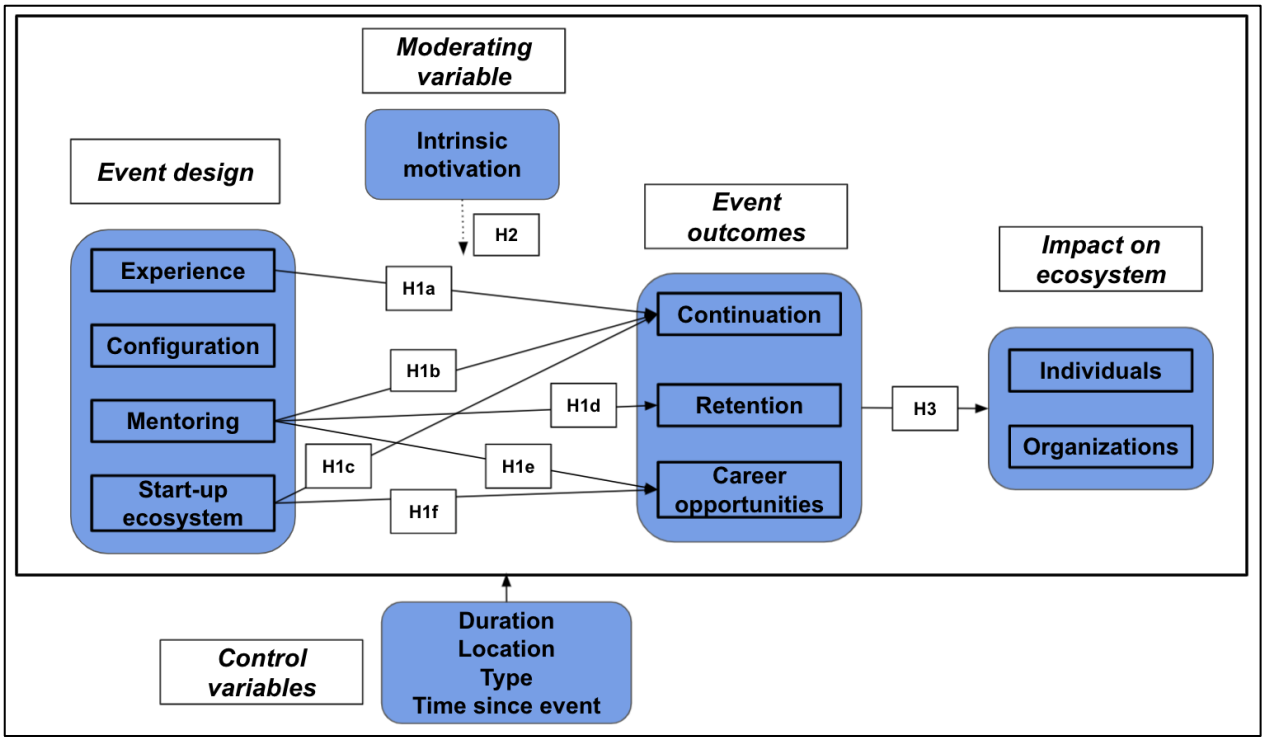

Figure 3.1 Conceptual model

The impact of the outcomes on the innovation ecosystem is represented by a single arrow (H3) because of its exploratory nature. This relation hasn't been studied before and this model represents a first step to understanding the impact of the event on the ecosystem in a broad sense. Since there wasn't any relation to expect from the literature, the relation has been simplified to one arrow to show its exploratory nature.

3.2 Database implementation

Since the goal of the research is to validate a conceptual model deduced from the literature (exploratory hypothetico-deductive approach) with a quantitative method, the survey is the instrument used to collect the data. In fact, the survey is the preferred method to collect quantitative data from a large number of people (Thiétart, 2007a). More particularly an online survey that has the advantage to permit a wide diffusion with a short response time (Thiétart, 2007a) while avoiding transcription errors. An online survey enables to collect primary data to validate the conceptual model through statistical analysis in accordance with Thiétart (2007a) while preserving the anonymity of the respondents. To collect the data required, the online survey has been built,

translated and then shared with a sample of people using different means. These steps are described in more detail in the subsections below.

3.2.1 Survey

The online survey has been built on LimeSurvey, an online survey tool for academics. The survey is composed of 6 different sections and 66 questions. The survey was adapted from previous surveys from the open innovation literature put together to validate the specific conceptual model of the present research.

Table 3.1 Structure of the online survey (for participants)

Theme	Sub-theme	Number of questions
Section A: Open innovation event experience	Number of participations Last event attended Time since last event Event's location Roles played	5
Section B: Open innovation events design	Configuration (online/offline) Duration Contact with ecosystem Contact with mentors	4
Section C: Motivation	Intrinsic motivation	6
Section D: KPI	Solution sustainability Solver retention Career opportunities Pleasure New connections Being part of a bigger cause New ideas, energy, motivation Impact on individuals Impact on companies	39

Table 3.1 Structure of the online survey (for participants) (cont'd and end)

Section E: Partnerships	Partnerships	3
Section F: General questions	Work status Academic qualification Field of highest academic qualification Company's industry Company's size Time working for company Activities performed at job Time dedicated to innovation Time dedicated to open innovation	9
Total: 6 sections		Total: 66

There are more sections in the survey that are not relevant for open innovation events participants but that are relevant for sponsors, intermediaries, promoters, and seekers. Logical conditions have been added on LimeSurvey so that only the relevant sections appear for the respondent. If the respondent is a participant (the respondent selected "I solved a problem proposed during the event (solver/participant)" to the fifth question of section A) only the 6 sections mentioned in Table 3.1 Structure of the online surveyare apparent to him. The fifth question of section A ("What roles have you played during the last open innovation event you were a part of?") is a filter question that allows to show only the relevant sections depending on the nature of the respondent (solver, seeker, sponsor, intermediary and promoter). The version of the survey for participants is the one used in the following sections unless mentioned otherwise and will be mentioned as "the survey".

To collect the participant's opinions on different subjects a metric interval scale (Likert scale) on 5 points has been used (more concise than a 7 points scale). This scale is composed of different items that seem to completely define a construct or idea. Taking the mean value of all the items can give a good idea of the participant's opinion on that particular subject by summarizing it with one value (Jolibert & Jourdan, 2006).

The last section contains demographic questions to try to categorize the respondents. One can notice that there is no question about the sex, age and origin of the respondent. This results from a choice of the research team to limit the total number of questions and wasn't judged essential since the open innovation literature doesn't insist on the importance of this demographic characteristics.

The survey was created in English on LimeSurvey and then translated by a professional translator in French to reach a maximum amount of people in and outside Québec. The size of the population of open innovation events solvers in Québec is pretty limited and not easily reachable due to the absence of database. The connections with different open innovation events promoters also gave the research team the opportunity to contact solvers outside of Québec to increase the sample size. For these reasons, the survey has been shared in Québec and across other countries. The complete survey in English can be found in Appendix B and in French in Appendix C.

After the survey was created it has been sent to the ethics committee of Polytechnique Montréal. The committee approved the survey on the 20th of January 2021 and gave its approbation to share the survey and start collecting the data (certificate number CER-2021-34-D).

Different feedbacks from respondents show that it took between ten and fifteen minutes to complete the survey and answer all the questions. Exceptionally, this survey has not been pretested to maximize the data collection time. However, during the entire creation process the survey has been shown to open innovation experts, events promoters, and innovation policymakers. Among others the survey has been discussed with Patricio Gutierrez, Ilias Benjelloun and Mirela Pirlea (open innovation experts and promoters of the Coopérathon organized by Desjardins) or with other open innovation experts. The personal experience of the research team in open innovation events has also helped to validate the relevance of the survey.

3.2.2 Data sample

The sample of people for this survey consists of former open innovation events participants. The first question of the survey ("How many open innovation events have you attended?") allows to eliminate respondents who never participated in an open innovation event. This is the only criteria to select the data sample. Since there is no reference source population for open innovation event participants the sampling method is non-probabilistic. The sample simply consists of the participants that the research team was able to find and contact (convenience sampling). Since there

is no database listing all the open innovation events participants and no research indicating the total number of the population, the external validity of the results cannot be verified.

Two databases have been created: a first one with promoters and a second one with participants. The promoter's database has been created thanks to connections of the research team with the Coopérathon, Hacking Health, Hackathown, Aéro Montréal and Génie en Affaires promoters. It has been supplemented with events found on the internet such as Museomix and Major League Hacking Hackthons. The events and promoter's email have been added to the database and some promoters have been added on LinkedIn when possible.

The participant's database has been built meanly from the "Coopérathon Global" platform, a platform listing a great number of Coopérathon participants. The Coopérathon is the largest OI competition in Canada and is organized every year. The participants attend 4 workshops (1 day each) before pitching their project to the jury in the semi-finals and, maybe, the finals. When possible, the participants have been added to the database and added on LinkedIn. This database represents an important asset for research on open innovation events since it gathers around 300 solvers from various open innovation events and around 50 promoters. Such a database wasn't available before and will help future researchers to collect data more easily.

In general, promoters and participants found on events' websites from all over the world have been added to the database.

3.2.3 Data collection

The data collection has started on March 3rd 2021 by sharing the survey to the main partners of the research team (Hacking Health, IDEOS, Coopérathon) and participants in the network of the research team (direct messages on LinkedIn). The first strategy was to ask the promoters to spread the survey to their pool of participants through newsletters, social media, or direct messages to contact a maximum number of participants with a small amount of time and effort. The Coopérathon team shared the survey on their Newsletter (thousands of readers) and their LinkedIn account (3500 followers) on March 11th 2021. This first attempt brought less than ten responses in a week, showing the research team that the first strategy couldn't be the most efficient. Sending reminders is also hard since the Coopérathon team cannot tell who opened the survey or not and does not want to solicit their followers too often. The other promoters selected were hard to reach

and didn't share the survey at first. In the meantime, the direct messages to participants were giving good results and bringing more responses (around 30 after 1 week). This second strategy was then prioritized: contacting participants by direct message (LinkedIn, Facebook or email) explaining the goal of the survey and sharing the link to the survey (in French and English). This database of participants has been mainly built from the "Coopérathon Global platform", a public platform gathering the profiles of previous Coopérathon participants. When the participants were providing their LinkedIn account the research team has added them to the database and contacted them individually with a personalized invitation to complete the survey. By clicking to the link, the participants were brought to the first page of the survey on LimeSurvey describing the research and asking them to agree to the terms of the survey. The respondents must accept the terms to start the survey. To maximize the response rate, the participants were contacted a maximum of three times if they didn't complete the survey with intervals between 7 and 15 days after the first invitation as suggested by Dillman (2011) and Fowler Jr (2013). Some participants were also asked to share the survey with their network to take advantage of the snowball effect.

Although longer and more time-consuming than the first one, this second strategy worked well and allowed to bring a significant number of responses. In parallel, some promoters have accepted to share the survey to their network from IODS, Génie en Affaires, the Hackathown team from Polytechnique Montréal, the Hacking Health Ottawa chapter and the BDC Hackathon team helping to increase the number of responses.

All the data collected was anonymous, every response is associated with a unique id on LimeSurvey making it impossible to know the identity of the respondent. The database created by the research team only contains public data found on different event's platforms and websites and is only accessible by the research team. The participation was voluntary, and the data has been stored directly on the Polytechnique servers where it is only accessible to the research team. Participants had to option to withdraw their participation or to stop completing the survey at any time without any negative consequences. They also had the opportunity to save their answers and complete them later. Only complete entries have been considered for the statistical analysis.

The data collection has been stopped on the 4th of Mai 2021 (62 days) for a total of 122 complete responses from open innovation events participants.

3.3 Variables implementation

To validate the conceptual model and verify the hypothesis from Section 3.1.2, the different concepts must be translated into variables that can be implemented into the survey to collect quantitative data that can be processed. This stage is crucial and allows to go from the theoretical world to the empirical world to measure interactions between different concepts. The choice of the different indicators is really important and will impact the precision with which the different concepts are measured (Thiétart, 2007d). Most of the concepts and indicators used come from the open innovation event literature to ensure good validity and reliability. Indeed, choosing constructs and items already validated by other researchers in the same field helps to achieve a good validity of the measure instrument (Babbie & Benaquisto, 2002; Venkatraman, 1989). Some of them have been gathered to improve the literature and find better ways to measure the concepts.

3.3.1 Independent variables

The independent variables are programmed to measure the different characteristics of an open innovation event and the experience of the participants before and during the event. The four independent variables are only composed of one item each and measure straightforward concepts. The first two variables measure the frequency (Likert scale from 1 to 5 where 1 corresponds to "Never" and 5 to "A great deal") at which the participants were in "contact with mentors/coaches during the open innovation event" (Wang et al., 2012) and in "Contact with the local startup ecosystem during the open innovation event". The third variable is a *dummy* variable asking the participants if they participated to an online or offline event. The fourth and last independent variable asks the participants "How many open innovation events have you attended?" to measure their experience with open innovation events. The possible answers are "I have never attended any open innovation event", "One", "Two" and "More than two".

Since these concepts are quite straightforward and only contain one item their validity and reliability don't have to be checked.

Table 3.2 Summary of the independent variables

Independent variables	Instrument of measure	Auteurs
Experience	Single choice question with 4 options	N.A.
Configuration	Dummy variable	N.A.
Presence of mentors	5 points Likert scale asking the frequency	(Wang et al., 2012)
Presence of the local start-up ecosystem	5 points Likert scale asking the frequency	(Wang et al., 2012)

3.3.2 Dependent variables

The dependent variables measure the open innovation events outcomes. Three outcomes have been selected as mentioned in the literature review (Section 2.2):

- The continuation of the project after the event (or project sustainability)
- The solver retention for future events
- The career opportunities for participants

Following the work of Olson et al. (2017), the project sustainability is composed of 5 items measuring the degree of agreement on a Likert scale from 1 to 5 (where 1 corresponds to “Strongly disagree” and 5 corresponds to “Strongly agree”) with these statements:

- “I have continued working on my project since the open innovation event” (Carruthers, 2014; Nolte et al., 2018; Olson et al., 2017)
- “My project has evolved a great amount since the open innovation event” (Olson et al., 2017)
- “I have created a new company for that project” (Olson et al., 2017)

- "The project from the open innovation event has been admitted in a start-up incubator/accelerator" (Olson et al., 2017)
- "I have commercialized new products/services from that project" (Olson et al., 2017)

To enrich the literature, a sixth item is added to the construct following the work of Zheng et al. (2011):

- "The project from the open innovation event has become my primary source of income"

These items will be tested with a principal component analysis (PCA) to ensure the validity of this construct and the reliability will be tested by calculating the Cronbach's alpha.

Concerning the solver retention, no construct has been found in the open innovation event literature.

As explained in Section 2.2.2, the retention can be measured by three indices (Aspinall et al., 2001; Stratigos, 1999):

- Customer satisfaction
- Likelihood to recommend
- Likelihood to use/contribute again

Different constructs and items from the open innovation event literature have been assembled to try to form a new construct measuring the solver retention in the context of open innovation events. It resulted in a four items construct measuring the degree of agreement on a Likert scale from 1 to 5 (where 1 corresponds to "Strongly disagree" and 5 corresponds to "Strongly agree"):

- "I am satisfied with my experience at the open innovation event" (Nolte et al., 2018)
- "I will recommend this open innovation to others" (Halvari et al., 2018)
- "I will participate in this open innovation event again" (Decker et al., 2015; Lakhani et al., 2007; Nolte et al., 2020a; Wang et al., 2018; Zheng et al., 2011)
- "I will participate in another open innovation event in the future" (Decker et al., 2015; Lakhani et al., 2007; Nolte et al., 2020a; Wang et al., 2018; Zheng et al., 2011)

To validate that this new construct is valid a CPA is performed to verify that all four items contribute to the same concept. The reliability is also checked with the Cronbach's alpha.

To measure the career opportunities for participants thanks to their participation in the event, three items construct from the open innovation literature (Olson et al., 2017) has been used measuring the degree of agreement on a Likert scale from 1 to 5 (where 1 corresponds to “Strongly disagree” and 5 corresponds to “Strongly agree”):

- I got a new job thanks to the connections made at the event
- I got a better position in my company thanks to the connections made at the event
- I got new work opportunities thanks to the connections made at the event

Again, the validity of this constructed is tested with a CPA and the reliability with the Cronbach’s alpha.

Table 3.3 Summary of the dependent variables

Dependent variables	Instrument of measure	Auteurs
Project continuation	6 items Degree of agreement (5 points Likert scale)	(Carruthers, 2014; Nolte et al., 2018; Olson et al., 2017; Zheng et al., 2011)
Solver retention	4 items Degree of agreement (5 points Likert scale)	(Decker et al., 2015; Halvari et al., 2018; Lakhani et al., 2007; Nolte et al., 2020a; Nolte et al., 2018; Wang et al., 2018; Zheng et al., 2011)
Career opportunities	3 items Degree of agreement (5 points Likert scale)	(Olson et al., 2017)

3.3.3 Moderating variable

The intrinsic motivation of the participants plays the role of the moderating variable. A six items construct has been assembled from the open innovation events literature to measure the participant's intrinsic motivation. The participants were asked to rate the level of importance of the following statements on a Likert scale from 1 to 5 (where 1 corresponds to "Not important" and 5 to "Extremely important"):

"I took part in an open innovation event because I enjoyed":

- "Creating new things" (Acar, 2019)
- "Solving problems" (Acar, 2019; Lakhani et al., 2007)
- "The feeling of being intellectually challenged" (Acar, 2019; Lakhani et al., 2007; Lakhani & Wolf, 2003)
- "The feeling of satisfaction from solving a problem" (Acar, 2019; Mair et al., 2015)
- "Applying my skills" (Mair et al., 2015)
- "Finding a solution to a problem I care about" (Wang et al., 2018)

Although the first four items have already been tested and validated by Acar (2019), the six items have to be tested together with a CPA to ensure the validity of this new construct. The reliability will be tested with the Cronbach's alpha.

3.3.4 Control variables

There are four control variables that could have an impact on the relations between the variables of the conceptual model:

- The type of event that the participants attended
- The time since they attended the event
- The country where the event took place
- The duration of the event

To inform which is the last event they attended the participants had the choice between 5 events: Hacking Health, Coopérathon, Génie en affaires, Aéro Montréal and AquaHacking corresponding

to the events the research team could contact in the first place due to their contact with the promoters. The participants had a sixth option “other” with text if the event they attended was not on the list.

The time since they attended the event consist of a three items list: “less than 6 months ago”, “between 6 months and 1 year ago” and “More than 1 year ago”. This variable will indicate if any memory effect can affect the answers of the participants.

The country where the event took place is a list of 15 countries corresponding to the events listed in the first control variables. An “other” option is also present with text if the country wasn’t in the list.

The duration of the event is represented by six items: “A couple of hours”, “A half day”, “One full day”, “Two days”, “Three days” or “More than three days”.

3.3.5 Impact on the innovation ecosystem

As explained in Section 2.1.2, an effective way to measure the impact on the innovation ecosystem hasn’t been developed yet but it could make sense to evaluate it by measuring the shared value created for the individuals and organizations in the innovation ecosystem.

A construct with two dimensions has been derived from that idea by using the experience of the researcher, the research team and the comments of open innovation events specialists and promoters from Coopérathon and Hacking Health. For individuals the shared value creation could be measured by the transformation of the way they innovate, developing an interest and aptitude for innovation and entrepreneurship, willingness to participate in other innovation activities and the new career opportunities. For organizations the shared value created could be measure by a better understanding of their customers’ needs, change (opening) of their mentality, better understanding and integration of open innovation practices, developing new partnerships outside the organization, realizing the importance of their network and ecosystem, participating in other open innovation events and creating new entrepreneurial projects. These new indicators will be tested and validate in order to improve the innovation ecosystem literature and find effective ways to measure the impact of open innovation events on the innovation ecosystem.

The first dimension measures the impact on the individuals in the innovation ecosystem on a Likert scale from 1 to 5 (where 1 corresponds to “Strongly disagree” and 5 corresponds to “Strongly agree”). “Since my participation in the event I have”:

- “Transformed my working methods”
- “Discovered a new interest in innovation”
- “Discovered new aptitudes for innovation”
- “Discovered a new interest in entrepreneurship”

The second dimension measures the impact on the organizations in the innovation ecosystem on a Likert scale from 1 to 5 (where 1 corresponds to “Strongly disagree” and 5 corresponds to “Strongly agree”). “Since my participation in the event I have”:

- “A better understanding of my customers’ needs”
- “Adopted a more open mentality by working with more people from different departments in my organization”
- “A better understanding of the open innovation process”
- “Integrated new practices in my organization's innovation management process”
- “Started consulting more people outside my organization in innovation projects”
- “Become more aware of the importance of maintaining dialogue with my network on an ongoing basis”
- “Become more aware of the importance of documenting new ideas”
- “Started involving my hierarchy in more open innovation events”

These two dimensions and their items will be tested by a CPA to ensure their validity and a Cronbach’s alpha to ensure their reliability.

3.4 Statistical methods and validation of the variables

Following the recommendations of Bagozzi (1980), Bagozzi andPhillips (1982), and Venkatraman andGrant (1986) concerning the preliminary verification of the constructs, an examination of the

one-dimensionality of the items, the validity of the constructs, as well as their reliability is established.

3.4.1 Validity

The goal of the survey is to measure as precisely as possible the different concepts needed to validate the hypothesis and the conceptual model. Even though the survey has been carefully built with dimensions and items coming from the literature, it is very important to verify that this measuring instrument (the survey) correctly measures the concepts it is supposed to measure.

The quality of the survey is measured by its validity and its reliability. The external validity is the fact that the results obtained with the sample can be generalized to the whole population. To have external validity it is required to know the total population and to have a sample representative of this whole population. In this case, the total population is not known and the external validity cannot be studied since there is no way to know if the sample used is a good representation of the total population (Thiétart, 2007b).

The internal validity is the capacity to draw valid conclusions that only depend on the studied variables without any interactions of external variables. It ensures that the results are not compromised by any external effect not studied in the research. To have a good internal validity the measuring instrument (the survey) needs to be valid too. The more the instrument is valid, the smaller is the systematic error (Thiétart, 2007c). There are two types of validity for the survey: the content validity and the concept (or construct) validity. The content validity is achieved when the items have already been validated in the literature, which is the case in this survey when we use items from the open innovation events literature. The concept validity is achieved when the operationalized concept describes well the theoretical concept (Thiétart, 2007e). In other words, verifying the concept validity is equivalent to verify that each item is relevant and measures the concept it is supposed to measure.

The concept validity can be verified using Stata and the Component Principal Analysis (CPA). The CPA is a statistical method that reduces the number of items to only keep the relevant items for the concept. But first the Kaiser-Meyer-Olkin (KMO) factor needs to be computed to verify if the CPA is relevant and that a factorial analysis is possible. In exploration, the KMO needs to be greater than 0.6. Then, the CPA starts with the number of factors following the Kaiser rule: all factors with

an eigenvalue bigger than one are kept. A Varimax rotation is then performed to have independent and orthogonal factors that only contribute to one factor (Jolibert & Jourdan, 2006). Finally, the output of the CPA is a table giving the weight of every item for each factor. Only the items with a weight greater than 0.5 (in absolute value) are kept and contribute to the concept (Hair, 2009). The items that don't contribute at all or contribute to multiple factors simultaneously are removed and a new CPA is performed until every item contributes to only one factor. In this research the CPA can have three benefits: validate the items from the literature, validate that added items are relevant and validate new items proposed by the research team.

