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The impact of entrepreneurial knowledge sharing on pivoting and business formalization in pre-seed stage startups.

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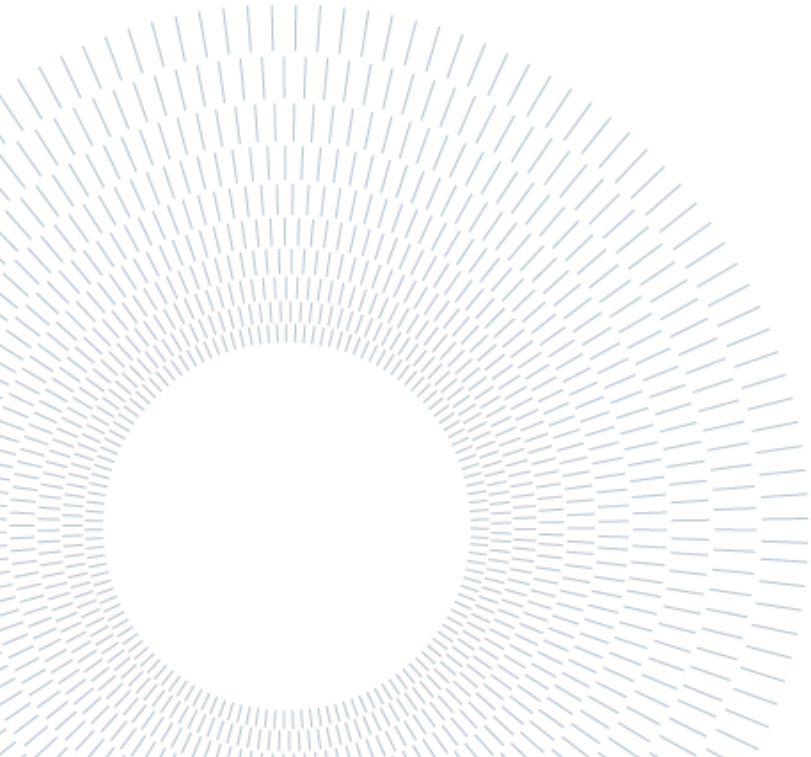


Abstract

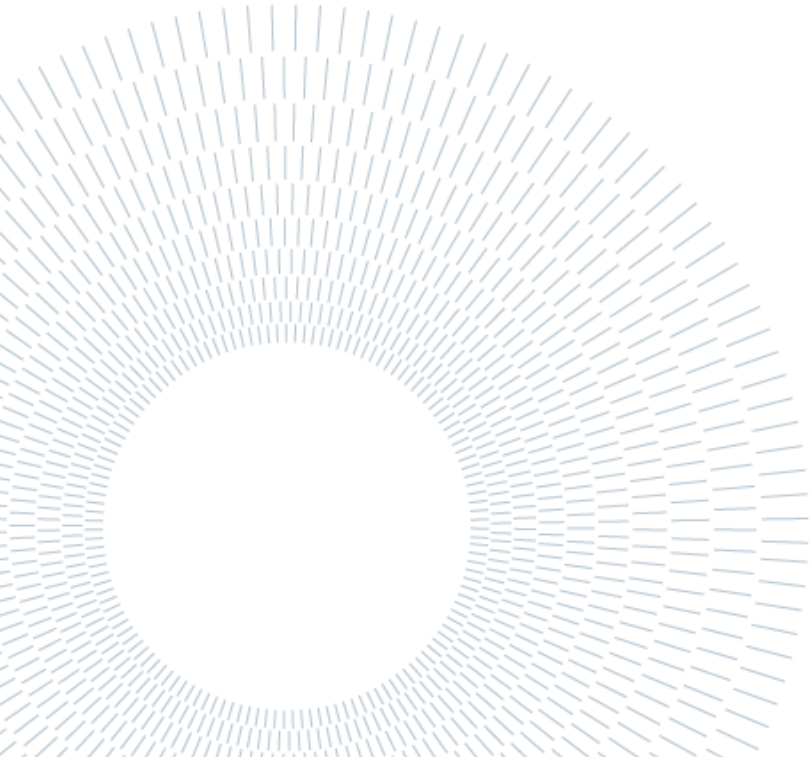
This research explores how entrepreneurial knowledge sharing within the founding team influences pivoting and business formalization in pre-seed startups.
At this stage, startups usually validate the problem and assess the feasibility of the business idea. Thus, activities such as pivoting and business formalization play a crucial role in startup development.
From the literature review emerged that both the activities are triggered or positively affected by the information and its quality. Information, in turn, is strongly affected by knowledge sharing. Therefore, it is assumed a positive correlation between entrepreneurial knowledge sharing and the performance of pivoting and business formalization.
The study is based on a sample of 50 startups, composed of 138 entrepreneurs, participating in InnoVentureLab. InnoVentureLab is a pre-acceleration program that aims to help entrepreneurs in validating their business idea by teaching entrepreneurial knowledge. Therefore, the study is structured into two levels. First, it is assessed whether this knowledge is shared within the team. Second, it is studied how entrepreneurial knowledge sharing impacts pivoting and business formalization.
From the analysis emerges that the entrepreneurial knowledge learned at the pre-acceleration program is shared within the team. However, the second level of analysis rejects both hypotheses.
Indeed, the results of the main analysis and the robustness tests show non-significant correlations between entrepreneurial knowledge sharing and pivoting. On the other hand, entrepreneurial knowledge sharing results negatively correlated with business formalization.
Besides the limitations of the model, these unexpected results may depend on other factors influencing the entrepreneurial entry process, such as individuals' personal traits, team characteristics, and external factors.

Keywords: knowledge sharing, pivoting, business formalization, entrepreneurial knowledge, pre-seed startups.

Abstract in Italiano

Questa ricerca studia come la condivisione di conoscenza imprenditoriale all'interno del team di startup in fase pre-seed influenza le attività di pivoting e formalizzazione dell'impresa.
In questo stadio, le startup solitamente si focalizzano sulla validazione del problema e la verifica di fattibilità dell'idea d'impresa. Pertanto, attività come pivoting e formalizzazione ricoprono un ruolo fondamentale per lo sviluppo della startup.
Dall'analisi della letteratura emerge come entrambe le attività siano innescate o positivamente influenzate dalle informazioni e della loro qualità. A loro volta, le informazioni sono fortemente influenzate dall'attività di condivisione di conoscenza. Di conseguenza, questo studio assume una correlazione positiva tra la condivisione di conoscenza imprenditoriale e la performance dalle attività di pivoting e formalizzazione dell'impresa.
La ricerca si basa su un campione di 50 startup, composte da 138 imprenditori, che partecipano a InnoVentureLab. InnoVenuteLab è un programma di pre-accelerazione che mira ad aiutare gli imprenditori a validare la propria idea di business, insegnando conoscenza imprenditoriale. Di conseguenza, lo studio è strutturato su due livelli. Innanzitutto, viene verificato se questa conoscenza imprenditoriale è condivisa all'interno del team. Successivamente, viene studiato come quest influenza l'attività di pivoting e formalizzazione dell'impresa.
Dalle analisi emerge che la conoscenza imprenditoriale appresa attraverso il corso di pre-accelerazione viene condivisa all'interno del team. Tuttavia, il secondo livello di analisi respinge entrambe le ipotesi.
Tutti i risultati emersi dalle diverse analisi effettuate mostrano una correlazione non significativa tra la condivisione di conoscenza imprenditoriale e l'attività di pivoting. Al contrario, la condivisione di conoscenza imprenditoriale influenza negativamente la formalizzazione del business. Al di là delle limitazioni del modello di analisi, questi risultati potrebbero dipendere da altri fattori che influenzano il processo di imprenditorialità, come ad esempio i tratti personali degli imprenditori, le caratteristiche del team ed altri fattori esterni.

Parole chiave: condivisione di conoscenza, pivoting, formalizzazione d'impresa, conoscenza imprenditoriale, pre-seed startup.



Summary

This study aims to explore the impact of entrepreneurial knowledge sharing on pivoting and business formalization in pre-seed stage startups

Despite these topics being individually investigated by different researchers, the literature lacks studies about their dynamics at this startup stage. Indeed, established companies or startups at a later stage of development usually face different internal and external dynamics.

Generally, the startup's dynamics are different from the established companies the entire startup stage in the company lifecycle could be seen as a test phase (Eisenmann, 2018). Moreover, compared to more developed startups, pre-seed stage startups are still validating the problem and demonstrating the feasibility of the business idea (Salamzadeh, 2015).

Due to the transformation from labor-intensive to knowledge-intensive, knowledge sharing has gained interest among researchers (Li et al., 2019). On the one hand, knowledge sharing impacts knowledge itself due to feedback, modifications, and contributions of the recipient. On the other hand, this activity helps entrepreneurs in finding a univocal interpretation of information (Carabrera, 2002

Generally, knowledge sharing is mainly affected by the nature of knowledge and the personal traits of the entrepreneurs involved in this activity (Matzler, 2008). Specifically, this research studies the transfer of entrepreneurial knowledge taught by a pre-accelerator program. Concerning the individuals' personal traits, the most important characteristics affecting knowledge sharing are agreeableness, conscientiousness, and openness (Matzler, 2008). These traits positively affect both the motivation to share knowledge and the process itself.

According to Ries (2011), pivoting is a radical change that aims to test a hypothesis about the product, the strategy, or the engine of growth.

Pivoting could be triggered by different events. However, the divergence between the information collected and the belief is widely recognized as the most common (Kirtley & O'Mahony, 2020). Due to the analytical nature of the pre-seed stage, pivoting is a common activity at this stage.

In this research, it is tested whether knowledge sharing positively influences the pivoting decision, increasing the occurrence in pre-seed stage startups.

This assumption is based on the fact that knowledge sharing contributes to

transcending the individual level of information's interpretation (James P . Walsh & Ungson, 1991). Consequently, the univocal interpretation within the team achieved after the knowledge-sharing process may be in contrast with the initial belief of the entrepreneurs, triggering a pivot.

The last main topic of this research is business formalization. Schminke (2000) defines it as the extent to which rules, procedures, instructions, and communication are written down. It is a crucial activity for the next stage, where formal documents are required to apply to support mechanisms.

De Clercq (2013) found a positive impact of formalization on knowledge sharing. Moreover, he argues that it reduces the uncertainty of the decision-making process, increasing trust and goal congruence. On the other hand, it reduces flexibility. However, his study focuses on established companies. In pre-seed stage startups, formalization issues are different. Therefore, this research bases its assumption on dynamics concerning business planning. Indeed, business planning is one of the most complete activities of business formalization because its output consists of a document that formally summarizes all the relevant issues of the startup. Since this activity requires time and resources, the decision is based on the trade-off between the opportunity cost and the potential benefits (Chwolka & Raith, 2012).

The second proposition of this research state that entrepreneurial knowledge sharing positively affects the formalization of the business idea.

This assumption is based on the fact that the benefit of planning depends on the quality of the business plan. In turn, the quality of the business plan depends on the quality of information (Ansoff I., 1991). Since knowledge sharing increases the quality of information (Chen et al., 2019), the benefit of business planning increases. Thus, the trade-off is affected positively.

Besides the three main topics of the research, the literature review considers also individuals' personal traits, team characteristics, and external factors that influence the entrepreneurial entry process. Indeed, since these characteristics influence the entire entrepreneurial entry process, it is likely that they affect also knowledge sharing, pivoting, and business planning activities.

As previously introduced, this research involves a pre-accelerator program, called InnoVentureLab. Unlike most of the acceleration programs, it is entirely free of charge. Therefore, knowledge and services provided are exchanged with the availability of startups to share information for the entire duration of the program.

The analysis is structured into two levels. Firstly, it is assessed whether the entrepreneurial knowledge taught by InnoVentureLab is shared within the startup team. Once the presence of entrepreneurial knowledge sharing is demonstrated, it

can be tested the correlation between this activity and the two startup performances. Consistently with the knowledge-sharing mechanism, the first level of analysis has a member's perspective. For each entrepreneur, knowledge sharing was designed as a function of two dynamics: the overall participation in the training classes, and the overall participation of the other team members in the training classes.

The impact of these dynamics is tested on three dependent variables (Theory, Hypotheses, and Test) which represent, on a scale from 0 to 5, the level of entrepreneurial knowledge. Thus, this model assumes that knowledge sharing exists whether the participation of the other team members in the classes has a positive impact on the level of entrepreneurial knowledge of the entrepreneur.

Since InnoVentureLab spitted startups into three slightly different programs, it is introduced a moderation variable to consider whether entrepreneurs are allocated in the scientific group. Indeed, the three dependent variables concern scientific issues. Moreover, a set of eight control variables consider other startup and entrepreneur characteristics.

On the other hand, consistently with the performance studied in this second level of the analysis, the test of the hypotheses takes the startup's perspective. Therefore, knowledge sharing, which is a member-level mechanism, must be represented by a proxy. The most consistent factor representing the others team members' attendance at the startup level is the startup attendance.

Regarding the hypothesis on pivoting, it is tested the impact of entrepreneurial knowledge sharing on incremental and radical pivoting. These performances are represented by two independent variables that count each type of pivot.

Concerning business formalization, it is tested the impact of knowledge sharing on the formalization of roles and the formalization of milestones. In this case, two independent variables measures from 0 to 5 these two formalization aspects.

As for the first level of analysis, a set of control variables is introduced to consider other startups' characteristics. Due to the limited size of the startup sample, the model includes only the startup typology and the presence of a member with entrepreneurial experience.

Despite 308 startups being admitted to the pre-accelerator program, the characteristics of this study require the exclusion of the startups composed of only one member and the startups that drop out before the end of the training period. Overall, the target startups are 50, for a total of 138 entrepreneurs.

Each startup has a contact person who is responsible for sharing information about the startup development through surveys and interviews. For the other members of the startup, there was only one session of data collection at the end of the training

period, which temporally coincides with session five of the contact person.
The first-level analysis shows significant results solely in the correlation between the others team members' attendance and Theory. Specifically, there is a significant positive correlation, with a coefficient of 0.226 and a confidence level higher than 99%, between the participation of the other team members of scientific entrepreneurs and Theory. Consistently with the scientific nature of Theory, non-scientific entrepreneurs have no significant correlations. The increase of the entrepreneurial knowledge level based on the participation of the other team members evidences the presence of knowledge sharing. On the other hand, Hypotheses and Test variables show only non-significant correlations.
Since the training program focuses more on Theory rather than the other two aspects and, in addition, Hypotheses and Test are more complex topics to be shared, the significant correlation between the other team members' participation and Theory is considered sufficient to demonstrate the presence of knowledge sharing.
The core analysis consists of four multivariate linear regressions.
The first two tests the correlation between knowledge sharing and pivoting. Both the analyses show non-significant results. Therefore, there is not any correlation between knowledge sharing and pivoting. This evidence rejects Proposition 1.
The other two multivariate linear regressions test the correlation between knowledge sharing and business formalization. In this case, results are both significant and negatively correlated to knowledge sharing. Specifically, the formalization of roles has a coefficient of – 0.298 with a confidence level higher than 97%. On the other hand, the formalization of milestones has a coefficient of - 0.374, with a confidence level higher than 99%.
Since the two results are significant and consistent, Proposition 2 can be rejected. Indeed, the evidence shows an opposite correlation to that assumed.
The analysis is complemented by robustness tests. These other tests are necessary because of the limited number of control variables considered in the main analysis. Firstly, two other pairs of control variables are included in the same model of analysis. Lastly, it is considered the entrepreneurs' perspective instead of the startups' one. In this case, knowledge sharing is represented by the attendance of the other team members, as in the analysis about the knowledge sharing existence. Since the entrepreneurs' observations are much more than the startups' observations, it is possible to simultaneously consider more factors as control variables.
All the multivariate linear regressions concerning pivoting show non-significant results. Conversely, all the multivariate linear regressions concerning business

formalization show significant negative correlations with knowledge sharing.
Since the result of all the robustness tests are consistent with the results of the main analysis, proposition 1 is rejected due to non-significant correlations. On the other side, proposition 2 is rejected due to the opposite correlation to that assumed.
The reasons behind these divergent results could lie in the design of the model.
First, the knowledge-sharing mechanism was designed as an increase of entrepreneurial knowledge acquisition through the participation of the other team members in the classes. However, the model does not consider that entrepreneurs could acquire entrepreneurial knowledge from other sources, such as books, courses, seminars, blogs, and social networks. Moreover, knowledge sharing is an entrepreneur-level dynamic that was proxied at the startup level. Thus, this change of perspective may have distorted its impact.
Concerning proposition 1, the non-statistical significance may be due to the limited number of observations, which in turn limits the number of factors considered in the model. In addition, this activity could be affected by personal traits, such as narcissism in the first phase of the pivoting process (Chaparro & Gomes, 2021) and openness and social skills in the second phase (Hasan and Koning, 2019).
Regarding proposition 2, besides the general potential motivations previously introduced, divergent results may also lie in the design of business formalization. Indeed, the assumption was based on arguments about business planning, which embeds the formalization of several aspects. Instead, the analysis considers only the formalization of roles and milestones. Moreover, evidence from this analysis could be explained by the concept of flexibility. Indeed, business formalization reduces flexibility (De Clercq et al., 2013), which is a crucial startup characteristic. Reduced flexibility increases the opportunity cost of business formalization, worsening the cost-benefit trade-off. Thus, this explanation assumes that entrepreneurial knowledge sharing fosters the concept of flexibility in the startup structure. Even in this case, personal traits such as opportunity costs (Bennett & Chatterji, 2019) and prior industry experience (Chen et al., 2019) could influence the activities undertaken before the market entrance, including business formalization.
In conclusion, entrepreneurial knowledge sharing in pre-seed stage startups is an interesting and complex topic for researchers. Indeed, despite it being poorly studied and highly affected by several internal and external factors, it has a great potential impact on future developments and performance. Moreover, since knowledge management is becoming increasingly more important, it could provide managers with valuable insights.

Contents

Introduction

Pre-seed stage startup issues are gaining interest among researchers due to their significant impact on the future development of the startup.
Despite this, literature has many gaps even about topics that are widely discussed for established companies. Indeed, since startups at this stage are usually validating the problem and demonstrating the feasibility of the business idea, it is difficult to access information about their development.
Usually, this information is available in later stages, when startups are backed by support mechanisms such as accelerator programs, incubators, and investors (Salamzadeh, 2015).

The purpose of this research is to investigate the impact of entrepreneurial knowledge sharing on pivoting and business formalization in pre-seed stage startups. According to Li (2019), many industries are transforming from labor-intensive to knowledge-intensive. Moreover, knowledge has become a critical resource and a potential source of competitive advantage (Angel Carabrera & Elizabeth F. Carabrera, 2002).
Considering that entrepreneurial capabilities and entrepreneurial knowledge are positively related to performance (Chandler & Jansen (1992), it might be intriguing to study the exchange of this specific kind of knowledge and its impact.
Besides the gain of information for the recipient, the value of knowledge-sharing lies in the contributions to the initial knowledge due to feedback, amplification, and motivation (Carabrera, 2002). Generally, knowledge sharing increases the quality of information (Chen et al., 2019). Moreover, knowledge sharing is crucial to transcend the individual level to find a univocal interpretation of information (James P . Walsh & Ungson, 1991).
Regarding pivoting, Ries (2011) defined this activity as a radical change that aims to test a hypothesis about the product, the strategy, or the engine of growth. Despite pivoting could be triggered by different events, the divergence between the information collected and the belief is widely recognized as the most common (Kirtley & O'Mahony, 2020). The pivoting process consists of four steps: recognition, generating options, seizing and testing, and reconfiguration (Chaparro & Gomes, 2021). However, this research focuses on the impact of entrepreneurial knowledge sharing on the number of pivots. Therefore, the stage involved is recognition, which concerns the pivoting decision.

Finally, business formalization concerns the extent to which rules, procedures, instructions, and communication are written down (Schminke, 2000). De Clercq (2013) found a positive impact of formalization on knowledge sharing. Moreover, he argues that formalization reduces the uncertainty of the decision-making process, increasing trust and goal congruence. On the other hand, it reduces the flexibility of the structure.

Since available researches concern established companies facing different formalization issues compared to startups, this research bases the assumption on business planning. Indeed, the output of this activity consists of a document that formally summarizes all the relevant issues of the business idea and the entrepreneurial team. The benefits of business planning depend on the quality of the information (Ansoff I., 1991). On the other hand, the main cost is the opportunity cost.

The decision to formalize the business is based on the trade-off between the opportunity cost and the potential benefits (Chwolka & Raith, 2012).

The activities on which is studied the impact of knowledge sharing on performance are chosen for two main reasons. First, both pivoting and business formalization are triggered or highly affected by information and its quality. In turn, information is highly affected by knowledge sharing. Secondly, these are crucial activities at this stage. Indeed, pivoting is common at the pre-seed stage due to the analytical nature of this phase that could easly generate divergent results from the belief. On the other hand, business formalization is an activity that prepares the startup for the next stage, when formal documents are needed to apply for support mechanisms and investors.

Besides the three main topics of the research, the study considers also individuals' personal traits, team characteristics, and external factors that generally influence the entrepreneurial entry process. Indeed, influencing the entire entrepreneurial entry process it is likely that they affect also knowledge sharing, pivoting, and business planning activities.

Due to the knowledge sharing impact on information and the influence of information on the activities analyzed, this research assumes a positive correlation of entrepreneurial knowledge sharing with the performance of pivoting and business formalization.

To collect data from pre-seed stage startups, this research involves a pre-accelerator program called InnoVentureLab. InnoVentureLab aims to help startups in validating their business idea through eight training classes, workshops, and other events. Since the training classes include notions about product, market, organization, and finance, the knowledge involved in this research could be classified as entrepreneurial knowledge (Hussain, 2021). The total length of the program is about eighteen months, however, training classes ended after the first

four months. Unlike most of the acceleration programs, it is entirely free of charge. Therefore, knowledge and services provided are exchanged with the availability of startups to share information for the entire duration of the program.
The model of analysis is structured into two levels. Firstly, it is assessed whether there is knowledge sharing between members of the same startup team. Once the presence of entrepreneurial knowledge sharing is demonstrated, it can be tested the correlation between this activity and the two startup performances.
Consistently with the knowledge-sharing mechanism, the first level of analysis has a member's perspective. Indeed, for each entrepreneur, knowledge sharing was designed as a function of two dynamics: the overall participation in the training classes, and the overall participation of the other team members in the training classes.
The impact of these dynamics is tested on three dependent variables which represent the level of entrepreneurial knowledge.
This model assumes that knowledge sharing exists whether the participation of the other team members in the classes has a positive impact on the level of entrepreneurial knowledge of the entrepreneur.
Moreover, a set of eight control variables consider other startup and entrepreneur characteristics.
On the other hand, consistently with the performance studied in this second level of the analysis, the test of the hypotheses takes the startup's perspective. Therefore, knowledge sharing, which is a member-level mechanism, must be represented by a proxy. The most consistent factor representing the others team members' attendance at the startup level is the startup attendance. Indeed, a startup attends a class if at least one member participates, implying that the other team members record the attendance of at least one other team member.
As for the first level of analysis, a set of control variables is introduced to consider other startups' characteristics. Due to the limited size of the startup sample, the model includes only two variables. However, the analysis is complemented by robustness tests which take into consideration other startup factors and perspectives.