3.4.2 Reliability

The global reliability of the research is achieved when it can be easily reproduced by another researcher or at another moment in time. This is mainly achieved by a clear methodology but more importantly by a reliable measure instrument. To be reliable the survey needs to allow different people to make the same measure of a same concept using the same survey or to allow one person to make the same measures of the same instrument. A reliable instrument will reduce the random error on the measure (Thiétart, 2007c). The internal coherence method is used to verify the reliability of the survey. This method gives the degree of homogeneity of the different items in on factor: the Cronbach's alpha varying from 0 to 1. The closer it is to 1, the more it is internally coherent and reliable but in exploration an alpha greater than 0.6 is accepted (Jolibert & Jourdan, 2006).

3.4.3 CPA and Cronbach's alpha results

The total number of respondents is 122 (N = 122) but some respondents didn't respond to some items or choose the "Not applicable" option. These two effects combined can reduce the data available for the CPA. To maximize the usable data, the empty items have been replaced by the mean of the other items (in the same construct) if the participant responded to more than 50% of the items. In the case of the dependent variable CONTINUATION for example, it added 28 responses to the CPA (from 84 to 112). Only the CPA after the replacements is showed.

3.4.3.1 Intrinsic motivation

Table 3.4 CPA 1 intrinsic motivation (N = 117)

Code	Intrinsic motivation	Factor 1
V1_MOTIVATION	Creating new things	0,590
V2_MOTIVATION	Solving problems	0,649
V3_MOTIVATION	The feeling of being intellectually challenged	0,663
V4_MOTIVATION	The feeling of satisfaction from solving a problem	0,698
V5_MOTIVATION	Applying my skills	0,614
V6_MOTIVATION	Finding a solution to a problem I care about	0,471
% VAR		38,3%
KMO		0,772
α Cronbach		0,669

This first CPA reveals that the last item (V6_MOTIVATION) does not contribute enough to the measure of the intrinsic motivation (weight < 0.5). This seems to make sense when looking at the literature. In fact, this last item has been added from (Wang et al., 2018) and seems to be redundant with the second item ("Solving problems"). A knew CPA is performed without this item:

Table 3.5 CPA 2 intrinsic motivation (N = 117)

Code	Intrinsic motivation	Factor 1
V1_MOTIVATION	Creating new things	0,602
V2_MOTIVATION	Solving problems	0,659
V3_MOTIVATION	The feeling of being intellectually challenged	0,675
V4_MOTIVATION	The feeling of satisfaction from solving a problem	0,717
V5_MOTIVATION	Applying my skills	0,625
% VAR		43,1%
KMO		0,743
α Cronbach		0,669

This time, all the five items contribute to the construct. The KMO and the alpha are greater than 0.6 but the percentage of the variance explained is small (43,1%). The construct has already been

improved compared to the one from Acar (2019) by adding a fifth item ("V5_MOTIVATION – Applying my skills") from Mair et al. (2015) but it could be improved more in another research to try to capture more variance. This construct is thus valid and reliable for our research.

The five items have been aggregated in one variable called "MOTIVATION" by computing the mean of the five items. If less than two items are missing, the mean is computed with the non-missing items. For example, if the participant replied to 3 items, the "MOTIVATION" value is the mean value of these 3 items. If the participant replied to 2 items, the "MOTIVATION" value is a missing value. Aggregating the items into one variable is mandatory to perform the regressions in the section 4.2 Exploratory analysis.

3.4.3.2 Dependent variables – CONTINUATION

Table 3.6 CPA CONTINUATION (N = 112)

Code	CONTINUATION	Factor1
V1_CONTINUATION	I have continued working on my project since the open innovation event	0,853
V2_CONTINUATION	My project has evolved a great amount since the open innovation event	0,823
V3_CONTINUATION	I have created a new company for that project	0,851
V4_CONTINUATION	The project from the open innovation event has been admitted in a start-up incubator/accelerator	0,667
V5_CONTINUATION	The project from the open innovation event has become my primary source of income	0,665
V6_CONTINUATION	I have commercialized new products/services from that project	0,778
% VAR		60,4%
KMO		0,777
α Cronbach		0,866

The construct is valid, all the items contribute to the construct (weights > 0.5). Even the new item added (V5_CONTINUATION) from Zheng et al. (2011) contributes, which means that this construct has been improved compared to the one from Olson et al. (2017) that contained 5 items.

The construct captures 60,4% of the variance, which is on the low end but acceptable. Future work could focus on improving the construct to capture more variance. The CPA is validated by a good KMO equal to 0.777 and is reliable (alpha = 0.866).

The six items have been aggregated in one variable called “CONTINUATION” by computing the mean of the six items. If less than two items are missing, the mean is computed with the non-missing items to optimize the data available.

3.4.3.3 Dependent variable – SATISFACTION

Table 3.7 CPA SATISFACTION (N = 120)

Code	Retention	Factor1	Factor2
V1_RETENTION	I am satisfied with my experience at the open innovation event	0,916	
V2_RETENTION	I will recommend this open innovation to others	0,943	
V3_RETENTION	I will participate in this open innovation event again		0,864
V4_RETENTION	I will participate in another open innovation event in the future		0,933
% VAR		45,3%	41,2%
KMO		0,470	
α Cronbach		0,868	0,791

This CPA show that the SATISFACTION construct contains two factors representing two different concepts. The first two items (V1_RETENTION and V2_RETENTION) contribute to the first factor and the last two items (V3_RETENTION and V4_RETENTION) contribute to the second factor. It seems to make sense since these two sets of items have been assembled from two different literatures. The first two items measure the satisfaction of the participant, and the two last items measure the intention to participate to another event in the future. The first two items will be referred as the dependent variable SATISFACTION and the last to as the dependent variable PARTI_FUTUR. As shown in **Erreur ! Source du renvoi introuvable.**, the first two items strongly contribute to the SATISFACTION construct (0.916 and 0.943), the construct is valid, and the items capture 45,3% of the variance. The construct is also reliable (alpha = 0.868). The last two items also strongly contribute to the PARTI_FUTUR construct (0.864 and 0.933), the construct is valid, and the items capture 41,2% of the variance. The construct is also reliable (alpha = 0.791). Together, both constructs capture 86,5% of the variance. The KMO is low (0.470) because there are two factors.

The first two items have been aggregated in one variable called “SATISFACTION” by computing the mean of the two items.
The last two items have been aggregated in one variable called “PARTI_FUTUR” by computing the mean of the two items.

3.4.3.4 Dependent variable – Career opportunities

Table 3.8 CPA CAREER_OPP (N = 93)

Code	Career opportunities	Factor
V1_CAREER_OPP	I got a new job thanks to the connections made at the event	0,881
V2_CAREER_OPP	I got a better position in my company thanks to the connections made at the event	0,916
V3_CAREER_OPP	I got new work opportunities thanks to the connections made at the event	0,821
% VAR		76,3%
KMO		0,687
α Cronbach		0,844

This dependent variable gathered less responses than the others even after replacing some missing values with the means (N = 93), too many values where missing and some respondent didn’t answer at all. An explanation could be the more sensitive nature of this question, maybe less people felt comfortable answering it. Another explanation could be that a lot of participants didn’t feel concerned by this question. Future work could investigate in more details why this variable gathered less data than the other ones. But the results of the CPA are good. All the items contribute to the construct, the validity is thus verified. It explains a good proportion of the variance (76,3%) and it is very reliable (alpha = 0.844). The KMO is also sufficient to justify a CPA (0.687).

The three items have been aggregated in one variable called “CAREER_OPP” by computing the mean of the three items or two of the three if one item was missing.

3.4.3.5 Impact on the innovation ecosystem

Table 3.9 CPA impact on innovation ecosystem (individuals) (N = 115)

Code	Impact on innovation ecosystem (individuals)	Factor 1
V1_ECO_INDIVIDUS	Transformed my working methods	0,731
V2_ECO_INDIVIDUS	Discovered a new interest in innovation	0,900
V3_ECO_INDIVIDUS	Discovered new aptitudes for innovation	0,900
V4_ECO_INDIVIDUS	Discovered a new interest in entrepreneurship	0,895
% VAR		73,9%
KMO		0,814
α Cronbach		0,880

As explained in section 3.3.5, this is a new construct with items that have never been used together before to measure the impact of the OI events on the shared value created for individuals in the innovation ecosystem. It is thus primordial to verify if this new construct is valid and reliable and verify that every item is relevant to the construct. For a new construct, the CPA shows very strong results: the weights are high which means that each item is relevant and that the construct is valid. The KMO is also high (0.814) which means that the CPA is relevant. The construct is also reliable with a very good alpha (0.880). The items also capture a good percentage of the variance (73,9%). This means that the construct can be used to perform statistical analysis to find links with the other variables. It is important to note that a CPA is the first step to validate the construct and that subsequent exploratory analysis should be performed to do more validation. Indeed, exploratory, and confirmatory analysis should be performed using a program like EQS to validate the construct and add it to the literature. But this falls behind the scoop of this research and could be the subject of future research.

The four items have been aggregated in one variable called "*ECO_INDIVIDUS*" by computing the mean of the four items or three of the four if one is missing.

Table 3.10 CPA impact on innovation ecosystem (organization) (N = 111)

Code	Impact on innovation ecosystem (organizations)	Factor 1
V1_ECO_ORGA	A better understanding of my customers' needs	0,722
V2_ECO_ORGA	Adopted a more open mentality by working with more people from different departments in my organization	0,791
V3_ECO_ORGA	A better understanding of the open innovation process	0,821
V4_ECO_ORGA	Integrated new practices in my organization's innovation management process	0,816
V5_ECO_ORGA	Started consulting more people outside my organization in innovation projects	0,798
V6_ECO_ORGA	Become more aware of the importance of maintaining dialogue with my network on an ongoing basis	0,741
V7_ECO_ORGA	Become more aware of the importance of documenting new ideas	0,748
V8_ECO_ORGA	Started involving my hierarchy in more open innovation events	0,805
% VAR		61,0%
KMO		0,909
α Cronbach		0,906

As explained in section 3.3.5, this is a new construct with items that have never been used together before to measure the impact of the OI events on the shared value created for organizations in the innovation ecosystem. Again, it is primordial to verify the validity and the reliability of this new construct to be able to use it to perform statistical analysis like regressions. This construct is valid, and all eight items contribute to it (weights > 0.5). It only captures 61% of the variance which could be improved by adding more items to try to capture more variance. The CPA is relevant since the KMO is high (0.909) and the construct is reliable (alpha = 0.906). To be fully validate this construct should be further analyzed in future research using exploratory and confirmatory analysis. But in the scope of this research the construct is considered valid and can be used for statistical analysis like regressions.

The eight items have been aggregated in one variable called "*ECO_ORGA*" by computing the mean of the eight items. If less than two were missing, the mean of the remaining non-missing items has been computed to optimize the data.

CHAPTER 4 RESULTS AND DISCUSSIONS

In this chapter, the results coming from the data collection will be revealed and discussed. The section 4.1 is dedicated to descriptive analysis to have a better understanding of the data and the grouping that can be made. The section 4.2 is dedicated to exploratory analysis to show and discuss the different interactions between variables.

4.1 Descriptive analysis

This section gives and overview and a better understanding of the results obtained, and the data collected.

4.1.1 Sample characteristics

The data collection has resulted to a database of the answers of 122 solvers. Although all respondents had in common that they participated in an OI event, no other characteristic was set to create the database. This gave a heterogeneous sample with solvers from all kinds of backgrounds, professions, and industries. General demographic questions like age and sex haven't been included in the survey because the research team judged that they wouldn't bring any additional value to the results. The main traits of the sample are discussed in this section.

The Table 4.1 contains the different work status of the 122 solvers:

Table 4.1 Work status repartition

Work Status	Frequency	Percent
Professional	39	32%
Student	23	19%
Business owner	22	18%
Director	16	13%
Independent	9	7%
Other	7	6%
Unemployed	4	3%
Intern	1	1%
No answer	1	1%
Retired	0	0%
Total	122	100%

Most solvers are professionals (or employees) (32%), students (19%), business owners (18%) or director (13%). These results make sense when we know that most solvers came from the Coopérathon and that this event attracts a lot of employees from existing companies and students through their recruitment campaigns online and in the universities. It is also interesting to see a good amount of business owners and directors which indicates that OI events also interest the decision makers.

The Table 4.2 contains the highest academic qualification obtained by the solvers:

Table 4.2 Highest academic qualification

Academic qualification	**Frequency**	**Percent**
No high school degree	1	1%
High school degree	10	8%
Bachelor's Degree	45	37%
Master's Degree	48	39%
Doctoral Degree	11	9%
Other	6	5%
No answer	1	1%
Total	122	100%

As anticipated most solvers have a bachelor’s degree or a master’s degree (76% combined). This repartition also makes sense because most solvers are from the same event in Canada. This event targets more people with a higher academic qualification than other events like educational hackathons or some hackathons organized in high schools. But it could be interesting to try to increase the number of solvers without a higher education as they could possibly bring new ideas and expertise. Younger solvers (in high school) could also bring more creativity and new perspectives.

The Table 4.3 gathers the field in which the solvers received their higher degree:

Table 4.3 Field of the highest academic qualification

Field	**Frequency**
Engineering	43
Business and administration	30
Computer and information science	16
Biological sciences	10
Social and behavioral sciences	6
Physical and chemical sciences	3
Education and teaching	3
Arts	2
Nursing	0
Mathematics	0
Others	14

Most solvers come have an engineering or a business background. This seems to fit the characteristics of the same event in Canada because most of the challenges proposed during the event required some engineering and business notions. It probably also results from the marketing strategy of the event that could be broadened to increase the diversity of participants. The percentage is not shown because it was a multiple-choice question.

The Table 4.4 gathers the solvers' industries (the percentage is not shown because it was a multiple-choice question):

Table 4.4 Solvers' industries

Industry	Frequency
Finance and insurance	13
Health care	12
Education	9
Aerospace	6
Transport	6
Telecommunication	6
Food	5
Entertainment	5
Arts, entertainment, and recreation	5
Construction	3
Pharmaceutical	1
Agriculture	0
Other	35

Solvers come from all types of industries from Finance and insurance to health care, education, aerospace, or transport. In the "others" section too the sample is quite diverse from renewable energies to e-commerce and tourism. This ensure a good diversity of participants from various industries which is a good practice for OI events (Arena et al., 2017; Pfitzer et al., 2013).

The Table 4.5 gathers the activities performed by the solvers at their job (the percentage is not shown because it was a multiple-choice question):

Table 4.5 Activities performed at the solvers' job

Job	Frequency
Development	61
Administration	52
Research	48
Marketing/Sales	33
Production	25
Distribution	9
Other sales service and support	7
Other	10

The solvers present a good diversity in terms of activities performed at their job: development (61%), administration (52%), research (48%), marketing/sales (33%), … Again it ensures the diversity of participants and allows to have multidisciplinary teams solving the problems.

Statistical analyses have been performed to analyze the impact of the profile of the participants on the results but no significant result have been found due to the large diversity of the participants. The large number of categories for each demographic factor reduces the significance of the relations between demographic factors and the results. To find the impact of the demographic aspects on the results one could reduce the number of options or gather options to try to increase the significance of the results.

4.1.2 Independent variables

The experience of participants was measured on a three points scale as presented in Table 4.6. More than half of the participants participated in one event (56.56%) and the other part participated to two or more events (43.44%). The "Experience" variable has thus been recoded as a *dummy* variable "*dExperience23*" equals to 0 if the participant attended one event and 1 if he/she attended more than one event. This means that the experience is reduced to the fact of having participated to more than one event in the past.

Table 4.6 Participant's experience

Experience	Frequency	Percent
One	69	56.56
Two	19	15.57
More than two	34	27.87
Total	122	100.00

More participants have attended an online event (67.21%) than an offline event (32.79%) (Table 4.7). This seems to make sense since most participants (68.85%, see Table 4.9) attended an OI event less than one year ago during the COVID-19 pandemic where most events shifted from offline to online for obvious reasons. It will be interesting to study the effect of that shift of configuration on the dependant variables.

Table 4.7 Event's configuration

OnOffLine	Freq.	Percent
Offline	40	32.79
Online	82	67.21
Total	122	100.00

The descriptive analysis of the “Mentor” (frequency of contacts with mentors during the OI event) and “Ecosystem” (frequency of contacts with the local start-up ecosystem during the OI event) can be found in Appendix D (Table D.1 Descriptive analysis). The mean for “Mentor” is 3.375 and the median (p50) is 3 (max = 5) so most participants had a fair number of contacts with mentors during the event. The standard deviation (sd) is 1.138 so the sample is homogeneous.

The mean for “Ecosystem” is 3.058 and the median (p50) is 3 (max = 5) so an equal number of participants had a good number of contacts with the local start up ecosystem and a small number of contacts with the local start up ecosystem. The standard deviation (sd) is 1.285 so the sample is homogeneous.

4.1.3 Dependant variables

The descriptive analysis of the dependent variables can be found in Appendix D (Table D.1 Descriptive analysis).

The mean value for CONTINUATION is 2.967 and the median (p50) is 3.167 (max = 5) so most participants agree that they continued to work on their project after the event. The standard deviation (sd) is 1.080 so the sample is homogeneous.

The mean value for SATISFACTION is 4.050 and the median (p50) is 4 (max = 5) so most people were satisfied after participating in the event. The standard deviation (sd) is 0.857 so the sample is homogeneous.

The mean value for PARTI_FUTUR is 3.628 and the median (p50) is 3.5 (max = 5) so most people have the intention to participate in an OI event again. The standard deviation (sd) is 0.976 so the sample is homogeneous.

The mean value for CAREER_OPP is 2.061 and the median (p50) is 2 (max = 5) so most people didn't receive any job/work opportunity from their participation at the event. The standard deviation (sd) is 0.990 so the sample is homogeneous.

4.1.4 Moderating variable

The descriptive analysis of the moderating variable (*MOTIVATION*) can be found in Appendix D (Table D.1 Descriptive analysis). The mean value for *MOTIVATION* is 4.229 and the median (p50) is 4.2 (max = 5) so most participants were highly intrinsically motivated. The standard deviation (sd) is 0.553 so the sample is homogeneous.

4.1.5 Control variables

As explained in section 3.2.2, participants and promoters from a lot of different events have been reached in Canada and outside Canada. But due to the high non-responses rate of promoters and the inefficacy of sharing the survey publicly on social media or in a Newsletter, most participants are from the Coopérathon. In fact, the research team had access to a large public database that allowed them to contact many Coopérathon participants by direct message on LinkedIn. This is the reason why 74.59% of the respondents participated in the Coopérathon. There are 20 respondents that participated in "other" events, but no event was standing out enough to create a new category. The "Event" control variable has been recoded into a *dummy* variable called "*dCOOP*" (equals to 1 for participants from the Coopérathon and 0 for all the others). Since the Coopérathon is held in Canada, the same goes for the location of the event, 90.16% of the participants come from Canada. The "Location" variable is recoded as a *dummy* variable "*dCanada*" equals to 1 for participants from Canada and 0 for others. Unfortunately, this lack of diversity in the respondents limits the research and the generalization of the results.

Table 4.8 Event's location repartition

Location	Frequency	Percent
Belgium	4	3.28
Canada	110	90.16
France	4	3.28
USA	2	1.64
Other	2	1.64
Total	122	100.00

Participants were also asked when they attended their last OI event. The Table 4.9 shows the repartition between the three options. It seems than half of the people (52.46%) participated less than 6 months ago and the other half more than 6 months ago. To simplify this variable and the statistical analysis, the "Time" variable is recoded as a *dummy* variable "*dTime6monthsmore*" equals to 0 if they participated less than 6 months ago and 1 if the participated more than 6 months ago.

Table 4.9 Time since last event repartition

Time	Frequency	Percent
Less than 6 months ago	64	52.46
Between 6 months and 1 year ago	20	16.39
More than 1 year ago	38	31.15
Total	122	100.00

The Table 4.10 summarizes the duration of the event the participant attended. Most participants attended an event that lasted more than three days (72.95%). Again, this is probably because most participants come from the Coopérathon that lasts a couple of weeks. The "Duration" variable is thus recoded as a *dummy* variable "dDur3daysmore" equals to 1 when the event is longer than 3 days and 0 when its shorter.

Table 4.10 Event's duration

Duration	Frequency	Percent
A couple of hours	8	6.56
A half day	4	3.28
One full day	6	4.92
Two days	9	7.38
Three days	6	4.92
More than three days	89	72.95
Total	122	100.00

Once all the variables are recoded it is important to group them two by two to eliminate any redundant variable. This has been done for all the control variables and two variables were

expressing the same thing: "*dCOOP*" and "dDur3daysmore". The terms outside the diagonal (6 and 8) in Table 4.11 are small compared to the terms in the diagonal which means that the two variables measure the same concept. The "dDur3daysmore" is redundant with "*dCOOP*" and is removed from the control variables.

Table 4.11 dCOOP vs dDur3daysmore

	dDur3joursplus		
dCOOP	0	1	Total
0	25	6	31
1	8	83	91
Total	33	89	122

4.1.6 Impact on the ecosystem

The descriptive analysis for the aggregated variables measuring the impact of the OI events on the innovation ecosystem are presented in Table 4.12. The variable "*ECO_INDIVIDUS*" measures the impact of the OI events on the shared value created for individuals in the innovation ecosystem and the variable "*ECO_ORGA*" measures the impact of the OI events on the shared value created for organizations in the innovation ecosystem.

Table 4.12 Descriptive analysis impact on the innovation ecosystem

stats	**ECO_INDIVIDUS**	**ECO_ORGA**
min	1.000	1.000
mean	3.383	3.540
p50	3.500	3.571
max	5.000	5.000
sd	0.915	0.817
N	115.000	105.000

The mean value for *ECO_INDIVIDUS* is 3.383 and the median (p50) is 3.5 (max = 5) so the impact of the OI events on the shared value created for individuals in the innovation ecosystem. The standard deviation (sd) is 0.915 so the sample is homogeneous.

The mean value for *ECO_ORGA* is 3.540 and the median (p50) is 3.571 (max = 5) so the impact of the OI events on the shared value created for organizations in the innovation ecosystem. The standard deviation (sd) is 0.817 so the sample is homogeneous.

4.2 Exploratory analysis

This section aims to test the model and hypothesis through exploratory analysis. Regressions have been performed between the variables using Stata 16 to find relations between the variables and their level of significance. These relations will then be discussed by comparing them to the hypothesis and the literature. Two sets of regressions are done: the first one between the OI event design and outcomes and the second one between the outcomes and the impact on the innovation ecosystem. But first, the prerequisites for performing regressions need to be satisfied.

4.2.1 Prerequisites for regressions

These prerequisites need to be met: the variables' normality, the sample's size, the linearity of the relation between the dependent and the independent variables, the absence of multicollinearity and the independence between the independent variables. These prerequisites are essentials to ensure that the results of the regressions are interpretable and that the results are not flawed by the non-respect of these conditions.

4.2.1.1 Variable's normality

Two coefficients are used to verify the normality of variables: the *skewness* and *kurtosis* coefficients. The *skewness* or asymmetry coefficient measures, as its name indicates, the degree of asymmetry of the distribution of a variable. The closer its value is to zero, the more symmetrical the distribution is and the closer it is to a normal variable. In practice, a variable is considered to have a normal distribution when its *skewness* coefficient is between -1.5 and 1.5. The *kurtosis* or "flatness" coefficient expresses the degree of flatness of the distribution. In practice, a variable is considered normal when its *kurtosis* coefficient is between 1.5 and 4.5. Finally, binary variables (dummy) are not concerned because they cannot respect a normal distribution. There is a special command in Stata that allows to calculate these two coefficients directly and to display them directly in a table (Table 4.13 Skewness and kurtosis).