1 Literature Review

This chapter reviews the existing literature about knowledge sharing, pivoting, and business formalization. Although these are the core topics of the study, other internal and external factors have been introduced.
Indeed, this review analyzes other drivers affecting the pre-seed stage and, more specifically, the entrepreneurial entry process because they may influence also knowledge sharing, pivoting, and business formalization. Few pieces of research study performances and knowledge sharing at the startup stage, sometimes finding divergent results. Moreover, the literature lacks studies concerning the effects of entrepreneurial knowledge sharing on specific performances, such as pivoting and business formalization.
The structure of the review firstly introduces the three main topics of the research. Subsequently, the other factors influencing the entrepreneurial entry process are introduced in three categories: Individual Personal Traits, Team Characteristics, and External Factors.
Since many studies involved in this research consider established companies rather than startups, it is first necessary to understand the different dynamics of these two kinds of businesses.

1.1. Startups Dynamics

For many years, there has not been a clear definition of startup and, usually, they have been described using generic parameters such as company age.
Aulet and Murray (2013) developed a detailed definition based on a five drivers analysis:

a) Role of innovation;
b) Geographical market;
c) Members and employees;
d) Financial capital and ownership structure;
e) Growth curve.

The core difference lies in the role of innovation (a). Within startups, innovation does not contribute solely to maintaining competitive advantage but is embedded

in the company's DNA. Indeed, innovation has a crucial role in the company's survival and it represents the most important driver of competitive advantage.
Generally, startups aim to lead in the market innovations with high growth potential. Those innovations are not only limited to products, services, and technologies but also encompass processes and especially business models. On the other side, small businesses, such as SMEs, do not necessarily need these kinds of innovations to sustain their competitive advantage, their growth, and their establishment.
Second (b), startups aim to serve the global market. Usually, they serve regional or niche markets only during the test phase. Indeed, as soon as this phase is concluded, they scale up to offer their product or service globally. Conversely, SMEs focus on the prevailing demand of local markets for their entire lifecycle.
Another crucial difference concerns human resources, and, more specifically, the educational level and the working location of collaborators (c). Generally, the startup's entrepreneurial team involves people with a diverse set of skills and a high level of education. In addition, they create job positions, called "treatable jobs", which do not force employees to perform them locally. Conversely, the average level of education in SMEs is lower, and most of the job positions are "non-tradable", meaning that employees must be on-site to perform them.
The aim of creating a global company necessarily influences the financing strategy (d). Indeed, startups need large financial resources, especially during the scale-up phase. Therefore, besides the debt market, they leverage diverse sources of funding, including venture capital and other entities of the equity market. Most of the financial resources come from external capital providers, which invest their money in exchange for a share of ownership. Consequently, startups have a diverse and fragmented ownership structure. On the other hand, SMEs are often family businesses or businesses with a simple ownership structure. Due to their limited market, they need fewer financial resources. Therefore, most of the financial capital comes directly from the founders.
The last driver of differentiation included in the Aulet and Murray (2013) definition is the growth curve (e). Startups usually have an exponential-shaped curve, which starts negative, losing money. If the business model is successful, the curve grows exponentially after the break-even point. Moreover, the startups' system (revenue, cash flow, jobs, etc.) does not respond quickly to an investment. On the other hand, the typical growth curve of SMEs is linear, with a system characterized by quick responses to investments.

Other authors studied the differences between startups and other forms of organization. In particular, Blank and Dorf (2012) distinguish startups from SMEs according to the business model's characteristics. SMEs have a stable and consolidated business model. On the other hand, startups maintain a flexible

business model to make quick and cost-effective changes. Overall, Blank and Dorf (2012) define a startup as a temporary organization searching for a scalable, repeatable, and profitable business model. Thus, this definition suggests that a startup is just a phase of a company. Indeed, companies usually do not have the ultimate business model from the beginning. In this stage, founders make assumptions about business model features and test them on the market. If the hypotheses are discovered to be false, they target a new market segment or adopt a different business model (Eisenmann et al., 2018).

Laitinen and Senoo (2019) combine the argument of these two research, developing the ultimate startup definition.

"A startup is a young innovation-driven organization searching for a repeatable and profitable business model through creating innovative products and services that target the uncertain global markets."

As introduced by Blank and Dorf (2012), the startup is a company phase. Nevertheless, this phase includes very different stages of development. Salamzadeh (2015) studied this issue and defined three different stages of the startup's lifecycle:

a) Bootstrapping stage;
b) Seed stage;
c) Creation stage.

For each of these stages, he deepened the following four main startups challenges: financial, human resources, support mechanism, and environmental elements.
The bootstrapping stage (a) is the very early stage of the startup. Starting from the business idea, founders initiate a set of activities, establish a team, and demonstrate the feasibility of the idea. More specifically, in this phase, they prove capabilities in cash management, team management, and customer acceptance. In addition, they demonstrate the technical feasibility of the product or service. In the bootstrapping phase, founders have very limited resources. Therefore, the financial bootstrapping strategy is the best way to take full advantage of the limited financial resources. Bootstrapping consists of a creative way of acquiring and using resources without borrowing them. In other words, instead of borrowing money and resources, startups reduce cost and cash outflow (Freear et al., 2002). For example, increasing payables and reducing receivables is coherent with a bootstrapping strategy. The other main sources of financing at this startup stage are personal funds, 3F (Family, Friends, and Fools), and Business Angels. Usually, the team is composed only of founders and cofounders.

The next stage of development is the seed stage (b). In this phase, the objective is startup growth. Thus, the crucial activities concern the research of support

mechanisms, such as accelerators and incubators, and financial resources.
The team works on the prototype development to enter the market. Here, a large number of startups fail due to the inability to find support mechanisms. On the other hand, the probability of becoming a successful and profitable company increases for those receiving support. This phase usually ends with the valuation of the startup.
The last startup phase is the creation stage (c). This stage is characterized by the sales of the product and the hiring of early employees. The transition from the seed stage to the creation stage could be facilitated by new funding, such as investment from a venture capital fund. At the end of this phase, the organization is structured and the company can no longer be considered a startup.

Finally, the environmental issue is crucial in the whole startup lifecycle and includes trends, market limitations, legal issues, and so on. Due to its uncertainty and turbulence, startups struggle more than established companies in the external environment.
Besides turbulence and uncertainty, the startup environment has other specific dynamics. For example, people mainly join startups according to the vision and the organizational culture (Laitinen & Senoo, 2019). Indeed, due to limited resources and poor economic results, startups are not attractive to talents and new employees at the early stage. Vision is defined as the idealized goal that the company aims to reach in the future (Ruvio et al., 2010). It has a crucial role in generating aspirations and motivating people. In addition, AlShamsi and Ajmal (2018) found a significant impact of vision on startup performance. Both Ruvio (2010) and Laitinen and Senoo (2019) found that vision influences the company's strategy and performance. On average, companies with a clear vision perform better. One of the reasons behind this positive impact on performance is that a well-communicated vision improved coordination in daily activities.
Consequently, strategy impacts organizational culture, which encompasses the values and beliefs of the organization (O'Reilly et al., 2014). According to AlShamsi and Ajmal (2018), organizational culture guides behavior and motivation, affecting performance. It is hard and costly to change company culture even after founders' exit because it has strong ties with the founders (O'Reilly et al., 2014).

1.2. Knowledge Sharing

This paragrapher introduces the knowledge-sharing mechanism and the drivers that directly influence the process.

1.2.1. Knowledge Sharing Process

According to Linda Argote and Ingram (2000), knowledge sharing is the process through which one person or unit is affected by the experience of another. From this definition, it emerges that knowledge sharing is not limited to the individual levels but involves higher levels, including groups, departments, or divisions. Knowledge sharing is considered part of knowledge management activities, which may also include other practices and policies on information technology, organizational structure, and human-resource.
Due to the intensification of globalization, acceleration of the rate of change, and massive use of information technology, knowledge has become a critical resource. (Angel Carabrera & Elizabeth F. Carabrera, 2002). Indeed, in the last years, many industries are gradually transforming their operations from labor-intensive to knowledge-intensive (Li et al., 2019).
Moreover, organizational knowledge is the result of specific internal and external interactions. Therefore, it is valuable, rare, and difficult to imitate. Since knowledge meets the strategic asset requirements, it is a potential source of competitive advantage (Angel Carabrera & Elizabeth F. Carabrera, 2002).
Overall, the importance of knowledge management, both in scientific research and companies, is growing according to the growing importance of knowledge as an intangible asset.
Regarding knowledge sharing, different studies have proved the positive impacts of internal and external knowledge exchange on performance.
First of all, I divided these studies according to what the effects of knowledge sharing fall on. I individualized two main areas affected:

i) The knowledge itself;
ii) The company performance.

According to Carabrera (2002), the value of knowledge grows when it is shared. On the side of the exchange source, there are contributions to the initial knowledge due to feedback, amplification, and motivation. On the other side, the recipient has a gain of information.
In addition, sharing information between individuals is crucial to reaching a univocal interpretation of knowledge. Indeed, knowledge coherence could be harmed from the use of cognitive abilities to generate the interpretation of information, which brings different individuals to different interpretations of the same information. Hence, knowledge sharing is crucial to transcend the individual level (James P . Walsh & Ungson, 1991).
Finally, Nahapiet and Ghoshal (2009) argue that knowledge creation is the result of this mechanism of exchange and combination.

Regarding the impact of knowledge sharing on performance, Nonaka and Takeuchi (1996) found that knowledge sharing is crucial in the development of the business idea into a product or service. Thus, the ability to transfer knowledge affects innovation and venture performance. Research by AlShamsi and Ajmal (2018) argues the importance of knowledge sharing in spreading the vision and culture through the organization. This is a significant finding because these characteristics are correlated to the organization's performance (Laitinen & Senoo, 2019).
Moreover, Oe and Mitsuhashi (2013) found that knowledge sharing improves survival rate and business metrics.
Knowledge sharing could also generate negative effects. Indeed, Argote and Ingram (2000) defined a framework to consider how, under certain conditions, the performance of the recipient can be negatively affected by the new knowledge. For example, they argue that the knowledge that is inappropriate or non-adoptable to the new context is likely to cause negative effects on performance.

As previously introduced, knowledge sharing could also involve external actors. In this case, process dynamics are different. First of all, the innovator can decide whether to keep knowledge private, protecting through intellectual property mechanisms or freely share it with external actors (Gächter, Simon; Von Krogh, Georg; Haefliger, 2006). Von Hippel and Von Krogh (2003) call the process that brings knowledge to become a public good the "private-collective innovation model".
A study from Carabrera (2002) conceptualizes knowledge sharing as a social dilemma, which is a paradoxical situation in which the rational maximization of an individual's pay-off leads to an irrational collective non-maximization. Specifically, the case of knowledge sharing deals with the public-good dilemma. Indeed, organizational knowledge can be considered a public good because it meets the two conditions. First, it is a shared resource whose availability does not depend on its use. Second, it is available to everyone inside the organization regardless of its personal contribution. This causes people's free-riding, which means enjoying resources without contributing. From the individual's point of view, free-riding behavior maximizes personal utility. Conversely, from the point of view of the organization, the non-contribution generates a loss of utility for everyone. To promote cooperation, the perception of the pay-off structure should reduce the cost of contribution or offer rewards as an incentive.

Regarding the stage of the knowledge-sharing process, one of the most complete studies was written by Szulanski (2000). He takes into consideration all the aspects involved in the process: the source of knowledge, the recipient, the context, and the knowledge itself. He found that the possession of knowledge within the organization does not necessarily imply a benefit for the whole organization.

Indeed, organizations do not necessarily know what they know.
Szulanski (2000) argues that the difficulties of a knowledge transfer can be predicted by analyzing the properties of the transfer itself, including source, channel, message, recipient, and context. The effectiveness of the knowledge exchange also depends on the tie between the sources and the recipient. This influences the communication style and the perception of some source's traits, such as motivation, perceived reliability, absorptive capacity, and casual ambiguity. The significance of these factors changes during the different phases of the process.
Using a time perspective, he individualized four key stages of knowledge sharing:

a) Initiation;
b) Implementation;
c) Ramp-up;
d) Integration.

Initiation (a) is triggered by the formation of the transfer idea. At the initiation phase, the core activities concern the recognition and evaluation of the transfer opportunity. Inevitably, these activities embed a certain level of uncertainty and casual ambiguity, which are reduced by the evidence about the robustness of knowledge in other environments, and the reliable and trustable perception of the source. To support the decision, the opportunity should be evaluated through performance measures. Nevertheless, assessing the real value of an opportunity is difficult and imprecise because indicators of performance are often unable to capture all the different factors involved.
The decision of pursuing the transfer opportunity moves the process into the implementation phase (b). At this stage, the process focuses on the knowledge and the resources that will be transferred from the source to the recipient. The actors involved plan the transfer process to avoid problems experienced in similar exchanges, which typically relate to communication gaps between source and recipient. To fill these gaps, actors should overcome technical gaps or other incompatibilities, such as language, coding, schemes, or cultural conventions. If these activities require a lot of effort, the focus on the knowledge transfer may decrease, causing problems of coordination. Indeed, besides the communication gap, coordination is the other main issue that influences the effectiveness of the exchange in the implementation phase. Coordination problems could be mitigated through planning, but the quality of this activity mainly depends on mutual adjustments, which are in turn affected by the quality of the relationship between the sources and recipient.
The ramp-up phase (c) starts when the recipient starts using the new knowledge. At this stage, recipients should identify and solve gaps between expected and actual performance. Therefore, the weight of this phase in the whole process depends on

the number of these gaps and the effort needed to solve them. To integrate effectively and efficiently the new knowledge, it is needed a gradual process, such as a period of coexistence between the old practices and the new ones. Unexpected events occurring within the ramp-up phase become more difficult to solve due to the gradual nature of the process to adapt existing knowledge to the new ones.
The last phase of the transfer process is the integration phase (d), which coincides with the achievement of the satisfying performance. At this moment of the process, the use of new knowledge becomes primary. Nevertheless, also at this stage a turn back to the old practices sometimes occurs. This is usually caused by problems that limit the routinization of the new practices. The success and the weight of the integration phase mainly depend on the size of the obstacles that limit the achievement of objectives.

1.2.2. Knowledge Sharing Drivers

This paragrapher shows the main drivers affecting the knowledge-sharing process. Specifically, the analysis focus on the knowledge nature, knowledge repositories, individuals' personal traits, motivation, and formalization.

First, the knowledge-sharing process is affected by the nature of knowledge. Depending on this characteristic, knowledge sharing could be explicit or implicit (Matzler et al., 2008).
Firstly, I clarify the difference between knowledge and information. According to the definition of Nonaka and Takeuchi (1996), information is just a flow of messages, while knowledge is generated by information anchored in the belief and commitment of its holder. Thus, knowledge is connected to information but is more related to human action.
Furthermore, knowledge could be characterized according to how well can be articulated. It is distinguished between:

a) Explicit knowledge;
b) Tacit knowledge;
c) Practical knowledge.

Explicit knowledge (a) concerns facts, rules, and policies. Knowledge always consists of an explicit dimension, which is easy to transfer because of its nature. However, this is just a small part because knowledge is mainly constituted by the tacit one.
Tacit knowledge (b) is very difficult to share and includes hard-to-communicate skills and know-how.
Finally, practical knowledge (c) includes non-codifiable knowledge which is embodied in practice and routine.

The articulation level is not the only driver of classification based on the nature of knowledge. Carabrera (2002) defines two categories referring to the level of aggregation:

i) Individual knowledge, which refers to knowledge held by a person;
ii) Collective knowledge, which refers to knowledge embedded in a group of people.

Lastly, Matzler (2008) defined five typologies of knowledge based on another perspective :

a) Embrained knowledge;
b) Embodied knowledge;
c) Encultured knowledge;
d) Embedded knowledge;
e) Encoded knowledge.

Embrained knowledge (a) includes conceptual skills and cognitive abilities. Knowledge acquired by doing, which is action-oriented, is classified as Embodied knowledge (b). The Encultured knowledge (c) concerns shared understanding, socialization, and acculturation. Finally, Embedded knowledge (d) lies in the systematic routine, and Encoded knowledge (e) is codified and made explicit through signs and symbols.
Companies should define their knowledge management strategy considering the different types of knowledge and the most valuable for them.
The pre-accelerator program involved in this experiment focuses on teaching a specific type of knowledge: entrepreneurial knowledge.
This refers to the main activities that an entrepreneur should carry out in the process of entrepreneurship. Thus, it includes notions about opportunity identification, opportunity exploitation, resource availability, business operation, and other entrepreneurial activities (Roxas, 2014). The capabilities associated with this type of knowledge allow entrepreneurs to comprehend, extrapolate, interpret, and utilize information and resources to produce new products or services. Indeed, according to Roxas (2014), entrepreneurial knowledge and skills are critical in setting up a business and exploiting perception and belief. Consequently, it has a positive impact on entrepreneurial intention and entrepreneurial entry.
Hussain (2021) argued that entrepreneurial knowledge is composed of four main aspects:

a) Product;
b) Market;
c) Organization;

d) Finance.

Product knowledge (a) involves notions about technologies, service, and production.
Concerning market knowledge (b), this is not only related to sales. It also includes knowledge about needs and marketing. Indeed, entrepreneurs need market capabilities and general market knowledge. Regarding organization (c), entrepreneurs should have access to structure knowledge, system knowledge, and management knowledge. Organizational knowledge, together with social and human capital, is the most important organizational resource. Finally, financial knowledge (d) concerns tax planning, finance management, and funding.

The knowledge-sharing process has different characteristics also depending on where knowledge lies. Walsh and Ungson (1991) recognized that the process of acquisition, retention, and retrieval influence subsequent individuals' behavior. Therefore, repositories play an important role in the knowledge-sharing process for two main reasons. On the one hand, the repositories evolve when there is a transfer of knowledge. On the other hand, they affect the knowledge-sharing process and outcome.
Walsh and Ungson (1991) define six repositories from which knowledge could be retained and recalled:

a) Individual members;
b) Company culture;
c) Transformations;
d) Structures;
e) Ecology;
f) External archives.

Individual members (a) retain information about their direct experiences and observations. This information is stored in their own capacity to remember and is processed through cognitive orientations.
Company culture (b) embodies past experience that could be useful in dealing with future issues. More specifically, information is stored in frameworks, language, symbols, and stories. Culture is gaining interest due to its influence on how people perceive, think, and feel problems.
Transformation (c) embedded the logic of the process transforming input in output. In the case of well-known processes, the transformation is classified as analyzable. In the case of unknown processes, the transformation is classified as unanalysable. When transformations are unanalysable, the logic of the transformation process is

based on experience, judgment, knack, wisdom, and intuition.
Structure (d) concerns the role that individuals have in the organization. Roles are a pattern to define tasks differentiation and control. Consequently, they affect social interaction and expected behavior. Structure, and more specifically individual roles, is the repository that stores information about the organization.
Ecology (e) was defined by Walsh and Ungson (1991) as the workspace or physical structure of the organization. The working environment is an important repository of information because its physical layout reflects the hierarchy and the membership of the organization. Oldham and Rotchford (1983) studied the impact of workspace ecology on employees and performances, finding that a dark and densely populated office negatively affects performance. Indeed, a higher mark of interpersonal conflicts and few opportunities for relationships shape employees' behavior. Even stakeholders, such as clients or visitors, are affected by the workspace's layout.
The last repository individualized is external to the organization. Indeed, part of the information can be stored outside the organization itself (f). External archives include different types of stakeholders who record observations following and collaborating with the organizations. The relationship of these stakeholders with the company and the amount of information stored could be very diversified. Examples of stakeholders are former employees, competitors, government, financial firms, news media, and other companies involved in the supply chain. These external players retain a great deal of information also when they are not directly involved anymore.
Besides the different nature of knowledge stored, repositories also differ in their capacity to retain and rework information. For example, individuals differ from the other repositories due to their cognitive capabilities to understand the "why".
Knowledge retention was also studied by Argote and Ingram (2000). They developed a framework that embeds knowledge in three basic elements of the organization: members, tasks, and tools. These elements are not independent of each other but can be cross-connected and inter-connected to form subnetworks. The seven subnetworks with their meaning are:

i) Member-Member: it represents the organization's social network;
ii) Task-Task: it includes the procedure of the organization;
iii) Tool-Tool: it concerns the combination of technologies used;
iv) Member-Task: it defines the division of labor;
v) Member-Tool: it assigns tools to members;
vi) Task-Tool: it defines which tools are needed for a specific task;
vii) Member-Task-Tool: it specifies which member performs which task with which tool.

Organizational effectiveness and performance are affected by compatibility and congruence between different repositories. For example, the effectiveness of the member-task subnetwork is maximized when tasks are allocated to the most qualified members. Another important aspect of knowledge retention is related to the concept of who knows what, which can be intended as which member best performs which task with which tool. Wegner (1987) coined the term "transactive memory" to identify this information. The development of transactive memory is positively affected by communication, especially when joined by feedback on individual members' skills.
This issue of compatibility also affects knowledge sharing itself. Indeed, members, tools, and tasks may adapt to be effective. Considering the three main repositories and the subnetworks, interactions involving members are the most problematic due to higher variability. It is even more likely that the interaction fits with the element rather than the context (Linda Argote & Ingram, 2000). Therefore, a different context could represent an obstacle during the knowledge-sharing process. Due to the variety of interconnection between networks, some kind of knowledge could be easier to transfer than others. For example, knowledge embedded in technologies can be transferred more easily than knowledge non embedded in technologies, both internally and externally. Similarly, non-complex and fully understood technologies are easier to transfer. Another characteristic that positively affects the ease of knowledge transfer is the similarity between tasks.

Since the knowledge-sharing process usually involves people, even individuals' personal traits influence the process. Matzler (2008) analyzes three traits of the Five-Factor Model which are related to knowledge sharing:

a) Agreeableness;
b) Conscientiousness;
c) Openness.

Agreeableness (a) is the trait that most depends on the experience and the external environment. It is related to altruism, generosity, and cooperation. When a job requires collaboration and cooperation, agreeable individuals have a significant impact on performance. People with a high level of agreeableness are more likely to engage in sharing knowledge.
Conscientiousness (b) concerns characteristics such as reliability, responsibility, organization, and hard work. Different studies emphasize the positive impact of this trait on venture performances. Researchers call this positive relation the conscientiousness-performance relationship. As for agreeableness, conscientiousness is positively associated with knowledge sharing.
Finally, openness to experience (c) is related to imagination, intellectual curiosity,

originality, and independence of judgment. People open to experiences are more likely to consider new ideas and values. In addition, since curiosity includes seeking other people's insights, this trait is a strong predictor of knowledge sharing. Individuals with a high score in openness are more likely to acquire knowledge and share it within the team.

Another important driver, which mainly affects the firsts stage of the knowledge-sharing process, is the motivation that triggers the knowledge exchange.
Szulanski (2000) studied the incentives influencing this motivation. He argues that, from the side of the source, incentives may increase the willingness to collaborate with the recipient. Conversely, from the side of the recipient, motivation depends on how much the source is perceived as reliable.
Researchers classify motivation as intrinsic and extrinsic.
Intrinsic motivation engages people in knowledge sharing without any apparent reward. On the other side, extrinsic motivation engages with some form of reward or incentives, such as monetary compensation. According to Cerasoli (2014), the two forms of motivation should be applied simultaneously to improve performance. Indeed, it is challenging to rely only on extrinsic motivation due to its monetary nature, which requires contracts and complex incentives. Therefore, intrinsic motivation is fundamental to cover the non-measured and non-measurable tasks as well.
Intrinsic motivation could be classified into enjoyment-based and obligation-based motivation (Lindenberg, 2001). The enjoyment-based intrinsic motivation is based on the concept that people are motivated to carry out activities because it makes them feel better. Thus, as long as a person's feelings are improved by the activity, external rewards are not necessary. On the other side, obligation-based intrinsic motivation concerns expectations and spurs people to behave in a particular manner that is suitable to the context.
Finally, founders positively affect motivation through actions and knowledge sharing (Laitinen & Senoo, 2019).
Since the creation of new knowledge represents an investment for an organization, Gächter and Von Krogh (2006) analyzed which are the incentives that drive innovators to share their knowledge with external entities. In this case, the mechanism of incentives is based on a give-and-take relationship between members of a community. Nevertheless, motivations often change over time and are also influenced by the governance structure of the community.
Generally, they found that innovators involved in the community are interested to share their knowledge only whether there is a mutual exchange. In this case, there is not any kind of conflict of interest. Conversely, conflict of interests arises when one innovator shares his knowledge, while the other conceals it. Therefore, the give-and-take mechanism fails and innovators have no incentives to share their

knowledge.
The crucial decision to share or conceal knowledge affects the costs and benefits of all the actors involved in the community. Thus, before making the decision, it is important to conduct a cost/benefit analysis. Gächter and Von Krogh (2006) found that the decision process does not take into consideration only the economical aspect, but it consider also social impact.

From the literature emerged research arguing that formalization of the organization influences the knowledge-sharing process. Indeed, De Clercq (2013) studies the opposite relationship between knowledge sharing and business formalization analyzed by this research, founding that a higher level of formalization fosters the knowledge-sharing process. De Clercq (2013) defines it as the extent to which a firm's decision-making process is based on formal procedures and policies. Formalization increases predictability and efficiency, reducing the uncertainty of the decision-making process. On the other side, formalization may reduce the scope of the decision and limit the creativity of managers. In his study, De Clercq (2013) found that knowledge sharing is incentivized by high formalization because formal mechanisms facilitate the exchange of knowledge because prevent them to be perceived as a criticism, especially in a trust-based relationship.

These are just the main and most studied drivers affecting this process. Indeed, other characteristics such as perceived reliability, absorptive capacity, casual ambiguity, network characteristics, and the typology of tie impact the process at specific stages.

Overall, factors affecting the exchange opportunity are more likely to cause difficulties during the initiation phase of the knowledge-sharing process. On the other hand, factors that affect the execution are more likely to cause difficulties during the integration phase.
Regarding the actors involved, their significance evolves during the process. The influence of the source is expected to diminish as the process of knowledge exchange goes on. Indeed, the interaction with the source of knowledge ends when a satisfactory result is obtained. Conversely, attributes of the recipient became increasingly more important as the exchange unfolds.
For example, motivation and perceived reliability influence the effectiveness of the exchange only in the first three stages.
Motivation is not sufficient to guarantee an effective exchange. Indeed, the absorptive capacity of the recipient is necessary to integrate external sources of knowledge, substituting old practices with new ones. Therefore, the absorptive capacity becomes crucial during the integration phase.
A factor influencing all the stages of the process is casual ambiguity. Together with

absorptive capacity, it is the most important driver affecting the effectiveness of the exchange process.
Generally, knowledge transfers more readily across organizations embedded in a network rather than across independent organizations. However, transfer effectiveness is not independent of the characteristic of the network. For example, McEvily and Zaheer (1999) found that companies are more prone to share knowledge and capabilities in a network if recipients have no redundant ties.
The nature of ties also influences the exchange process. Weak ties facilitate the exchange process whether knowledge is not complex and could be codified. Conversely, codable complex knowledge is transferred easily between organizations with strong ties (Hansen, 1999).

1.3. Pivoting

The first activity on which the effects of knowledge are studied is pivoting. This activity indicates a decision that aims to redirect the course of action. It is a crucial change because involves irreversible commitment and uncertain consequences. This term was coined by Eric Ries, who explains how this radical change aims to test hypotheses about product, strategy, or engine of growth (Ries E., 2011).
This startup dynamic was studied by different authors who developed different conceptualizations. Chaparro and Gomes (2021) defined five categories:

a) Pivot as a change;
b) Pivot as a strategic decision;
c) Pivot as a correction of failure;
d) Pivot as a process;
e) Pivot as a state.

The first definition of pivot concerns a change (a). To differentiate this type of change from others, they took into consideration the subject of change and the degree of criticality. In terms of what the change affects, they identified eight main areas: strategy, direction, business model, idea, business concept, product, hypothesis, and offers.
About the level of critically, they defined three main categories: major change, strategic change, and fundamental change.
The second definition frames pivoting as a strategic decision (b). It is defined as a process that leads to changing one or more components when resources are limited and not sufficient to survive and grow. It could be considered also a strategic choice because involve risk and investments.
The third research stream associates pivot to failure (c), arguing that the review of fails triggers adjustments to the course of action. Since pivoting is seen as a

replacement of some startup components, it is implicit that this component did not work.
The definition that associates pivoting to a process (d) is based on the concept that also pivoting is a sequence of events, actions, and activities. Within this research stream, some researchers argue that the process has defined stages, while others argue that the process has not a clear structure and is more like trial and error learning.
Lastly, a pivot is seen as a state (e) in which concepts and business model are not ultimate. Changes are part of this state and allow the startup to evolve. Thus, this perspective does not differentiate pivoting from other decisions or changes. The length of this period depends on the startup characteristics.

Besides the different definitions, studies about pivots have also different perspectives.
They can be clustered into four streams, each one with a focus on a particular nuance of pivots:

a) Design perspective;
b) Cognitive perspective;
c) Negation perspective;
d) Environmental perspective.

P. Liu and Bell (2019) conduct a study about the design perspective stream (a). They argue that entrepreneurs expect pivots during the entrepreneurial process. Thus, they plan a strategy to execute them optimally, planning stages and defining measures of control. This occurs especially in extremely dynamic markets, such as small high-tech businesses in emerging markets. In this scenario, adopting iterative product development methods is a good choice to learn and fix quickly.
The cognitive perspective stream (b) is more related to cognition ad decision-making. A study by Kirtley and O'Mahony (2020) argues that the decision to pivot and the related action are driven by the entrepreneur's perception and experience. For instance, the focus of their study is on how entrepreneurs frame internal and external information to decide whether to pivot. Their main result is that entrepreneurs decide to pivot when the information collected is divergent from their beliefs. However, information must be interpreted before the decision. Therefore, lack of knowledge, bounded rationality, or any type of bias could drive a non-optimal decision.
The third stream is the negation perspective (c). It takes into consideration the effect of pivoting on the relationship between the company and its stakeholders. Hampel (2020) argues that pivots have different effects depending on the stage of the company. Anyway, the impact on the relationship with stakeholders is not positive.

In the early stage, the occurrence of pivots has less potential for undermining relationships. On the other hand, in a later stage, this risk increases due to stronger relationships. According to Hampel (2020), entrepreneurs could mitigate this negative effect by creating empathy with stakeholders and communicating clearly the need for change. Thus, the social aspect plays an important role in the relationship. Besides this, entrepreneurs should be ready to switch suppliers or resources. Therefore, a flexible strategy is crucial to mitigate pivoting effects.
The last perspective is the environmental one (d). In this stream, researchers argue that pivots depend on environmental changes. More specifically, a study from Pillai (2020) identified external factors such as customers, competitors, regulators, and related as the real trigger of pivots. He also found that pivots emerged after the market entrance. According to him, the company can collect data that will be used to refine the offering through a pivot only when the product interacts with the market.

Overall, the pivot is seen by the large majority of authors as an action to face the most difficult situation in the entrepreneurial process. Since in most cases the trigger of a pivot is a divergent result from expectation, the decision is affected by cognitive elements, such as learning from failure attitude (Chaparro & Gomes, 2021).

Chaparro and Gomes (2021) designed a framework of four steps to analyze the pivot decision. Those steps are recognition, generating options, seizing and testing, and, finally, reconfiguration.
The pivoting process starts from the recognition of a divergence between expectation and belief, that works as a trigger. Besides, also the recognition of a more promising opportunity could generate in entrepreneurs' minds the willingness to pivot.
Once the need for pivoting is determined, entrepreneurs generate options about the next action, evaluating which elements of the business should be terminated. In generating alternatives, entrepreneurs must take into consideration market and technological constraints. This phase is significantly influenced by the entrepreneur's traits. Indeed, external stakeholders such as investors, advisors, and peers could provide insights about unforeseen market opportunities. Kirtley and O'Mahony (2020) define the new options as "strategic addition", while the business elements that will be terminated are defined as "strategic exits". The next phase is crucial to the progress of the pivoting process, and, in some cases, could force the entrepreneur to turn back at the previous stage. In the seizing and testing stage, the entrepreneurs evaluate the viability of the different options and run a test to collect information. Seizing an option means assessing the resources available to run its validation process and determining whether those are sufficient. About this phase, I have three possible outputs. In the first one, the entrepreneurs had generated just

one viable option from the previous stage. Thus, they go straight to test this one. In the second scenario, the entrepreneurs were able to generate different viable options. In this case, they can either test only the option that results better or launch parallel experiments to test different options. In the last scenario, all the options generated were found to be not viable during the seizing phase. Thus, the entrepreneurs are forced to turn back at the previous stage and generate new ideas.
After the entrepreneurs define which option test, they have to design experiments to collect data from the market. Camuffo (2020) deepens this issue, suggesting how entrepreneurs run validation tests using a minimum viable product (MVP), prototypes, concierges, or conducting other experiments. He argues that firms define decision rules based on the hypothesis outcome. Thus, depending on the test results, entrepreneurs could either move forward to the next stage or turn back to the previous one.
According to Chaparro and Gomes (2021), the final stage of the pivoting process is reconfiguration. Here the focus is on adopting the resources to the new action plan. Entrepreneurs could reconfigure the existing resources or acquire new ones. The most important resources that are involved in this process are competencies, knowledge, capital, technology, and network. This stage is crucial because entrepreneurs have to pay attention to mitigate the negative effects of pivoting, especially the ones related to the human side, such as networking, mindset, attention, passion, identity, and so on.

1.4. Business Formalization

According to Schminke (2000), formalization concerns rules, procedures, instructions, and communication. Specifically, it measures the extent to which these aspects are written down.
Formalization has pros and cons. On the one hand, it reduces the uncertainty in the output of the decision-making process, increasing trust and goal congruence. On the other hand, it reduces the flexibility of the structure, limiting the managers' possibility to solve issues creatively (De Clercq et al., 2013).
Due to the fragmented nature of this argument and the lack of specific studies, this paragrapher focus on the literature about business planning, which is one of the most important and complete activities of business formalization. Indeed, its output consists of a document that formally summarizes all the relevant issues of the business idea and the entrepreneurial team.
This document aims to signal quality and reduce information asymmetry to external investors (Kirsch et al., 2006).
According to Castrogiovanni (1996), business planning concerns those activities carried out by entrepreneurs to gather information and define how to use that

information to create value to exploit the business opportunity.
Overall, the activities involved in this process could be clustered in the following macro-activities: gather and analyze information, evaluate required tasks, identify risks and strategies, and project financial developments.
All the analyses and the outputs carried out during this activity are written in a document. Organization theory argues that planning before taking action improves the quality of most human action (Ansoff I., 1991). Nevertheless, the value of the business plan depends on its quality: as much quality of business plan rises, as much useful and valuable it is.
Consequently, entrepreneurs should aim for the highest quality of planning.
On the other hand, business planning requires a lot of effort and time. Besides these costs, the most significant one is the opportunity cost, which is declined in the launch delay due to the time effort needed by business planning (Chwolka & Raith, 2012).
The first effect of delaying is a decline of the net present value due to the discount rate. Secondly, the market condition could change, reducing the expected inflow.
Thus, business planning requires analyzing the trade-off between costs and benefits.
Generally, this activity is particularly useful in the startup context because the time gap between planning and feedback is shorter than in established organizations. The only reason for an entrepreneur to avoid business planning is that the monetary and opportunity costs overweight the value of information. Nevertheless, entrepreneurs are boundedly rational, so they don't know all the possible alternatives and the consequences in advance. They will use a heuristic rather than an optimizing approach, choosing a satisfactory alternative instead of the optimal one. Since business planning could be viewed as a multi-stage decision process, this could have an impact on the relationship between planning and learning.
Providing a framework to which base subsequent action, business planning has an impact on different crucial aspects of venture development:

a) Decision-making;
b) Managing supply and demand;
c) Action steps;
d) Product development;
e) Venture organization;
f) Disbanding.

About decision making (a), planning allows entrepreneurs to take faster decisions reducing the time needed to find missing information. The opposite approach, the trial-and-error one, consists of executing experiments that require time and resources (Ansoff I., 1991).

Planning is also useful in managing the supply and the demand (b) because it highlights the relationship between action and resource flow. This allows to better estimate the time of resources flow, identifying bottlenecks (Armstrong J., 1982).
The activity of business planning requires setting goals (c). This helps entrepreneurs to develop specific steps to achieve goals and communicate to other stakeholders.
The other three aspects affected by business planning were studied by Delmar and Shane (2003).
Product development (d) is the creation of the product or service that the new venture will sell. Anticipating problems and information needs, business planning boosts product development. As for decision-making, this is a faster approach than trial-and-error.
Venture organization (e) includes the activities related to the establishment of the physical structure and organizational process. As Armstrong (1982) argues, business planning facilitates the managing of resources. This has a significant impact on venture organization because allow entrepreneurs to determine which areas need more attention and effort.
The last effect analyzed is the disbanding rate (f). Disbanding is defined as the dropout of all the team members from the venture. Thus, the business opportunity is abandoned.
Business planning has a significant impact on disbanding, reducing this hazard by 19% (Delmar & Shane, 2003).
About this last business planning aspect, the experiment from Chwolka and Raith (2012) argues an opposite result. According to them, one of the main advantages of business planning is right an increase in the ex-ante termination rate.
Entrepreneurs are overconfident and perceive their chances of success better than others (Cooper et al., 1988). Therefore, business planning has a positive effect in affecting entrepreneurs' behavior in the evaluation of negative signals. Thus, Chwolka and Raith (2012) argue that one of the main impacts of business planning is the ex-ante evaluation of the opportunity, which has a significant value in the decision to enter the market.
The increase of ex-ante termination rate is something positive since allows entrepreneurs with a low-quality startup to avoid entering the market and failing in a subsequent moment.

1.5. Entrepreneurial Entry Drivers

Since the study focuses on pre-seed stage startups, I review the drivers affecting entrepreneurial entry. Indeed, many of the startups involved in the pre-accelerator program are still evaluating whether pursue the business idea. Hence, it is important to consider factors influencing this crucial process because they may

influence also knowledge sharing, pivoting, and business formalization.
Entrepreneurial entry is a process whereby entrepreneurs collect information that will affect subsequent performance (Bennett & Chatterji, 2019). This is not a binary choice determined by static cost-benefit analysis. Particularly, it is a learning process made by a series of decisions (Johnson et al., 2006) in which quality and length depend on the characteristics of potential entrants (Bennett & Chatterji, 2019).
The choice of becoming an entrepreneur is firstly affected by the entrepreneurial intention, which is in turn affected by pre-entry activities. Intentions concern future goals and activities related to the new startup. These activities, classified into learning and administrative activities, are crucial in collecting information (Chen et al., 2019).
Learning activities concern the steps that are solely taken to assess the quality of the idea. On the other hand, administrative activities are necessary to collect new information about the profitability of the idea (Bennett & Chatterji, 2019).

Entrepreneurial intention is not influenced only by the number and the typology of activities undertaken by prospective entrepreneurs. Indeed, there could be barriers to acquiring information that affects the process. These barriers differ for different prospective entrepreneurs, which consequently collect different information. This may affect entry and the distribution of performance (Bennett & Chatterji, 2019).
Entrepreneurs have prior beliefs about their idea which may be updated during the entrepreneurial entry process. Indeed, undertaking this learning process affects beliefs as they contemplate entry. These beliefs, in turn, influence the likelihood that they enter, and once they enter, their willingness to endure losses (Chen et al., 2019).
Prospective entrepreneurs conduct different experiments to reduce uncertainty about the quality of their business idea. Each experiment updates the perception of profitability and the confidence in that perception. Experiments end with one of the following three decisions: continue experimenting, launch the business, or end the entrepreneurial process. Launching the business or ending the entrepreneurial process concludes the pre-entry learning period (Fjeld, 2018).
Overall, there are differences in the number of information entrepreneurs can acquire during this period due to the different levels of pre-entry activity they engage in (Bennett & Chatterji, 2019).
The entrepreneurial process is also influenced by individuals' personal traits, team characteristics, and external environment.

1.5.1. Individuals' Personal Traits

Concerning individuals' personal traits, I analyzed the following drivers:

a) Decision-making approach;
b) Opportunity cost;

c) Industry experience;
d) Confidence;
e) Overoptimism;
f) Self-control;
g) Improvisation;
h) Self-efficacy;
i) Narcissism;
j) Social skills;
k) External experience.

The first driver affecting the entrepreneurial process concerns the approach in collecting and elaborating information (a). The two main approaches taken into consideration are the scientific and the effectuation approach. This aspect is crucial in this research because, as previously introduced, the pre-accelerator program teaches both approaches to different entrepreneurs.
Lopez-Vega and Tell (2016) suggest that the scientific approach leads to the discovery of theories and models that bring to the development of predictions and hypotheses. These assumptions are subsequently tested by the entrepreneurs. Therefore, the entrepreneurial process is a Popperian process of hypothesis falsification in which entrepreneurs design experiments to tests hypotheses. Hypotheses concern both problem identification and problem-solving. This approach is the basis of the Lean Startup method designed by Ries (2011). If well-designed and conducted, experiments could be compared to real options. Indeed, they provide signals about the current hypothesis tested and useful information to develop further hypotheses. Experiments allow entrepreneurs to reduce uncertainty on outcomes and variance.
On the other hand, the effectuation approach is a heuristic method. By definition, this approach takes a set of means as given and focuses on selecting between possible effects that can be created with that set of means (Sarasvathy, 2001).
Means available are part of three categories: they know who they are, they know what they know, and they know whom they know.
This approach is reflected on four main principles:

i) Instead of estimating expected return, entrepreneurs focus on affordable loss;
ii) Rather than run a competitive analysis, they focus on strategic alliances;
iii) Rather than focus on preexisting knowledge, they focus on contingencies;
iv) Instead of predicting an uncertain future, they control it.

Another peculiar characteristic of the effectuation decision-making approach is that it involves multiple decision-makers (Sarasvathy, 2001).

The experiment conducted by Camuffo (2020) suggests that a scientific approach reduces the positive bias on the profitability of the idea, which raises the probability of exit without affecting the time of exit. This result is the effect of the learning opportunity provided by multiple experiments.
Another result from this experiment is that entrepreneurs running a scientific approach are more likely to pivots (Camuffo et al., 2020).
Overall, in terms of firm performances, the scientific approach results better because it allows entrepreneurs to recognize more profitable opportunities.

The second aspect influencing the entrepreneurial entry process is the opportunity cost (b).
Individuals with higher opportunity costs would have a higher bar against which compare the value of the business idea (Ashish Arora, 2011).

Consequently, these individuals undertake more activities during the pre-entry period to acquire sufficient information to make an entry decision with the lowest uncertainty (Bennett & Chatterji, 2019).

Another key driver is the prior specific industry experience (c).
It influences how much information a prospective entrant has about his or her chances of success (Agarwal, R., Echambadi, R., Franco, A. M., & Sarkar, 2004).
About this driver, literature has contrasting results. The model proposed by Chen et al. (2019) suggests that prospective entrants with prior experience take fewer steps. Indeed, since they already have a significant amount of information about the industry, they have less uncertainty about their prior beliefs on the profitability of the idea.
On the other hand, the model proposed by Bennett & Chatterji (2019) suggests that people with industry experience undertake more activities in the pre-entry period.

This divergent result is explained by the third driver affecting the entrepreneurial entry process: confidence (d).
Confidence can influence both the propensity to enter entrepreneurship and the persistence in facing the losses after entering (Chen et al., 2019). From a theoretical perspective, confidence could manifest in three main ways (Astebro et al., 2014):

i) A higher prior belief about the probability of success;
ii) A bias in the way a prospective entrepreneur interprets new information, and, finally;
iii) The width of confidence intervals around the expected value.

The relationship between confidence and the number of activities undertaken by prospective entrants is not unique. Considering confidence as a belief of higher prior probability on the likelihood of success, the impact on the number of activities

undertaken during the pre-entry period depends on initial feedback. If positive, it would lead the prospective entrepreneur to take fewer activities. If negative, it could result in finding other evidence taking more activities (Bennett & Chatterji, 2019).

According to Lowe & Ziedonis (2006), overoptimism (e) is another critical driver that influences entrepreneurs' decisions to establish and sustain new ventures. It is a form of cognitive bias that has been identified in a wide variety of decision-making situations (A. T. Kahneman, D., 1979) and is enhanced in ambiguous environments (Camerer, C., Lovallo, 1999). Specifically, in the pre-entry period, it manifests similarly to overconfidence: it is a substantial mismatch between entrepreneurs' predictions of their chances of success and actual survival data of startup firms (D. L. Kahneman, D., 1993). Thus, overoptimism may be an important factor contributing to failure among new firms (Camerer, C., Lovallo, 1999). In addition, after entrepreneurial entry, startups continue unsuccessful development efforts for longer periods than established firms do, with a significantly lower termination rate (Lowe & Ziedonis, 2006).
In the pre-entry period, the intention of entering the entrepreneurial career must be supported by actions. Indeed, a potential new venture cannot be realized if a prospective entrepreneur does not take action despite intentions. This is called the action-intention gap.