Table 4.13 Skewness and kurtosis

stats	CONT	SATIS	PARTI_FUTUR	CAREER_OPP	Mentor	Ecosystem	MOTIVATION	ECO_INDIV	ECO_ORGA
skewness	-0.188	-1.120	-0.307	0.775	-0.325	-0.085	-0.711	-0.568	-0.940
kurtosis	2.063	4.756	2.680	3.022	2.383	1.993	3.550	3.076	4.524

All the (continuous) variables have a *skewness* coefficient between -1.5 and 1.5. Their asymmetry is similar to the one of a normal variable and they can be used in the regressions without modifications. Two variables have a *kurtosis* coefficient bigger than 4.5: SATISFACTION (4.756) and *ECO_ORGA* (4.524). Since 4.524 is really close to 4.5, *ECO_ORGA* can be assumed normal and used without any modifications. But SATSIFACTION could be normalized to bring its *kurtosis* coefficient between 1.5 and 4.5. Variables can be normalized by computing their natural logarithm (ln_SATISFACTION), their inverse (inv_ SATISFACTION) or their square root (sqrt_ SATISFACTION) (Table 4.14 Variables' normalization.

Table 4.14 Variables' normalization

stats	SATISFACTION	ln_SATISFACTION	inv_SATISFACTION	sqrt_SATISFACTI
skewness	-1,117	-2,540	4,542	-1,726
kurtosis	4,663	11,784	26,818	7,263

As shown in Table 4.14, the SATISFACTION variable cannot be normalized since its kurtosis coefficient only gets worse when the logarithm, inverse and square root are computed. The SATISFACTION variable will not be normalized, and its kurtosis coefficient (4.756) will be accepted, and the variable will be considered normal. All the continuous variables satisfy the normality prerequisite.

4.2.1.2 Sample's size

The size of the sample used for the regressions is also a prerequisite. The sample should be big enough to have valid regressions. The minimal sample size should be 30 plus 5 respondents per variable. In this case there are 6 dependant variables, 4 independent variables, 1 moderating variable and 3 control variables (14 variables total). The minimal sample size should then be 30 + 14*5 = 100 respondents to have valid regressions. The total sample size is 122 but it varies for

every regressions since some participants are lost if they didn't respond to an item or replied: "Not applicable". The sample size for each regression is showed in Table 4.15.

Table 4.15 Sample size for regressions

	CONT	SATIS	PARTI_FUTUR	CAREER_OPP	ECO-IND	ECO-ORGA
Sample size	102	112	113	90	84	82

The sample size for CONTINUATION (102) is right above the minimum. The sample size for SATISFACTION (112) and PARTI_FUTUR (113) is above the minimum but still low. The sample size for CAREER_OPP (90) is below the minimum. Same thing for the second set of regressions (N = 84 and N = 82). Even if the sample sizes are low, all the regressions will be computed and discussed but the results will not be as strong as they could be. Unfortunately, the data collection has been closed and no data can be added to improve the sample size. Future researchers could continue the data collection to increase the sample size and improve the regressions. Typically, a sample size of 200 would give strong regressions.

4.2.1.3 Linearity between dependent and independent variables

Since these are linear regressions, it is important to ensure that the explanatory variables have a linear relationship with the explained variables (Jolibert & Jourdan, 2006). The plots of the dependent variables as a function of the independent variables are displayed in Appendix A. The plots CONTINUATION-Mentor (Figure A.1 Plot CONTINUATION-Mentor and the plot CONTINUATION-Ecosystem (Figure A.2) show a cloud of points with a positive linear tendency. The SATISFACTION-Mentor (Figure A.3) and SATISFACTION-Ecosystem (Figure A.4) both show a positive linear relation between the variables. The PARTI_FUTUR-Mentor (Figure A.5) and PARTI_FUTUR-Ecosystem (Figure A.6) also both show a positive linear relation between the variables. The CAREER_OPP-Mentor (Figure A.7) and CAREER_OPP-Ecosystem (Figure A.8) both show a cloud of points with a positive linear relation. Even though the linearity between the continuous dependent and independent variables is not perfect, it is sufficient to compute regressions between these variables.

The linearity between the events outcomes and the impact on the innovation ecosystem also need to be verified. In this case, the events outcomes are the independent variables and the impact on

the innovation ecosystem are the dependent variables. The plots between the impact of the OI events on the shared value created for individuals in the innovation ecosystem (ECO_INDIVIDUALS) and the dependent variables (CONTINUATION, SATISFACTION, PARTI_FUTUR and CAREER_OPP) show a positive linear relation (Figure A.9 to Figure A.12). The plots between the impact of the OI events on the shared value created for organizations in the innovation ecosystem (*ECO_ORGA*) and the dependent variables (CONTINUATION, SATISFACTION, PARTI_FUTUR and CAREER_OPP) show a positive linear relation (Figure A.9 to Figure A.12). The relations between the impact on the innovation ecosystem and the outcomes satisfy the need of linearity for the regressions.

4.2.1.4 Multicollinearity and independence of the independent variables

We speak of multicollinearity when the explanatory variables are correlated with each other. The multicollinearity between the independent variables can introduce bias in the regression by under or over-estimating the coefficients of the regression.

The first step to look for multicollinearity is to check the independence of the independent variables (*dExperience23*, *OnOffLine*, *Mentor* and Ecosystem). This can be observed with the correlation matrix (Table E.1 in Appendix E): if the correlation coefficient between independent variables are higher than 0.5, the independent variable can be considered strongly correlated (Jolibert & Jourdan, 2006). As shown in the correlation matrix there is no correlation coefficient greater than 0.5 between independent variables, the higher correlation coefficient between independent variables is 0.418 (between *Mentor* and Ecosystem). The dependent variables (CONTINUATION, SATISFACTION, PARTI_FUTUR and CAREER_OPP) become the independent variables for the second set of regressions between the outcomes and the impact on the innovation ecosystem. Their independence also needs to be verified using the correlation matrix. Again, there is no correlation coefficient greater than 0.5 between these variables.

Therefore, the independence of the independent variables is satisfied for both sets of regressions.

Another indicator can also be used to detect collinearity and ensure that the regressions are not biased by collinearity. The "VIF" (Variance Inflation Factor) is the inverse of the tolerance (1/Tolerance), when it is greater than 3, it is considered that there is a strong multi-collinearity.

Table 4.16 VIF 1

Variable	**VIF**
OnOffLine	2.26
dTime6monthsmore	2.06
Mentor	1.34
Ecosystem	1.30
dCOOP	1.26
dExperience23	1.25
dCanada	1.14
MOTIVATION	1.07
Mean VIF	1.46

As shown in Table 4.16, the maximal VIF is 2.26 for *OnOffline* and the mean VIF is 1.46. They are both inferior to 3 so there is no collinearity between variables for the first set of regressions.

The same can be done for the second set of regressions between the outcomes and the impact on the innovation ecosystem (Table 4.17).

Table 4.17 VIF 2

Variable	**VIF**
CONTINUATION	1.49
SATISFACTION	1.46
PARTI_FUTUR	1.45
CAREER_OPP	1.45
dCOOP	1.25
MOTIVATION	1.17
dCanada	1.15
dTime6monthsmore	1.07
Mean VIF	1.31

Again, the maximal VIF is lower than 3 (1.49 for CONTINUATION) and the mean VIF is lower than 3 (1.31). There is no collinearity between the variables for the second set of regressions.

In summary, all the prerequisites for the two sets of regressions have been verified and the regressions can be computed without risking being biased. The variables are normal, the sample size is small but acceptable, the relations between dependent and independent relations are linear, the independent variables are independent and there is no multicollinearity.

4.2.2 Regressions' results

The regression method used is the hierarchical multiple linear regression. Indeed, this method allows the introduction of variables one by one or by group following the logic of the research model. This method makes it possible to estimate the extent to which the addition of a variable or a group of variables has an effect on the relationships studied. Two main sets of regressions have been computed. The first one contains four sets for each dependent variable (CONTINUATION, SATISFACTION, PARTI_FUTUR and CAREER_OPP) to highlight the relations between the OI event design and their outcomes. The second one contains two set for each of the dependent variables (*ECO_INDIVIDUS* and *ECO_ORGA*) to highlight the relations between the OI events outcomes and their impact on the shared value created for individuals and organizations. The first set of regressions will explore the conceptual model between the event design, the intrinsic motivation and the event outcomes. The second set of regressions will explore the impact of the event outcomes on the innovation ecosystem.

In both sets the variables have been added in a hierarchical manner starting with the control and independent variables, followed by the moderating variable and the cross-products (between the independent and moderating variables) one by one (in stairs), two by two and then all together. The following cross-products are added to look for any moderating effects of the intrinsic motivation on the relations between the independent variables and the dependent variables:

- The independent variable *Mentor* and the moderating variable *MOTIVATION*: *MenMot*
- The independent variable *Ecosystem* and the moderating variable *MOTIVATION*: *EcoMot*
- The independent variable *OnOffLine* and the moderating variable *MOTIVATION*: *OnOffMot*

- The independent variable *dExperience23* and the moderating variable *MOTIVATION*: *dExpMot*

These regressions have been computed by using the "reg" command in Stata 16. This produced regressions tables with 13 regressions giving the regression coefficients (b), the standard error coefficient (se), and the p-value (p) for each regression. The regression tables are displayed in Appendix F. The p-value gives the level of significance of the relations, the lower the p-value the more significant the relation. Since the hypothesis developed are unilateral, the level of significance must also be unilateral (twice the bilateral levels) (Jolibert & Jourdan, 2006). For the sake of this research a level of significance of 0.2 has been chosen. If the p-value is higher than 0.2, the relation is judged not significant, and the hypothesis is not corroborated. Different levels of significance are display with different thresholds: "*" for p-value < 0.2, "**" for p-value < 0.1, "***" for p-value < 0.02 and "****" for p-value < 0.002 where "*" is slightly significant and "****" is highly significant. Finally, the regressions are considered robust if the levels of significance stay the same (unless the cross-products are added) and the regression coefficients keep the same sign (Carroll & Welsh, 1988).

4.2.2.1 Dependent variable: CONTINUATION

The first series of regressions are displayed in Table F.1 Regressions for CONTINUATION(Appendix F) and highlight the relations with the dependent variable CONTINUATION which represents in average the degree to which the participants continued working on their project after the OI event. The regressions are robust.

The Table 4.18 shows that three variables have a significant influence on the project continuation:

Table 4.18 Regression's results for CONTINUATION (regcont1a)

Variable	Level of significance	Regression coefficient
dCOOP	** (0.028)	0.635
Mentor	* (0.183)	0.137
OnOffLine	* (0.157)	-0.479

The Coopérathon participant (*dCOOP* = 1) are in average more susceptible to continue working on their project after the event because the level of significance is good ("**") and the regression coefficient is positive.

In average, the participants who are more in contact with mentor and coaches (*Mentor* close to 5) are more susceptible to continue working on their project after the event. But the level of significance and the regression coefficient are low, and the relation is only significant for the first regression (regcont1a). This relation is thus significant but weak (marginally significant).

The participants who attended an online event (*OnOffLine* = 1) are less susceptible to continue working on their project after the event than the participant who attended an offline event (*OnOffLine* = 0). Indeed, the regression coefficient is negative with means that the more *OnOffline* is closer to 0 (offline event) the more the participants will continue working on the project after the event.

Until the two last regressions (regcont12a and 13a) no moderating effect is observed since the cross-product are not significant. But the cross-products *MenMot* and *EcoMot* become significant when they are added together in regcont12a and *EcoMot* becomes significant when all the cross-products are added in regcont13a. In these last two regressions the independent variable *Ecosystem* also becomes significant. These phenomena typically happen when there are triple effects between variables. These triple effects are very hard to understand and are beyond the scope of this research. However, future research could investigate these effects by adding triple cross-products between *Mentor*, *Ecosystem* and *MOTIVATION*.

The **Hypothesis 1a:** *Solvers with more experience in open innovation events have a higher chance to continue working on their project after the event* is **not corroborated** because the relation between *Experience* and CONTINUATION is not significant.

The **Hypothesis 1b:** *Solvers in contact with mentors during the open innovation event have a higher chance to continue working on their project after the event* is marginally **corroborated** because the relation between Mentor and CONTINUATION is marginally significant.

The **Hypothesis 1c:** *Solvers in contact with local start-up ecosystem during the open innovation event have a higher chance to continue working on their project after the event* is **not corroborated** because the relation between *Ecosystem* and CONTINUATION is not significant.

The **Hypothesis 2a:** *The intrinsic motivation of solvers has a negative moderating effect on the project continuation after the open innovation Event* is **not corroborated** because none of the cross products are significant.

A new relation has been found between the configuration and the project continuation:

Proposition 1a: *Solvers who participate in an offline open innovation event are more susceptible to continue working on their project after the event than those who participated in an online event.*

This result seems logical because offline events allow participants to create stronger bonds by meeting face to face and give them more time and freedom to socialize. For those who need it, offline events also allow to work on a prototype at an early stage of a project and develop a minimum viable product faster. All these factors should lead to stronger teams that should have higher chances to continue working on their project after the event.

4.2.2.2 Dependent variable: SATISFACTION

The second series of regressions are displayed in Table F.2 (Appendix F) and highlight the relations with the dependent variable SATISFACTION which represents in average the satisfaction of the participants after the OI event. The Table 4.19 shows the variables that have a significant influence on the participant's satisfaction.

Table 4.19 Regression's results for SATISFACTION (regsat4a)

Variable	Level of significance	Regression coefficient
dCanada	* (0.106)	-0.407
Mentor	* (0.145)	0.106
Ecosystem	** (0.030)	0.962
OnOffLine	** (0.022)	-0.547
MOTIVATION	*** (0.007)	0.795
EcoMot	** (0.080)	-0.178

The regressions are robust and the studied regression in Table 4.19 is the regsat4a because it contains all the significant relations.

The participants from Canada (*dCanada* = 1) are in average less satisfied from the event than the participants from outside Canada (*dCanada* = 0) because the regression coefficient is negative (-0.407).

The participants who were more in contact with mentors and coaches (*Mentor* is high) are in average more satisfied from the event than participants who were less in contact with them. Indeed, the relation between *Mentor* and SATISFACTION is marginally significant ("*") and the regression coefficient is positive (0.106).

The participants who were more in contact with the local startup ecosystem (*Ecosystem* high) are in average more satisfied with participation ("**" and regression coefficient = 0.962). It seems that being in contact with the local start-up ecosystem has more impact on the satisfaction than being in contact with mentors.

The relation between *OnOffLine* and SATISFACTION is significant ("**") and negative (-0.547). Since *OnOffLine* is equal to 1 for online events it means that participants at online events are less satisfied than participants at offline events.

The intrinsic motivation (*MOTIVATION*) plays two different roles: a direct role and a moderating role on the satisfaction. A direct role because the relation between *MOTIVATION* and

SATISFACTION is significant (“***”) with a positive regression coefficient (0.795). Intrinsically motivated people are thus more satisfied after participating in an OI event than participants who are not intrinsically motivated. And a moderating role because the relation between *EcoMot* and SATISFACTION is significant (“**”) and negative (-0.178). This moderating effect means that the level of intrinsic motivation changes the relation between *Ecosystem* and SATISFACTION. More specifically, the intrinsic motivation has a negative impact on that relation. The greater the motivation the smaller the relation between *Ecosystem* and SATISFACTION. In other words, when a participant is highly motivated the contacts with the local start up ecosystem don’t have an important impact on their satisfaction. For highly motivated participants, more contacts with the local startup ecosystem does not means that they are more satisfied.

The **Hypothesis 1d:** *The solver retention is higher when they are in contact with mentors during the event* becomes *The solver satisfaction is higher when they are in contact with mentors during the event* and is marginally **corroborated** because there is a marginally significant relation between *Mentor* and SATISFACTION.

The **Hypothesis 2:** *The intrinsic motivation of solvers has a moderating effect on the relation between open innovation design and outcomes* is **corroborated** because the intrinsic motivation has a moderating effect on the relation between *Ecosystem* and SATISFACTION.

New relations have been discovered:

Proposition 1b: *Solvers who are more in contact with the local start-up ecosystem are more satisfied of the open innovation event*.

Actors from the local start-up ecosystem can bring added value to the open innovation events such as giving presentations on entrepreneurial subjects, animate a workshop, give feedback, give access to their network, facilities and experience or even provide funding opportunities. It thus makes sense that their presence would lead to the satisfaction of the solvers.

Proposition 1c: *Solvers who participate in an offline open innovation event are more satisfied of the event than participants who participated in an online event.*

This proposition is pretty trivial since most open innovation events are designed to be offline and built around workshops, networking, team building or conferences. Offline events allow the solvers

to communicate easily and to work together in a stimulating environment which is not the case in offline event.

Proposition 2a: *Intrinsically motivated solvers are more satisfied of their open innovation event.*

This relation might seem obvious but isn't especially true for any type of events. In fact, intrinsically motivated solvers are usually more focused on the task itself and want a higher level of autonomy than extrinsically motivated solvers (Acar, 2019; Ryan & Deci, 2000). Intrinsically motivated solvers usually want to have more time and resources to work on their project and want to deliver a quality project. In events such as one day hackathons, intrinsically motivated solvers might get frustrated and less satisfied of the events than in longer events such as Coopérathon where they have more time to develop their ideas and use their skills. Since most solvers in this survey took part in the Coopérathon, it seems logical to find that result.

Proposition 2b: *The solver intrinsic motivation has a negative impact on the relation between their contact with the local start-up ecosystem and their satisfaction. The impact of the contacts with local start-up ecosystem on the satisfaction decreases when the intrinsic motivation of solvers increases.*

This relation can be hard to understand and translate into practical recommendations for promoters. It seems that when the solvers are extremally intrinsically motivated, the presence of the local start-up ecosystem barely has any impact on their satisfaction anymore. As explained above, when they are intrinsically motivated solvers tend to focus more on the task and eliminate other distractions. An explanation could be that they only want to focus on solving the problems they are given and see the presence of the local start-up ecosystem as a distraction. They probably prefer to focus on their project than to attend a networking events or a workshop. If there are too many solicitations, they probably get frustrated and less satisfied. Promoters should try to have a good understanding of the solvers motivation and adapt the level of implication needed. A good way to do it could be through a short survey before the event to ask what motivates the solvers to take part in the event and ask them what they are expecting from the event.

4.2.2.3 Dependent variable: PARTI_FUTUR

The third series of regressions are displayed in Table F.3 (Appendix F) and highlight the relations with the dependent variable PARTI_FUTUR which represents in average the intentions of the participants to attend other OI events in the future.

The Table 4.20 shows the variables that have a significant influence on the future participation:

Table 4.20 Regression's results for PARTI_FUTUR (regfut6a)

Variable	Level of significance	Regression coefficient
dCOOP	*** (0.013)	-0.530
Mentor	* (0.124)	0.130
Ecosystem	** (0.038)	0.153
dExperience23	*** (0.013)	3.207
MOTIVATION	*** (0.020)	0.456
dExpMot	** (0.033)	-0.646

The regressions are robust and the studied regression in Table 4.20 is the regfut6a because it contains all the significant relations.

The first variable to have a significant relation with the future participation to OI events is *dCOOP* ("***"). Its regression coefficient is negative (-0.530) meaning that participants from the Coopérathon are less susceptible to participate in another OI event in the future.

Participants who were more in contact with mentors and the local startup ecosystem are more susceptible to participate in OI events in the future. Indeed, the relations between *Mentor* and PARTI_FUTUR and *Ecosystem* and PARTI_FUTUR are significant with a positive regression coefficient.

The relation between *dExperience23* (1 if participants have participated to more than one event) is significant ("***") and positive (3.207) which means that participants with more experience (participated in two events and more) have more intentions to participate in OI events in the future. It seems that the more events they attend the more they want to attend in the future.

Intrinsically motivated participants also have more intentions to participate to OI events in the future ("***" and 0.456 between *MOTIVATION* and PARTI_FUTUR). The more intrinsically motivated they are the more they want to participate again.

A first moderating effect appears when the cross-product between *dExperience23* and *MOTIVATION* (*dExpMot*) is added. Its contribution is significant ("**") and negative (-0.646). The negative regression coefficient means that the intrinsic motivation of participants has a negative effect on the relation between the participant's experience and their future participation intentions. The higher the intrinsic motivation the smaller the impact of the experience on the future participation intentions.

The **Hypothesis 1d:** *The solver retention is higher when they are in contact with mentors during the event* becomes *The solver intention to participate again is higher when they are in contact with mentors during the event* and is **corroborated** because there is a marginally significant relation between *Mentor* and PARTI_FUTUR.

The **Hypothesis 2:** *The intrinsic motivation of solvers has a moderating effect on the relation between open innovation design and outcomes* is **corroborated** because the intrinsic motivation has a moderating effect on the relation between *Ecosystem* and PARTI_FUTUR.

New relations have been discovered:

Proposition 1d: *Solvers who are more in contact with the local start-up ecosystem are more susceptible to participate again in open innovation events.*

This seems to be a networking effect. Solvers in contact with the start-up ecosystem probably expand their network with people who are regularly involved in open innovation events. This new network is probably stimulating solvers to be more involved and to participate again to stay connected and up to date. This could lead to the creation of networks of "open innovation events enthusiasts" that participate to many events to meet again and stay updated.

Proposition 1e: *Solvers who participate in more than one event are more susceptible to participate again in open innovation events.*

This result could be explained by the discussion of the previous proposition. Open innovation events enthusiasts who participate again and again after entering this new network.

Proposition 2c: *Intrinsically motivated solvers are more susceptible to participate again in open innovation events.*

This proposition can be linked to the **Proposition 2a** (*Intrinsically motivated solvers are more satisfied of their open innovation event*) and the fact that most solvers in this survey came from the Coopérathon. The design of the Coopérathon gives a lot of time to the solvers to work on their project during and between the workshops with a lot of freedom which satisfies intrinsically motivated solvers. Since most solvers came from the Coopérathon, it seems that they are satisfied and would like to participate again because the design of the event suits their needs.

Proposition 2d: *The impact of the solvers' experience on their intention to participate again decreases when their intrinsic motivation increases.*

It would have seemed logical for experience and motivation to go hand in hand to motivated solvers to participate again but it is not the case. This result is surprising and doesn't seem to lead to any recommendation for the promoters.

4.2.2.4 Dependent variable: CAREER_OPP

The fourth series of regressions are displayed in Table F.4 (Appendix F) and highlight the relations with the dependent variable CAREER_OPP which represents in average the job opportunities offered to the OI event's participants.

As shown in Table F.4 there are no significant relations in the regression table. The hypothesis cannot be corroborated by these series of regressions.

The **Hypothesis 1e:** *Solvers in contact with mentors during the open innovation event have a higher chance to be recruited after the event* is **not corroborated** because the relation between *Mentor* and CAREER_OPP is not significant.

The **Hypothesis 1f:** *Solvers in contact with actors from the local start-up ecosystem during the open innovation event have a higher chance to be recruited after the event* is **not corroborated** because the relation between *Ecosystem* and CAREER_OPP is not significant.

4.2.2.5 Dependent variable: ECO_INDIVIDUS

The results of the first series of the second set of regressions are shown in Table 4.21. These regressions highlight the relation between the OI events outcomes (CONTINUATION, SATISFACTION, PARTI_FUTUR and CAREER_OPP) and the impact of the OI events on the shared value created for individuals in the innovation ecosystem. The control variables are the same as the previous set of regressions (*dCOOP*, *dTime6monthsmore* and *dCanada*) but there is no moderating variable for this set of regressions.