Self-control (f) is one of the drivers that mostly affect this mechanism (Van Gelderen et al., 2015). It is defined as a personality disposition that reflects an individual's capacity to exercise willpower. The effect of intention strength on taking action is positively correlated to the level of self-control. Generally, those who quit the startup process have taken more action than those who linger in the still-trying phase (Van Gelderen et al., 2015).

Baker (2003) defines the entrepreneurial process as an improvisational activity (g). Despite prospective entrepreneurs starting with a goal or a vision, the environmental conditions, resource constraints, and cognitive limitations usually prevent them from executing their initial plans (Baker et al., 2003). This implies that entrepreneurs have to adapt their plans to the environmental conditions through their improvisational skills. Startups led by entrepreneurs with a proclivity toward improvisational behavior tend to outperform their less improvisational counterparts, especially within highly dynamic industrial environments (Hmieleski, K.M., Ensley, 2004). In contrast, Hmieleski and Corbett (2008) find no direct relationship between improvisational behavior and new venture performance.
Moorman and Miner (1998) define improvisational behavior as the deliberate extemporaneous composition and execution of novel action, involving a mixture of

pre-composed and spontaneous (Weick, 1998). Baker et al., 2003 demonstrate that often those extemporaneous decisions are made using only the resources available at that moment. Improvisation is not inherently good or bad (Crossan, M., Cunha, M.P., Vera, D., Da Cunha, 2005), instead, it is moderated by different factors such as self-efficacy, organizational age, and external experience.
As a response to daily unexpected events, performance has a U-shaped curvilinear relationship between the relative presence of improvisation and pre-designed activities (O'Toole et al., 2020). Startups lack capabilities to integrate pre-designed and improvisational activities because they didn't have a history that would otherwise provide it. Indeed, the organization's memory, which is related to organization age, is one of the factors that affect improvisation the most.

The organization's memory is the collective knowledge of an organization. It primarily resides in shared beliefs, routines, roles, and physical artifacts (L Argote, 1999). A company with a robust memory has more experience that could exploit during improvisation. A greater amount of firm-specific routines and micro-action bundles available for recombination and new interpretations allow quicker response (O'Toole et al., 2020). Organizational memory increases the positive effect of improvisation (O'Toole et al., 2020) and, according to Moorman and Miner (1998), it is more effective in the improvisation related to product and process development.

Besides improvisation, self-efficacy (h) affects both the cognition and behavior of entrepreneurs, influencing the set goals and the persistence (Bandura, 1977).
Since self-efficacy is the belief to produce high levels of performance, people with a high level tend to set challenging goals and persist in them even under difficulties and stressful circumstances (Bandura, 1977). Interaction between improvisational behavior and entrepreneurial self-efficacy has a significant positive effect on performance (Hmieleski & Corbett, 2008). Firms led by individuals with these characteristics were by far the fastest-growing startups in the sample of Hmieleski and Corbett (2008).

The propensity to learn from failure (i) is another important driver affecting the entrepreneurial entry process. Failure is a common occurrence in the startup context because it is fraught with uncertainty and ambiguity (Headd, 2003).
According to Cope (2011), there are three categories of failure: financial, social, and psychological failure.
Generally, failure provides entrepreneurs an opportunity to collect information and learn (Cope, 2011), revising the current knowledge concerning how to manage effectively a business (Shepherd, D.A., 2003). Learning from failure has several effects, and, according to Minniti and Bygrave (2001), it increases the odds of success

for subsequent entrepreneurial activities.
However, not all entrepreneurs inevitably learn from their failures (Cope, 2011). At the individual level, there is one psychological trait that particularly influences the propensity to learn: narcissism (Y. Liu et al., 2019). This trait harm the motivation to learn because narcissistic entrepreneurs focus on information that enhances their inflated self-view. Besides, their predisposition limits them in seeking and taking into consideration external advice. Among the three types of failure, social failure constitutes a more salient ego threat to narcissists. Thus, it has a more substantial impact.

Since the entrepreneurial process involves numerous interactions with people, networking behavior has a crucial role. The effectiveness of this behavior depends on the social skills (j) of the entrepreneur.
According to Arregle (2015), networking influence prospective entrepreneurs in launching and managing a new business. It is a crucial resource because gives entrepreneurs benefits in various domains, such as developing opportunities, mobilizing resources, and gaining legitimacy (Elfring & Hulsink, 2003). Networking has an impact on performances, too. For example, a study from Danis (2010) finds that entrepreneurs who network are more likely to grow their business. To exploit the benefit provided, entrepreneurs must have social skills to develop and maintain the relationships inside the network.
Even if the purpose of the relationship is not business-oriented, such networking could potentially assist entrepreneurs to reach goals.
The role of social skills is crucial because the impact on performances changes depending on how well an entrepreneur is able to network (Klyver & Arenius, 2020).
The network should not be static: entrepreneurs have to act and change networks mobilizing necessary resources in the social surrounding. The ability and behavior of individuals to shape relations to create beneficial links or dissolve those that have become redundant is called Network Agency (Ahuja, G., Soda, G., & Zaheer, 2012).
According to Fligstein and McAdam (2011), social skills capture three fundamental elements:

i) Social competencies;
ii) Political skills;
iii) Networking skill

Social competencies include the abilities that enable entrepreneurs to read people and the environment. Political skills enable entrepreneurs to frame or influence action and people. Lastly, networking skills enable entrepreneurs to mobilize people.

The effectiveness of social skills is affected by the type of tie. Therefore, they do not always have a positive impact on launching a new business.
Engagement in networking with close social ties increases the probability of launching a business only for those with high social skills. For those with low social skills, this probability decreases (Klyver & Arenius, 2020).
Baron and Tang (2009) focus their social skills study only on financial performance. They found a positive correlation between social skills and growth in terms of sales, profits, and employees. Their research also evidence that information acquisition and resource acquisition mediate the effect of social skills on new venture performance, especially in terms of growth. Social perception and social adaptability are the two main skills influencing the effectiveness of information acquisition (Zheng, Y., Devaughn, M. L. Zellmer-Bruhn, 2016).

Despite startups do not have firm-specific experience, founders could provide fundamental components for the organizational memory by their non-firm-specific experience (k).
Non-firm-specific experience is generated by the founders' work and academic background to direct and establish routines (Miner, A., Gong, Y., Baker, T., & O'Toole, 2011). Prior experience may not fit with the firm-specific context, therefore founders are engaged in recombination and redeployments of routines (Miner, A., Gong, Y., Baker, T., & O'Toole, 2011). This activity is more important when the presence of improvisation is relevant (O'Toole et al., 2020). However, knowledge accumulated from non-firm-specific can introduce more variety that may enhance the impact of improvisation (Gong, Y., Baker, T., Eesley, D., & Miner, 2008).

1.5.2. Entrepreneurial Team

The entrepreneurial team is considered one of the most important factors of a new venture. It is a signal of quality and, in addition, it is casually important for entrepreneurial performance (Bernstein et al., 2017).
The importance of the entrepreneurial team is well known, indeed the average investor responds more strongly to information about the founding team than the ones about the business idea (Bernstein et al., 2017). Entrepreneurs usually are not alone in the entrepreneurial entry process: 90% of new ventures are started by teams (Beckman, 2006), and successful entrepreneurs either build teams around them or are part of it (Cooney, 2005).
Compared to individual entrepreneurs, a team offers advantages in terms of:

i) Information access and processing capabilities;
ii) Complementary skills and knowledge.

As previously introduced, entrepreneurial entry is also affected by the team's characteristics and its internal dynamics. Thus, besides the individual characteristics of the entrepreneurs, I analyzed the impact of the following drivers:

a) Internal peers relationship;
b) Internal prior ties;
c) Distribution of competencies;
d) Psychological ownership.

A study from Hasan and Koning (2019) argues that the personality of the lead entrepreneur, matched with the peers' one, affects the business idea (a). Idea generation is a crucial step in the entrepreneurial journey because all future steps depend on it. The quality of this process does not depend only on the individual capabilities of the lead entrepreneurs but depends on social interactions too. Indeed, a team generates better ideas than a lone investor (Singh & Fleming, 2010). The match between the characteristics of peers and the ones of the lead entrepreneur is crucial.
More specifically, Hasan and Koning (2019) take into consideration two main characteristics of lead entrepreneurs: openness to experience and capturing creativity. On the other side, they take into consideration peers' extroversion and willingness to share information.
Openness and absorption capabilities are crucial characteristics affecting creative processes, such as business idea generation. People with these characteristics are more comfortable working with ambiguity and uncertainty (Le Pine et al., 2000). They exploit divergent thinking, trying to find connections between ideas that seem unrelated. Besides this individual effect of openness and absorption, entrepreneurs with these characteristics have a different approach to their peers. Indeed, they are more prone to adapt to others' perspectives and opinions, collecting external experiences and recalling that information in idea generation.
On the other side, extroversion of peers is more related to the diversity and the volume of information shared. Extroverted entrepreneurs are eager to share their knowledge and describe events and experiences in elaborate and interpretive terms (Matzler et al., 2008).
The experiment of Hasan and Koning (2019) leads to two main results.
Open innovators do not generate better ideas a priori. However, the quality of the idea generation process depends on the characteristic of the peers. Open innovators matched with extroverted peers generate high-quality ideas, while open innovators matched with introverted peers do not generate better ideas. The characteristic of the lead entrepreneur is crucial. If the entrepreneur is not an open innovator, he will not be able to exploit the extroversion of his peers.

Internal relationships are also affected by internal ties (b). Often the entrepreneurial team is made by family members, friends, prior colleagues, or people with prior ties. This mechanism of team formation involving known people is called the interpersonal attraction perspective (Forbes, D. P., Borchert, P. S., Zellmer-Bruhn, M. E., & Sapienza, 2006).
This perspective involves two main dynamics: homophily and social network.

The first one, homophily, relates to the similarity between individuals in terms of social characteristics, demographics, and other abilities.
On the other hand, the social network mechanism is related to frequent social interaction that creates opportunities for observing the skills of each other, developing mutual trust, and discussing the possibility of jointly launching a new business.
The impact of prior ties on performances is positive in terms of communication and coordination. Indeed, the common ground makes those two activities easier.
Prior ties has also negative implications. The most obvious is that the entrepreneurial team tends to be homogeneous in terms of competencies and individual characteristics. In addition, facing internal problems could be problematic due to the strong ties. Indeed, addressing problematic issues with family and friends is more difficult.

As previously introduced, internal prior ties could affect the heterogeneity of competencies (c) in the entrepreneurial team (Forbes, D. P., Borchert, P. S., Zellmer-Bruhn, M. E., & Sapienza, 2006). The distribution of competencies is one of the main topics studied about entrepreneurship. Compared to individual entrepreneurs, teams offer advantages in internalizing critical and complementary competencies.
Each competence could be unique inside the team or shared between two or more team members.
In the first case, members of the team that exclusively have a specific competence are expected to be experts with deep knowledge of this competence. Gruber (2012) fouds that diversified teams may be beneficial to the new venture, especially in identifying market opportunities. On the other hand, a team composed of members that share competencies and knowledge could exploit synergies, better interaction, and quicker responses (Zheng, Y., Devaughn, M. L. Zellmer-Bruhn, 2016). To understand which scenario affects more positively the success of new firms, Reese (2020) introduced the concept of "sharedness" of competencies. It refers to the degree to which a given aggregate level of competency is spread across founding team members or concentrated in one or few members. In his experiment Reese (2020) define and analyze three aggregate of competencies in the founding team:

i) Managerial competencies;

ii) Technical competencies;
iii) Entrepreneurial competencies.

Managerial competencies include skills related to organization, implementation, and coordination of people and tasks. For instance, these competencies are crucial in activities like developing plans, acquiring external resources, hiring and leading people, and dealing with external stakeholders, such as customers. Technical competencies concern skills in using tools and techniques of a specialized field. Finally, entrepreneurial competencies include necessary skills to capture particular settings of new venture dynamics that are not managed by the other two groups of competencies. Particularly, entrepreneurial competencies are related to opportunity identification and fruition (Chandler & Jansen, 1992). They find that the sharedness of technical competencies has not a significant impact on new venture performance. On the other hand, the sharedeness of entrepreneurial competencies is positively related to performance. On the contrary, sharedness of managerial competencies is negatively related to new venture performance.

A startup's performance is also affected by the team's psychological issues, such as the shared sense that a business idea belongs to the team. In entrepreneurship, this is called collective ownership (d). In contrast, individual psychological ownership is an individual's belief that something is "mine" (Gray et al., 2020). Klein and Kozlowski (2000) define two necessary conditions under which collective ownership exists:

i) Shared cognition;
ii) Belongs to the group.

The first condition is related to the perception or belief that the members of a collective hold in common the business idea. Collective ownership must not exist if unanimity in members' cognition does not exist. The second condition is that the business idea belongs to the group. It is a possession that is an extension of the collective itself, not just of each individual person on the team.
Pierce JL (2010) found three main activities affecting the collective ownership of the business idea: sharing control over, developing joint knowledge about, and investing collective effort into it.
Reaching this psychological condition in entrepreneurial teams is particularly difficult. Often an entrepreneurial opportunity is formed when one person, the lead entrepreneur, generates the initial idea and then, with this idea in hand, recruits others to join the effort to make the idea a reality (Hargadon & Bechky, 2006). Asymmetry in psychological ownership constitutes an initial obstacle to the success of entrepreneurial teams. According to Gray (2020), two main drivers could mitigate this tension generating collective ownership: help-seeking and territorial marking.

On the one hand, help-seeking involves inviting new team members' input into the team's idea. On the other hand, territorial marking includes actions that signal ownership and demarcate boundaries to others. Entrepreneurial leads who embrace both help-seeking and territorial marking can simultaneously foster the unifying force of team identification and avert the divisive force of team conflict, thus enabling the emergence of collective ownership.
More specifically. Both these two drivers have a positive significant impact on team identification, which has a positive impact on the generation of collective ownership. Collective ownership is negatively related to team conflicts and positively related to team performances and team commitment.

1.5.3. External Factors

Lastly, this last paragraph introduces external drivers that influence startups at this stage.
I classify as external factors stakeholders which have a relation with pre-seed stage startups. Indeed, entrepreneurship is a process that involves many stakeholders beyond the entrepreneurial team and the company itself. As argued by Ali and Cottle (2019), there is a mutual relationship between the new venture and external stakeholders. On the one hand, there are non-economic consequences of entrepreneurship that can either create or destroy value for stakeholders. The activities that entrepreneurs undertake to create value for a specific group may negatively affect other groups around them. On the other hand, there are individuals, companies, institutions, and organizations that directly, or indirectly, affect startup performances.
The external stakeholders involved in this research are:

a) Accelerator programs;
b) Networking;
c) External peers;
d) Entrepreneurial mentorship;
e) Industry.

As previously introduced, the study involves startups backed by a pre-accelerator program. Therefore, the first external factor analyzed concerns the impact of accelerator programs on pre-seed stage startups (a).
According to Cohen (2019)'s definition, accelerator programs are fixed-term, cohort-based programs for startups, which offer resources and pitch opportunities to help entrepreneurs in their entrepreneurial process. The services provided by the accelerator are exchanged for a small portion of equity, typically around 6-8%. The program is aimed at pre-seed stage startups, with a duration that typically goes from three to six months.

During this period, accelerators provide participants with resources that help them in overcoming entrepreneurial issues. The most popular resources provided are a small amount of seed capital, a co-working space, network, mentorship support, and funding opportunity.

Accelerator programs differ from incubators due to their focus on learning instead of physical infrastructure. Hallen (2020) found that learning is independent or even complementary to the entrepreneurial team's experience. The amount and diversity of knowledge sources are crucial to help founders in different aspects of entrepreneurship. For example, this is likely to reduce the entrepreneurs' bounded rationality, giving access to more information to evaluate during the decision process (S. L. Cohen et al., 2019).

Accelerator programs are diffused in the startup environment, indeed, about one-third of all startups receiving venture capital had been through an accelerator program (Pitchbook, 2016).

Overall, accelerator programs are considered as an intermediary between the startup and the resources needed in the entrepreneurial process. Simultaneously, those programs are crucial in educating entrepreneurs on how to utilize the resources provided through mentorship, guest speakers, and interaction with other ventures. Regarding the importance of peers in collecting useful information, Cohen (2019) found that different accelerator promotes differently this exchange. Indeed, some accelerator programs are designed to foster privacy instead of promoting information sharing. Startups involved in those programs had been found to perform worse than the others.

Besides the role of resource providers, accelerator programs are also a mechanism for sorting and signaling (Stuart & Hybels, 1999). Sorting is a two-sided process driven by actors seeking partners to maximize value creation or value capture. In this mechanism, high-quality startups are more likely to partner with one another. On the other hand, low-quality ones are more likely to partner with other low-quality startups.

Signaling is another important treatment effect. It is based on observable information concerning the achievement of difficult milestones, such as establishing a partnership with a high-quality venture or affiliating with a high-status venture capitalist. At the early stage, signaling is even more important than sorting. Indeed, signaling reduces information asymmetry, which is at its maximum level at this stage. Despite the purpose of accelerator programs is the same, different programs are designed with different features. This is crucial in affecting the performance of treated startups (Hallen et al., 2020).

According to Cohen (2019), the treatment effect on startups is heterogeneous across different accelerators, with pieces of evidence of negative effects on some startups' performance. Differences in performance also depend on the type of funding

sponsor. For example, from Cohen's (2019) experiment emerged that investor-led accelerated startups tend to raise more capital after the end of the program. A study from Hallen (2020) confirms that participating in accelerator programs increases funding performance.
On the other hand, this study also takes into consideration other performance dimensions, such as web traffic and employment growth. For each of these dimensions, Hallen (2020) (S. L. Cohen et al., 2019) demonstrate that startups participating in accelerator programs enjoy better performance compared to similar ventures almost accepted to the same program. He also find that accelerated ventures are more likely to reach key outcomes faster than non-accelerated ventures. According to Yua (2020), those programs help entrepreneurs in assessing the feasibility of their idea by providing feedback, thus accelerators also help entrepreneurs in taking quickly and efficiently dropout decisions. Overall, accelerators help resolve the uncertainty related to the quality of the company.

The second external factor analyzed concerns the network (b). According to Klyver and Arenius (2020), networking behavior is related to social interactions and relationships established and maintained to gain benefits.
In the entrepreneurial context, benefits related to networking potentially help entrepreneurs in developing opportunities, acquiring resources, and gaining legitimacy (Elfring & Hulsink, 2003). A study by Danis (2010) shows how networking behavior has a central aspect in a firm strategy and how affects its performance.
Danis (2010) studied the relationship between networking, strategy, and performance, finding that networking, combined with market-based strategies, is associated with firm growth. However, empirical results from other studies show inconsistent results about the impact of networking on performances. This difference was explained by Klyver and Arenius (2020). They argued how the effectiveness of networking activities depends on how well entrepreneurs are able to network and with whom entrepreneurs are networking.
Hence, it depends on the level of social skills and the type of tie.
About the first driver, the role of social skills as an individual's personal trait was previously introduced in the review of internal factors.
About the typology of ties, Klyver and Arenius (2020) define two kinds of relationships: close social ties and weak social ties.
Close social ties are based on affection and are not task-oriented. This category includes relationships characterized by long-term reciprocity, such as the ones with family members and friends.
On the other side, weak ties are less affect-based and often are task-oriented. This category includes acquaintances, colleagues, and other business contacts. In this kind of relationship, self-interest is the primary motivation. Weak ties allow

entrepreneurs to acquire different information, resources, and legitimacy.
He argues that frequent engagement in networking with close social ties positively affects the chances to successfully lunch a business only if the entrepreneur has high social skills. In the case of low social skills, entrepreneurs are more likely to get over-embedded and locked-in close social ties.
On the other hand, the effectiveness of networking activities with weak social ties does not depend on social skills. The reason behind this result lies in the different nature of the relationship. Indeed, weak ties are based on self-interest instead of affect-based. Thus, until the relationship is beneficial for both the parties involved, social skills are redundant.

Within the network, there is a particular kind of stakeholders that could have a greater effect on the startup performance (c). External peers are other entrepreneurs which may have an important role in giving feedback and advice about management. Since the value of many startups comes from its employees, especially in high-tech knowledge-intensive startups, managerial issues related to human management may have a significant impact on performances, such as growth rate and survival rate (J. N. Baron et al., 2002). A bad human resources management could increase the risk of losing key personnel due to the inability of recognizing and rewarding high-performing employees. Also, problems in coordination and resources management could arise.
Managerial issues could be handled by hiring experienced managers, entering incubator or accelerator programs, or relying on trial and error. Besides these three solutions, also the advice from peers with prior experience could mitigate managerial problems.
According to Chatterji (2019), informal advice is different from coaching, mentoring, and general feedback. Informal advice is typically received through a conversation. Thus, in most cases, it is unstructured and based on the experience of the adviser. In addition, this kind of external source of information is more customized than the others because allows entrepreneurs to request clarifications and additional information in real-time.
On the other hand, this kind of managerial improvement could be not effective due to the tacit or highly specific managerial practices. The effectiveness of informal advice also depends on the psychological characteristics of entrepreneurs and sources of managerial knowledge. Under some conditions, other formal sources of managerial knowledge are complementary to informal advice. For example, formal training provides frameworks and knowledge to understand whether the advice is good or bad.
The study from Chatterji (2019) shows how responses of entrepreneurs to informal advice are different. They found out that founders with MBA degrees or incubator/accelerator experience are less affected by peer advice. This result

suggests that informal advice and formal training are substitutes, and not complementary.
Another aspect of external peers is based on the concept of prior ties. Hasan and Koning (2019) studied the impact of prior ties in cultivating new interactions with other peers. New connections could be beneficial for entrepreneurs due to knowledge sharing, help, and comparative performance expectations. However, this activity is socially challenging.
In addition, Hasan and Koning (2019) find that entrepreneurs with few or no prior ties are more likely to seek external advice. On the other hand, individuals with prior ties were overall less likely to interact with unknown peers. Indeed, having many prior ties may limit how much an individual invests in forming new connections.
Overall, they demonstrate that when a team's members have many prior ties, the team's performance is unlikely to be influenced by external peers.