Table 4.21 Regression's results for ECO_INDIVIDUS

	regind1	**p-value[1]**
	b/se	
dCOOP	0.213	
	(0.260)	
dTime6monthsmore	-0.106	
	(0.190)	
dCanada	-0.612	** (0.091)
	(0.358)	
CONTINUATION	0.029	
	(0.108)	
SATISFACTION	0.156	* (0.193)
	(0.119)	
PARTI_FUTUR	0.088	
	(0.122)	
CAREER_OPP	0.159	* (0.156)
	(0.111)	
_cons	2.522	
	(0.655)	
N	84.000	
F	2.000	
r2	0.156	
r2_a	0.078	
p	0.066	

The relation between *dCanada* and *ECO_INDIVIDUS* is significant ("**") and negative (-0.612). Events outside Canada (*dCanada* = 0) seem to have less benefits for the people in the innovation ecosystem.

The relation between SATISFACTION and *ECO_INDIVIDUS* is marginally significant ("*") and positive (0.156) which indicates that events with satisfied participants tend to give more benefits for the people in the innovation ecosystem.

The relation between CAREER_OPP and *ECO_INDIVIDUS* is marginally significant ("*") and positive (0.159) which indicates that events providing more job opportunities to participants tend to give more benefits for the people in the innovation ecosystem.

The **Hypothesis 3a:** *Open innovation events create shared value for the individuals in the innovation ecosystem* is marginally **corroborated** because there are significant relations between SATISFACTION, CAREER_OPP and ECO_INDIVIDUS. Open innovation events with solvers who are more satisfied and have career opportunities have an impact on the innovation ecosystem.

New propositions can be formulated:

Proposition 3a: *Open innovation events with satisfied solvers create shared value for the individuals in the innovation ecosystem.*

Satisfied solvers will probably come back from the event with more intention to apply what they learned and use open innovation in their work. This can create a domino effect if they use open innovation and transfer this knowledge to their network and the creation of more shared value as an end product. It seems that having a good experience is important for the creation of shared value for the individuals.

Proposition 3b: *Open innovation events that offer career opportunities to the solvers create shared value for the individuals in the innovation ecosystem.*

This relation is quite trivial seems receiving more career opportunity is a direct added value for the solvers. Open innovation events can directly and positively impact the solvers by providing career opportunities.

4.2.2.6 Dependent variable: ECO_ORGA

The results of the second series of the second set of regressions are shown in Table 4.22. These regressions highlight the relation between the OI events outcomes (CONTINUATION. SATISFACTION. PARTI_FUTUR and CAREER_OPP) and the impact of the OI events on the shared value created for organizations in the innovation ecosystem. The control variables are the same as the previous set of regressions (*dCOOP*. *dTime6monthsmore* and *dCanada*) but there is no moderating variable for this set of regressions.

Table 4.22 Regression's results for ECO_ORGA

	regorga1	**p-value[1]**
	b/se/p	
dCOOP	0.087	
	0.198	
	0.662	
dTime6monthsmore	-0.291	** (0.047)
	0.144	
	0.047	
dCanada	-0.218	
	0.291	
	0.458	
CONTINUATION	0.098	
	0.081	
	0.228	
SATISFACTION	0.174	** (0.080)
	0.098	
	0.080	
PARTI_FUTUR	0.222	** (0.025)
	0.097	
	0.025	
RECRUITEMENT	0.057	
	0.083	
	0.493	
_cons	1.942	
	0.498	
	0.000	
N	82.000	
F	4.217	

Three variables have an impact on shared value created for organizations: *dTime6monthsmore*, SATISFACTION and PARTI_FUTUR. All three have the same significance level ("**").

The relation between *dTime6monthsmore* and *ECO_ORGA* is negative (-0.291) which means that the impact on shared value created for organizations is greater when participants participated less than 6 months before they completed the survey. So participants who recently took part in the event reported more creation of shared value for their organization.

The relation between SATISFACTION and *ECO_ORGA* is positive (0.174) which means that events with satisfied participants have more impact on the shared value created for organizations than events with less satisfied participants.

The relation between PARTI_FUTUR and *ECO_ORGA* is positive (0.222) which means that events with participants who want to participate in OI events again have more impact on the creation of shared value for organizations.

The **Hypothesis 3b:** *Open innovation events create shared value for the organizations in the innovation ecosystem* is **corroborated** because there are significant relations between SATISFACTION, PARTI_FUTUR and ECO_ORGA. Open innovation events with solvers who are more satisfied and have intentions to participate again have an impact on the innovation ecosystem.

The **Hypothesis 3:** *Open innovation events have a positive impact on the innovation ecosystem* is also **corroborated** because the **Hypothesis 3a** and **3b** are both **corroborated.** Open innovation events create shared value for the individuals and the organizations in the innovation ecosystem and thus have a positive impact on the innovation ecosystem.

New propositions can be formulated:

Proposition 3c: *Open innovation events with satisfied solvers create shared value for the organizations in the innovation ecosystem.*

Similarly to the **Proposition 3a**, satisfied solvers are probably most likely to make a good use of open innovation and share it to their network, organization or co-workers. This could lead to the

adoption of open innovation practices at a larger scale in their organization and maybe change the way their organization innovate.

Proposition 3ac (3a et 3c combined): *Open innovation events with satisfied solvers have a positive impact on the innovation ecosystem.*

Through satisfied solvers, open innovation events can impact an entire ecosystem by creating shared value for the solvers and the organizations in the ecosystem.

Proposition 3d: *Open innovation events with solvers who intend to participate again create shared value for organizations in the innovation ecosystem.*

Having people in an organizations who are regularly involved in open innovation events can be very beneficial for the organizations. It allows the organizations to stay up to date with the ecosystem and the latest innovation practices while showing their presence at the event. Being involved in multiple events can lead to a strong presence in the ecosystem, new partnerships, access to talents and many more advantages (Gagné et al., 2021) that seem to lead to the creation of shared value for the organizations.

4.2.3 Summary of the results

Table 4.23 Summary of the results – Impact of the design on the outcomes

Concept	Hypothesis	Corroborated	Not corroborated
Impact of the design on the outcomes	**Hypothesis 1:** *The design elements have an impact on the open innovation event outcomes.*	**X**	
	Hypothesis 1a: *Solvers with more experience in open innovation events have a higher chance to continue working on their project after the event.*		**X**
	Hypothesis 1b: *Solvers in contact with mentors during the open innovation event have a higher chance to continue working on their project after the event.*	**X**	
	Hypothesis 1c: *Solvers in contact with local start-up ecosystem during the open innovation event have a higher chance to continue working on their project after the event.*		**X**
	Hypothesis 1d: *The solver satisfaction and intention to participate again is higher when they are in contact with mentors during the event.*	**X**	
	Hypothesis 1e: *Solvers in contact with mentors during the open innovation event have a higher chance to be recruited after the event.*		**X**
	Hypothesis 1f: *Solvers in contact with actors from the local start-up ecosystem during the Open Innovation event have a higher chance to be recruited after the event.*		**X**

Table 4.24 Summary of the results - Moderating role of the motivation

Concept	Hypothesis	Corroborated	Not corroborated
Moderating role of the intrinsic motivation	**Hypothesis 2:** *The intrinsic motivation of solvers has a moderating effect on the relation between open innovation design and outcomes.*	**X**	
	Hypothesis 2a: *The intrinsic motivation of solvers has a negative moderating effect on the project continuation after the open innovation event.*		**X**

Table 4.25 Summary of the results - Impact on the innovation ecosystem

Concept	Hypothesis	Corroborated	Not corroborated
Impact on the innovation ecosystem	**Hypothesis 3:** *Open innovation events have a positive impact on the innovation ecosystem.*	**X**	
	Hypothesis 3a: *Open innovation events create shared value for the individuals in the innovation ecosystem.*	**X**	
	Hypothesis 3b: *Open innovation events create shared value for the organizations in the innovation ecosystem.*	**X**	

New propositions have been found and gathered in Table 4.26. These propositions result from new relations explored outside of the hypothesis. The linear regressions performed between all the

dependent and independent variables have highlighted new relations that weren't in the hypothesis initially.

Table 4.26 Summary of the propositions

Concept	Number	Proposition
Impact of the design on the outcomes	**Proposition 1a**	*Solvers who participate in an offline open innovation event are more susceptible to continue working on their project after the event than those who participated in an online event.*
	Proposition 1b	*Solvers who are more in contact with the local start-up ecosystem are more satisfied of the open innovation event.*
	Proposition 1c	*Solvers who participate in an offline open innovation event are more satisfied of the event than participants who participated in an online event.*
	Proposition 1d	*Solvers who are more in contact with the local start-up ecosystem are more susceptible to participate again in open innovation events.*
	Proposition 1e	*Solvers who participate in more than one event are more susceptible to participate again in open innovation events.*
Moderating role of the intrinsic motivation	**Proposition 2a**	*Intrinsically motivated solvers are more satisfied of their open innovation event.*
	Proposition 2b	*The solver intrinsic motivation has a negative impact on the relation between their contact with the local start-up ecosystem and their satisfaction.*
	Proposition 2c	*Intrinsically motivated solvers are more are more susceptible to participate again in open innovation events.*
	Proposition 2d	*The impact of the solvers' experience on their intention to participate again decreases when their intrinsic motivation increases.*
Impact on the innovation ecosystem	**Proposition 3a**	*Open innovation events with satisfied solvers create shared value for the individuals in the innovation ecosystem.*
	Proposition 3b	*Open innovation events that offer career opportunities to the solvers create shared value for the individuals in the innovation ecosystem.*

Table 4.26 Summary of the propositions (cont'd and end)

	Proposition 3c	*Open innovation events with satisfied solvers create shared value for the organizations in the innovation ecosystem.*
	Proposition 3ac	*Open innovation events with satisfied solvers have a positive impact on the innovation ecosystem.*
	Proposition 3d	*Open innovation events with solvers who intend to participate again create shared value for organizations in the innovation ecosystem.*

4.3 Discussions

This section highlights the results and provides explanations and discussions based on the literature review to try to justify the results and their implications. The discussion is segmented into three parts. The first part focuses on the constructs developed and validated to measure the intrinsic motivation, the events' outcomes and their impact on the ecosystem. The second part focuses on the relation between events' design and outcomes with the role of the intrinsic motivation. Finally, the third part focuses on the impacts of the events' outcomes on the ecosystem.

4.3.1 Measuring Open innovation events outcomes, intrinsic motivation and impact on the ecosystem

Measuring open innovation events outcomes is a recent subject of research and there is a lack of validated constructs allowing to precisely measure them. But in order to study these outcomes and how to achieve them it is essential to develop valid and reliable measure instrument. This research aimed to improve the open innovation outcomes literature by developing new valid and reliable constructs to efficiently measure these outcomes. Some existing constructs from the open innovation events literature were adapted and enriched with new items and some constructs were adapted from a different literature.

Previously, project continuation has been measured by Olson et al. (2017) with a 5 items construct. A sixth item from Zheng et al. (2011) has been added and validated to enrich the construct. This sixth item measured if the project became the solvers' primary source of income. This new improved construct seems to make more sense because the financial aspect of the project is a key

element to the project continuation that wasn't measured before. The impact of the financial aspect of the project on its continuation should be a central aspect to study in the future and a priority for researchers and promoters since most start-ups fail because of bankruptcy even before launching their first product.

A fifth item measuring the enjoyment of solvers to "apply their skills" from Mair et al. (2015) has been successfully added to the four items construct previously validated by Acar (2019). Since intrinsically motivated people derive pleasure from the activity itself and will perform it more intensely to meet the project's requirements (Acar, 2019; Ryan & Connell, 1989; Ryan & Deci, 2000; Zheng et al., 2011), it seems logical that applying their skills is an important measure of their intrinsic motivation and that intrinsically motivated people will derive more pleasure in the activity if they can apply their skills while doing it.

The results also indicate that the solvers' retention can be measured using concepts from the management literature like customer satisfaction and intention to buy or contribute again in the future. But these concepts must be separated in the context of open innovation events. There isn't sufficient literature on solvers' retention to explain this result but the sample characteristics can explain part of it. In fact, 75% of the solvers came from the Coopérathon where most solvers only participate once due to the four days of workshops before they can present their project. It seems then logical that the solvers' satisfaction and intention to participate again are not correlated because by design most solvers won't participate again even if they were satisfied. This result should be verified with other types of OI events such as crowdsourcing activities where, by design, solvers have more chances to contribute again.

Last but not least, the quantitative analysis has shown that the impact on the ecosystem can be measured by the creation of value for individuals and organizations. If the events contribute to these two at the same time, they contribute to the creation of shared value for the entire innovation ecosystem. The shared value created can be measured by two constructs: the first one measures the value creation for individuals with 4 items and the second one measures the value creation for organizations with 8 items. This corroborates the impressions of experts in the field and open innovation promoters that the impact on the innovation ecosystem can be measured by the creation of shared value for the individuals and the organizations. It also supports the theory that open innovation events act as a "middleground" between the "underground" composed of informal

individuals and the “upperground” composed of organizations to create shared value in the ecosystem (Cohendet et al., 2020). This theory was developed in the Montreal Video Game industry and seems to be applicable in the open innovation event context. Measuring the impact on the innovation ecosystem is still understudied and these findings contribute to a first step towards a better understanding of this subject.

4.3.2 Relations between design and outcomes

This research has highlighted relations between open innovation events design and outcomes. This section focuses on explaining the reasons behind some relations by comparing them to the existing literature while proposing new relations that should be further investigated.

Surprisingly, no relation was found between the solver’s experience and the project continuation. The experience was suspected to have a positive impact on the project continuation since experienced participants have a better understanding of what it takes to make a project successful and can anticipate most of the obstacles they will face. A possible explanation could be the fact that experienced solvers developed better skills to perform during the event and satisfy the event’s requirement but that they did not gain as much experience on how to make the project work beyond the event. It seems that they gained experience to perform for the event but didn’t gain as much experience in developing a successful project outside the scope of the event. It would be interesting to test these results again with crowdsourcing participants that tend to participate to multiple projects and gain more experience from them (Acar, 2019). In fact, in crowdsourcing activities the end goal is to deliver a practical and usable project where solvers in hackathons or other time-bonded competitions don’t have enough time to bring their project to their maximal potential during the event. It could be interesting to create events that fit the market and consumer reality while giving the opportunity to the solvers to bring their project to life during the event. Indeed, some events are too focused on solving their specific problems or giving knowledge to the participants without implied actors from the market and focusing on their needs (Nolte et al., 2020b).

As expected, the positive impact of the presence of mentors on the project continuation has been verified. Two reasons can support these results: the mentors can share their network with the solvers and their experience which can contribute to give a strong foundation to the project and increase its chance of continuation (Carruthers, 2014; Nolte et al., 2018; Pe-Than et al., 2020). Another explanation could be that the participants and their mentors stay connected after the event

and that the solvers are still benefiting from the mentor support and experience after the event which is an important aspect in entrepreneurship.

Although previous research has suggested that involving the solvers in business accelerators or bootcamps can have a positive impact on entrepreneurship and project continuation (Chowdhury, 2012; Medina & Nolte, 2020; Nolte et al., 2018), no relation has been found between the contact with the local start-up ecosystem and the project continuation. This result is surprising and could be explained by the fact that the solvers who benefit the most from the presence of the local start-up ecosystem are the founders of start-ups who see the event as a way to expand their business (Nolte, 2019) so they might not consider it as "project continuation" but more as a "business expansion". This dimension could be added to the "project continuation" outcome or become a new outcome on its own. Another reason could be that the contact with mentors could be considered as contact with the local start-up ecosystem even if the correlation matrix does not show any conflict between the two. It could be possible that the contact with mentors was taking significant relation from the contact with the start-up ecosystem. Some solvers can also miss connections with the local start-up ecosystem if they are intrinsically motivated and too focused on solving the problem and think that it is a waste of time and energy (Acar, 2019). The promoters could try to identify these solvers and show them the benefits of connecting with actors from the ecosystem. The fact that most solvers contacted have participated to an online event during the COVID-19 pandemic can explain the absence of impact of the presence of the local start-up ecosystem. Their impact has probably been diminished by the configuration of the event since establishing strong connections is harder online.

Offline events have a positive impact on the project continuation. This result seems to make sense since project continuation depends on team characteristics such as diversity, skills and connection between members (Nolte, 2019). Creating a strong team and establishing connections between team members is easier in person than remotely. Important aspects for creating a product such as creating a prototype and being in direct contact with customers are also more challenging in an online context than an offline one. The literature comparing online and offline open innovation evens is still scarce due to the recent nature of the spike of interest because of the COVID-19 pandemic. The results on the configuration of the events presented in this thesis are quite trivial and exploratory but still are a first step to the understanding of the impact of the change of configuration due to the COVID-19 pandemic. From these first results, it seems that offline events

are still more efficient than online events and that replacing offline events with online events after the pandemic will do more harm than good even if online events are less expensive to organize and can be accessed from all over the world.

As expected, the presence of mentors has a positive impact on the solver satisfaction and their intention to participate again. This results confirms qualitative results from the literature that states that solvers who have been followed by a mentor during the event report a higher satisfaction of their learning gains and project outcome as well as more interest in the community that organized the event (Nolte et al., 2020a). It could be interesting to further the research by understanding which aspect of the mentoring experience made the solvers more satisfied and willing to participate again.

Solvers are also more satisfied and willing to participate again when they are in contact with the local start-up ecosystem. Probably for the same reasons that made them more satisfied to be followed by a mentor and the fact that being in contact with the local start-up ecosystem fulfills some of their needs during the event such as building relationships (Lampel et al., 2012), staying connected to their network and receiving added value (Gagné et al., 2021). This relation is negatively impacted by the intrinsic motivation, the more the solvers are intrinsically motivated, the less the contact with the local start-up ecosystem has an impact on their satisfaction. This could be explained by the fact that intrinsically motivated people like to focus more on the task they are doing and on the problem itself (Acar, 2019; Ryan & Connell, 1989; Ryan & Deci, 2000) and that they do not want their focus to be taken by another activity like networking or following a presentation by an incubator. This aspect should be carefully managed by the promoters and mentors to ensure that intrinsically motivated teams and solvers do not miss opportunities.

It also seems that solvers who participate in an offline event are more satisfied than solvers from an online event. This result seems logical since promoters should “provide an environment for participants that fosters the desired outcome” (Nolte, Alexander et al., 2020). Promoters have more control over the solvers’ environment when the event is offline and can offer a better experience to them. In online events, important parts of the experience are lost such as in person networking, food, activities and working in a motivating environment filled with people with the same goal. Online events could be improved by reducing the length of the calls and the number of people in the breakout rooms to incite every participant to contribute to the conversation. Members of the organization team could also go from rooms to rooms to ensure that everything is working and that

everyone feels included in the discussion. More research is still needed on how to improve the quality of these online events and the difficulties appear mostly for events that were previously offline and had to transition to online due to the COVID-19 pandemic.

There is a direct positive impact of the intrinsic motivation and the solver satisfaction and intention to participate again. It seems that the more intrinsically motivated they are the more satisfied they are. A possible explanation for this is the fact that the sample is composed of a majority of participants coming from the Coopérathon which is an event that starts with four workshops each separated by one week and that allows solvers to work independently on their project at their own rhythm. Intrinsically motivated people like to have a high degree of autonomy (Acar, 2019; Ryan & Connell, 1989; Ryan & Deci, 2000). But in general, the impact of the configuration on the satisfaction should be further studied with different types of events.

Solvers are more willing to participate again when they already have more experience in open innovation events. Unfortunately, no literature has been found to explain that relation. It would be interesting to further the research to understand if the solvers are more willing to participate in the same event or a different one. Since the events tend to be more cyclical with recurring editions it would be interesting for promoters to know if they should target solvers from their past events or from other events to have the best participation rate. Removing barriers to entry is a key aspect for increasing diversity and participation (Jeppesen & Lakhani, 2010) and understanding how experienced solvers choose their next event could help a lot to remove these barriers and create better events. This relation is negatively impacted by the intrinsic motivation, the experience has less impact on the intentions to participate again when the solvers are intrinsically motivated. No possible explanation could be found for the phenomenon and should be further investigated in the future.

Unfortunately, no relation has been found between the career opportunities for solvers and the design of the event. This could be attributed to the small sample size used for this set of regressions due to a lower rate of response from the respondents (N = 90) and that there is probably a small number of solvers who get career opportunities from the event. These two reasons combined can explain that no quantitative results were found. The questions about career opportunities are maybe too sensitive or not adapted to the solvers. The absence of relation is probably due to the fact that most solvers already had a job and that only 3% of the solvers were unemployed. The intrinsic

motivation didn't have any direct or moderating impact either. Probably because recruitment is more of an external reward that will appeal to extrinsically motivated solvers (Acar, 2019). It would also be interesting to measure the quality of the career opportunities instead of the number since it is more important for the solvers. The construct developed could be enriched by adding more items asking more specific questions on the career opportunities such as the number of interactions with business owners who want to recruit new people.

4.3.3 Impact on the innovation ecosystem

This section discusses how open innovation events impact the innovation ecosystem. The discussion starts by analyzing the impact of the OI events outcomes on the creation of value for individuals, then the impact of the OI events outcomes on the creation of value for organizations and finally the combination of the two to find the impact on the entire innovation ecosystem.

The project continuation doesn't seem to create value for individuals in the innovation ecosystem. This is an interesting result that contradicts the literature since the number of businesses created is an indicator of impact on the ecosystem (Gagné et al., 2021). The success of the innovation ecosystem depends on its business ecosystem and a dynamic middleground that produces shared value and inter-connected businesses (Cohendet et al., 2020). Therefore, it was expected that the project continuation would have a positive impact on the value creation for individuals by creating new businesses and opportunities in the ecosystem. A possible explanation could be that the project continuation and the creation of new businesses impact the creation of value on a larger scale that individuals don't perceive or that they perceive this creation of new value as an indirect and not as a direct consequence. The satisfaction of the solvers after an event has a positive impact on the creation of shared value for individuals. Satisfied solvers are probably more susceptible to share their new knowledge and skills on open innovation with other people in the ecosystem. Therefore, one satisfied solver can generate value for multiple individuals in the ecosystem and create a domino effect for a large number of individuals. The career opportunities offered to the solvers during open innovation events have a positive impact on the creation of value for the individuals in the innovation ecosystem. This seems to make sense since open innovation events could be considered as the middleground between individuals and organizations. Events that offer more career opportunities participate to fortify the link between this underground and upperground to

create stronger ecosystems filled with opportunities and collaborations to create more value for the individuals.

The project continuation doesn't have any impact on the creation of value for organizations. Again, this is an unexpected result since the creation of new businesses is usually an indicator of impact for innovation ecosystems. A possible explanation is that the project continuation on its own is not enough to impact the creation of value for the organizations. This concept could be coupled with other concepts such as the quality of the businesses, the number of partnerships created or the number of jobs created. Another possibility could be to add items to the project continuation to create a new construct that captures more information on the creation of new businesses in the ecosystem. As for the individuals, the satisfaction of the solvers has a positive impact on the creation of value for organizations. This could be explained by the fact that satisfied individuals will go back to their organizations after the event with more intentions to change their innovation practices than unsatisfied solvers. By sharing their knowledge on open innovation with their colleagues and hierarchy they could slowly change the way their organization innovates. And on its turn, the organizations could inspire other organizations to change the way they innovate and create more partnerships and creation of value for other organizations. The intentions of solvers to participate to other events in the future has a positive impact on the creation of value for organizations. This makes sense since collaboration is at the heart of a strong ecosystem and that solvers who keep participating in events will probably keep their connections from one event to the other with the other solvers or organizations. Participating to multiple events can improve the innovation mindset which can "affect many members of an ecosystem and can have important ripple effects" (Cheng et al., 2018, p. 38). It also seems like solvers who recently participate to the event (less than 6 months ago) report more value creation for their organization. Probably that after 6 months the solvers don't see the direct impact of the event anymore or that the lifespan of the benefits from the event is short. The first assumption makes more sense since open innovation events can have long-term effects on organizations.

In conclusion, the only outcome that positively impacts the value creation for individuals and organizations is the satisfaction of solvers. Since it impacts the value creation for individuals and solver it is supposed to contribute to the creation of shared value for the entire innovation ecosystem and thus have a positive impact on the innovation ecosystem. It seems logical that satisfied solvers will create a better innovation ecosystem than unsatisfied solvers. It also verifies that a strong

ecosystem is “led by the passion of individuals” and that an ecosystem composed of satisfied and positive individuals will have a higher “power of attractiveness”. “Passionate individuals are key in developing the ability of an ecosystem of innovation to cope with disruptive ideas and to quickly reconfigure its structures” (Cohendet et al., 2020).

CHAPTER 5 CONCLUSION AND RECOMMENDATIONS

5.1 Thesis contributions

This thesis has achieved results and provided contributions to the open innovation events literature on multiple levels. This section summarizes these results and contributions.

First, it has contributed to improve the constructs to measure the solvers intrinsic motivation, the OI events outcomes and their impact on the environment. A new construct has been developed to measure the solver motivation. From the 6 items retrieved from the open innovation literature, 5 have been validated to contribute to the measure of the solver motivation. A new construct to measure the project continuation has been assembled from the OI literature and the 6 items have been validated. A global construct measuring the solver retention couldn't be validated, the satisfaction and the intention to participate in the future have to be measured separately. A new construct with 3 items from the business literature has been validated to measure the career opportunities for the solvers. And finally, two new constructs have been developed and validated to measure the creation of value for individuals and organizations and the impact on the innovation ecosystem when they are combined. These achievements have helped to solve the specific problematic and add to the open innovation event literature.

Second, this thesis has investigated the relations between open innovation events design and outcomes. It has been found that the design of the OI event has an impact on its outcomes. More specifically, experience solvers are more willing to participate again, offline events have a positive impact on the project continuation and the solver satisfaction, the contact with mentors has a positive impact on the project continuation, the solvers satisfaction and their intentions to participate again. And the contacts with the local start-up ecosystem have a positive impact on the solvers satisfaction and their intention to participate again. These relations have helped to answer our general problematic and first research question: open innovation events design have an impact on the events outcomes.

Third, the moderating role of the solver's intrinsic motivation on these relations has been investigated. It appeared that the intrinsic motivation has a negative impact on the relation between the contact with the local start-up ecosystem and the solver satisfaction. It also has a negative impact on the relation between the experience of the solvers and their intention to participate again.

It has also been found that the intrinsic motivation has a direct positive impact on the satisfaction of solvers and their intention to participate again.

Finally, this thesis has added to the literature by giving new insights on how open innovation events create value for individuals, organizations and how these two combined create shared value for the entire innovation ecosystem. The results showed that the satisfaction of the solvers and the career opportunities provided by the event has a positive impact on the creation of value for individuals. The satisfaction of the solvers and their intention to participate again has a positive impact on the creation of value for organizations. Thus, open innovation events with satisfied solvers have a positive impact on the creation of shared value for the entire innovation ecosystem. These results answered the second research question: open innovation events have a positive impact on their ecosystem.

In summary, the contributions for open innovation are the validation of constructs measuring the outcomes of open innovation events and the intrinsic motivation of the solvers as well as the relations between design and outcomes. Four indicators of success of open innovation events have been validated: the project continuation, the satisfaction of the solvers, the intention to participate again and the career opportunities. The contributions to innovation ecosystem are the creation and the validation of two new constructs measuring the creation of value for the individuals and the organizations in the ecosystem as well as identifying the events outcomes that positively impact the ecosystem.

5.2 Implications for theory and practice

This thesis has multiple implications for the open innovation event literature as well as for the open innovation events practitioners.

This research has filled knowledge gaps and adds new perspectives to the extant literature. The creation and validation of new constructs to measure the intrinsic motivation, the OI events outcomes and the creation of value for organizations and individuals should benefit future research on OI events by giving them better instruments to capture these concepts. This thesis has also filled gaps in understanding the relations between OI design and outcomes and should help future researchers to have new insights on which relations they should explore and prioritize. The direct role of the intrinsic motivation has already received some attention in the OI events literature but

this research is a first insight on the moderating role of the intrinsic motivation that could open a new topic on the importance of the intrinsic motivation. The results on the moderating role of the intrinsic motivation were new and exploratory and should be further investigated by future researchers as it has been shown to have some impact on the relations between design and outcomes. This thesis represents a first step to measure and understand the impact of open innovation events on the innovation ecosystem. The lack of empirical research on the impact on the innovation ecosystem makes it difficult to justify the results of these events and this thesis provides a first step into measuring and understanding the importance of open innovation events for their innovation ecosystem. It is hoped that these new constructs and relations will open new discussions and interests for future research on open innovation events.

These theoretical results also have multiple implications for open innovation events practitioners, mainly solvers and promoters. Open innovation events promoters should carefully design their events in function of the outcomes they want to achieve. To stimulate the solvers to continue working on their project after the event they should increase the presence of mentors during the event and organize offline events. To maximize the satisfaction of the solvers, they should increase the presence of mentors and the local start-up ecosystem, organize offline events and prefer intrinsically motivated solvers. They should also pay attention to intrinsically motivated solvers who could be less satisfied with the presence of the start-up ecosystem. A recommendation could be to ask the solvers to take a quick survey to understand their motivation and adapt the activities in function of the solvers. To increase the intentions of the solvers to participate again, promoters should increase the presence of mentors and actors from the local start-up ecosystem. Recruitment intrinsically motivated solvers will also lead to having solvers who want to participate again but if the solvers are intrinsically motivated, their experience doesn't have much impact on their intention to participate again. Carefully designing the event will thus lead to the completion of their outcomes which in turn will lead to creating value for individuals and organizations in the innovation ecosystem. To create value for individuals, promoters should focus on the solver satisfaction and offering career opportunities to the solvers. To create value for organizations, promoters should focus on the solver satisfaction and increasing their will to participate again (by increasing the presence of mentors or the local start-up ecosystem for example).

On the other hand, solvers should also enter the event with the right mindset. It would be interesting for the solvers to understand what motivates them to participate in the event. If they find that they

are mainly intrinsically motivated, they should be aware that their motivation could decrease the benefits of the presence of the local start-up ecosystem. If their goal is to continue working on their project after the event, they should make sure that they are sufficiently in contact with mentors during the event and they should favor offline events over online events.

It is also important for the promoters to ensure that the solvers start with some common notions before the event. The experience of the researcher during the Coopérathon has thought him that the diversity of the background of the solvers is a strength for innovation but can also be a difficulty when the difference in skills and knowledge it too big. Therefore, it is recommended that organizers measure the skills and knowledge of the solvers on specific subjects before the event and try to give material to the ones who lack certain skills. For example, sending a short explanation on the Business Model Canvas before the event to avoid losing time and explaining it again to those who already know about it.

5.3 Research limitations

The robustness and generalizability of the results are limited by the sample size. The sample size of 122 respondents should be increased to have robust and reliable results, especially for the regressions. Unfortunately, the absence of a large and accessible database of open innovation solvers, the small response rate when the survey was shared by the promoters and the limited data collection duration made it difficult to collect enough data. For the same reasons, the sample characteristics were also limited and most respondents came from the Coopérathon and events held in Canada. This unfortunately also limits the generalizability and robustness of the results and limits the results to only one type of event. In order to maximize the significance of the results and have stronger statistical analyses, the research team has decided to keep all the data, even outside Canada. Limiting the analyses to Canadian participants only could bring an interesting outlook on the local innovation ecosystem but would also decrease the significance of the results.

The convenient and non-probabilistic nature of the sample increases the risk of having open innovation enthusiasts with extreme opinions which could bring some bias to the results. In the scope of this research, it was inevitable due to the nature of the sample but it should be considered in future research to limit the bias of the sample.

Not knowing the age, sex and origin of the respondent is also a limitation since they can have an impact on the model and bring interesting new results. In the management literature, these demographic characteristics are largely studied and recognized to play a big role. They haven't received much attention in the open innovation literature but should definitely receive more attention in the future.

As one can notice in the literature review, the literature on open innovation events is pretty limited and relies on a small number of research initiatives. The literature on open innovation events outcomes is even more limited and mostly focuses on hackathons and crowdsourcing activities and hasn't been generalized to open innovation events in a broad sense. This limits the scope of the results and discussions and limits the arguments to analyze and justify the results obtained.

The lack of research and consensus on the ways to measure open innovation outcomes and their impact on the ecosystem were also a limitation in this research. Indeed, there is a very limited number of constructs that have been validated and developed to measure these two concepts. This makes it hard to be sure that the concepts measured are accurate and relevant.

The extent of the research is also limited by the experience and the resources of the research team. For example, some triple effects were suspected but it would require more expertise and time to analyze these effects. Triple effects occur when two variables and their cross-products have a significant impact on the dependent variable, making it difficult to understand how they interact and individually affect the dependent variable. In fact, analyzing triple effects requires a lot of experience in quantitative analysis. Pushing the validation of the constructs measuring the impact on the ecosystem would require having more knowledge and learn to use a new program that goes beyond Stata 16. Indeed, a CPA with Cronbach's alpha is a good start to validate a new construct but some deeper validations can be done to make sure that the construct is valid and reliable. The number of responses to the survey could also be improved with more funding to propose rewards to respondents such as amazon gift cards as it is frequently done by other researchers. Increasing the number of responses would increase the robustness of the results.

5.4 Recommendations for future research

In the short term, future research should focus on continuing the data collection to increase the sample size and diversity. The data collection on LimeSurvey has been left open by the research

team so that the data sample size could be increased. To that effect, one could recommend re-establishing the contact with some key promoters and create new contacts with other promoters or influential actors of the Open Innovation event world.

Another recommendation is to improve the survey and the constructs to increase the response rate and collect more precise data. Since the survey was part of a broader program, it also contained parts for other actors (sponsors, promoters, intermediaries and seekers) that made the survey longer for respondents who have multiple roles. Instead, it would be better to only design the survey for solvers to make it shorter and less confusing. After taking the survey, some promoters and open innovation experts recommended to ask more questions on the timeline of the outcomes after the event ended. The question on the configuration of the event should also include a "both online and offline" option since more and more events have a hybrid configuration.

If researchers want to study the impact on the Canadian innovation ecosystem it would be interesting to redo the statistical analysis only with the Canadian respondents. In order to have significant results, researchers should continue the data collection with Canadian solvers to ensure the significance of the results. For this purpose, the database has been left open by the research team.

Future research on the subject should also continue the quantitative analysis of the results. First, the triple effects found in the regressions should be further investigated and tested to see what information they could reveal. Second, the validation of new constructs should be confirmed with exploratory and confirmatory analysis. Third, the construct on the impact on the ecosystem should be enriched with new dimensions and re-tested with exploratory and confirmatory analysis. New dimensions could include concepts such as shared-value, perception of the ecosystem and other dimensions developed by Gagné et al. (2021). And fourth, future research should continue to investigate the new relations found between open innovation events design and outcomes to help promoters achieve their desired outcomes by designing events based on empirical results.

Last but not least, open innovation events are an efficient way to apply open innovation and have the potential to impact a whole innovation ecosystem and industry. For these reasons, it is crucial to continue the research to have a better understanding of these events and how to organize them to increase their impact and outcomes. By receiving more practical recommendations based on

empirical results, promoters will have more resources to improve their events, attract more funding and create shared value for the entire innovation ecosystem.

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APPENDIX A PLOTS DEPENDENT VARIABLES IN FUNCTION OF INDEPENDENT VARIABLES