As previously introduced, mentorship is another form of external influence that cloud helps entrepreneurs in overcoming obstacles during the entrepreneurial process (d). Mentorship is defined as an interpersonal relationship between an experienced individual (i.e., the mentor) and a less experienced individual (i.e., the mentee) (Eesley & Wang, 2017). Thus, this kind of social interaction implies hierarchy and professional authority.
Typically, mentors are older, experienced, more successful, and possess a certain level of professional knowledge.
Mentors can both be entrepreneurs and non-entrepreneurs. Indeed, even non-entrepreneurs mentors can provide benefits to entrepreneurs promoting general leadership development and sharing industry experience.
On the other hand, benefits specifically related to the obstacle of the entrepreneurial process can be provided only by mentors with entrepreneurial experience. For example, entrepreneurial mentors can share specific skills in opportunity identification, team formation, and fundraising. In addition, entrepreneur mentors have better credibility and authority in the entrepreneurial network. Therefore, they are able to carry greater influence with investors, potential co-founders, early employees, and board members.
A particular type of mentor is represented by entrepreneurial parents.
According to Sørensen (2007), parents have a strong influence both in entrepreneurial entry and entrepreneurial development. A study by Eesley and Wang (2017) shows how significant is the correlation between students' career choices and parents' background. Children of entrepreneurs see entrepreneurship as a viable career choice. In addition, they can also benefit from parents' knowledge and network.

Overall, the parent-child relationship has some similarities with the mentors-mentees relationship. For example, characteristics such as age difference, career stage, and authority follow the same dynamics (Sørensen, 2007).
Eesley and Wang (2017) show how mentors have a strong positive impact only on students with non-entrepreneurs parents. Moreover, the interaction between these two kinds of mentorship hurts the startup's performance. (Hasan & Koning, 2019b).

Lastly, I introduce the industry effects (e). It is crucial taking into consideration this external factor because startups typically act in a turbulent and unstable environment (Laitinen & Senoo, 2019). This context affects startups' organization, strategy, and, consequently, performance. According to Rumelt (1991), the variance caused by industry effects is a combination of the variance among stable industries plus the variance of annual fluctuations. Specifically, he studied the industry effects on the business-unit return, finding that stable industry effects account for only 8% of the variance of this metric. He also found that the majority of the variance in performance depends on stable differences among business units rather than industry effects. Therefore, the impact of differences between different industries is lower than the impact of differences between different business units in the same industry.
Fernándeza (2019) based his research on the relationship between industry, firm, and performance. He argues that this is an SCP paradigm in which the industry's structure affects the firm structure, which consequently affects performance. Therefore, the competitive strategy depends on the characteristics of the industry. According to the resource-based theory, performance differences in the same industry are driven by an asymmetric distribution of resources. Thus, the most profitable companies are those with superior resources.
Fernándeza (2019) also studied whether the size of the company affects the influence of the industry. According to the European Commission's (2003) recommendation, turnover and number of employees are the two parameters that classify companies into small, medium, or large.
This study concludes that for small and large companies the industry effect is less severe, while the firm effect is dominant. This is caused by two different reasons: in large companies, economies of scale and creative accumulation allow them to attain a competitive advantage. On the other hand, small firms base their competitive advantage on flexibility and dynamism.
Conversely, medium firms' performance is mainly affected by industry effects. In fact, due to their size, they are not able to exploit either the pros of small firms or the pros of large firms. Their profitability is mainly determined by the industry's profitability.

Another performance affected by industry characteristics is the survival rate. The Minimum Efficient Scale (MES), defined as the point at which the firm can achieve necessary economies of scale to compete effectively within the market, is negatively correlated with the survival rate (Gimeno et al., 1997). The bigger the size of the company should be to achieve effectiveness, the more incumbents are advantaged. A lower MES allows startups to be efficient even with a small size, increasing their survival rate.

On the other hand, Aksaray and Thompson (2018) found that a lower MES is associated with a higher failure rate. Indeed, MES could be considered as an entry barrier that requires sunk entry costs. The smaller the investment needed, the higher the attractiveness for low-quality firms. In addition, due to the smaller average size, a higher number of companies is needed to serve a given level of demand. In conclusion, a lower MES is associated with a less concentrated market, composed of lower-quality firms.

Another factor that affects the survival rate is the intensity of competition. It is connected to the MES and is negatively related to the survival rate as well.

The intensity of competition does not vary only industry by industry, but also inside the same industry at different stages of the life-cycle. For example, during the growing stage, the risk of failure due to the newness of the company, called the liability of newness, is less severe. On the other hand, the risk of failure due to the size of the company, called the liability of smallness, is more severe.

2 Hypoteses Formulation

The pre-acceleration program of my experiment involves startups at different stages of development.
Nevertheless, most of the projects are in the bootstrapping phase, trying to validate their business idea. Just a few projects are in the seed stage, trying to sell their product in the market. No one is in the creation stage.
In this study, I consider only startups in the pre-seed stage. Hence, the ones validating the problem or in the early phase of prototyping.
As mentioned earlier, in the bootstrapping phase activities are mainly financed using personal funds, 3F, or business angels (Salamzadeh, 2015). Regarding the team, it is usually composed of one founder and some cofounders. Indeed, lack of knowledge and competencies will be bridged in the following phases with new human resources.
Even if more diffused in the next phase, some support mechanisms may have already been used since the beginning. For example, all the startups in our sample are involved in a pre-acceleration program, which is a support mechanism.
According to the nomenclature used by the pre-accelerator program to classify startup phases, the following three categories correspond to the bootstrapping stage:

a) Analysis;
b) Prototype;
c) Prototype with clients.

The analysis is the very first activity of the bootstrapping stage (a). The aim is to understand the problem and the potential customers through surveys and interviews. Once the problem is clearly defined, entrepreneurs start developing the solution and a prototype to assess feasibility (b). The bootstrapping phase ends with customers' testing (c). If this has positive results, entrepreneurs move on to the seed stage which involves the market. If results do not meet expectations, entrepreneurs move back to the analysis of the problem or the development of the prototype. Indeed, companies in this phase are more likely to pivot due to the difficult situations that may occur in this stage of the entrepreneurial process.

According to Yua (2020), accelerator programs help entrepreneurs in assessing the feasibility of their idea by providing feedback.

In the hypothesis development, it is also important to take into consideration individuals' personal traits because they affect both knowledge sharing, pivoting, and business formalization.
Since startups are less structured than established companies, they usually do not have divisions, departments, or different team works. Consequently, knowledge sharing mainly involves individuals who attend the pre-accelerator program and those who didn't attend it.
The first hypothesis developed concerns a causal relationship between knowledge sharing and pivoting.
Both these two activities impact innovation and the development of the business idea into a product or service (Nonaka & Takeuchi, 1996; Chaparro & Gomes, 2021). Kirtley and O'Mahony (2020) argue that entrepreneurs decide to pivot when the information collected is divergent from their beliefs.
Since individuals use cognitive activities to generate interpretations of information, different people may have different interpretations. Therefore, knowledge sharing became crucial to find a univocal interpretation (Angel Carabrera & Elizabeth F. Carabrera, 2002). In addition, entrepreneurs participating in the pre-acceleration program receive contributions and feedback from other members that may update their interpretation of information (Chen et al., 2019).
The effectiveness of this process depends on the tie between the sources and the recipients. In this case, knowledge is shared with peers. Therefore, gaps in communication style, motivation, and perceived reliability, which negatively influence the effectiveness, should not exist (Szulanski, 2000). On the other hand, Hasan and Koning (2019) argue that having many prior ties may limit how much an individual invests in forming new connections and seeking external advice, which can also lead to a pivot (Pillai, 2020).
The process is also affected by individuals' personal traits. Indeed people open to experience are more likely to consider new ideas and values. In addition, open individuals are more likely to share the knowledge acquired within the team (Matzler, 2008).
Even the entrepreneurs' failure approach and narcissism could impact pivoting. Indeed, Chaparro and Gomes (2021) argue that unexpected results which trigger the pivot could be seen as a failure. Thus, it is important to consider whether the entrepreneur is able to learn and exploit this information to pivot, depending on narcissism (Y. Liu et al., 2019).
Moreover, entrepreneurial knowledge sharing could also influence the second stage of the pivoting process, which includes the generation of the options for the next action and the evaluation of the elements that should be terminated (Chaparro &

Gomes, 2021).
In generating alternatives, entrepreneurs must take into consideration market and technological constraints. Thus, knowledge sharing between members with different competencies and knowledge could be valuable (Gruber, 2012). Particularly, at this stage of the pivoting process, the entrepreneurial competencies are related to opportunity identification and fruition (Chandler & Jansen, 1992). In addition, Nahapiet and Ghoshal (2009) argue that knowledge creation is the result of a mechanism of exchange and combination, indeed, peers could provide insights about unforeseen market opportunities (Nonaka & Takeuchi 1996). Overall, a team generates better ideas than a lone investor (Singh & Fleming, 2010).
Also, the generation of ideas for the pivot is affected by individuals' personal traits. Indeed, open innovators matched with extroverted peers generate high-quality ideas (Hasan and Koning, 2019). This is a crucial stage of the pivoting process because the effectiveness of pivoting depends on the quality of the new idea (Camuffo, 2020). Overall, this research tests whether entrepreneurial knowledge sharing could be the trigger of pivoting, assuming that at the end of the knowledge-sharing process, a pivot occurs if the univocal interpretation of information is different from the initial beliefs.

Proposition 1 *Entrepreneurial knowledge sharing within the entrepreneurial team increases the occurrence of pivots in pre-seed stage startups.*

The second hypothesis concerns the relationship between entrepreneurial knowledge sharing and the formalization of the business idea.
As introduced in the literature review, the formalization of the business idea is associated with the business planning activity.
Knowledge sharing may influence the business planning process because it is based on activities that aim to gather information and define how to use that information to create value (Castrogiovanni, 1996).
In addition, the quality of a business plan depends on the quality of the information used, which in turn is influenced by knowledge sharing. Indeed, as previously introduced, knowledge sharing affects initial information with updates, contributions, and feedback, finding a univocal interpretation and increasing its quality (Chen et al., 2019).
On the other hand, business planning costs. Thus, entrepreneurs decide to formalize the business idea only whether the value of the business plan, which depends on its quality, overweight costs. According to De Clercq (2013), the value of formalization lies in an increase of predictability and efficiency, reducing the uncertainty of the decision-making process.

Since the major cost is represented by the opportunity cost, and the quality of business planning depends on the quality of information, entrepreneurs formalize the business idea whether the opportunity cost is lower than the value of information (Chwolka & Raith, 2012). Quality of business planning also depends on the distribution of competencies inside the team. Indeed, managerial competencies are crucial to developing plans (Chandler & Jansen, 1992).
Finally, even the formalization decision is affected by individuals' personal traits. More specifically, they affect the number of activities carried out before the market entry.
According to Bennett and Chatterji (2019), individuals with a high opportunity cost undertake more activities during the pre-entry period to acquire sufficient information to make an entry decision with the lowest uncertainty.
Moreover, entrepreneurs take fewer steps before entrepreneurial entry also if they have prior experience in the industry (Chen et al., 2019).
Overall, this research tests whether the sharing of entrepreneurial knowledge affects the formalization of the business idea, assuming that knowledge sharing reduces the cost-opportunity trade-off by increasing the quality of information.

Proposition 2 *Entrepreneurial knowledge sharing within the entrepreneurial team increases the formalization of the business idea in pre-seed stage startups.*

3 Methodology

Chapter 3 explain the methodology designed to test the two hypotheses.
First, I show the structure of InnoVentureLab, a pre-accelerator program involved in the research which influences the variables' design. Subsequently, I introduce the set of variables, explaining its logic. Lastly, I show the startup sample and the data collection process.

3.1. InnoVentureLab

InnoVentureLab is the pre-acceleration program involved in this research to provide a pool of pre-seed stage startups. This program is designed and managed by three top Italian universities: Politecnico di Milano, Università Bocconi, and Politecnico di Torino.
Overall, this program accelerated more than 500 startups in the past editions.
The program objective is to help entrepreneurs assess the feasibility of their business idea through eight online training sessions, workshops, and other events. These sessions are held by experienced instructors and focus on a set of managerial practices which allow entrepreneurs to search, collect, and process information to avoid waste of crucial resources.
Entrepreneurial topics taught are divided into the eight training sessions in the following way:

1. Introduction and Business Model Canvas;
2. Identify the Customer Problems and the Customer Journey;
3. Problem Validation: data collection and interviews;
4. Segmentation and identification of the target market;
5. Choose the decisional metrics and make informed decisions;
6. Offer and solution validation;
7. Pricing strategies;
8. Recap and other tests to validate offer and solution.

Despite the online training sessions lasting four months, the program length is about eighteen months. Indeed, besides the training sessions, InnoVentureLab offers other valuable services for business idea development.

During the entire program, InnoVentureLab organizes webinars, workshops, boot camps, and events to deepen different topics related to the development of startups. Each startup has a contact person who is required to attend at least five online training sessions, while other team members have no constraint about participation. Contact persons are allowed to miss more than three classes only in case of serious justified reasons. The other initiatives are optional, even for the contact person.
The acceleration process ends with two events: the demo day and the graduation day.
During the graduation day, scheduled at the end of the eight training lessons, startups involved in the program receive the certification of program participation. The second event, the demo day, takes place one year after the training lessons and allows entrepreneurs to pitch their startups to an audience of potential investors.
Finally, InnoVentureLab provides participants its network and partnership. The main partners are globally recognized accelerator programs, communities of startups, consulting firms, and other entrepreneurs.
In contrast to other programs, InnoVentureLab is entirely free. Thus, selected startups are not required to pay program services with participation fees or equity stocks.
Startups can benefit from the services provided by InnoVentureLab in exchange for their availability to be monitored and share information about the development of the startup. Indeed, the entire pre-acceleration program conceals a scientific experiment that studies the different effects of scientific and effectuation approaches on performances.
Besides this primary purpose of the program, several researchers exploit the information collected to deepen other startups' issues, such as entrepreneurial knowledge sharing.
Information collected concerns four areas: basic information, scientific behavior, effectuation behavior, and performance.
After the selection process, the startups selected for the program are randomly divided into three groups having slight differences in the knowledge teched.
The first group is the treated control group, which taught basic entrepreneurial knowledge to validate the business idea.
The second and the third group are the treated scientific and effectuation groups. To each of these two groups, is taught a maximum of 30% of specific knowledge concerning respectively scientific or effectuation approach. The other 70% of the program is the same as the control group.
The program also includes a fourth group, the non-treated pure control group, which is not involved in this research. Startups of this group have no access to online training classes because they failed the selection process. Nevertheless, also information about this group is significant.

To motivate the startups of the non-treated pure control group in sharing information, some of the events and partnerships are accessible also to them. In addition, data collection is less frequent. At the end of this pre-accelerator program, startups treated should be capable of validating the problem and the solution of their business idea to start selling their product or services on the market.

3.2. Variables

Once clarified the structure and the main characteristics of InnoVentureLab, I define the set of variables to test the hypotheses.
As explained in Chapter 2, hypotheses aim to test the relationships between knowledge sharing and startup performance.
Thus, first of all, I define a set of variables to study knowledge sharing.

The first level of analysis aims to verify the correlation between participation in InnoVenturaLab's training and knowledge sharing. Due to the nature of knowledge sharing, which involves people, this analysis does not consider startups, but, conversely, it takes the perspective of the entrepreneurs considering their participation.
The mechanism of knowledge sharing is assumed to be a function of two dynamics concerning training classes: the attendance of the entrepreneur, and, on the other hand, the attendance of each entrepreneur's team members.
The independent variable Sum_Att measures the overall attendance of the entrepreneur. This numerical variable can assume only integer numbers in a range from 0 to 8. If it scores 0, the entrepreneur did not participate in any lessons. Conversely, if it scores 8, the entrepreneur attended all eight classes.
Sum_Att is computed as Equation (1.1). It is the sum of the eight boolean independent variables, one for each class, that measure the attendance of the entrepreneur. Att_1, Att_2, Att_3, Att_4, Att_5, Att_6, Att_7, and Att_8 score 0 in case of the entrepreneur did not attend the respective lesson. Conversely, it scores 1 in case the entrepreneur attends the lesson.

$$\textbf{Sum\_Att} = Att\_1 + Att\_2 + Att\_3 + Att\_4 + Att\_5 + Att\_6 + Att\_7 + Att\_8 \quad (3.1)$$

It is crucial to record the entrepreneurs' attendance because it is directly related to entrepreneurial knowledge acquisition. If Sum_Att scores high, the entrepreneur acquired entrepreneurial knowledge from classes participation. On the other hand, if it scores low, the entrepreneur is not directly aware of the entrepreneurial knowledge taught in most lessons.

Even if the entrepreneur did not attend lectures, he could acquire entrepreneurial knowledge taught through the other team members who participated in the classes. Thus, it is crucial to record the participation of team members for each entrepreneur. The independent variable Sum_Att_Oth_B can assume only integer numbers in a range from 0 to 8. If it scores 0, it means that no other team member has participated in any classes. Conversely, if it scores 8, at least one other team member has participated in any classes.
Sum_Att_Oth_B is computed as Equation (1.2). It is the sum of the eight boolean independent variables which measure the attendance of at least one other team member at each lesson. Att_Oth_B1, Att_Oth_B2, Att_Oth_B3, Att_Oth_B4, Att_Oth_B5, Att_Oth_B6, Att_Oth_B7, and Att_Oth_B8 score 0 in case of none of the other team members attended the respective lesson. Conversely, it scores 1, whether at least one of the other team members participated in the class.

$$\textbf{Sum\_Att\_Oth\_B} = \text{Att\_Oth\_B1} + \text{Att\_Oth\_B2} + \text{Att\_Oth\_B3} + \text{Att\_Oth\_B4} + \text{Att\_Oth\_B5} + \text{Att\_Oth\_B6} + \text{Att\_Oth\_B7} + \text{Att\_Oth\_B8} \quad (3.2)$$

Since the dependent variables Theory_RD5, Hypotheses_RD5, and Test_RD5 are specific to the scientific approach, it is necessary to specify the different effects of the two dynamics described above between scientific and non-scientific entrepreneurs.
First, I defined a boolean independent variable that records whether the entrepreneur is part of the scientific group. The variable Scientificity scores 1, whether the entrepreneur is Scientific. Conversely, it scores 0 if he is in the Effectuation or Control group.
Entrepreneurs of the same startup's team are inevitably in the same group.
To consider the potential effects of Scientificity on entrepreneurial knowledge sharing, I introduce a moderation variable for both the attendance dynamics.
The independent variable Prod_Sum_Att measures the additional contribution given by the Scientificity to the direct participation of scientific entrepreneurs.
This variable is computed as Equation (1.3). It is the product between the independent variable Sum_Att and the boolean variable Scientificity.

$$\textbf{Prod\_Sum\_Att} = \text{Scientificity} * \text{Sum\_Att} \quad (3.3)$$

The independent variable Prod_Sum_Att_Oth_B measures the additional contribution given by Scientificity to the attendance of scientific entrepreneurs' team members. It is computed as Equation (1.4).

$$\textbf{Prod\_Sum\_Att\_Oth\_B} = \text{Scientificity} * \text{Sum\_Att\_Oth\_B} \quad (3.4)$$

The existence of knowledge sharing is studied through three dependent variables that measure the level of entrepreneurial knowledge: Theory_RD5, Hypotheses_RD5, and Test_RD5. Theory_RD5 measures the articulation of the core business ideas and the relationships between them to make the business proposal viable. Theory_RD5 can assume integer numbers from 0 to 5. If it scores 0, entrepreneurs do not have a clear idea of the problems faced and the relationship with their solution. Conversely, if it scores 5, entrepreneurs are capable of clearly explaining the problem and how their solution can solve it.
The variable Hypotheses_RD5 concerns the predictions that flow logically from the idea but still need to be tested. Hypotheses_RD5 can assume integer numbers from 0 to 5. It scores 0 if the entrepreneur is not able to provide any assumption about the causes of the problems and the behavior of the potential customer. Conversely, it scores 5 whether the entrepreneur can identify specific assumptions.
Finally, Test_RD5 measures the rigorousness of data collection from a representative sample of the target population to conducts a series of measurements. Tests aim to assess if what the entrepreneur observes is in line with his hypothesis or not. As for the other two variables, Test_RD5 can assume only integer numbers in a range from 0 to 5. If the data collected are entirely unrelated to the assumption, the variable scores 0. On the other hand, if the entrepreneur collects comprehensive and specific data, it scores 5.
For the representative members, these variables assume the score given in the interview "Round 5" because it temporally coincides with the one-off interviews of the other team members.

Besides the dynamics which concern class attendance, there could be other factors influencing entrepreneurial knowledge sharing. Therefore, a set of eight control variables is defined to consider also demographical and teamwork characteristics.
About the demographical characteristic, gender, age, education, working experience, and entrepreneurial experience are characteristics included in the model.
The control variables Gender, Bechelor_D, Master_D, and Early_Entr are booleans. If Gender scores 1, the entrepreneur is a Male. Conversely, if it scores 0, the entrepreneur is a Female.
About Bechelor_D and Master_D, if the variable scores 1, the entrepreneur has reached the correspondent educational level. Conversely, he does not.
The last boolean variable indicates if the entrepreneur has previous entrepreneurial experience. If Early_Entr scores 1, the entrepreneur has previous experience as an entrepreneur. If it scores 0, he does not.
About the demographic characteristics, only Age and Y_Work_Exp are integer numerical variable that assumes respectively the current age of the entrepreneur and the current years of working experience.

Regarding the teamwork characteristics, the model records the number of team members and the stage of the project.
N_Members is an integer numerical variable that assumes the number of members in the entrepreneurial team.
Lastly, Startup_Stage can assume integer numbers in a range from 1 to 5, according to the phase of development of the startup. If it scores 1, the startup is in the problem analysis phase. On the other side, if it scores 5, the startup is billing and selling its product/service on the market.

This first level of analysis focuses on the entire sample of entrepreneurs and allows testing the presence of knowledge sharing related to training attendance. More specifically, there is knowledge sharing if the participation of the other team members in the classes has a positive and significant impact on the dependent variables, which measure the level of entrepreneurial knowledge. Indeed, the logical assumption is that an entrepreneur can broaden his entrepreneurial knowledge through the participation in the classes of his team members only if the knowledge taught is shared by the members.

Table 3.1 summarizes variables concerning this first level of analysis.