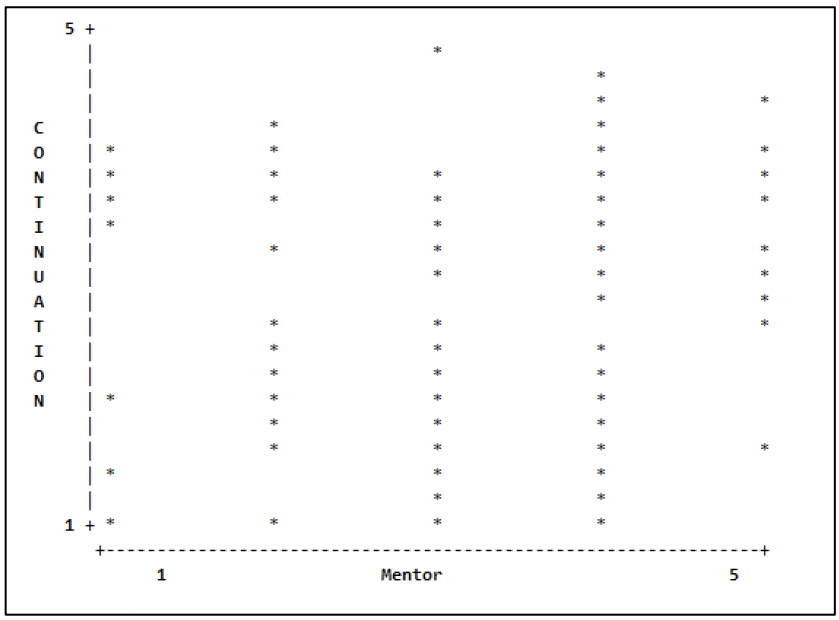

Figure A.1 Plot CONTINUATION-Mentor

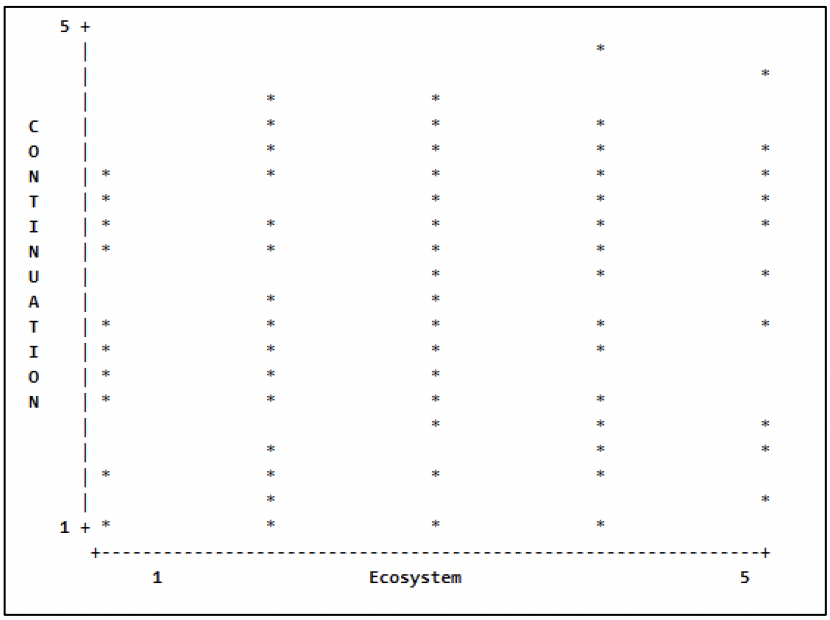

Figure A.2 Plot CONTINUATION-Ecosystem

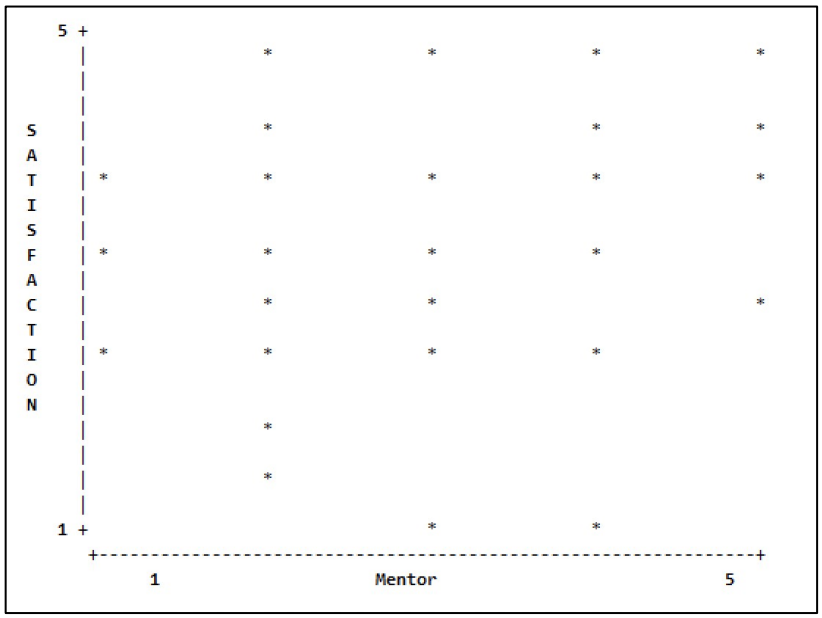

Figure A.3 Plot SATISFACTION-Mentor

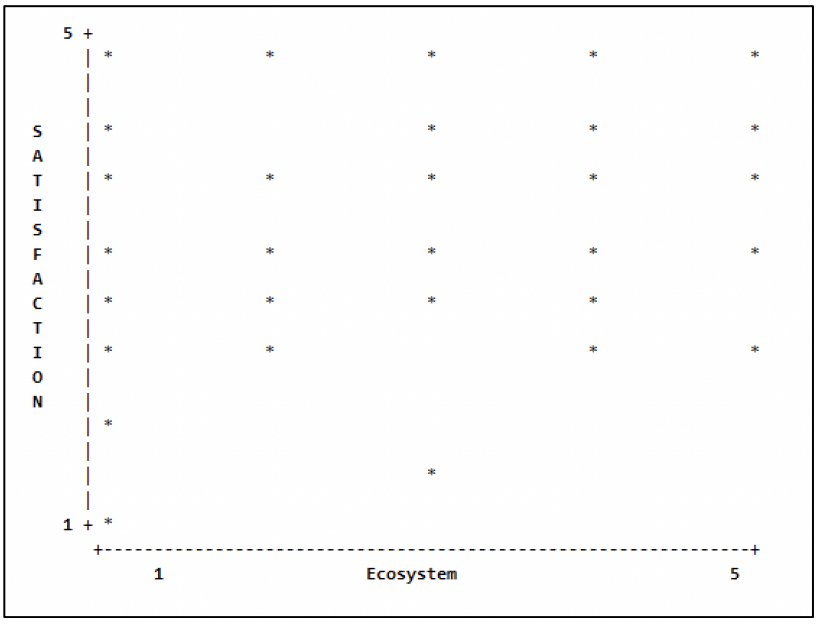

Figure A.4 Plot SATISFACTION-Ecosystem

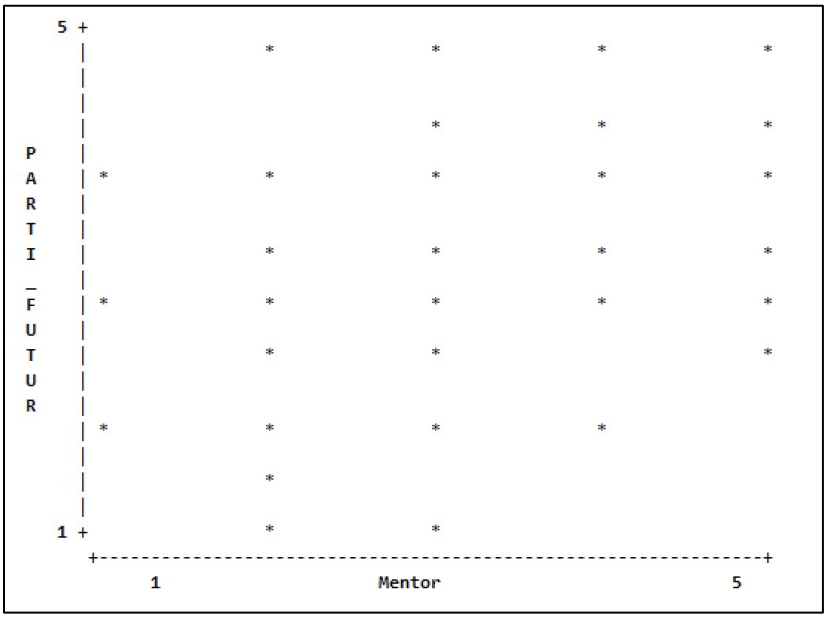

Figure A.5 Plot PARTI_FUTUR-Mentor

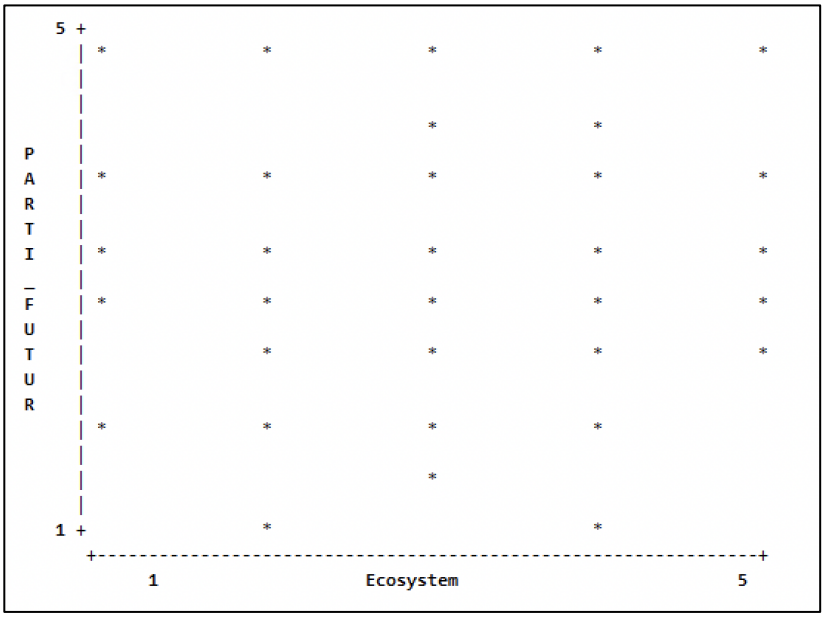

Figure A.6 Plot PARTI_FUTUR-Ecosystem

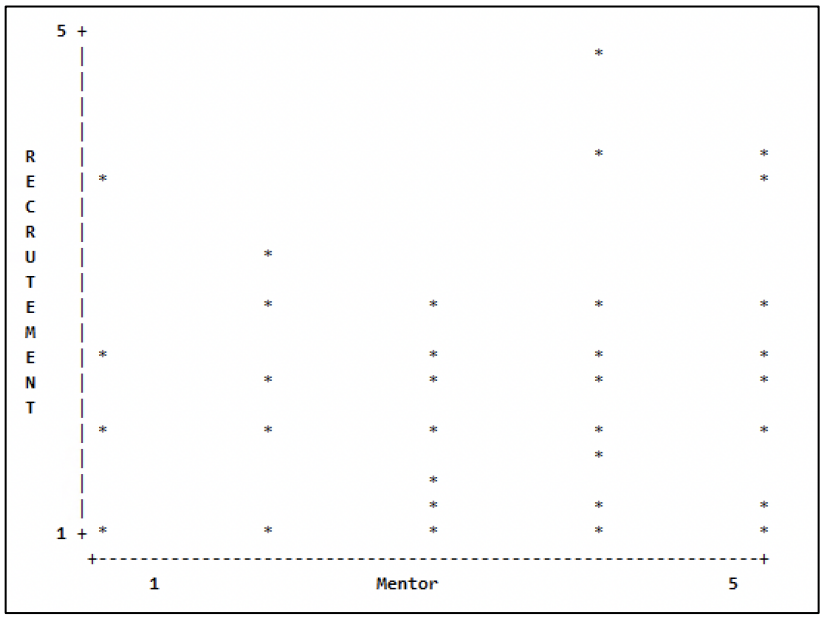

Figure A.7 Plot CAREER_OPP-Mentor

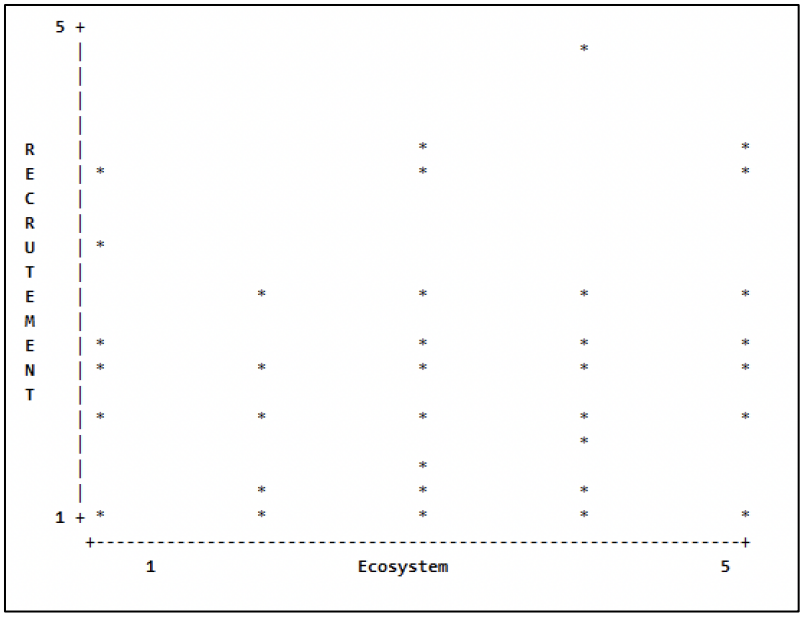

Figure A.8 Plot CAREER_OPP-Ecosystem

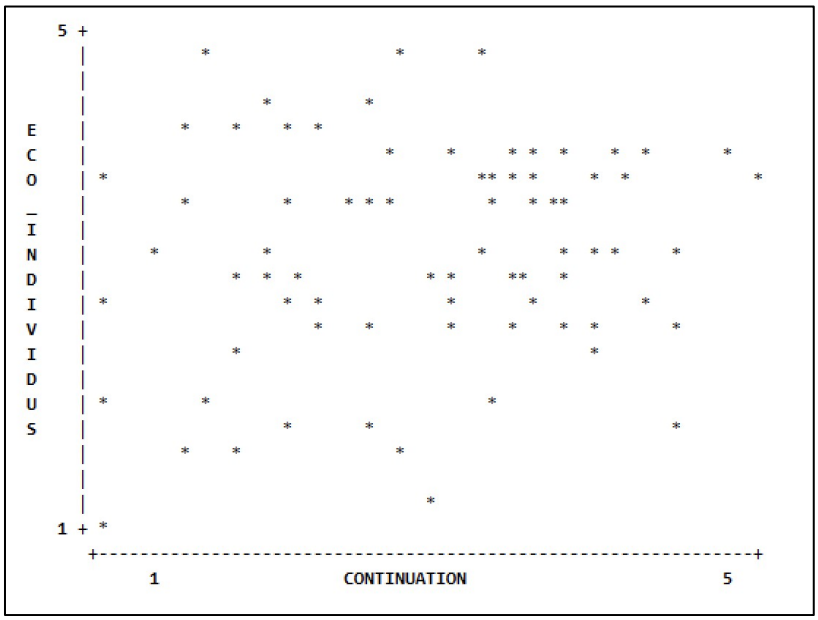

Figure A.9 Plot ECO_INDIVIDUS-CONTINUATION

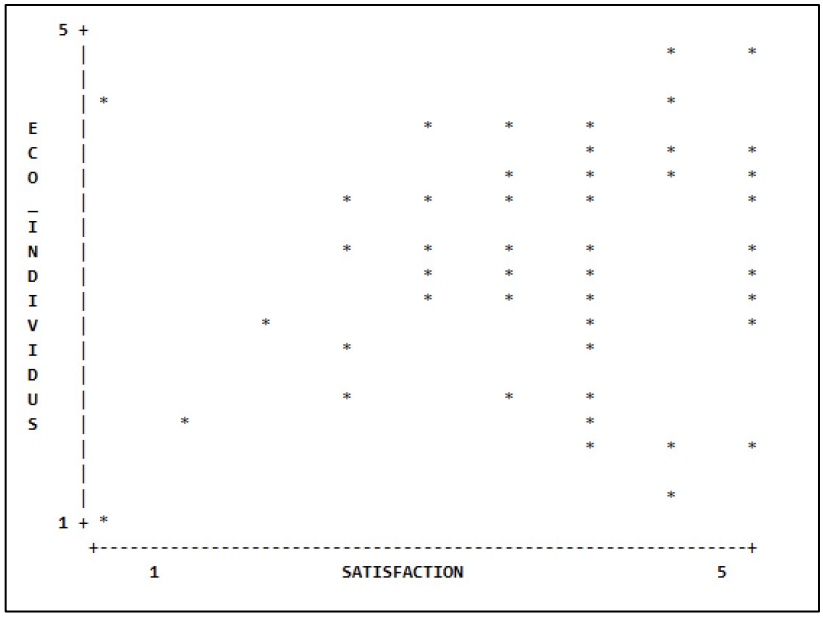

Figure A.10 Plot ECO_INDIVIDUS-SATISFACTION

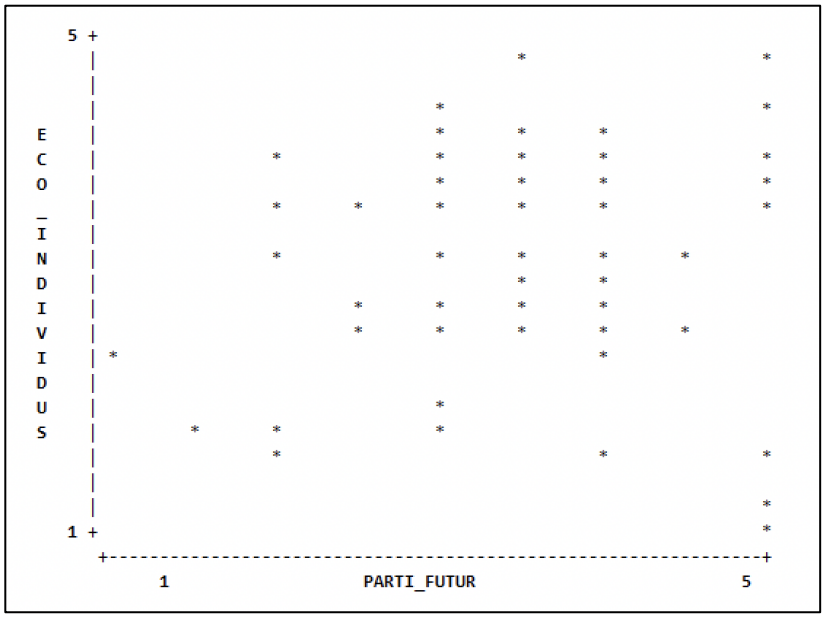

Figure A.11 Plot ECO_INDIVIDUS-PARTI_FUTUR

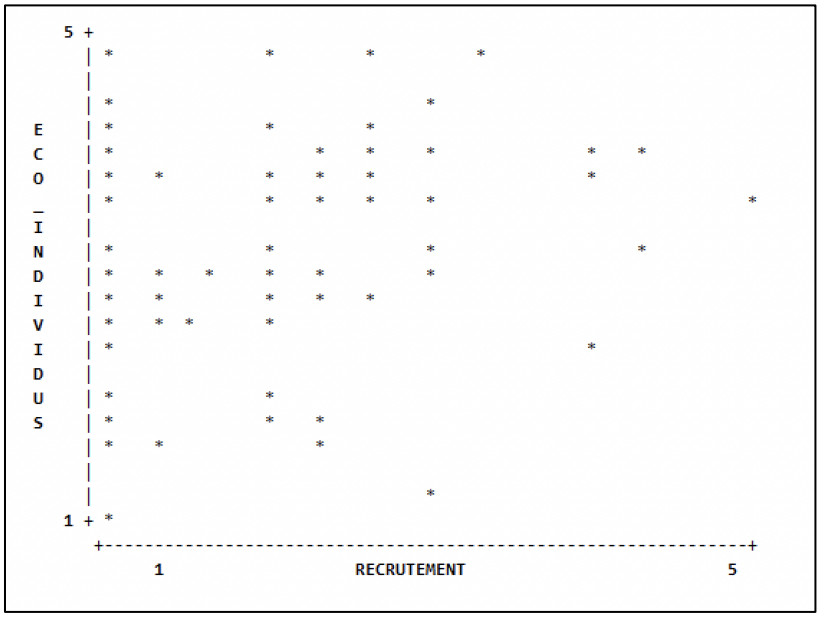

Figure A.12 Plot ECO_INDIVIDUS-CAREER_OPP

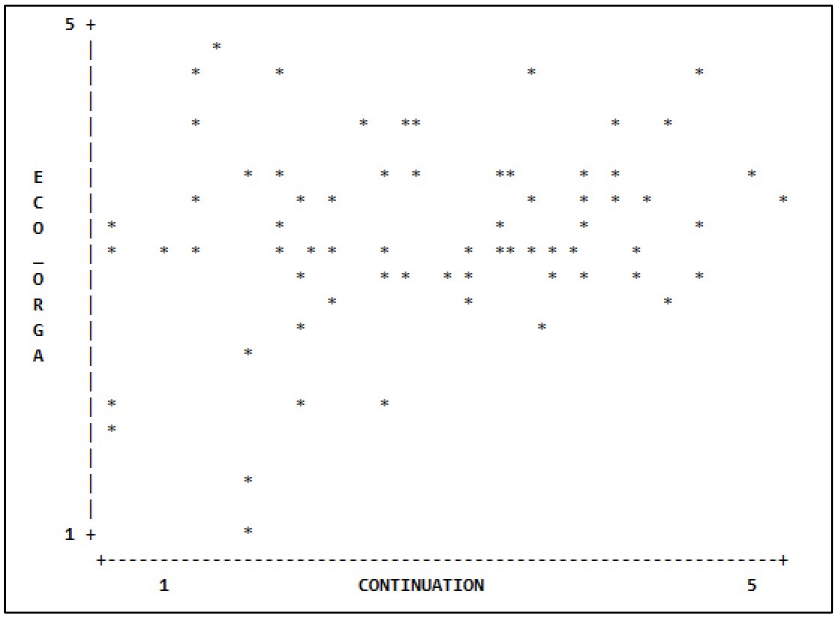

Figure A.13 Plot ECO_ORGA-CONTINUATION

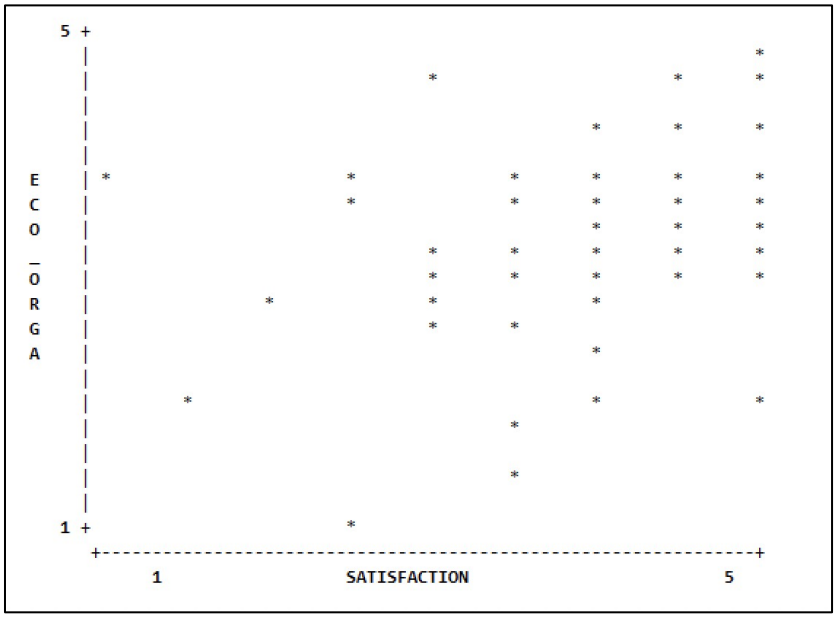

Figure A.14 Plot ECO_ORGA-SATISFACTION

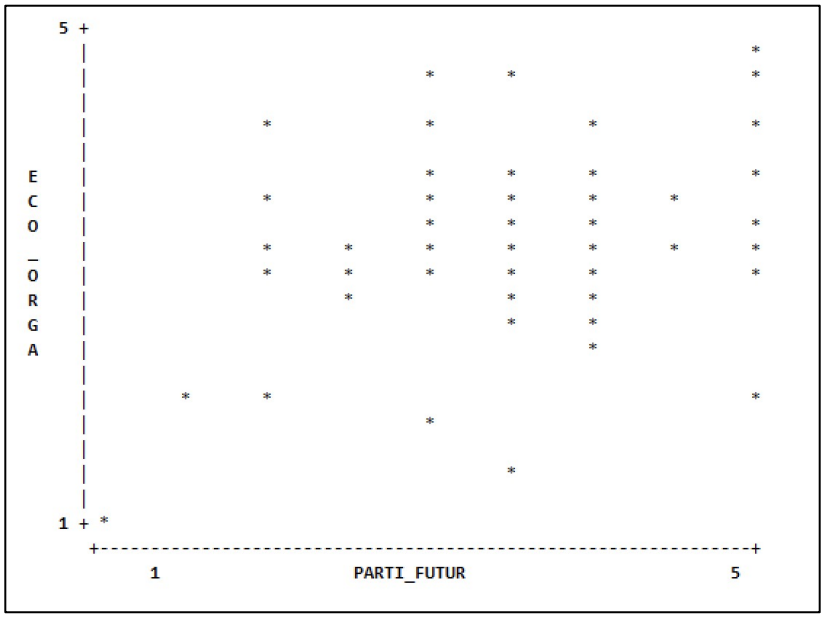

Figure A.15 Plot ECO_ORGA-PARTI_FUTUR

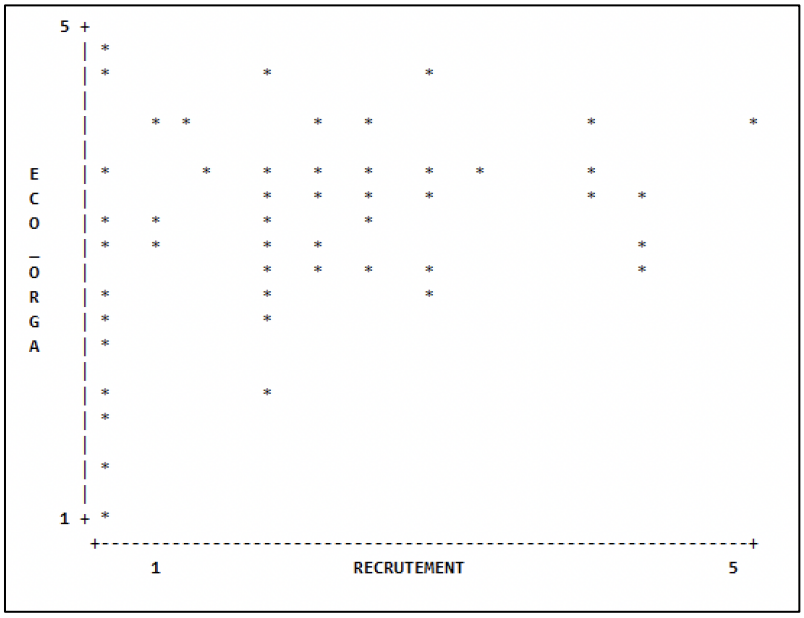

Figure A.16 Plot ECO_ORGA-CAREER_OPP

APPENDIX B SURVEY IN ENGLISH

Open innovation events outcomes

Dear participant,

You have been invited to complete this survey because you recently took part in an open innovation event.

Open innovation has transformed the way companies innovate, mostly through a new form of events: open innovation events. Open Innovation often takes place during special events organized to foster innovation in order to solve specific problems.

This study aims to answer recent calls for practical, manageable policy instruments to stimulate regional innovation systems. This study helps shape policy to effectively use funds and, more importantly, regional networks to facilitate local open innovation (LOI) through events.

By completing this survey you will help to develop and test new indicators of open innovation events outcomes and develop factual arguments for specialists and promoters to diffuse open innovation events. This will enable us to generate recommendations about best practices of open innovation events organization and promotion.

This survey takes approximately 15 minutes to complete.

In advance, thank you for your participation.

There are 35 questions in this survey.

[ALL] Section A: Open innovation event experience

Open innovation is defined as "a distributed innovation process based on purposively managed knowledge flows across organizational boundaries".

Open innovation events are organized at a specific time and place (online, offline or both) to stimulate innovation and collaborations in order to solve particular problems. They can take the form of hackathons, citizen science conferences, crowdsourcing activities, virtual design competitions, cooperathons and co-creation workshops.

1 How many open innovation events have you attended?

Please choose **only one** of the following:

- ◯ I have never attended any open innovation event
- ◯ One
- ◯ Two
- ◯ More than two

2 What is the last open innovation event you were a part of?

Please choose **only one** of the following:

- ◯ Hacking Health
- ◯ Coopérathon
- ◯ Génie en affaires
- ◯ Aéro Montréal
- ◯ AquaHacking
- ◯ Other

3 When did you attend that event?

Please choose **only one** of the following:

- ◯ Less than 6 months ago
- ◯ Between 6 months and 1 year ago
- ◯ More than 1 year ago

4 In which country did that event take place?

Please choose **only one** of the following:

- ◯ Australia
- ◯ Belgium
- ◯ Brazil
- ◯ Canada
- ◯ Chili
- ◯ France
- ◯ Germany
- ◯ Greece
- ◯ Malaysia
- ◯ Mexico
- ◯ Netherlands
- ◯ Switzerland
- ◯ Tunisia
- ◯ United Kingdom
- ◯ United States of America
- ◯ Other

5 What roles have you played during the last open innovation event you were a part of?

Please choose **all** that apply:

- ☐ I solved a problem proposed during the event (solver/participant)
- ☐ I or my company/organization proposed a problem to be solved by participants during the event (seeker)
- ☐ I or my company/organization helped fund and organize the event (sponsor)
- ☐ I had various roles during the event including supporting collaboration between actors (e.g. mentoring, training workshops) (intermediary)
- ☐ I promoted the event (marketing, supporting innovation ideas, promoting relations between actors, recruiting participants) (promoter)

Section B: Open Innovation events design

This section will help us understand the design of the last open innovation event you attended.

6 [ALL] What was the format of the open innovation event?

Please choose **only one** of the following:

- ◯ Online
- ◯ Offline

7 [ALL] How long was the open innovation event?

Please choose **only one** of the following:

- ◯ A couple of hours
- ◯ A half day
- ◯ One full day
- ◯ Two days
- ◯ Three days
- ◯ More than three days

8 [SOLVER] Please indicate the frequency at which you experienced the items below:

Please choose the appropriate response for each item:

	1 - Never	2 - Rarely	3 - Occasionally	4 - A moderate amount	5 - A great deal	Not applicable
Contact with mentors/coaches during the open innovation event	◯	◯	◯	◯	◯	◯
Contact with the local startup ecosystem* during the open innovation event	◯	◯	◯	◯	◯	◯

*Startup ecosystem: network of people, entrepreneurs, organizations and startups fostering the creation and scaling of new startups.

9
[ALL-SOLVER] Please indicate the frequency at which you experienced the items listed below:

Please choose the appropriate response for each item:

	1 - Never	2 - Rarely	3 - Occasionally	4 - A moderate amount	5 - A great deal	Not applicable
Providing mentoring/coaching to the participants	◯	◯	◯	◯	◯	◯
Facilitating contact between participants and the local startup ecosystem*	◯	◯	◯	◯	◯	◯

*Startup ecosystem: network of people, entrepreneurs, organizations and startups fostering the creation and scaling of new startups.

[Solver] Section C: Motivation

This section is designed to understand your motivations for taking part in an open innovation event.

10
[Intrinsic] Please indicate the level of importance of the following statements. I took part in an open innovation event because I enjoyed:

Please choose the appropriate response for each item:

	1 - Not important	2 - Of little importance	3 - Moderately important	4 - Important	5 - Extremely important	Not applicable
Creating new things	◯	◯	◯	◯	◯	◯
Solving problems	◯	◯	◯	◯	◯	◯
The feeling of being intellectually challenged	◯	◯	◯	◯	◯	◯
The feeling of satisfaction from solving a problem	◯	◯	◯	◯	◯	◯
Applying my skills	◯	◯	◯	◯	◯	◯
Finding a solution to a problem I care about	◯	◯	◯	◯	◯	◯

[Solver] Section D: KPI

This group of questions will help us understand open innovation events outcomes.

11 [Solution Sustainability] Please indicate the extent to which you agree with the following statements:

Please choose the appropriate response for each item:

	1 - Strongly disagree	2 - Disagree	3 - Neither agree nor disagree	4 - Agree	5 - Strongly agree	Not applicable
I have continued working on my project since the open innovation event	◯	◯	◯	◯	◯	◯
My project has evolved a great amount since the open innovation event	◯	◯	◯	◯	◯	◯
I have created a new company for that project	◯	◯	◯	◯	◯	◯
The project from the open innovation event has been supported by a start-up incubator/accelerator	◯	◯	◯	◯	◯	◯
The project from the open innovation event has become my primary source of income	◯	◯	◯	◯	◯	◯
I have commercialized new products/services from that project	◯	◯	◯	◯	◯	◯

12

[SolverRetention] Please indicate the extent to which you agree with the following statements:

Please choose the appropriate response for each item:

	1 - Strongly disagree	2 - Disagree	3 - Neither agree nor disagree	4 - Agree	5 - Strongly agree	Not applicable
I am satisfied with my experience at the open innovation event	○	○	○	○	○	○
I will recommend this open innovation event to others	○	○	○	○	○	○
I intend to participate in this open innovation event again	○	○	○	○	○	○
I intend to participate in another open innovation event in the future	○	○	○	○	○	○
I had fun participating in the open innovation event	○	○	○	○	○	○

13 [Connections] Please indicate the extent to which you agree with the following statements:

Please choose the appropriate response for each item:

	1 - Strongly disagree	2 - Disagree	3 - Neither agree nor disagree	4 - Agree	5 - Strongly agree	Not applicable
I made new connections at the event	○	○	○	○	○	○
The new connections I made are useful	○	○	○	○	○	○
I felt comfortable contacting these new connections after the event	○	○	○	○	○	○
I made new connections based on their visibility	○	○	○	○	○	○
I made new connections based on their credibility	○	○	○	○	○	○
I am still in contact with these new connections	○	○	○	○	○	○
I got a new job thanks to the connections made at the event	○	○	○	○	○	○
I got a better position in my company thanks to the connections made at the event	○	○	○	○	○	○
I got new work opportunities thanks to the connections made at the event	○	○	○	○	○	○

14 [Biggercause] Please indicate the extent to which you agree with the following statements. Participating in the open innovation event gave me the opportunity to:

Please choose the appropriate response for each item:

	1 - Strongly disagree	2 - Disagree	3 - Neither agree nor disagree	4 - Agree	5 - Strongly agree	Not applicable
Work on something that matters	○	○	○	○	○	○
Work on real-life problems	○	○	○	○	○	○
Benefit others through my solution	○	○	○	○	○	○
Gain more visibility in the local innovation ecosystem*	○	○	○	○	○	○
Gain more credibility in the local innovation ecosystem*	○	○	○	○	○	○

*An innovation ecosystem consists of all the different players, stakeholders, and community members working together for innovation. They typically consist of universities, government, corporations, startup accelerators, venture capitalists, private investors, foundations, entrepreneurs, mentors, and the media.