Table 3.1: Knowledge Sharing Variables

Variable Name	Typology	Nature	Vale Range
Theory_RD5	Dependent	Numeric Integer	0 – 5
Hypotheses_RD5	Dependent	Numeric Integer	0 – 5
Test_RD5	Dependent	Numeric Integer	0 – 5
Sum_Att	Independent	Numeric Integer	0 – 8
Sum_Att_Oth_B	Independent	Numeric Integer	0 – 8
Scientificity	Independent	Boolean	0, 1
Prod_Sum_Att	Independent	Numeric	0 – 8
Prod_Sum_Att_Oth_B	Independent	Numeric	0 – 8
Gender	Control	Boolean	0, 1
Bechelor_D	Control	Boolean	0, 1
Master_D	Control	Boolean	0, 1
Early_Entr	Control	Boolean	0, 1
Age	Control	Numeric Integer	> 18
Y_Work_Exp	Control	Numeric Integer	> 0

N_Members	Control	Numeric Integer	> 1
Startup_Stage	Control	Numeric Integer	1 – 5

Once knowledge sharing is demonstrated to be a function of course attendance, the level of the analysis is changed to take into consideration the startup perspectives instead of the entrepreneur's one.
This change of perspective is necessary because the two hypotheses investigated concern startup performance and not entrepreneurs' performance. The bridge between these two perspectives is knowledge sharing.
Therefore, I define an independent variable acting as a proxy to measure the level of knowledge sharing for each startup. This variable must represent Sum_Att_Oth_B at the startup level because, as explained before, this is the independent variable related to knowledge sharing.
Specifically, for each startup, the independent variable Sum_Att_Startup represents Sum_Att_Oth_B at the startup level because it measures the number of classes attended by the startup. A startup is considered attending a class if at least one team member participates, implying that the other team member scores 1 for Att_Oth_B. Sum_Att_Startup can assume integer numbers in a range from 0 to 8. The lower bound means that nobody in the team has attended any class, consequently, there is no knowledge sharing because there is no knowledge acquisition at all. The upper bound means that at least one member of the startup team, not necessarily the same, attended every class. Hence, there is new entrepreneurial knowledge to share with the other members.
Sum_Att_Startup B is computed as Equation (2.1). It is the sum of the eight boolean independent variables measuring the attendance of the startup at each lesson. Att_Startup_1, Att_Startup_2, Att_Startup_3, Att_Startup_4, Att_Startup_5, Att_Startup_6, Att_Startup_7, and Att_Startup_8 score 0 in case of non of the team members attend the respective lesson, conversely, it scores 1 if at least one team member attends the lesson.

$$\textbf{Sum\_Att\_Startup} = \text{Att\_Startup\_1} + \text{Att\_Startup\_2} + \text{Att\_Startup\_3} + \text{Att\_Startup\_4} + \text{Att\_Startup\_5} + \text{Att\_Startup\_6} + \text{Att\_Startup\_7} + \text{Att\_Startup\_8} \quad (2.1)$$

Unlike the first level of analysis, it is not crucial to consider whether the startup's team had participated in scientific classes or not. Indeed, the performance studied in the hypothesis refers to general knowledge taught to startups of all three groups. Consequently, Sum_Att_Startup can describe alone the knowledge-sharing mechanism of a startup.

Then, I have to define a set of dependent variables to describe the performance investigated in this research: pivoting and business formalization.
Concerning the first hypothesis, I defined two dependent variables representing two different dynamics of pivoting.
N_Inc_Pivots measures the number of incremental pivots that occurred until the interview round 5. An incremental pivot occurs when a startup changes some significant features in one of the nine blocks of the business model without pivoting the entire business model. Thus, this update aims to adjust the current business.
N_Inc_Pivots can assume only an integer number higher or equal than 0.
The second mechanism recorded by this model is radical pivoting. In this case, the change is not limited to specific features but rather concerns the entire business model. Therefore, radical pivots result in the design of a new and completely different business model.
This mechanism is recorded by the dependent variable N_Rad_Pivots. This variable represents the occurrences of radical pivots until the interview round 5. Thus, it can assume only integer numbers higher or equal than 0.
The second hypothesis, which relates to business formalization, is studied through two dependent variables that capture two different aspects of formalization.
The first aspect concern the formalization of roles. The dependent variable Roles_Def represents the formalization of the job allocation, assuming integer numbers in a range from 0 to 5. The lowest score indicates the complete absence of roles definition, job allocation, and job titles. Conversely, the highest score indicates a well-defined job allocation and a formalization of roles with titles.
The second aspect of formalization involved in this research concerns planning. The dependent variable Milestones_Def measure the formalization of objectives, milestones, and action plans. It can assume integer numbers in a range from 0 to 5. The score of 0 is associated with a complete lack of an action plan and milestones. Conversely, 5 indicates the presence of a detailed action plan and milestones.

As for the first level of analysis, it is necessary to define a set of control variables to consider other characteristics of the startups that could impact the performances studied.
Due to the limited size of the startup sample, I defined only two control variables that represent two crucial characteristics of startups.
First, it is necessary to specify whether startups offer products or services to their potential customers. The control variable Typology is boolean and scores 1, whether the startup sells products. Conversely, if the startup offers services, it scores 0.
Second, is considered whether an early entrepreneur is part of the entrepreneurial team. Indeed, the entrepreneurial experience could have a significant impact on performance.

The control variable Entr_Exp is boolean. If at least one member in the founding team has already entrepreneurial experience, it scores 1 Conversely, scores 0.

Table 3.2 shows the overview of the second level's set of variables.

Table 3.2: Hypotheses Variables

Variable Name	Typology	Nature	Vale Range
N_Inc_Pivots	Dependent	Numeric Integer	> 0
N_Rad_Pivots	Dependent	Numeric Integer	> 0
Roles_Def	Dependent	Numeric Integer	0 – 5
Milestones_Def	Dependent	Numeric Integer	0 – 5
Sum_Att_Startup	Independent	Numeric Integer	0 – 8
Typology	Control	Boolean	0, 1
Entr_Exp	Control	Boolean	0,

Following the multivariate linear regression analyses that study the different aspects of the two hypotheses, a robustness test is designed to verify the consistency of the results under a different perspective and involving other factors.
Indeed, due to the limited sample of startups, hypotheses are tested considering only two factors, represented by two control variables.
Therefore, I first test the hypotheses considering other sets of control variables, representing other significant startups' characteristics.
Finally, I change the perspective of analysis testing pivoting and business formalization at the entrepreneur level.
Unlike the analysis concerning knowledge sharing, which has its effects at the entrepreneurs level, pivoting and business planning are performance at the startup level. Thus, even with the perspective of the entrepreneurs, control variables relate to startups characteristics.

3.3. Startup Sample

As introduced before, startups involved in this research are part of the InnoVentureLab pre-accelerator program, which attracted 699 startups to candidate their business idea.
Startups are not required to comply with specific characteristics. Indeed, both incorporated and non-incorporated startups at the pre-seed stage of development can apply for the program.

In terms of the startup's team characteristics, members are not required to respect age or educational constraints. In addition, also alone entrepreneurs could apply for their business idea.
Generally, InnoVentureLab targets nascent entrepreneurs who plan to increase their entrepreneurial knowledge to improve their startup's development. Nevertheless, even a minority of incorporated and on-the-market startups participated in the program. Startup admitted belongs in one of the following stages of development:

1. Analysis: startups focus on the analysis of the problem, so they are still doing interviews and questionnaires;
2. Prototype: startups have a prototype or a basic version of the product;
3. Prototype with clients: startups have a prototype and are testing it with customers;
4. On the market: startups have a working product or service, but are not billing yet;
5. On the market and billing: startups are selling their product or service on the market

Overall, of the 699 applications, 308 startups are involved in the full program. 54 takes part only in some activities as the non-treated control group. Finally, 337 startups have not been involved in any activities. Startups are selected through a screening process composed of an online questionnaire and a phone interview. The first aims to collect information about the business idea and the team, while the second, aims to understand also the seriousness of the entrepreneurial intentions.
The 308 startups fully involved in the pre-acceleration program were randomly divided into the three clusters introduced in the previews paragraph: the effectuation group, the scientific group, and the control group.

The Effectuation treated group starts the program with 105 startups, the Scientific treated group with 102, and the Control group with 101.
The non-treated startups are excluded from the analysis because they were not involved in the training classes. Thus, team members of these startups have not assimilated the entrepreneurial knowledge, which is the core of the knowledge sharing studied in this research.
About the startups involved in the training classes, this research requires to comply with a couple of characteristics. Thus, not all the 308 startups can be considered in the research sample. The two fundamental constraints concern:

a) Number of team members;
b) Dropout decision.

The first boundary concerns the number of team members in the entrepreneurial team (a). The independent variable measuring this characteristic at the startup level is N_Members. It is an integer numerical variable that can assume values higher or equal to 1.
Since the focus of this research concerns knowledge sharing inside the entrepreneurial team, startups managed by alone entrepreneurs cannot be considered. Thus, startups scoring 1, as N_Members, are discarded.
Overall, 181 treated startups are composed of one member and, therefore, are excluded from the startup sample of this research.
Considering this first boundary, the startups managed by a team of two or more members are in total 127.

During the pre-acceleration program, startups may face dropout decisions (b). In this research, dropout considers both the business idea and the InnoVentureLab program. These two dynamics are represented respectively by two variables: Idea_Dropout and Program_Dropout. Both these two variables are boolean. Thus, they score 0 whether the startup did not drop out until the research period, while they score 1 whether the startup faced the dropout before this period.
Idea_Dropout measures the startup's decision of withdrawing the business idea. If the idea dropout occurs, Program_Dropout goes accordingly. Indeed, even if the entrepreneurial team intends to continue the pre-accelerator program with a new business idea is still not considered anymore in this research.
On the other hand, Program_Dropout measures whether a startup decides to withdraw from the pre-acceleration program. In this case, Idea_Dropout is not necessarily the same as Program_dropout. If Program_Dropout scores 1, and Idea_Dropout scores 0, the entrepreneurial team is still developing the business idea outside InnoVentureLab. Since the research team can't monitor the development, the study excludes also these startups.
Hence, I consider only startups that score 0 for both these two variables.
Overall, at the end of the fourth month of the program, a total of 74 startups faced a dropout decision. Of these 74 startups, 36 are associated with Idea_Dropout, while 38 with Program_dropout.
Considering the first and the second boundary, the aggregated pool of startups includes 53 treated startups.

Finally, three more startups are subsequently excluded from the final sample due to significant missing data. The ultimate startup sample is composted by 50 treated startups, for a total of 138 treated entrepreneurs.

3.4. Data Collection

Information about startups characteristics and development is collected through the InnoVentureLab program.
As introduced before, InnoVentureLab is a scientific experiment conducted by three of the most important Italian universities. Due to the scope of the project, during the entire duration of the pre-acceleration program, which lasts about 18 months, a large number of different data are constantly collected. This information, collected by the InnoVentureLab Research Assistants Team, is exploited only for scientific purposes.
About 20 students from the three universities involved in the project compose the Research Assistant Team. Research Assistants have two principal roles. First, during the online training period, they carry out operative tasks and provide technical support in the training classes. Second, each Research Assistant is assigned to a pool of about 15 startups to monitor execution and performance.
The second task allows data collection from each startup. Indeed, every seven weeks, each Research Assistant contacts its entire pool of startups to schedule a phone interview and submit a survey.
Both these two activities are submitted only to the contact person, which is delegated by its team members to share information about the startup development. Startups cannot choose whether take part in these sessions, indeed interviews and surveys are mandatory to keep on participating in the InnoVentureLab program.
The data collection process starts during the online training period, from lesson number three, and lasts until the end of the 18 months program.
Before each interview, the contact person fills out the survey, which aims to capture mainly background and performance information.

The most crucial tool for monitoring and scoring the execution is the interview. To have a constant frequency between data collected, the Research Assistants schedule all the calls in the same week.
The phone interview range between 30 and 45 minutes for each startup and is divided into four macro-areas: basic information, scientific behavior, effectuation behavior, and performance. Each area has its set of variables. To highlight the startup evolution, those variables are the same for the entire length of the program. Research Assistants are provided with an interview script (Appendix A) and guidelines to score consistently. Data are recorded in an aggregate database that stores data of all the interviews of each startup.

Besides the regular interviews and surveys to the contact person, it was carried out a single round of interviews involving all the team members of each startup. In terms of timing, this round was scheduled after the end of the online training

session period and coincides with the fifth round of regular interviews.
Therefore, data of the entire set of variables concerning the startup perspective and the contact person are related to the fifth round.

4 Results

In chapter four, the results of the data analysis are presented.
First, I introduce an overview of the variable analysis, showing distribution and other standard statistical indicators. Then, I will show the results of the multivariate linear regressions, which proxy knowledge sharing through the correlation between attendance and knowledge acquisition. Finally, I present the results of the multivariate linear regression between knowledge sharing and performance.
This chapter is closed with the robustness test of the hypotheses analysis.

4.1. Variable Analysis

The variables analysis is divided into the two-level structure of the methodology. Nevertheless, each variable of both levels is analyzed through the same indicators:

- Maximum;
- Minimum;
- Mean;
- Median;
- Standard Deviation (St Dev);
- Variance.

For the non-boolean variables, it is also considered the distribution of data. The curve indicators used to study the normal distribution are:

- Skewness (S);
- Kurtosis (K).

Table 4.1 shows the results of the first level Variable Analysis. This level has the perspective of the entrepreneurs, therefore, there are 138 observations for each variable.

Table 4.1: Knowledge Sharing Variable Analysis

Variable Name	Min	Max	Mean	Median	St Dev	Variance	S	K
Theory_RD5	1	5	4.051	4	0.923	0.851	- 1.052	4.200
Hypotheses_RD5	1	5	3.891	4	0.933	0.871	- 0.810	3.617
Test_RD5	1	5	3.703	4	0.977	0.955	- 0.791	3.491
Sum_Att	0	8	5.500	6	2.489	6.193	- 1.079	2.959
Sum_Att_Oth_B	0	8	6.616	7	1.756	3.085	- 2.055	7.230
Scientificity	0	1	0.348	0	0.478	0.228	-	-
Prod_Sum_Att	0	8	1.949	0	2.995	8.968	1.011	2.222
Prod_Sum_Att_Oth_B	0	8	2.268	0	3.259	10.62	0.833	1.836
Gender	0	1	0.739	1	0.441	0.194	-	-
Bechelor_D	0	1	0.609	1	0.490	0.40	-	-
Master_D	0	1	0.370	0	0.484	0.235	-	-
Early_Entr	0	1	0.130	0	0.338	0.114	-	-
Age	18	59	28.529	27	7.633	58.266	1.451	5.786
Y_Work_Exp	0	35	5.036	3	6.514	42.429	2.167	7.962
N_Members	2	7	3.101	3	1.216	1.479	1.639	5.946
Startup_Stage	1	5	1.986	2	1.299	1.664	1.235	3.369

Considering the ideal values of S and K, respectively 0 and 3 for a normally distributed curve, some variables need to be normalized. Variables missing S and K values are boolean, therefore the distribution analysis is not necessary.

More specifically, the normalization function is designed as the Equation (3.1).

$$\textbf{Ln\_Variable\_Name} = \ln(\text{Varibale\_Name}+1) \tag{3.1}$$

Considering the first level of analysis, Age, Startup_Stage, N_Members, and Y_Working_Exp are the only control variables that improve their data distribution through the normalization. Hence, testing the hypotheses will be used the normalized version of these variables.
Concerning the second level of analysis, which takes the startup's point of view, each variable has 50 observations.

Table 4.2 summarizes the Variable Analysis of this level.

Table 4.2: Hypotheses Variable Analysis

Variable Name	Min	Max	Mean	Median	St Dev	Variance	S	K
N_Inc_Pivots	0	4	1.420	1	1.108	1.228	0.204	2.059
N_Rad_Pivots	0	1	0.160	0	0.370	0.137	1.855	4.440
Roles_Def	1	5	3.620	4	1.210	1.465	- 0.563	2.350
Milestones_Def	1	5	3.680	4	1.077	1.160	- 0.227	2.178
Sum_Att_Startup	3	8	7.320	7	0.844	0.712	- 2.716	14.767
Typology	0	1	0.300	0	0.463	0.214	-	-
Entr_Exp	0	1	0.280	0	0.454	0.206	-	-

At the startup level, any variable improves its data distribution through normalization.

4.2. Knowledge Sharing Analysis

As introduced before, the first level of analysis aims to test whether existing knowledge sharing. Knowledge sharing is proxied by the correlation between the member's class attendance and the level of knowledge acquisition.
Specifically, I designed three multivariate linear regressions which measure the impact of attendance on three critical startups issues: Teory_RD5, Hypotheses_RD5, and Test_RD5. For all three regressions, the structure of independent and control variables is the same.

Table 4.3 shows the result of the linear regression that studies the impact on Theory_RD5.

Table 4.3: Knowledge Sharing on Theory_RD5

Variable Name	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att	0.045	0.037	1.220	0.225
Sum_Att_Oth_B	0.008	0.048	0.180	0.861
Scientificity	- 1.420	0.721	- 1.970	0.051
Prod_Sum_Att	0.026	0.067	0.380	0.703
Prod_Sum_Att_Oth_B	0.217	0.091	2.380	0.019
Gender	0.172	0.209	0.830	0.410

Bechelor_D	0.143	0.211	0.680	0.498
Master_D	- 0.040	0.268	- 0.150	0.881
Early_Entr	0.037	0.253	0.140	0.885
Ln_Age	- 0.987	0.632	- 1.560	0.121
Ln_Y_Work_Exp	0.210	0.172	1.220	0.224
Ln_N_Members	0.281	0.243	1.160	0.250
Ln_Startup_Stage	0.353	0.190	1.860	0.065

This regression shows a significant correlation concerning the participation of the other team members of the scientific group. To have a significant impact on the dependent variable, independent and control variables must have a p-value lower than 0.1. In this case, the p-value of Prod_Sum_Att_Oth_B scores 0.019. Therefore, there is a significant correlation between Prod_Sum_Att_Oth_B and Theory_RD5. Nevertheless, this variable measures only the incremental contribution given by Scientificity. Thus, it is necessary to sum Prod_Sum_Att_Oth_B with Sum_Att_Oth_B to show the overall contribution of the other team members' attendance of the scientific group.

Table 4.4 shows the contribution of the other team members' attendance in the case of a scientific or non-scientific group.

Table 4.4: Impact of other team members attendance on Theory_RD5

Variable Name	Scientificity	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att_Oth_B	0	0.008	0.048	0.180	0.861
Sum_Att_Oth_B	1	0.226	0.076	2.95	0.004

As emerges from Table 4.4, the Sum_Att_Oth_B coefficient for scientific entrepreneurs is the sum between the coefficient of Sum_Att_Oth_B for non-scientific entrepreneurs and the coefficient of Prod_Sum_Att_Oth_B, which gives the incremental contribution of scientificity.

Overall, scientific entrepreneurs increase the score of Theory_RD5 by 0.226, with a confidence interval of 99.6%, whether at least one other team member participates in one more class. This result is coherent with the assumption concerning the mechanism of knowledge sharing. Indeed, the increase of knowledge acquisition, represented by Theory_RD5, through the increase of the other team members'

attendance, is caused by knowledge sharing. As introduced in the methodology, it is crucial to consider scientificity due to the scientific nature of the variable Theory_RD5.
Finally, it emerged another significant result, which is not related to knowledge sharing. The startup stage of development, represented by Ln_Startup_Stage, has a positive and significant impact on Theory_RD5. Specifically, a unitary increase in the startup stage causes an increase of 0.353 in Theory_RD5, with a confidence level of 93,5%. This result implies that startups at a further development stage have defined clearer their core ideas and the relationships between them to make the business proposal viable, which is logically correct.

Table 4.5 shows the result of the linear regression that studies the impact of attendance on Hypotheses_RD5.

Table 4.5: Knowledge Sharing on Hypotheses_RD5

Variable Name	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att	0.004	0.040	0.100	0.923
Sum_Att_Oth_B	0.022	0.051	0.440	0.662
Scientificity	- 0.199	0.672	- 0.300	0.767
Prod_Sum_Att	0.054	0.068	0.790	0.432
Prod_Sum_Att_Oth_B	- 0.001	0.096	- 0.00	0.999
Gender	- 0.066	0.179	- 0.370	0.712
Bechelor_D	0.105	0.255	0.410	0.680
Master_D	- 0.412	0.247	- 1.670	0.098
Early_Entr	- 0.063	0.268	- 0.230	0.815
Ln_Age	- 1.839	0.622	- 2.960	0.004
Ln_Y_Work_Exp	0.358	0.163	2.200	0.030
Ln_N_Members	0.139	0.261	0.530	0.597
Ln_Startup_Stage	- 0.027	0.234	- 0.120	0.908

In this case, even considering Scientificity, there are no significant correlations between Hypoteses_RD5 and the two mechanisms of attendance.
The only significant results concern Ln_Age and Ln_Y_Work_Exp. Specifically, the variable representing the age of the entrepreneurs has a negative impact of – 1.839 on the variable Hypoteses_RD5 for a unitary increase of the logarithmic age. This

correlation has a confidence level of 99.6%. This result may be explained by the different approaches of entrepreneurs of different ages. Indeed, the definition of hypotheses could be seen as a scholastic approach. Thus, younger entrepreneurs are more prone to comply with this methodology.
The second significant result concern a positive correlation between the years of working experience and the logical predictions about the idea. The unitary increase in the logarithmic years of working experience causes an increase of 0.358 of Hypotheses_RD5, with a confidence level of 97.0%. In this case, the working experience could influence entrepreneurs' working methodology or available information.

Finally, Table 4.6 shows the result of the linear regression that studies the impact of attendance on Test_RD5.

Table 4.6: Knowledge Sharing on Test_RD5

Variable Name	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att	0.024	0.040	0.600	0.548
Sum_Att_Oth_B	0.006	0.054	0.110	0.909
Scientificity	- 0.631	1.047	- 0.600	0.548
Prod_Sum_Att	0.054	0.086	0.620	0.535
Prod_Sum_Att_Oth_B	0.051	0.141	0.360	0.720
Gender	- 0.133	0.202	- 0.660	0.510
Bechelor_D	0.226	0.219	1.030	0.304
Master_D	- 0.282	0.222	- 1.270	0.206
Early_Entr	0.436	0.275	1.590	0.115
Ln_Age	- 0.955	0.793	- 1.200	0.231
Ln_Y_Work_Exp	0.017	0.170	0.100	0.919
Ln_N_Members	- 0.235	0.310	- 0.760	0.449
Ln_Startup_Stage	0.541	0.197	2.750	0.007

Again, there are no significant correlations between Test_RD5 and the two mechanisms of attendance.
Table 4.6 shows only a significant correlation with Ln_Startup_Stage. Indeed, a unitary increase of the logarithmic startup stage causes an increase of 0.541 in the rigorousness of data collection and measurements, with a confidence level of 99.3%.

This is also a logical result. Indeed, startups at a further stage of development, especially those already in the market, are assumed to have completed the analysis phase.
Generally, the correlation between attendance and knowledge sharing is significant only for the variable Theory_RD5. The following two considerations may explain this result. First, the InnoVentureLab program was more focused on the concepts of Theory instead of the concepts of Hypotheses and Tests. Therefore, more training hours are dedicated to this topic. Second, it could be easier for entrepreneurs attending classes to share concepts related to Theory instead of Hypotheses and Tests concepts. Indeed, logical prediction about the idea, data collection, and measurements are more complex than the relationships between core ideas to make the business proposal viable.
In the light of these considerations, the participation of the other team members in the classes is taken as the proxy of knowledge sharing, as demonstrated by the results of Table 4.4.