15

[Motivations/Ideas] Please indicate the extent to which you agree with the following statements. Since my participation in the event I have:

Please choose the appropriate response for each item:

	1 - Strongly disagree	2 - Disagree	3 - Neither agree nor disagree	4 - Agree	5 - Strongly agree	Not applicable
More motivation to work on my job/company/projects	◯	◯	◯	◯	◯	◯
New ideas for my job/company/projects	◯	◯	◯	◯	◯	◯
Transformed my working methods	◯	◯	◯	◯	◯	◯
Discovered a new interest in innovation	◯	◯	◯	◯	◯	◯
Discovered new aptitudes for innovation	◯	◯	◯	◯	◯	◯
Discovered a new interest in entrepreneurship	◯	◯	◯	◯	◯	◯
A better understanding of my customers needs	◯	◯	◯	◯	◯	◯
Adopted a more open mentality by working with more people from different departments in my organization	◯	◯	◯	◯	◯	◯
A better understanding of the open innovation process	◯	◯	◯	◯	◯	◯
Integrated new practices in my organization's innovation management process	◯	◯	◯	◯	◯	◯
Started consulting more people outside my organization in innovation projects	◯	◯	◯	◯	◯	◯
Become more aware of the importance of maintaining dialogue with my network on an ongoing basis	◯	◯	◯	◯	◯	◯
Become more aware of the importance of documenting new ideas	◯	◯	◯	◯	◯	◯
Started involving my hierarchy in more open innovation events	◯	◯	◯	◯	◯	◯

[COMMON] Section E: Partnerships

26

Please indicate the extent to which you agree with the following statements. Taking part in the event has enabled me to:

Please choose the appropriate response for each item:

	1 - Strongly disagree	2 - Disagree	3 - Neither agree nor disagree	4 - Agree	5 - Strongly agree	Not applicable
Make new innovation partnerships	◯	◯	◯	◯	◯	◯
Create new projects with new partners that I met during the event	◯	◯	◯	◯	◯	◯
Commercialize new products/services with new partners from the event	◯	◯	◯	◯	◯	◯

[ALL] Section F: General questions

27 What is your work status?

Please choose **only one** of the following:

- ◯ Director
- ◯ Professional
- ◯ Intern
- ◯ Independent
- ◯ Business owner
- ◯ Student
- ◯ Retired
- ◯ Unemployed
- ◯ Other

28 What is the highest academic qualification you have received?

Please choose **only one** of the following:

- ◯ No high school degree
- ◯ High school degree
- ◯ Bachelor's Degree
- ◯ Master's Degree
- ◯ Doctoral Degree
- ◯ Other

29 In which field have you received your highest academic qualification?

Please choose **all** that apply:

- ☐ Nursing
- ☐ Engineering
- ☐ Computer and information science
- ☐ Mathematics
- ☐ Business and administration
- ☐ Physical and chemical sciences
- ☐ Education and teaching
- ☐ Biological sciences
- ☐ Social and behavioral sciences
- ☐ Arts
- ☐ Other:

30 In which industry is your company?

Please choose **all** that apply:

- ☐ Aerospace
- ☐ Transport
- ☐ Telecommunication
- ☐ Agriculture
- ☐ Construction
- ☐ Education
- ☐ Pharmaceutical
- ☐ Food
- ☐ Health care
- ☐ Entertainment
- ☐ Finance and insurance
- ☐ Arts, entertainment and recreation
- ☐ Other:

31 What is the size of your company?

Please choose **only one** of the following:

- ◯ Autonomous
- ◯ Small business (2-99 employees)
- ◯ Medium-sized business (100-499 employees)
- ◯ Large business (500+ employees)

32 How many years have you been working at your job?

Please write your answer here:

33 Which of the following activities are you currently performing at your job?

Please choose **all** that apply:

- ☐ Administration
- ☐ Research
- ☐ Development
- ☐ Production
- ☐ Marketing/Sales
- ☐ Distribution
- ☐ Other sales service and support
- ☐ Other:

34 What percentage of your working time is dedicated to innovation?

Please choose **only one** of the following:

- ◯ 0%
- ◯ 1-20%
- ◯ 21-40%
- ◯ 41-60%
- ◯ 61-80%
- ◯ 81-100%

35 What percentage of your working time is dedicated to open innovation?

Please choose **only one** of the following:

- ◯ 0%
- ◯ 1-20%
- ◯ 20-40%
- ◯ 40-60%
- ◯ 60-80%
- ◯ 80-100%

Thank you for your participation!

If you want to be informed of the research results, please send an email to basile.thisse@polymtl.ca and we will happily discuss them with you!

Submit your survey.
Thank you for completing this survey.

APPENDIX C SURVEY IN FRENCH

Bilan des événements d'innovation ouverte

Cher participant, chère participante,

Vous avez été invité(e) à répondre à ce sondage car vous avez récemment participé à un événement d'innovation ouverte.

L'innovation ouverte a transformé la façon dont les entreprises innovent, et ce, principalement grâce à la tenue d'une nouvelle forme d'événements : les événements d'innovation ouverte. Les activités d'innovation ouverte ont souvent lieu lors d'événements spéciaux organisés dans le but de favoriser l'innovation et résoudre des problèmes particuliers.

Ce sondage vise à répondre aux récents appels en faveur de la mise en œuvre d'instruments politiques pratiques et gérables qui puissent stimuler les systèmes d'innovation régionaux. Cette étude contribue à la conception de politiques qui permettent d'utiliser les fonds de manière efficace et, plus important encore, de soutenir les réseaux régionaux afin de faciliter l'innovation ouverte locale (IOL) par l'entremise d'événements.

En répondant à ce sondage, vous contribuez au développement et au test de nouveaux indicateurs relatifs au bilan des événements d'innovation ouverte. Ces nouveaux indicateurs pourront aider à formuler des arguments factuels et permettront aux spécialistes et aux promoteurs de diffuser une information qui soit davantage pertinente sur les événements d'innovation ouverte. Nous pourrons ainsi être en mesure d'énoncer des recommandations en ce qui concerne les meilleures pratiques pour l'organisation et la promotion d'événements d'innovation ouverte.

Répondre à ce sondage prend environ 15 minutes. Nous vous remercions à l'avance pour votre participation.
Il y a 35 questions dans ce questionnaire.

[TOUS] Section A : Expérience relative à l'événement d'innovation ouverte

L'innovation ouverte se définit comme étant « un processus d'innovation distribuée qui repose sur des flux de connaissances sciemment gérés au travers des frontières organisationnelles ».

Les événements d'innovation ouverte sont organisés dans un temps et un lieu précis (en ligne, hors ligne ou les deux) afin de stimuler l'innovation et les collaborations et de résoudre des problèmes particuliers. Ils peuvent prendre la forme de marathons de programmation, de conférences de science citoyenne, d'activités d'externalisation ouverte, de concours de design virtuel, de compétitions d'innovation ouverte (Coopérathon) ou encore d'ateliers de cocréation.

1 À combien d'événements d'innovation ouverte avez-vous participé?

Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- ◯ Je n'ai jamais assisté à un événement d'innovation ouverte
- ◯ Un
- ◯ Deux
- ◯ Plus de deux

2 Quel est le dernier événement d'innovation ouverte auquel vous avez participé?

Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- ◯ Hacking Health
- ◯ Coopérathon
- ◯ Génie en affaires
- ◯ Aéro Montréal
- ◯ AquaHacking
- ◯ Autre [ ]

3 Quand avez-vous assisté à cet événement d'innovation ouverte?

Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- ◯ Il y a moins de 6 mois
- ◯ Il y a entre 6 mois et 1 an
- ◯ Il y a plus d'un an

4
Dans quel pays cet événement d'innovation ouverte a-t-il eu lieu?

Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- ◯ Australie
- ◯ Belgique
- ◯ Brésil
- ◯ Canada
- ◯ Chili
- ◯ France
- ◯ Allemagne
- ◯ Grèce
- ◯ Malaisie
- ◯ Mexique
- ◯ Pays-Bas
- ◯ Suisse
- ◯ Tunisie
- ◯ Royaume-Uni
- ◯ États-Unis d'Amérique
- ◯ Autre [ ]

5 Quels rôles avez-vous joués lors du dernier événement d'innovation ouverte auquel vous avez participé?

Cochez la ou les réponses
Veuillez choisir toutes les réponses qui conviennent :

- ☐ J'ai résolu un problème proposé lors de l'événement (solutionneur/participant)
- ☐ J'ai ou mon entreprise/organisation a proposé un problème à résoudre aux participants lors de l'événement (chercheur)
- ☐ J'ai ou mon entreprise/organisation a contribué au financement et à l'organisation de l'événement (commanditaire/sponsor)
- ☐ J'ai joué différents rôles lors de l'événement, y compris celui de soutien à la collaboration entre les acteurs (p. ex. mentorat, ateliers de formation) (intermédiaire)
- ☐ J'ai fait la promotion de l'événement (marketing, soutien aux idées d'innovation, promotion des relations entre les acteurs, recrutement des participants) (promoteur)

Section B : La conception d'événement d'innovation ouverte

Cette section nous aidera à comprendre la manière dont était conçu le dernier événement d'innovation ouverte auquel vous avez participé.

6 [TOUS] Quel était le format de présentation de l'événement d'innovation ouverte?

Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- ◯ En ligne
- ◯ Hors ligne

7 [TOUS] Combien de temps a duré l'événement d'innovation ouverte?

Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- ◯ Quelques heures
- ◯ Une demi-journée
- ◯ Une journée complète
- ◯ Deux jours
- ◯ Trois jours
- ◯ Plus de trois jours

8 [SOLUTIONNEUR] Veuillez indiquer la fréquence à laquelle vous avez vécu les situations suivantes :

Répondre à cette question seulement si les conditions suivantes sont réunies :
La réponse était 'J'ai résolu un problème proposé lors de l'événement (solutionneur/participant)' à la question '5 [Role]' (Quels rôles avez-vous joués lors du dernier événement d'innovation ouverte auquel vous avez participé?)

Choisissez la réponse appropriée pour chaque élément :

	1 - Jamais	2 - Rarement	3 - Occasionnellement	4 - Souvent	5 - Très souvent	Sans objet
Relations avec les mentors/instructeurs lors de l'événement d'innovation ouverte	○	○	○	○	○	○
Relations avec l'écosystème de jeunes entreprises local* lors de l'événement d'innovation ouverte	○	○	○	○	○	○

*Écosystème de jeunes entreprises : réseau de personnes, d'entrepreneurs, d'organisations et de jeunes entreprises favorisant la création et l'expansion de nouvelles jeunes entreprises.

[Solutionneur] Section C : Motivation

Cette section est conçue pour comprendre vos motivations à participer à un événement d'innovation ouverte.

10
[Intrinsèque] Veuillez indiquer le niveau d'importance des éléments suivants. J'ai participé à un événement d'innovation ouverte parce que j'ai apprécié :

Choisissez la réponse appropriée pour chaque élément :

	1 - Pas important	2 - Peu important	3 - Modérément important	4 - Important	5 - Extrêmement important	Sans objet
Créer de nouvelles choses	○	○	○	○	○	○
Résoudre des problèmes	○	○	○	○	○	○
Le sentiment d'être stimulé intellectuellement	○	○	○	○	○	○
Le sentiment de satisfaction d'avoir résolu un problème	○	○	○	○	○	○
Mettre en pratique mes compétences	○	○	○	○	○	○
Trouver une solution à un problème qui me tient à cœur	○	○	○	○	○	○

[Solutionneur] Section D : Indicateurs de performance

Cet ensemble de questions nous aidera à faire le bilan des événements d'innovation ouverte.

11 [Durabilité de la solution] Veuillez indiquer dans quelle mesure vous êtes d'accord avec les énoncés suivants :

Choisissez la réponse appropriée pour chaque élément :

	1 - En profond désaccord	2 - En désaccord	3 - Ni en accord ni en désaccord	4 - En accord	5 - En parfait accord	Sans objet
J'ai continué à travailler sur mon projet depuis l'événement d'innovation ouverte	○	○	○	○	○	○
Mon projet a beaucoup évolué depuis l'événement d'innovation ouverte	○	○	○	○	○	○
J'ai créé une nouvelle entreprise pour réaliser ce projet	○	○	○	○	○	○
Le projet présenté lors de l'événement d'innovation ouverte a été soutenu par un incubateur/accélérateur de jeunes entreprises	○	○	○	○	○	○
Le projet présenté lors de l'événement d'innovation ouverte est devenu ma principale source de revenus	○	○	○	○	○	○
J'ai commercialisé de nouveaux produits/services issus de ce projet	○	○	○	○	○	○

12

[Fidélisation du solutionneur] Veuillez indiquer dans quelle mesure vous êtes d'accord avec les énoncés suivants :

Choisissez la réponse appropriée pour chaque élément :

	1 - En profond désaccord	2 - En désaccord	3 - Ni en accord ni en désaccord	4 - En accord	5 - En parfait accord	Sans objet
Je suis satisfait(e) de mon expérience lors de l'événement d'innovation ouverte	○	○	○	○	○	○
Je recommanderai cet événement d'innovation ouverte à d'autres personnes	○	○	○	○	○	○
J'ai l'intention de participer à nouveau à cet événement d'innovation ouverte	○	○	○	○	○	○
J'ai l'intention de participer à un autre événement d'innovation ouverte dans l'avenir	○	○	○	○	○	○
J'ai pris plaisir à participer à l'événement d'innovation ouverte	○	○	○	○	○	○

13 [Relations] Veuillez indiquer dans quelle mesure vous êtes d'accord avec les énoncés suivants :

Choisissez la réponse appropriée pour chaque élément :

	1 - En profond désaccord	2 - En désaccord	3 - Ni en accord ni en désaccord	4 - En accord	5 - En parfait accord	Sans objet
J'ai établi de nouvelles relations lors de l'événement	○	○	○	○	○	○
Les nouvelles relations que j'ai établies me sont utiles	○	○	○	○	○	○
Je me sentais à l'aise de communiquer après l'événement avec ces nouvelles relations	○	○	○	○	○	○
J'ai établi de nouvelles relations en fonction de leur visibilité	○	○	○	○	○	○
J'ai établi de nouvelles relations en fonction de leur crédibilité	○	○	○	○	○	○
Je suis toujours en lien avec ces nouvelles relations	○	○	○	○	○	○
J'ai un nouvel emploi grâce aux relations que j'ai établies lors de l'événement	○	○	○	○	○	○
J'occupe un meilleur poste dans mon entreprise grâce aux relations que j'ai établies lors de l'événement	○	○	○	○	○	○
J'ai eu de nouvelles opportunités de travail grâce aux relations que j'ai établies lors de l'événement	○	○	○	○	○	○

14 [Cause plus large] Veuillez indiquer dans quelle mesure vous êtes d'accord avec les énoncés suivants. Participer à l'événement d'innovation ouverte m'a donné l'opportunité de :

Choisissez la réponse appropriée pour chaque élément :

	1 - En profond désaccord	2 - En désaccord	3 - Ni en accord ni en désaccord	4 - En accord	5 - En parfait accord	Sans objet
Travailler sur quelque chose qui compte	○	○	○	○	○	○
Travailler sur des problèmes de la vie réelle	○	○	○	○	○	○
Faire bénéficier les autres de la solution que j'apporte	○	○	○	○	○	○
Gagner en visibilité dans l'écosystème d'innovation local*	○	○	○	○	○	○
Gagner en crédibilité dans l'écosystème d'innovation local*	○	○	○	○	○	○

* Un écosystème d'innovation se compose des différents acteurs, parties prenantes et membres de la communauté qui travaillent ensemble en vue de générer de l'innovation. Il s'agit généralement d'universités, de gouvernements, d'entreprises, d'accélérateurs de démarrage pour jeunes entreprises, de sociétés de capital-risque, d'investisseurs privés, de fondations, d'entrepreneurs, de mentors et de médias.

15

[Motivations/idées] Veuillez indiquer dans quelle mesure vous êtes d'accord avec les énoncés suivants. Depuis ma participation à l'événement, j'ai :

Choisissez la réponse appropriée pour chaque élément :

	1 - En profond désaccord	2 - En désaccord	3 - Ni en accord ni en désaccord	4 - En accord	5 - En parfait accord	Sans objet
Davantage de motivation envers mon travail/mon entreprise/mes projets	○	○	○	○	○	○
De nouvelles idées pour mon travail/mon entreprise/mes projets	○	○	○	○	○	○
Changé mes méthodes de travail	○	○	○	○	○	○
Découvert un nouvel intérêt pour l'innovation	○	○	○	○	○	○
Découvert de nouvelles aptitudes pour l'innovation	○	○	○	○	○	○
Découvert un nouvel intérêt pour l'entrepreneuriat	○	○	○	○	○	○
Une meilleure compréhension des besoins de mes clients	○	○	○	○	○	○
Adopté une attitude plus ouverte en travaillant avec davantage de personnes de différents départements au sein de mon organisation	○	○	○	○	○	○
Intégré de nouvelles pratiques dans le processus de gestion de l'innovation de mon organisation	○	○	○	○	○	○
Commencé à consulter davantage de personnes extérieures à mon organisation dans les projets d'innovation	○	○	○	○	○	○
Davantage conscience de l'importance de maintenir le dialogue avec mon réseau sur une base continue	○	○	○	○	○	○
Davantage conscience de l'importance de documenter les nouvelles idées	○	○	○	○	○	○
Commencé à impliquer les différents niveaux décisionnels de mon organisation dans plus d'événements d'innovation ouverte	○	○	○	○	○	○

[Chercheur] Section D : Indicateurs de performance

Cet ensemble de questions nous aidera à faire le bilan des événements d'innovation ouverte.

16 [Relations] Veuillez indiquer dans quelle mesure vous êtes d'accord avec les énoncés suivants :

Choisissez la réponse appropriée pour chaque élément :

	1 - En profond désaccord	2 - En désaccord	3 - Ni en accord ni en désaccord	4 - En accord	5 - En parfait accord	Sans objet
J'ai établi de nouvelles relations lors de l'événement	○	○	○	○	○	○
Les nouvelles relations que j'ai établies me sont utiles	○	○	○	○	○	○
Je me sentais à l'aise de communiquer après l'événement avec ces nouvelles relations	○	○	○	○	○	○
J'ai établi de nouvelles relations en fonction de leur visibilité	○	○	○	○	○	○
J'ai établi de nouvelles relations en fonction de leur crédibilité	○	○	○	○	○	○
Je suis toujours en lien avec ces nouvelles relations	○	○	○	○	○	○
J'ai reçu de nouvelles idées lors de l'événement pour résoudre certains problèmes et faire avancer mes projets	○	○	○	○	○	○

Les nouvelles idées que j'ai reçues étaient pertinentes par rapport au problème que j'ai présenté	○	○	○	○	○	○
J'ai mis en application les nouvelles idées reçues lors de l'événement	○	○	○	○	○	○
J'ai commercialisé de nouveaux produits/services à partir de solutions reçues lors de l'événement	○	○	○	○	○	○
J'ai pris plaisir à participer à l'événement d'innovation ouverte	○	○	○	○	○	○
J'ai pourvu un poste vacant dans mon entreprise grâce aux relations que j'ai établies lors de l'événement	○	○	○	○	○	○
La participation à l'événement a conduit à la création de nouveaux emplois dans mon entreprise	○	○	○	○	○	○

17

[Crédibilité] Veuillez indiquer dans quelle mesure vous êtes d'accord avec les énoncés suivants. Le fait de participer à l'événement :

Choisissez la réponse appropriée pour chaque élément :

	1 - En profond désaccord	2 - En désaccord	3 - Ni en accord ni en désaccord	4 - En accord	5 - En parfait accord	Sans objet
M'a donné plus de crédibilité dans l'écosystème d'innovation local*	○	○	○	○	○	○
M'a donné plus de crédibilité dans l'écosystème d'innovation régional *	○	○	○	○	○	○
M'a donné plus de visibilité dans l'écosystème d'innovation local *	○	○	○	○	○	○
M'a donné plus de visibilité dans l'écosystème d'innovation régional *	○	○	○	○	○	○
A mis à jour mes connaissances sur l'écosystème d'innovation local*	○	○	○	○	○	○
Correspondait avec mon travail quotidien	○	○	○	○	○	○
Correspondait avec mes valeurs personnelles	○	○	○	○	○	○
Correspondait avec la vision stratégique de mon entreprise	○	○	○	○	○	○
A accru ma motivation envers mon travail/mon entreprise/mes projets	○	○	○	○	○	○
M'a donné de nouvelles idées pour mon travail/mon entreprise/mes projets	○	○	○	○	○	○

* Un écosystème d'innovation se compose des différents acteurs, parties prenantes et membres de la communauté qui travaillent ensemble en vue de générer de l'innovation. Il s'agit généralement d'universités, de gouvernements, d'entreprises, d'accélérateurs de démarrage pour jeunes entreprises, de sociétés de capital-risque, d'investisseurs privés, de fondations, d'entrepreneurs, de mentors et de médias.

Le terme « local » fait référence à l'échelle d'une ville, comme Montréal ou Los Angeles.
Le terme « régional » fait référence à l'échelle d'une région ou d'un État, comme le Québec ou la Californie.

[COMMUN] Section E : Partenariats

26

Veuillez indiquer dans quelle mesure vous êtes d'accord avec les énoncés suivants. Participer à l'événement m'a permis de :

Choisissez la réponse appropriée pour chaque élément :

	1 - En profond désaccord	2 - En désaccord	3 - Ni en accord ni en désaccord	4 - En accord	5 - En parfait accord	Sans objet
Établir de nouveaux partenariats d'innovation	○	○	○	○	○	○
Créer de nouveaux projets avec de nouveaux partenaires que j'ai rencontrés lors de l'événement	○	○	○	○	○	○
Commercialiser de nouveaux produits/services avec de nouveaux partenaires rencontrés lors de l'événement	○	○	○	○	○	○

[TOUS] Section F : Questions générales

27 Quelle est votre situation relative à l'emploi?

Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- ◯ Directeur/directrice
- ◯ Professionnel/professionnelle
- ◯ Stagiaire
- ◯ Travailleur/travailleuse autonome
- ◯ Propriétaire d'entreprise
- ◯ Étudiant/étudiante
- ◯ Retraité/retraitée
- ◯ Sans emploi
- ◯ Autre ____

28 Quel est le niveau de diplomation le plus élevé que vous avez obtenu?

Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- ◯ Pas de diplôme d'études secondaires
- ◯ Diplôme d'études secondaires
- ◯ Baccalauréat
- ◯ Maîtrise
- ◯ Doctorat
- ◯ Autre ____

29 Dans quel domaine avez-vous obtenu votre diplôme le plus élevé?

Répondre à cette question seulement si les conditions suivantes sont réunies :
La réponse était 'Doctorat' *ou* 'Maîtrise ' *ou* 'Baccalauréat' *ou* 'Autre' à la question '28 [AcademicQualificatio]' (Quel est le niveau de diplomation le plus élevé que vous avez obtenu?)

Cochez la ou les réponses
Veuillez choisir toutes les réponses qui conviennent :

- ☐ Soins infirmiers
- ☐ Ingénierie
- ☐ Informatique et sciences de l'information
- ☐ Mathématiques
- ☐ Affaires et administration
- ☐ Sciences physiques et chimiques
- ☐ Éducation et enseignement
- ☐ Sciences biologiques
- ☐ Sciences sociales et comportementales
- ☐ Arts
- ☐ Autre: ____

30 Dans quel secteur votre entreprise œuvre-t-elle?

Répondre à cette question seulement si les conditions suivantes sont réunies :
La réponse était 'Stagiaire' *ou* 'Professionnel/professionnelle' *ou* 'Directeur/directrice' *ou* 'Autre' *ou* 'Propriétaire d'entreprise' *ou* 'Travailleur/travailleuse autonome' à la question '27 [WorkStatus]' (Quelle est votre situation relative à l'emploi?)

Cochez la ou les réponses
Veuillez choisir toutes les réponses qui conviennent :

- ☐ Aérospatiale
- ☐ Transport
- ☐ Télécommunications
- ☐ Agriculture
- ☐ Construction
- ☐ Éducation
- ☐ Pharmaceutique
- ☐ Alimentation
- ☐ Soins de santé
- ☐ Divertissement
- ☐ Finance et assurance
- ☐ Arts, divertissements et loisirs
- ☐ Autre: ____

31 Quelle est la taille de votre entreprise?

Répondre à cette question seulement si les conditions suivantes sont réunies :
La réponse était 'Professionnel/professionnelle' *ou* 'Directeur/directrice' *ou* 'Stagiaire' *ou* 'Autre' *ou* 'Propriétaire d'entreprise' *ou* 'Travailleur/travailleuse autonome' à la question '27 [WorkStatus]' (Quelle est votre situation relative à l'emploi?)

Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- ◯ Travailleur/travailleuse autonome
- ◯ Petite entreprise (2 à 99 employés)
- ◯ Entreprise de taille moyenne (100 à 499 employés)
- ◯ Grande entreprise (500 employés et plus)

32 Depuis combien d'années occupez-vous votre emploi?

Répondre à cette question seulement si les conditions suivantes sont réunies :
La réponse était 'Professionnel/professionnelle' *ou* 'Directeur/directrice' *ou* 'Stagiaire' *ou* 'Autre' *ou* 'Propriétaire d'entreprise' *ou* 'Travailleur/travailleuse autonome' à la question '27 [WorkStatus]' (Quelle est votre situation relative à l'emploi?)

Seuls des nombres peuvent être entrés dans ce champ.
Veuillez écrire votre réponse ici :

33 Parmi les activités suivantes, quelles sont celles que vous exercez en ce moment à votre travail?

Répondre à cette question seulement si les conditions suivantes sont réunies :
La réponse était 'Propriétaire d'entreprise' *ou* 'Autre' *ou* 'Directeur/directrice' *ou* 'Stagiaire' *ou* 'Travailleur/travailleuse autonome' *ou* 'Professionnel/professionnelle' à la question '27 [WorkStatus]' (Quelle est votre situation relative à l'emploi?)

Cochez la ou les réponses
Veuillez choisir toutes les réponses qui conviennent :

- ☐ Administration
- ☐ Recherche
- ☐ Développement
- ☐ Production
- ☐ Marketing/Vente
- ☐ Distribution
- ☐ Autres services de vente ou de soutien
- ☐ Autre:

34 Quel pourcentage de votre temps de travail est consacré à l'innovation?

Répondre à cette question seulement si les conditions suivantes sont réunies :
La réponse était 'Autre' *ou* 'Directeur/directrice' *ou* 'Professionnel/professionnelle' *ou* 'Stagiaire' *ou* 'Travailleur/travailleuse autonome' *ou* 'Propriétaire d'entreprise' *ou* 'Étudiant/étudiante' à la question '27 [WorkStatus]' (Quelle est votre situation relative à l'emploi?)

ⓘ Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- ◯ 0%
- ◯ 1-20%
- ◯ 21-40%
- ◯ 41-60%
- ◯ 61-80%
- ◯ 81-100%

35 Quel pourcentage de votre temps de travail est consacré à l'innovation ouverte?

Répondre à cette question seulement si les conditions suivantes sont réunies :
La réponse était 'Travailleur/travailleuse autonome' *ou* 'Propriétaire d'entreprise' *ou* 'Autre' *ou* 'Professionnel/professionnelle' *ou* 'Directeur/directrice' *ou* 'Étudiant/étudiante' *ou* 'Stagiaire' à la question '27 [WorkStatus]' (Quelle est votre situation relative à l'emploi?)

ⓘ Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- ◯ 0%
- ◯ 1-20%
- ◯ 20-40%
- ◯ 40-60%
- ◯ 60-80%
- ◯ 80-100%

Nous vous remercions pour votre participation à ce sondage!

Si vous souhaitez être informé(e) des résultats de ce sondage, veuillez envoyer un courriel à basile.thisse@polymtl.caet nous nous ferons un plaisir d'en discuter avec vous!

Envoyer votre questionnaire.
Merci d'avoir complété ce questionnaire.

APPENDIX D DESCRIPTIVE ANALYSIS

Table D.1 Descriptive analysis

stats	CONTINUATION	SATISFACTION	PARTI_FUTUR	CAREER_OPP	dCOOP	dTime6monthsmore	dCanada	dExperience23	OnOffLine	Mentor	Ecosystem	MOTIVATION	ECO_INDIVIDUS	ECO_ORGA
min	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	2.600	1.000	1.000
mean	2.967	4.050	3.628	2.061	0.746	0.475	0.902	0.434	0.672	3.375	3.058	4.229	3.383	3.540
p50	3.167	4.000	3.500	2.000	1.000	0.000	1.000	0.000	1.000	3.000	3.000	4.200	3.500	3.571
max	5.000	5.000	5.000	5.000	1.000	1.000	1.000	1.000	1.000	5.000	5.000	5.000	5.000	5.000
sd	1.080	0.857	0.976	0.990	0.437	0.501	0.299	0.498	0.471	1.138	1.285	0.553	0.915	0.817
N	107	119	117	93	122	122	122	122	122	120	120	119	115	105
skewness	-0.188	-1.120	-0.307	0.775	-1.130	0.098	-2.697	0.265	-0.733	-0.325	-0.085	-0.711	-0.568	-0.940
kurtosis	2.063	4.756	2.680	3.022	2.276	1.010	8.276	1.070	1.538	2.383	1.993	3.550	3.076	4.524

APPENDIX E CORRELATION MATRIX

Table E.1 Correlation matrix

		1	p-value[1]	2	p-value[1]	3	p-value[1]	4	p-value[1]	5	p-value[1]	6	p-value[1]	7	p-value[1]	8	p-value[1]	9	p-value[1]	10	p-value[1]	11	p-value[1]	12
1	**CONTINUATION**	1.000																						
2	**SATISFACTION**	0.350	***	1.000																				
3	**PARTI_FUTUR**	-0.109		0.302	***	1.000																		
4	**CAREER_OPP**	0.392	****	0.296	***	0.313	***	1.000																
5	**dCOOP**	0.264	**	0.063		-0.213	*	0.017		1.000														
6	**dTime6monthsmore**	0.083		0.137		-0.009		0.083		-0.145		1.000												
7	**dCanada**	0.078		-0.052		-0.182	*	0.043		0.219	**	0.079		1.000										
8	**dExperience23**	-0.074		-0.100		0.343	***	0.069		-0.315	***	0.041		-0.227	**	1.000								
9	**OnOffLine**	-0.178		-0.286	***	0.024		-0.073		0.069		-0.702	****	0.014		0.112		1.000						
10	**Mentor**	0.179		0.371	****	0.166		0.099		0.069		0.097		0.070		-0.027		-0.309	***	1.000				
11	**Ecosystem**	0.095		0.385	****	0.186	*	0.197	*	0.155		0.206	*	0.206	*	-0.020		-0.205	*	0.418	****	1.000		
12	**MOTIVATION**	0.067		0.291	***	0.219	**	0.058		0.148		-0.077		-0.007		0.055		0.080		0.285	***	0.199	*	1.000

APPENDIX F REGRESSIONS

Table F.1 Regressions for CONTINUATION

N = 102	regcont1a	p	regcont2a	p	regcont3a	p	regcont4a	p	regcont5a	p	regcont6a	p	regcont7a	p	regcont8a	p	regcont9a	p	regcont10a	p	regcont11a	p	regcont12a	p	regcont13a	p
	b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p	
dCOOP	0,635	**	0,621	**	0,616	**	0,671	**	0,617	**	0,623	**	0,616	**	0,618	**	0,672	**	0,615	**	0,666	**	0,701	***	0,695	***
	(0,284)		(0,285)		(0,286)		(0,290)		(0,288)		(0,286)		(0,289)		(0,288)		(0,291)		(0,289)		(0,291)		(0,289)		(0,292)	
dTime6months	-0,143		-0,150		-0,158		-0,184		-0,153		-0,138		-0,142		-0,147		-0,173		-0,159		-0,196		-0,235		-0,232	
	(0,294)		(0,295)		(0,296)		(0,297)		(0,297)		(0,297)		(0,298)		(0,298)		(0,299)		(0,298)		(0,299)		(0,298)		(0,302)	
dCanada	0,353		0,374		0,396		0,330		0,379		0,450		0,465		0,468		0,403		0,397		0,339		0,349		0,424	
	(0,405)		(0,408)		(0,411)		(0,410)		(0,411)		(0,428)		(0,434)		(0,431)		(0,431)		(0,414)		(0,413)		(0,408)		(0,434)	
Mentor	0,137	*	0,124		-0,308		0,108		0,121		0,124		0,119		-0,288		0,108		-0,305		0,097		-1,007		-0,952	
	(0,102)		(0,105)		(0,686)		(0,106)		(0,107)		(0,105)		(0,107)		(0,690)		(0,106)		(0,701)		(0,109)		(0,810)		(0,823)	
Ecosystem	-0,079		-0,083		-0,078		0,567		-0,083		-0,091		-0,092		-0,086		0,544		-0,078		0,637		1,137	*	1,149	*
	(0,093)		(0,094)		(0,094)		(0,653)		(0,094)		(0,095)		(0,096)		(0,096)		(0,657)		(0,095)		(0,677)		(0,769)		(0,789)	
OnOffLine	-0,479	*	-0,500	*	-0,484	*	-0,546	*	-0,202		-0,496	*	0,032		-0,481	*	-0,541	*	-0,438		0,290		-0,544	*	0,253	
	(0,336)		(0,338)		(0,340)		(0,341)		(1,967)		(0,340)		(2,007)		(0,342)		(0,343)		(2,011)		(2,018)		(0,340)		(2,061)	
dExperience23	-0,011		-0,017		-0,023		0,013		-0,018		-1,049		-1,135		-1,002		-0,950		-0,023		0,015		0,024		-0,868	
	(0,231)		(0,232)		(0,233)		(0,234)		(0,233)		(1,721)		(1,760)		(1,729)		(1,725)		(0,234)		(0,235)		(0,233)		(1,762)	
MOTIVATION			0,123		-0,180		0,508		0,181		0,032		0,126		-0,253		0,413		-0,169		0,712		0,064		0,197	
			(0,193)		(0,514)		(0,428)		(0,422)		(0,245)		(0,432)		(0,532)		(0,461)		(0,709)		(0,650)		(0,533)		(0,747)	
MenMot					0,103										0,098				0,102				0,263	*	0,247	
					(0,162)										(0,163)				(0,166)				(0,189)		(0,193)	
EcoMot							-0,150										-0,146				-0,166		-0,278	*	-0,283	*
							(0,149)										(0,150)				(0,155)		(0,175)		(0,179)	
OnOffMot									-0,072				-0,127						-0,011		-0,202				-0,192	
									(0,465)				(0,475)						(0,477)		(0,480)				(0,491)	
dExpMot											0,245		0,265		0,232		0,228								0,212	
											(0,405)		(0,414)		(0,407)		(0,405)								(0,414)	

Table F.2 Regressions for SATISFACTION

N = 113	**regsat1a**	**p**	**regsat2a**	**p**	**regsat3a**	**p**	**regsat4a**	**p**	**regsat5a**	**p**	**regsat6a**	**p**	**regsat7a**	**p**	**regsat8a**	**p**	**regsat9a**	**p**	**regsat10a**	**p**	**regsat11a**	**p**	**regsat12a**	**p**	**regsat13a**	**p**
	b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p	
dCOOP	-0,038		-0,064		-0,064		-0,006		-0,065		-0,060		-0,061		-0,060		0,001		-0,066		-0,005		0,018		0,025	
	(0,189)		(0,184)		(0,185)		(0,185)		(0,185)		(0,185)		(0,187)		(0,186)		(0,186)		(0,186)		(0,186)		(0,187)		(0,189)	
dTime6months	-0,098		-0,143		-0,141		-0,178		-0,145		-0,143		-0,144		-0,141		-0,180		-0,143		-0,191		-0,204		-0,214	
	(0,212)		(0,207)		(0,208)		(0,206)		(0,208)		(0,208)		(0,209)		(0,209)		(0,206)		(0,209)		(0,207)		(0,207)		(0,209)	
dCanada	-0,468	**	-0,387	*	-0,389	*	-0,407	*	-0,383	*	-0,415	*	-0,412	*	-0,416	*	-0,446	**	-0,385	*	-0,393	*	-0,401	*	-0,431	*
	(0,256)		(0,252)		(0,253)		(0,249)		(0,254)		(0,261)		(0,266)		(0,263)		(0,259)		(0,255)		(0,251)		(0,249)		(0,262)	
Mentor	0,160	**	0,120	*	0,193		0,106	*	0,117	*	0,121	*	0,120	*	0,187		0,107	*	0,216		0,092		-0,449		-0,465	
	(0,073)		(0,073)		(0,477)		(0,072)		(0,075)		(0,073)		(0,076)		(0,479)		(0,073)		(0,489)		(0,075)		(0,567)		(0,576)	
Ecosystem	0,208	****	0,195	***	0,194	***	0,962	**	0,195	***	0,198	***	0,198	***	0,197	***	0,989	**	0,194	***	1,062	**	1,251	***	1,351	***
	(0,065)		(0,063)		(0,064)		(0,437)		(0,063)		(0,064)		(0,064)		(0,064)		(0,441)		(0,064)		(0,458)		(0,527)		(0,543)	
OnOffLine	-0,427	**	-0,494	**	-0,497	**	-0,547	**	-0,248		-0,492	**	-0,383		-0,495	**	-0,545	**	-0,184		0,465		-0,547	**	0,148	
	(0,241)		(0,236)		(0,238)		(0,236)		(1,338)		(0,237)		(1,389)		(0,239)		(0,236)		(1,379)		(1,373)		(0,236)		(1,431)	
dExperience23	-0,172		-0,151		-0,151		-0,122		-0,150		0,311		0,288		0,306		0,525		-0,150		-0,115		-0,113		0,518	
	(0,159)		(0,155)		(0,156)		(0,155)		(0,156)		(1,113)		(1,157)		(1,119)		(1,107)		(0,157)		(0,155)		(0,155)		(1,155)	
MOTIVATION			0,338	***	0,390		0,795	***	0,386	*	0,383	**	0,402	*	0,429		0,872	***	0,471		1,054	**	0,574	*	0,824	*
			(0,130)		(0,358)		(0,288)		(0,290)		(0,169)		(0,294)		(0,372)		(0,317)		(0,502)		(0,452)		(0,365)		(0,523)	
MenMot					-0,018										-0,016				-0,024				0,131		0,133	
					(0,112)										(0,113)				(0,116)				(0,133)		(0,135)	
EcoMot							-0,178	**									-0,183	**			-0,201	**	-0,244	**	-0,266	**
							(0,101)										(0,101)				(0,105)		(0,121)		(0,124)	
OnOffMot									-0,059				-0,026						-0,075		-0,245				-0,168	
									(0,317)				(0,329)						(0,328)		(0,327)				(0,342)	
dExpMot											-0,110		-0,105		-0,109		-0,154								-0,149	
											(0,263)		(0,274)		(0,265)		(0,261)								(0,273)	

Table F.3 Regressions for PARTI_FUTUR

N = 112	**regfut1a**	**p**	**regfut2a**	**p**	**regfut3a**	**p**	**regfut4a**	**p**	**regfut5a**	**p**	**regfut6a**	**p**	**regfut7a**	**p**	**regfut8a**	**p**	**regfut9a**	**p**	**regfut10a**	**p**	**regfut11a**	**p**	**regfut12a**	**p**	**regfut13a**	**p**
	b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p	
dCOOP	-0,531	***	-0,540	***	-0,543	***	-0,570	***	-0,546	***	-0,530	***	-0,534	***	-0,532	***	-0,554	***	-0,551	***	-0,566	***	-0,606	***	-0,585	***
	(0,213)		(0,213)		(0,214)		(0,216)		(0,213)		(0,209)		(0,210)		(0,210)		(0,212)		(0,213)		(0,216)		(0,216)		(0,214)	
dTime6months	-0,216		-0,243		-0,236		-0,223		-0,252		-0,241		-0,246		-0,234		-0,224		-0,242		-0,236		-0,182		-0,197	
	(0,241)		(0,242)		(0,243)		(0,243)		(0,242)		(0,237)		(0,238)		(0,238)		(0,239)		(0,242)		(0,244)		(0,243)		(0,241)	
dCanada	-0,203		-0,159		-0,166		-0,149		-0,138		-0,320		-0,298		-0,324		-0,307		-0,145		-0,135		-0,157		-0,287	
	(0,291)		(0,292)		(0,293)		(0,292)		(0,292)		(0,296)		(0,300)		(0,298)		(0,298)		(0,293)		(0,293)		(0,291)		(0,300)	
Mentor	0,146	**	0,123	*	0,472		0,131	*	0,105		0,130	*	0,119	*	0,427		0,136	*	0,621		0,114	*	1,049	*	0,935	*
	(0,083)		(0,085)		(0,552)		(0,085)		(0,087)		(0,084)		(0,086)		(0,543)		(0,084)		(0,563)		(0,088)		(0,664)		(0,663)	
Ecosystem	0,144	**	0,137	**	0,134	**	-0,325		0,134	**	0,153	**	0,151	**	0,150	**	-0,220		0,129	**	-0,187		-0,806	*	-0,568	
	(0,074)		(0,074)		(0,074)		(0,511)		(0,074)		(0,073)		(0,073)		(0,074)		(0,505)		(0,074)		(0,541)		(0,615)		(0,628)	
OnOffLine	0,025		-0,012		-0,025		0,022		1,567		-0,003		0,905		-0,014		0,024		1,901		1,277		0,023		0,839	
	(0,273)		(0,273)		(0,275)		(0,276)		(1,523)		(0,269)		(1,539)		(0,270)		(0,272)		(1,565)		(1,602)		(0,275)		(1,619)	
dExperience23	0,488	***	0,502	***	0,504	***	0,486	***	0,503	***	3,207	***	3,035	**	3,178	***	3,114	***	0,506	***	0,492	***	0,473	***	2,792	**
	(0,182)		(0,182)		(0,183)		(0,183)		(0,182)		(1,263)		(1,300)		(1,269)		(1,272)		(0,182)		(0,184)		(0,183)		(1,313)	
MOTIVATION			0,191		0,438		-0,085		0,496	*	0,456	***	0,614	**	0,664	*	0,225		0,934	*	0,243		0,279		0,723	
			(0,151)		(0,416)		(0,338)		(0,326)		(0,193)		(0,327)		(0,422)		(0,364)		(0,574)		(0,533)		(0,426)		(0,601)	
MenMot					-0,083										-0,071				-0,124				-0,216	*	-0,191	
					(0,130)										(0,128)				(0,134)				(0,155)		(0,156)	
EcoMot							0,107										0,087				0,075		0,217	*	0,165	
							(0,117)										(0,116)				(0,125)		(0,141)		(0,144)	
OnOffMot									-0,378				-0,218						-0,463		-0,303				-0,197	
									(0,359)				(0,363)						(0,371)		(0,381)				(0,386)	
dExpMot											-0,646	**	-0,605	**	-0,639	**	-0,627	**							-0,552	**
											(0,299)		(0,308)		(0,300)		(0,301)								(0,311)	

Table F.4 Regressions for CAREER_OPP

N = 90	regrecru1a	p	regrecru2a	p	regrecru3a	p	regrecru4a	p	regrecru5a	p	regrecru6a	p	regrecru7a	p	regrecru8a	p	regrecru9a	p	regrecru10a	p	regrecru11a	p	regrecru12a	p	regrecru13a
	b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p		b/se/p
dCOOP	0,113		0,113		0,113		0,114		0,106		0,116		0,108		0,115		0,116		0,103		0,104		0,114		0,104
	(0,281)		(0,283)		(0,284)		(0,284)		(0,284)		(0,284)		(0,284)		(0,285)		(0,285)		(0,285)		(0,285)		(0,286)		(0,287)
dTime6months	0,063		0,063		0,067		0,053		0,053		0,090		0,084		0,096		0,080		0,058		0,028		0,054		0,076
	(0,326)		(0,328)		(0,330)		(0,331)		(0,330)		(0,332)		(0,332)		(0,334)		(0,335)		(0,331)		(0,332)		(0,335)		(0,341)
dCanada	0,194		0,193		0,183		0,173		0,225		0,258		0,317		0,248		0,237		0,212		0,200		0,173		0,298
	(0,420)		(0,425)		(0,429)		(0,430)		(0,428)		(0,437)		(0,443)		(0,440)		(0,444)		(0,431)		(0,431)		(0,433)		(0,449)
Mentor	0,001		0,001		0,223		-0,003		-0,009		0,001		-0,012		0,285		-0,002		0,406		-0,020		0,033		0,318
	(0,112)		(0,117)		(0,781)		(0,118)		(0,118)		(0,117)		(0,118)		(0,788)		(0,118)		(0,812)		(0,119)		(1,026)		(1,066)
Ecosystem	0,118		0,119		0,118		0,381		0,110		0,109		0,095		0,108		0,326		0,108		0,614		0,362		0,400
	(0,099)		(0,101)		(0,101)		(0,653)		(0,102)		(0,102)		(0,103)		(0,103)		(0,661)		(0,102)		(0,698)		(0,852)		(0,900)
OnOffLine	-0,074		-0,074		-0,076		-0,089		1,301		-0,059		1,677		-0,061		-0,073		1,591		1,828		-0,089		2,265
	(0,361)		(0,366)		(0,368)		(0,370)		(1,932)		(0,368)		(1,986)		(0,370)		(0,372)		(2,021)		(2,069)		(0,373)		(2,147)
dExperience23	0,263		0,263		0,266		0,272		0,264		-0,899		-1,243		-0,968		-0,827		0,269		0,280		0,271		-1,345
	(0,233)		(0,234)		(0,236)		(0,237)		(0,235)		(1,756)		(1,800)		(1,776)		(1,779)		(0,236)		(0,237)		(0,238)		(1,884)
MOTIVATION			-0,004		0,145		0,154		0,256		-0,105		0,192		0,078		0,031		0,590		0,666		0,166		0,710
			(0,205)		(0,555)		(0,439)		(0,413)		(0,256)		(0,421)		(0,565)		(0,483)		(0,769)		(0,699)		(0,564)		(0,804)
MenMot					-0,053										-0,067				-0,099				-0,008		-0,080
					(0,183)										(0,185)				(0,192)				(0,240)		(0,250)
EcoMot							-0,061										-0,050				-0,117		-0,056		-0,072
							(0,149)										(0,150)				(0,160)		(0,195)		(0,206)
OnOffMot									-0,330				-0,416						-0,401		-0,464				-0,562
									(0,456)				(0,468)						(0,478)		(0,492)				(0,509)
dExpMot											0,274		0,356		0,292		0,259								0,383
											(0,411)		(0,421)		(0,416)		(0,416)								(0,441)