Table 4.7 summarizes the three correlations between attendance and knowledge acquisition.

Table 4.7: Overview Knowledge Sharing

Variable Name	Theory_RD5	Hypotheses_RD5	Test_RD5
Sum_Att	0.045	0.004	0.024
	(0.225)	(0.923)	(0.548)
Sum_Att_Oth_B	0.008	0.022	0.006
	(0.861)	(0.662)	(0.909)
Scientificity	- 1.420	- 0.199	- 0.631
	(0.051)	(0.767)	(0.548)
Prod_Sum_Att	0.026	0.054	0.054
	(0.703)	(0.432)	(0.535)
Prod_Sum_Att_Oth_B	0.217	- 0.001	0.051
	(0.019)	(0.999)	(0.720)
Gender	0.172	- 0.066	- 0.133
	(0.410)	(0.712)	(0.510)
Bechelor_D	0.143	0.105	0.226
	(0.498)	(0.680)	(0.304)
Master_D	- 0.040	- 0.412	- 0.282

	(0.881)	(0.098)	(0.206)
Early_Entr	0.037	- 0.063	0.436
	(0.885)	(0.815)	(0.115)
Ln_Age	- 0.987	- 1.839	- 0.955
	(0.121)	(0.004)	(0.231)
Ln_Y_Work_Exp	0.210	0.358	0.017
	(0.224)	(0.030)	(0.919)
Ln_N_Members	0.281	0.139	- 0.235
	(0.250)	(0.597)	(0.449)
Ln_Startup_Stage	0.353	- 0.027	0.541
	(0.065)	(0.908)	(0.007)

4.3. Hypotheses Analysis

Since the correlation of knowledge sharing with class attendance has been demonstrated, hypotheses can be tested through the logical structure introduced in the methodology.
First, I test the hypothesis concerning pivoting through two multivariate linear regressions, which study the effect of knowledge sharing on incremental and radical pivoting. As explained in the methodology, knowledge sharing is proxied by Sum_Att_Startup.

Table 4.8 shows the result of the multivariate linear regression that studies the impact of knowledge sharing on N_Inc_Pivots.

Table 4.8: Knowledge Sharing on N_Inc_Pivots

Variable Name	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att_Startup	- 0.164	0.249	- 0.660	0.515
Typology	- 0.239	0.323	- 0.740	0.464
Entr_Exp	- 0.381	0.330	- 1.160	0.254

Table 4.8 does not show any significant results. Indeed, there is no statistical correlation between knowledge sharing and incremental pivoting. In addition, there is no statistical correlation between incremental pivoting and the startup's characteristics represented by the control variables.

Results concerning radical pivoting are shown in Table 4.9 In this case, the multivariate linear regression studies the impact of knowledge sharing on N_Rad_Pivots.

Table 4.9: Knowledge Sharing on N_Rad_Pivots

Variable Name	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att_Startup	0.012	0.044	0.280	0.783
Typology	- 0.038	0.115	- 0.330	0.746
Entr_Exp	- 0.025	0.118	- 0.210	0.832

Even in this case, there are no significant results. Hence, both knowledge sharing and startup characteristics considered are not statistically related to radical pivoting.
From the results of the two multivariate linear regressions, knowledge sharing is not statistically related to either incremental or radical pivoting. Therefore, knowledge sharing seems not correlated to the pivoting practice.
Nevertheless, as explained in the methodology, the limited number of observations forced a limited number of control variables. Therefore, in the robustness test, I will check these results considering different control variables and a different perspective.
If the results are coherent, Proposition 1 will be rejected.

The second hypothesis, which concerns business formalization, is analyzed through the same multivariate linear regression structure of the first one. Therefore, Sum_Att_Startup proxies knowledge sharing while control variables consider the same startup's characteristics.
In this case, knowledge sharing effects are studied on the formalization of roles and milestones.

Table 4.10 shows the results concerning the formalization of roles. In this case, the multivariate linear regression studies the impact of knowledge sharing on Roles_Def.

Table 4.10: Knowledge Sharing on Roles_Def

Variable Name	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att_Startup	- 0.298	0.132	- 2.260	0.028
Typology	- 0.525	0.361	- 1.460	0.152

Entr_Exp	0.136	0.422	0.320	0.749

Here emerges a significant negative correlation between knowledge sharing and roles formalization. Specifically, a unitary increase in the number of classes attended by the startup, which proxies an increase of knowledge sharing, causes a decrease of 0.298 in the level of roles formalization. This result is significant, with a confidence level of 97.2%.
Regarding the other startup's characteristics considered by the control variables, there are no significant relations with the formalization of roles.

The results of the second formalization issue analyzed, the formalization of milestones, are shown in Table 4.11.

Table 4.11: Knowledge Sharing on Milestones_Def

Variable Name	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att_Startup	- 0.374	0.133	- 2.80	0.007
Typology	- 0.142	0.356	- 0.400	0.693
Entr_Exp	0.064	0.354	0.180	0.857

Even for the milestones formalization emerges a negative and statistically significant relation with knowledge sharing. Indeed, a unitary increase in the number of classes attended by the startup, which proxies an increase of knowledge sharing, causes a decrease of 0.374 in the level of milestone formalization. This result is significant, with a confidence level of 97.2%. As for the previous analysis, control variables that proxy startup's characteristics have no significant relation with milestones formalization.
From both analyses concerning business formalization, it emerged a significant negative correlation with knowledge sharing. Hence, considering the coherence of results between the two aspects analyzed, business formalization seems negatively correlated to knowledge sharing. This result is in contrast with Proposition 2. Thus, if the robustness test confirms this result, Proposition 2 will be rejected.

Table 4.12 summarizes the three correlations between attendance and knowledge acquisition.

Table 4.12: Overview Knowledge Sharing Impact

Variable Name	N_Inc_Pivots	N_Rad_Pivots	Roles_Def	Milestoness_Def
Sum_Att_Startup	- 0.164	0.012	- 0.298	- 0.374
	(0.515)	(0.783)	(0.028)	(0.007)
Typology	- 0.239	- 0.038	- 0.525	- 0.142
	(0.464)	(0.746)	(0.152)	(0.693)
Entr_Exp	- 0.381	- 0.038	0.136	0.064
	(0.254)	(0.746)	(0.749)	(0.857)

4.4. Robustness Test

Due to the limited number of observations, a detailed robustness test is necessary to confirm or reject the results from the analysis. As introduced in the methodology, this research has a two-level robustness test.
First, hypotheses will be tested considering other couples of control variables. Second, it is changed the perspective of analysis considering entrepreneurs instead of startups.
Besides Typology and Entr_Exp, which are the startup's factors considered in the analysis, the robustness test takes two more pairs of control variables.
First, Startup_Stage and N_Members. As in the entrepreneur perspective, Startup_Stage represents the startup stage of development assuming integer values from 1 to 5. On the other side, N_Members represent the number of members in the founding team, assuming integer numerical values higher than 1. These variables are analyzed following the same criteria of the Variables Analysis. Consequently, in the multivariate linear regression is taken the logarithmic N_Members, due to its data distribution. The following tables show the result of the multivariate linear regression, which tests the hypotheses considering this pair of control variables.

Table 4.13 and Table 4.14 shows respectively the impact of knowledge sharing on N_Inc_Pivots and N_Rad_Pivots, considering Startup_Stage and N_Members as control variables.

Table 4.13: Knowledge Sharing on N_Inc_Pivots (RT1)

Variable Name	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att_Startup	- 0.156	0.274	- 0.570	0.571
Startup_Stage	- 0.078	0.100	- 0.790	0.436

Ln_N_Members	0.412	0.731	0.560	0.576

Table 4.14: Knowledge Sharing on N_Rad_Pivots (RT1)

Variable Name	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att_Startup	0.002	0.043	0.050	0.959
Startup_Stage	- 0.002	0.051	- 0.040	0.969
Ln_N_Members	- 0.344	0.232	- 1.480	0.145

As emerged from Table 4.13 and Table 4.14, there are no significant results from both analyses. Hence, knowledge sharing and factors represented by the control variables do not influence pivoting. This result, coherently with the main analysis, rejects Proposition 1.

Table 4.15 and Table 4.16 show respectively the impact of knowledge sharing on Roles_Def and Milestones_Def, considering Startup_Stage and N_Members as control variables.

Table 4.15: Knowledge Sharing on Roles_Def (RT1)

Variable Name	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att_Startup	- 0.263	0.131	- 2.010	0.050
Startup_Stage	0.327	0.130	2.510	0.016
Ln_N_Members	0.098	0.697	0.140	0.889

Table 4.16: Knowledge Sharing on Milestones_Def (RT1)

Variable Name	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att_Startup	- 0.344	0.104	- 3.300	0.002
Startup_Stage	0.450	0.087	5.210	0.000
Ln_N_Members	- 0.008	0.536	- 0.020	0.988

As emerged from Table 4.15 and Table 4.16, knowledge sharing is significatively related to Roles_Def and Milestones_Def. Specifically, a unitary increase in Sum_Att_Startup, which proxes knowledge sharing, causes a decrease of 0.263 in

Roles_Def and a decrease of 0.344 in Milestones_Def. The confidence level of these relations is respectively 95% and 99.8%. In addition, Stratup_Stage has a positive and significant correlation with both Roles_Def and Milestones_Def. Overall, knowledge sharing has a negative influence on business formalization. This result rejects Proposition 2 and it is coherent with the main analysis.

The second pair of factors considered as control variables concern the educational level and the working experience of the startup team. Specifically, it is considered the presence of members with a master's degree and the team's overall years of working experience. Variables name is respectively Master_D and Y_Work_Exp.
The first one is a boolean variable. Thus, it scores 1 in the case at least one member meets the education background condition. Conversely, it scores 0.
The second one is an integer numerical variable that scores the sum of each member's years of working experience. These variables were analyzed following the same criteria of the Variables Analysis. Consequently, Y_Work_Exp is normalized through logarithmic normalization due to its data distribution.
The following tables show the result of the multivariate linear regression, which tests the hypotheses considering this pair of control variables.

Table 4.17 and Table 4.18 show respectively the impact of knowledge sharing on N_Inc_Pivots and N_Rad_Pivots, considering Master_D and Y_Work_Exp as control variables.

Table 4.17: Knowledge Sharing on N_Inc_Pivots (RT2)

Variable Name	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att_Startup	- 0.182	0.282	- 0.640	0.523
Master_D	0.002	0.365	0.000	0.997
Ln_Y_Work_Exp	- 0.132	0.156	- 0.850	0.401

Table 4.18: Knowledge Sharing on N_Rad_Pivots (RT2)

Variable Name	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att_Startup	0.006	0.040	0.140	0.890
Master_D	0.067	0.115	0.580	0.564
Ln_Y_Work_Exp	- 0.070	0.059	- 1.170	0.247

Table 4.17 and Table 4.18 do not emerge any significant relationship between knowledge sharing and pivoting. Hence, as for the previous test, knowledge sharing and factors represented by the control variables do not influence pivoting. This result rejects Proposition 1 and it is coherent with the main analysis.

Table 4.19 and Table 4.20 show respectively the impact of knowledge sharing on Roles_Def and Milestones_Def, considering Master_D and Y_Work_Exp as control variables.

Table 4.19: Knowledge Sharing on Roles_Def (RT2)

Variable Name	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att_Startup	- 0.258	0.141	- 1.830	0.073
Master_D	0.162	0.398	0.410	0.686
Ln_Y_Work_Exp	0.155	0.159	0.980	0.332

Table 4.20: Knowledge Sharing on Milestones_Def (RT2)

Variable Name	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att_Startup	- 0.381	0.128	- 2.980	0.005
Master_D	- 0.259	0.385	- 0.670	0.504
Ln_Y_Work_Exp	- 0.019	0.156	- 0.120	0.903

Table 4.19 and Table 4.20 show a significant negative relationship between knowledge sharing and business formalization. Specifically, a unitary increase of Sum_Att_Startup causes a decrease of 0.258 in Roles_Def and a decrease of 0.381 in Milestones_Def.
The confidence level of these relations is respectively 93.7% and 99.5%. Factors represented by the control variables are not significantly related to business formalization. Overall, knowledge sharing has a negative influence on business formalization. This result rejects Proposition 2 and it is coherent with the main analysis.

The second robustness test analyses the hypotheses from the entrepreneurs' perspective.
Despite the performance studied in this research concerning startups and not members, the dependent variables representing performance can be also interpreted at the entrepreneur level.

N_Inc_Pivots_M, N_Rad_Pivots_M, Roles_Def_M, and Milestones_Def_M represent the respective startup performance variable at the entrepreneur level. Therefore, members of the same startup team score the same startup value for these four dependent variables. Before using these in the robustness test, each variable was analyzed following the same criteria of the Variables Analysis. In this case, the data distributions of the dependent variables do not require any logarithmic normalization.
The change of perspective is more coherent with the knowledge-sharing concept because it is a member's level mechanism. Therefore, the independent variable that represents it does not require a proxy, unlike the startup level.
Consistently to the first level of the principal analysis, which studied the presence of knowledge sharing, Sum_Att_Oth_B represents this mechanism. Since performances analyzed are not specific for the scientific group, in this case, the independent variable is not joined with a moderation variable that considers scientificity.

One of the main reasons for changing the level of analysis is the number of observations. Indeed, at the members' level, there are 138 observations. Those are more than twice the observations at the startup level.
A larger number of observations increase the number of control variables that can be considered in the regression model. Specifically, at this level of the robustness test, are considered 7 control variables.
Since performance concerns the startup level, even control variables concern the startup's characteristics.
Startup_Typology, Startup_Entr_Exp, Master_D, Startup_Y_Work_Exp, Startup_Stage, and N_Members represent the same factors considered in the different analyses at the startup level.
The first variable is boolean and represents the startup typology with the same logic as the corresponding startup level variable. Startup_Entr_Exp and Master_D are also boolean variables. They score 1, whether at least one team member complies with this characteristic. Conversely, it scores 0 only whether all the startup members do not comply with the characteristic. Thus, for example, if a startup member has no entrepreneurial experience, but one other member of the same startup has, the variable Startup_Entr_Exp scores 1 also for the first member.
Startup_Y_Work_Exp is the sum of the years of working experience of the entire team members. Therefore, even a member with no working experience may score more than 0 for this variable.
Finally, the last two control variables concern startup characteristics that are already involved in the first study of knowledge sharing.
The seventh control variable is Sum_Att, which is not related to startup characteristics but is considered to better represent knowledge sharing.

Table 4.21 and Table 4.22 show respectively the impact of knowledge sharing on N_Inc_Pivots_M and N_Rad_Pivots_M, considering members' perspectives.

Table 4.21: Knowledge Sharing on N_Inc_Pivots (RT3)

Variable Name	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att_Startup	- 0.023	0.063	- 0.370	0.716
Sum_Att	0.017	0.040	0.440	0.664
Startup_Entr_Exp	- 0.471	0.282	- 1.670	0.097
Master_D	0.212	0.199	1.070	0.288
Ln_Startup_Y_Work_Exp	- 0.048	0.097	- 0.490	0.625
Startup_Typology	- 0.167	0.205	- 0.810	0.417
Ln_Startup_Stage	- 0.026	0.264	- 0.100	0.992
Ln_N_Members	1.121	0.349	3.210	0.002

Table 4.22: Knowledge Sharing on N_Rad_Pivots (RT3)

Variable Name	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att_Startup	- 0.012	0.019	- 0.660	0.510
Sum_Att	- 0.003	0.011	- 0.280	0.778
Startup_Entr_Exp	0.071	0.083	0.850	0.396
Master_D	0.046	0.054	0.850	0.397
Ln_Startup_Y_Work_Exp	- 0.095	0.034	- 2.750	0.007
Startup_Typology	- 0.015	0.070	- 0.210	0.836
Ln_Startup_Stage	- 0.014	0.117	- 0.120	0.905
Ln_N_Members	- 0.287	0.117	- 2.460	0.015

Table 4.21 and Table 4.22 show no significant relations between knowledge sharing and pivoting. Indeed, both the p-values of the independent variable of the two multivariate linear regressions are higher than 0.1.
This result is coherent with the principal analysis and the first level of the robustness test. Therefore, Proposition 1 is rejected also in this case.
Besides this main result, these regressions show some significant correlation between the control variables and the dependent variable.

From Table 4.21 emerged that the presence of members with entrepreneurial experience is negatively correlated with incremental pivoting. On the other hand, the size of the entrepreneurial team is positively correlated with incremental pivoting.

Table 4.23 and Table 4.24 show respectively the impact of knowledge sharing on Roles_Def and Milestones_Def, considering members' perspectives.

Table 4.23: Knowledge Sharing on Roles_Def (RT3)

Variable Name	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att_Startup	- 0.111	0.046	- 2.410	0.017
Sum_Att	- 0.930	0.035	- 2.640	0.009
Startup_Entr_Exp	- 0.371	0.247	- 1.500	0.135
Master_D	- 0.252	0.214	- 1.180	0.241
Ln_Startup_Y_Work_Exp	0.240	0.086	2.800	0.006
Startup_Typology	- 0.714	0.195	- 3.660	0.000
Ln_Startup_Stage	1.412	0.257	5.520	0.000
Ln_N_Members	0.646	0.333	1.940	0.055

Table 4.24: Knowledge Sharing on Roles_Def (RT3)

Variable Name	Coefficient	Robust Std. Err.	t	P > |t|
Sum_Att_Startup	- 0.096	0.057	- 1.680	0.095
Sum_Att	- 0.071	0.036	- 1.960	0.053
Startup_Entr_Exp	- 0.180	0.241	- 0.750	0.457
Master_D	- 0.210	0.184	- 1.140	0.256
Ln_Startup_Y_Work_Exp	- 0.050	0.086	- 0.580	0.560
Startup_Typology	- 0.444	0.161	- 2.760	0.007
Ln_Startup_Stage	1.682	0.176	9.580	0.000
Ln_N_Members	0.016	0.296	0.050	0.957

Table 4.23 and Table 4.24 show that knowledge sharing has a significant negative correlation with roles definition and milestones definition. Specifically, a unitary increase of knowledge sharing, represented by Sum_Att_Oth_B, causes a decrease

of 0.111 in Roles_Def, with a confidence level of 99.3%. On the other side, a unitary increase of knowledge sharing causes a 0.096 decrease in Milestones_Def, with a confidence level of 91.5%.
From these results emerge that knowledge sharing has a significant negative correlation with business formalization. This is coherent both with the principal analysis and the first level of robustness test.

Hence, Proposition 2.2 is rejected due to the opposite correlation found..

5 Conclusion and Future Developments

Despite startup issues are increasing the interest of researchers, literature still has many gaps also about topics that are widely discussed for established companies.
These gaps are even more pronounced for pre-seed stage startups. Startups at this phase of development are usually validating the problem and demonstrating the feasibility of the business idea (Salamzadeh, 2015).
Therefore, it is difficult to access information about their development because it is rare that they are part of a support mechanism (i.e. accelerators, incubators) or they are backed by investors. Indeed, these entities force startups to share all their relevant data to apply in their program. However, they are more prone to involve startups at a later stage of development.
This research instead involves InnoVentureLab, a pre-accelerator program. Since it is designed and managed by universities, this program has no financial objectives. Conversely, it aims to involve and collect data from pre-seed startups. Therefore, this research has the opportunity to deepen issues at the very beginning of the startup lifecycle.
The pre-accelerator training course teaches significant entrepreneurial knowledge for business idea development. Moreover, attendance of all the team members of each startup is not mandatory.
Due to the program design, the focus of this research is understanding whether entrepreneurial knowledge is shared within the team and its impact on performance.
Specifically, the impact is studied on the performance of two activities that are crucial for moving the startup to the next stage of development: pivoting and business formalization.
The first performance concerns a diffused activity that aims to redirect the course of action involving irreversible commitment and uncertain consequences. In most cases, the trigger of a pivot lies in divergent results from the expectations (Chaparro & Gomes, 2021). Therefore, this activity is common at the pre-seed startup stage due to its analytical nature. Indeed, divergent results are often the output of analyses carried out in this phase.
On the other hand, business formalization is an activity that prepares the startup

for the next stage. Indeed, the most important and complete output of this activity is the business plan, which is usually required to apply for support mechanisms and investors.

According to the poor literature available on these three core topics, knowledge sharing should have had a positive correlation both with pivoting and business formalization.

The general reason behind these assumptions is that both the activities are triggered or positively affected by the information. Information, in turn, is strongly affected by knowledge sharing.

Despite this, both the analyses and robustness tests reject the two hypotheses.

The first reason could lie in the design of the knowledge-sharing mechanism. Indeed, knowledge sharing was designed as an increase of knowledge acquisition through the participation of the other team members in the classes. Specifically, analysis shows that the participation of the other team members in one more class significantly increases by 0.226 knowledge acquisition. This analysis considers several factors referring to the characteristics of entrepreneurs and startups. However, it does not consider other potential sources of entrepreneurial knowledge.

Indeed, entrepreneurs participating in the InnoVentureLab program could absorb entrepreneurial knowledge apart from the pre-accelerator training courses and startup team members.

Especially in recent years, many other formal and informal channels provide entrepreneurial knowledge. Besides books, courses, and seminars, this type of knowledge is currently shared also by social networks, blogs, and influencers.

Thus, the increase in knowledge acquisition is not necessary based on knowledge shared by the other team members who participated in the training classes.

Moreover, knowledge sharing is an entrepreneur-level dynamic. On the other hand, performances studied concern the startup level. Therefore, to study the impact of knowledge sharing on performance it was necessary a proxy that represents knowledge sharing at the startup level. This change of perspective and the use of a proxy could also distort the real impact of knowledge sharing on performance.

Considering the specific results of the two hypotheses, the first was rejected due to the lack of statistical significance. Thus, it seems that there is no correlation between pivoting and knowledge sharing.

The pivoting mechanism is highly related to the interpretation of information, which in turn is highly affected by knowledge sharing. Therefore, independently from the type of correlation, it is peculiar that there is any kind of correlation.

Besides the design of the knowledge-sharing mechanism, a likely explanation of this result lies in the limited number of observations, which also limits the number of factors that could be simultaneously considered in the analysis.

Moreover, since pivoting is a startup-level activity, both in the main analysis and in the robustness tests are considered factors concerning startup characteristics.
However, Chaparro and Gomes (2021) argued that even personal traits could influence pivoting. Specifically, narcissism may negatively influence the recognition of a failure, which is embedded in divergent results from the expectations. Since this is one of the main triggers of pivoting, narcissism may limit the occurrences of pivots.
Concerning the second phase of the process, there are other individual characteristics affecting it. For example, openness and social skills could be positively related to opportunity recognition and generation of ideas (Hasan and Koning, 2019). Consequently, these individual traits may increase or limit the occurrences of pivoting, depending on their level.
On the other side, the second hypothesis was rejected due to the opposite correlation found. Thus, knowledge sharing seems negatively correlated to business formalization. Both the main analysis and the robustness tests showed the same correlation, with a significant confidence level. Indeed, the limited size of the sample seems not a limitation for this analysis.
However, the other considerations regarding the design of the knowledge-sharing mechanism, the number of factors considered, and their perspective may have affected also the correlation between knowledge sharing and business formalization.
Another potential limitation of the model, which is specifically related to this hypothesis, is the design of business formalization. Unlike pivoting, this performance is less studied by researchers. Consequently, the activities and boundaries of this topic are not clearly defined. De Clercq (2013) studied the impact of business formalization on knowledge sharing, arguing that a formal organization fosters knowledge sharing. Nevertheless, his evidence does not imply predicted results for the opposite correlation. The assumption was based on arguments about business planning, which is an activity that embeds the formalization of several aspects of the business idea. Despite this topic having been most studied, it also includes other analyses which are not strictly related to business formalization. Moreover, the model of this research measures only the definition of milestones and the definition of roles. Despite these being two core aspects of business planning and business formalization, they do not fully represent all the different topics.
The meaning of the negative impact of knowledge sharing on business formalization is a worsening of the cost-benefit analysis between the cost of business formalization and its benefit.

The assumption was based on the fact that knowledge sharing improves the quality of information, which in turn increases the quality of business planning (Chen et al., 2019). Therefore, a higher quality of the output improves the cost-benefit analysis.

However, the results evidence that knowledge sharing increases the opportunity cost, fostering flexibility, which is crucial for startups at this stage of development.
Moreover, the decision to formalize the business does not depend only on this cost-benefit analysis. Indeed, even in this case, individual traits could influence the activities carried out in the pre-seed stage.
Characteristics such as opportunity cost (Bennett & Chatterji, 2019) and prior industry experience (Chen et al., 2019) influence the activities undertaken before the market entrance, including business formalization.
Generally, the entrepreneurial entry process is affected by several factors, both internal and external. The literature review has considered eleven internal and four external factors, however, it was not possible to include all these aspects in the analysis.
Moreover, several other factors may influence this particular startup stage.
Overall, this research contributes to the literature about pre-seed startups' performance and entrepreneurial entry activities in Europe. Specifically, emerges dynamics about the transfer of the entrepreneurial knowledge acquired through a pre-accelerator program and the impact of this activity on performance.
Despite the startup sample being mainly Italian, the results of this study could be reflected in European startups. Indeed, the structure of pre-accelerator programs and the knowledge taught are aligned to the Italian context.
The literature has few studies about this kind of external support mechanism because it is less diffused and involves startups at the very beginning of the entrepreneurial process. However, entrepreneurial knowledge taught by pre-accelerator programs at this stage of the startup's lifecycle could radically influence the entrepreneurial activities carried out by the entrepreneurs. Therefore, this research contributes to understanding how this knowledge is exploited and how is managed within the startup.
In addition, the contribution extends also to the literature about pivoting and business formalization. The first topic was deepened by several researchers. However, despite its mechanism and its theoretical triggers, there are not many studies about the activities influencing pivoting. From this research emerges that pivoting is not influenced by knowledge sharing. However, there should be considered the limitations of the model.
Concerning business formalization, this is less studied by researchers. Despite there being studies that deepen how formalization influences other performance, there aren't researches that deepen how formalization is influenced. This study has shown how business formalization is negatively correlated with entrepreneurial knowledge sharing. This is an interesting result that could be studied more in detail. Indeed, it could be intriguing for other researchers to understand whether there are other factors influencing business formalization.

Overall, this research is a starting point for the study of entrepreneurial knowledge sharing.
Other researchers could deepen the correlation between this activity and other performances. Moreover, it could be interesting to study whether entrepreneurial knowledge taught at a later stage of the startup change the impact on pivoting, business formalization, and the performance of other activities.
Studying entrepreneurial knowledge sharing at a later stage may also be easier. Indeed, accelerator and incubator programs, which involve more developed startups, are more widespread than pre-accelerator programs.
Besides the different studies that could help researchers in understanding this fairly unknown topic, some insights for managerial practices could be already extrapolated.
According to Chandler and Jansen (1992), entrepreneurial capabilities and entrepreneurial knowledge are positively related to performance. Therefore, it is generally a good practice to share within the team entrepreneurial knowledge. In addition, since people use cognitive abilities to generate their interpretation of the information (Carabrera, 2002), different points of view from people with different competencies and experiences could be valuable.
In pre-seed startups, entrepreneurial knowledge sharing was found to be negatively correlated to business formalization. However, at this particular stage, business formalization could reduce the flexibility of the startup, affecting negatively performance. Therefore, this negative correlation does not negatively affect entrepreneurs from sharing knowledge. Indeed, it is likely that more flexibility in the first stages of the entrepreneurial entry process leads to better performances and a more effective process.

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A Appendix A

This appendix shows the interview script for the contact person and the other team members. Besides the questions, the script also shows all the variables scored by the Research Assistants. Indeed, even questions and variables that are completely unrelated to this research are shown. Variables that are used in this research are highlighted.

A.1. Interview Script - Contact Person

1. Al momento studi o svolgi qualche altro lavoro al di fuori della start-up?
   Variabile database → Altra_occupazione (SI/NO)

   [se svolge altro lavoro oltre alla start-up] Lavori part-time o full-time?
   Variabile database → Lavoro_full-time (1 se lavora full-time, 0 altrimenti)

2. Quante ore a settimana dedica mediamente ogni membro del team alla start-up (compresi tutti i membri del team)?
   Variabile database → Ore_lavorate

3. Come vi organizzate lavorativamente con gli altri membri del team?
   Variabili database:

   → Clear_definition_roles (score 0 - 5)

   → Definition of milestones (score 0 - 5)

4. Puoi fornire una breve panoramica della tua attività? Qual è la tua situazione attuale e quali sono state le attività su cui tu e il tuo team vi siete concentrati rispetto all'ultima telefonata.

Variabile Database	Score
Fase_startup	1) Analisi del problema (stanno ancora facendo interviste/questionari e non hanno ancora un sito, una landing page, un prototipo)

	2) Prototipo (hanno un prototipo o una versione base del prodotto) 3) Prototipo con cliente (hanno un prototipo E stanno effettivamente testando con cliente/i) 4) Sul mercato ma non fatturano (hanno un prodotto/servizio funzionante, ma non fatturano ancora) 5) Sul mercato e fatturano

Puoi raccontarmi come si sta evolvendo il percorso della tua start-up? Iniziamo dalla soluzione che avete sviluppato/state sviluppando e dal vantaggio chiave che offrite ai vostri clienti). Rispetto all'ultima chiamata, ci sono stati dei cambiamenti nello sviluppo della vostra offerta/soluzione? (Se sì) quali? Per quale motivo? Cosa vi ha portato a definire la vostra attuale offerta/soluzione?

[Se sì] Perché pensi che questa soluzione possa avere successo? Come sei/siete arrivati a questa conclusione?

Variabile Database	Cosa Codifica	Score Range
Teoria_chiara	**La teoria è comprensibile (falsificabilità)**	**0 - 5**
Teoria_elaborata	La teoria va nel dettaglio (falsicabilità)	0 - 5
Teoria_alternative	La teoria considera aspetti alternativi (generalizzabilità)	0 - 5
Teoria_evidente	La teoria ha dei dati a supporto	0 - 5
Teoria_modulare	La teoria scompone il problema in sotto-problemi da risolvere	0 - 5
Teoria_gerarchia	La teoria aiuta a prioritizzare i problemi da risolvere	0 - 5

1. Vorrei sapere qualcosa in più sullo sviluppo del vostro business. Quali sono gli aspetti principali della vostra offerta/soluzione ad oggi? Ci sono aspetti sui quali state ancora investigando alcune cose? Cosa vi ha portato a definire questi aspetti?

[In un secondo momento] State parlando con clienti potenziali e/o effettivi per capire alcuni aspetti della vostra offerta/soluzione? [Se sì] Che cosa volevate capire nello specifico e perchè? E che cosa avete scoperto?

[Se hanno parlato con clienti/fatto interviste o questionari] Che domande avete fatto e perchè?

Variabile Database	Cosa Codifica	Score Range
Ipo_esplicite	**Elenca le ipotesi che intende testare in modo esplicito**	**0 - 5**
Ipo_coerenti	Sono derivate dalla teoria	0 - 5
Ipo_precise	Testano una cosa alla volta	0 - 5
Ipo_falsificabili	Hanno una soglia per la convalida [sono in grado di stabilire una condizione (soglia) in base alla quale le ipotesi possono essere considerate supportate / non supportate]	0 - 5
Ipo_testabili	Le variabili da testare sono state operazionalizzate correttamente	0 - 5
Ipo_alternativa	Le ipotesi erano mirate a falsificare una cosa e a supportarne un'altra come conseguenza diretta (alternativa)	0 - 5

2. In che modo avete indagato o state indagando gli aspetti della vostro business su cui pensate di aver bisogno di raccogliere più informazioni? Ad esempio, avete raccolto dei dati?

   [Se hanno fatto qualche tipo di ricerca] Che tipo di ricerche avete fatto? Che domande avete fatto? A chi le avete fatte? Cosa vi ha portato a scegliere che tipo di ricerca fare?

Variabile Database	Cosa Codifica	Score Range
Test_coerenti	**il test permette di testare le ipotesi**	**0 - 5**
Test_validi	Specificità: il test è fatto nel vero contesto in cui opera la startup	0 - 5

	-Validità: Il utilizza metriche coerenti con il costrutto teorico -Affidabilità: il test utilizza misure ripetibili con un basso errore di misurazione	
Test_rappresentativi	Il test coinvolge un campione con le caratteristiche del reale target della startup	0 - 5
Test_rigorosi	Usano il test giusto e con le procedure giuste (es. domande aperte nelle interviste; o hanno una baseline di confronto o un contraffattuale nel test di prodotto/servizio)	0 - 5
Test_causalità	Il test misura un nesso di causalità tra le 2 variabili testate (se Variabile1 allora effetto su Variabile2)	0 - 5
Test_bias	Il test è realizzato su un campione con bias ridotti di selezione e autoselezione	0 - 5

3. Che cosa emerge dai dati che avete raccolto? Che cosa vi ha portato a queste conclusioni?

   [In un secondo momento] Dove avete archiviato i dati? Come li avete analizzati?

Variabile Database	Cosa Codifica	Score Range
Val_dati	Non basati su esperienze individuali o sensazioni	0 - 5
Val_misure	Misurano quello che teoricamente l'imprenditore vuole misurare e sono dati affidabili	0 - 5

Val_sistematica	C'è un modello di metriche, uno schema, qualcosa che categorizzi la raccolta dati	0 - 5
Val_esplicativi	Riesce a connettere i vari risultati e a rielaborare la propria teoria conseguentemente	0 - 5
Val_stima	Se gli imprenditori hanno una misura di performance in base alla quale stimano il valore dell'idea al fine di prendere la decisione finale (Continua/Pivot/Exit)	0 - 5
Val_componente	Evidenze dei test (relativi a specifiche ipotesi) sono tradotte in una stima del valore della componente del modello di business testata	0 - 5
Val_alternativa	I dati raccolti aiutano a stimare il valore della componente alternativa a quella testata	
Val_negativa	I risultati negativi dei test permettono di capire nuove possibilità di esplorazione	

4. Come avete usato le informazioni raccolte? Che cosa emerge dai dati che avete raccolto? Come avete tratto eventuali conclusioni?

   Come avete usato le informazioni raccolte / quanto emerge dai dati raccolti?

   [In un secondo momento] → Avete impostato delle soglie minime per decidere come valutare i dati raccolti? Come?

Variabile Database	Cosa Codifica	Score Range
Decisione_soglia	Se la decisione di: 1. continuare o abbandonare il progetto è stata presa confrontando la stima del valore dell'idea con una soglia minima	0 - 5

	2. modificare il progetto è stata presa confrontando la stima del valore dell'idea con una soglia minima	
Decisione_soglia_calibrata	La soglia tiene conto della qualità dei test e del tipo di dato raccolto	0 - 5

5. Rispetto all'evoluzione del vostro business dall'ultima chiamata ad oggi, quali fattori hanno condizionato le scelte fatte finora? Da che cosa siete partiti per prendere le decisioni più rilevanti? Cosa vi ha portato a scegliere questi fattori?

   [Se menzionano i loro mezzi (conoscenza, preferenze, connessioni) nella risposta alla domanda precedente] Che ruolo hanno avuto le vostre conoscenze personali e professionali e le vostre connessioni nell'evoluzione della vostra idea di business dall'ultima chiamata?

Variabile Database	Cosa Codifica	Score Range
Bird_in_hand_whoare	Gli imprenditori sviluppano l'idea partendo da chi sono, ossia dalle proprie abilità e capacità	0 - 5
Bird_in_hand_whoknow	Gli imprenditori sviluppano l'idea partendo da chi conoscono, ossia dalla propria famiglia, amici, network lavorativo	0 - 5
Bird_in_hand_whatknow	Gli imprenditori sviluppano l'idea partendo da cosa conoscono, ossia dal proprio background e esperienza	0 - 5

6. Che tipo di risorse (di tipo economico e non) state utilizzando per sviluppare il vostro business? Quante di queste risorse avete investito nel progetto finora? Come avete definito quante risorse investire sul progetto?

   [Se ci sono investimenti economici] Come avete deciso che tipo di investimenti fare?

Variabile Database	Cosa Codifica	Score Range
Affordable_loss_max	L'imprenditore ha usato il massimo delle risorse che può permettersi di perdere	0 - 5
Affordable_loss_risk	L'imprenditore non ha aggiunto risorse (anche soldi) a quelle disposte inizialmente	0 - 5
Affordable_loss_focus	L'imprenditore ha focalizzato la sua attenzione a non perdere più di quanto può permettersi invece di focalizzarsi sul valore atteso	0 - 5

7. Vorrei parlare delle tue relazioni con fornitori, concorrenti, altri imprenditori, eventuali partner. Hai sviluppato qualche relazione con loro?

   [Se si] Di che tipo? (partnership, alleanze) Con chi le hai fatte (fornitori, clienti, potenziali competitor)? Quando hai iniziato a pensare/stringere queste relazioni?

Variabile Database	Cosa Codifica	Score Range
Crazy_quilt_competitor	Se l'imprenditore ha stretto partnerships o alleanze con possibili competitor	0 - 5
Crazy_quilt_supply	Se l'imprenditore ha ridotto l'incertezza stringendo accordi con fornitori che hanno mostrato interesse prima della commercializzazione	0 - 5
Crazy_quilt_client	Se l'imprenditore ha ridotto l'incertezza stringendo accordi con clienti che hanno mostrato interesse prima della commercializzazione	0 - 5

8. Riesci a ricordare una situazione in cui è successo qualcosa di inaspettato (chiedi esempi) dall'ultima chiamata ad oggi? Se si, come hai reagito? Quali decisioni hai preso in seguito a questo/i evento/i?

Variabile Database	Cosa Codifica	Score Range
Lemonade_surprise	Gli imprenditori hanno cercato di sfruttare eventi inattesi	0 - 5
Lemonade_adapt	Gli imprenditori adattano le loro scelte alle risorse a disposizione e non viceversa	0 - 5
Lemonade_opportunity	Gli imprenditori hanno approfittato di nuove opportunità che sono emerse	0 - 5
Lemonade_flexibility	La flessibilità è un valore da preservare	0 - 5

5. Se una grande e affermata impresa dovesse entrare nel tuo mercato, cosa faresti?
   Variabile database → Contingency_plan (score 0 – 10)

6. Vorrei parlare dei fattori e dei potenziali rischi che ritieni possano determinare il futuro della tua startup ad oggi. Quali sono? Perché pensi che questi fattori saranno importanti?

   Più in generale, come gestite i rischi e più l'incertezza riguardo il futuro?

Variabile Database	Cosa Codifica	Score Range
Pilot_plane_control	Il focus è su quelle attività che l'imprenditore conosce bene e può controllare, invece di affidarsi a previsioni	0 - 5
Pilot_plane_exec	Il focus è sull'execution invece che aspettare di vedere cosa succede	0 - 5

7. Ricapitolando, quali sono state le 2 o 3 decisioni più importanti rispetto alla tua startup che hai preso dall'ultima chiamata a oggi? Cosa ti ha portato a prendere queste decisioni?
   Variabile database → Decisioni (max 10 parole)

8. Pensando alle attività svolte nell'ultimo periodo, quanti clienti sono stati attivati/acquisiti? (dipende dalla fase della start-up)
   Variabili database:

→Customer_Activation

→ Customer_Acquisition

9. Quanti costi avete sostenuto dalla chiamata precedente ad oggi? E in totale?
   Variabili database:

   → Costi_nuovi (costi da ultima chiamata a oggi)

   → Costi_totali (costi totali cumulati dall'inizio)

10. State già fatturando/producendo dei ricavi?

    [Se si] Quanto ha fatturato la tua start-up dall'ultima chiamata ad oggi? E in totale? (indica un valore in €)
    Variabili database:

    → Ricavi_nuovi (€ - fatturato dall'ultima chiamata)

    → Ricavi_totali (€ - fatturato complessivo cumulato alla data attuale)

    [Se no] Tra quanti mesi pensate di poter iniziare a fatturare? [se non stanno già fatturando] (indica numero di mesi)
    Variabile database:

    → Time_to_revenue (numero mesi)

11. Pensando a quanto svolto dalla chiamata precedente ad oggi, ci sono stati cambiamenti nel tuo modello di business?
    Variabili database:

    → PIVOT_incrementale (SI/NO)

    → PIVOT_radicale (SI/NO)

    → DROPOUT (SI/NO)

    → Change_BusModela (SI/NO)

    Qual è stato il motivo per cui hai cambiato questo aspetto del tuo modello di business?
    Variabile_Database → Motivo_change_BM

12. In base alla vostra situazione attuale, con quale probabilità pensate di cambiare il vostro business model canvas nelle prossime 7 settimane?
    Variabile database → Prob_changeBMC

A.2. Interview Script - Other Team Members

1. Raccontami come avete iniziato a sviluppare la vostra idea. Come vi è venuta questa idea? Qual è stato il punto di partenza?

Variabile Database	Cosa Codifica	Score Range
Teoria_chiara	**La teoria è comprensibile (falsificabilità)**	**0 - 5**
Teoria_elaborata	La teoria va nel dettaglio (falsicabilità)	0 - 5
Teoria_alternative	La teoria considera aspetti alternativi (generalizzabilità)	0 - 5
Theory_evidence	La teoria ha dei dati a supporto	0 - 5
Teoria_modulare	La teoria scompone il problema in sotto-problemi da risolvere	0 - 5
Teoria_gerarchia	La teoria aiuta a prioritizzare i problemi da risolvere	0 - 5

2. Parlami della vostra proposta di valore (vantaggio chiave che offri ai tuoi clienti) - chi sono i vostri potenziali clienti e quali problema hanno?
   Se non dovessero fornire sufficienti dettagli: Come avete identificato questi clienti e questi problemi? Perché pensate che la vostra soluzione avrà successo? Come lo sapete?

   [Se si] →che cosa volevi capire, che cosa hai scoperto? Che domande hai fatto?

Variabile Database	Cosa Codifica	Score Range
Ipo_esplicite	**Elenca le ipotesi che intende testare in modo esplicito**	**0 - 5**
Ipo_coerenti	Sono derivate dalla teoria	0 - 5
Ipo_precise	Testano una cosa alla volta	0 - 5
Ipo_falsificabili	Hanno una soglia per la convalida [sono in grado di stabilire una condizione (soglia) in base alla quale le ipotesi	0 - 5

	possono essere considerate supportate / non supportate]	
Ipo_testabili	Le variabili da testare sono state operazionalizzate correttamente	0 - 5
Ipo_alternativa	Le ipotesi erano mirate a falsificare una cosa e a supportarne un'altra come conseguenza diretta (alternativa)	0 - 5

3. Parlami del problema dell'utente che state affrontando con la vostra idea di business. Come lo avete studiato/approfondito? Avete raccolto dei dati? [se hanno fatto qualche tipo di ricerca --> che tipo di ricerche avete fatto?]

   [Se si] → di che tipo? (questionario, intervista) Che domande hai fatto? A chi le hai fatte?

Variabile Database	Cosa Codifica	Score Range
Test_coerenti	**il test permette di testare le ipotesi**	**0 - 5**
Test_validi	Specificità: il test è fatto nel vero contesto in cui opera la startup -Validità: Il utilizza metriche coerenti con il costrutto teorico -Affidabilità: il test utilizza misure ripetibili con un basso errore di misurazione	0 - 5
Test_rappresentativi	Il test coinvolge un campione con le caratteristiche del reale target della startup	0 - 5
Test_rigorosi	Usano il test giusto e con le procedure giuste (es. domande aperte nelle interviste; o hanno una baseline di confronto o un contraffattuale nel test di prodotto/servizio)	0 - 5

Test_causalità	Il test misura un nesso di causalità tra le 2 variabili testate (se Variabile1 allora effetto su Variabile2)	0 - 5
Test_bias	Il test è realizzato su un campione con bias ridotti di selezione e autoselezione	0 - 5

4. Come avete usato le informazioni raccolte? Che cosa emerge dai dati che avete raccolto?

   Come avete usato le informazioni raccolte / quanto emerge dai dati raccolti?

   [Se si] → Hai deciso impostando delle soglie minime per procedere? Come?

Variabile Database	Cosa Codifica	Score Range
Decisione_soglia	Se la decisione di: 1. continuare o abbandonare il progetto è stata presa confrontando la stima del valore dell'idea con una soglia minima 2. modificare il progetto è stata presa confrontando la stima del valore dell'idea con una soglia minima	0 - 5
Decisione_soglia_calibrata	La soglia tiene conto della qualità dei test e del tipo di dato raccolto	0 - 5

5. Vorrei che tu mi raccontassi delle risorse che state utilizzando per sviluppare la vostra idea di business. Che tipo di investimenti avete fatto? Come avete deciso quante risorse devolvere al progetto?

   [Se si] → come hai deciso quanti/quali investimenti fare?

Variabile Database	Cosa Codifica	Score Range
Affordable_loss_max	L'imprenditore ha usato il massimo delle risorse che può permettersi di perdere	0 - 5
Affordable_loss_risk	L'imprenditore non ha aggiunto risorse (anche soldi) a quelle disposte inizialmente	0 - 5

Affordable_loss_focus	L'imprenditore ha focalizzato la sua attenzione a non perdere più di quanto può permettersi invece di focalizzarsi sul valore atteso	0 - 5

List of Tables

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