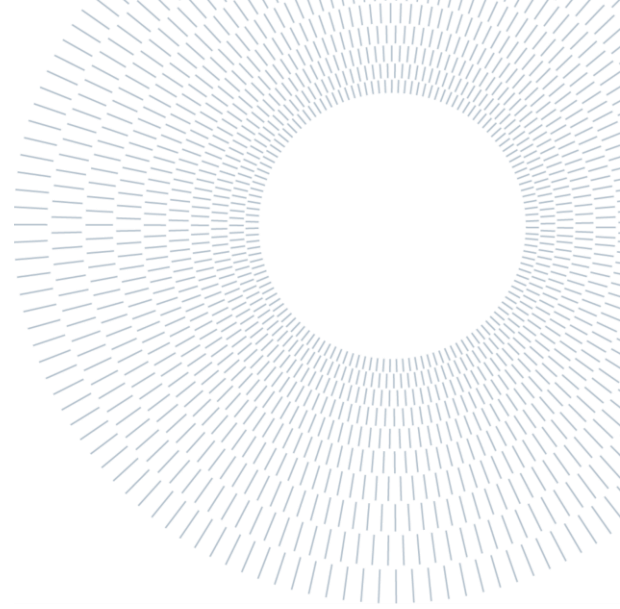




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EXECUTIVE SUMMARY OF THE THESIS

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

TESI MAGISTRALE IN MANAGEMENT ENGINEERING – INGEGNERIA GESTIONALE

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### 1. Introduction

The purpose of this research is to investigate the relationship between knowledge-sharing activity and the performance of pivoting and business formalization in pre-seed stage startups. Issues concerning knowledge management are gaining interest among researchers due to the transformation of many industries from labor-intensive to knowledge-intensive (Li, 2019). However, especially concerning startups, knowledge sharing is a poorly researched topic. Moreover, pre-seed stage startups are usually validating the problem and demonstrating the feasibility of the business idea, facing different dynamics from established companies or later-stage startups (Salamzadeh, 2015). Therefore, this research studies the knowledge-sharing mechanism and its impact involving a pre-accelerator program that teaches entrepreneurial knowledge to pre-seed stage startups. Specifically, the impact of the entrepreneurial knowledge exchange is studied on pivoting and business formalization, which are activities that could significantly impact the future development of the startup.

### 2. Literature Review

Since the available studies on knowledge sharing mainly concern established companies, the literature review firstly analyzes the major differences between startups and established companies. According to Aulet & Murray (2013), startups have different strategies in the role of innovation, geographical market, members and employees, financial capital and ownership structure, and growth curve. Indeed, the entire startup stage in the company lifecycle could be seen as a test phase. Therefore, startups act with a flexible structure to minimize the time and cost of changes (Eisenmann, 2018). In this scenario, knowledge is a critical resource and a potential source of competitive advantage (Carabrera, 2002). Knowledge sharing plays a crucial role for two main reasons. First, knowledge sharing impacts knowledge itself due to feedback, modifications, and contributions of the recipient. Second, this activity helps entrepreneurs in finding a univocal interpretation of information (Carabrera, 2002). Indeed, the cognitive abilities of different entrepreneurs could generate different interpretations of the same information. Overall,

knowledge sharing increases the quality of information (Chen et al., 2019) and it is mainly affected by the nature of knowledge and the personal traits of the entrepreneurs involved in the process (Matzler, 2008).

Concerning the other activities involved in the study, pivoting is a radical change that aims to test a hypothesis about the product, the strategy, or the engine of growth (Ries, 2011). It 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. Besides the influence on the pivoting decision, knowledge sharing could also positively affect other phases of the pivoting process, such as the alternatives generation phase (Chandler & Jansen, 1992). Indeed, other members could provide insights about unforeseen market opportunities.

Lastly, business formalization is defined as the extent to which rules, procedures, instructions, and communication are written down (Schminke, 2000). It is a crucial activity for the next stages, where formal documents are required to apply to support mechanisms, such as incubators and investors.

De Clercq (2013) studied the opposite correlation of this research, founding 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.

However, he focused 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).

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, which is faced by most entrepreneurs at this startup stage, it is likely that they affect also knowledge sharing, pivoting, and business formalization.

Specifically, the personal traits considered are the decision-making approach, opportunity cost, industry experience, confidence, overoptimism, self-control, improvisation, self-efficacy, narcissism, social skills, and external experience.

Concerning team characteristics, it is considered the internal peers' relationship, the internal priorities, the distribution of competencies, and psychological ownership.

Finally, it is introduced the impact of external factors such as accelerator programs, networking, external peers, entrepreneurial mentorship, and industry characteristics.

### 3. Hypotheses Formulation

The first hypothesis assumes that knowledge sharing positively influences the pivoting decision, increasing the occurrence of pivots in pre-seed stage startups. This assumption is based on the fact that knowledge sharing contributes to transcending the individual level of information 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.

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

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

This assumption is based on the fact that planning before taking action has a positive impact depending on the quality of the business plan. In turn, the quality of the business plan depends on the quality of information (Ansoff I., 1991), which is positively affected by knowledge sharing (Chen et al., 2019). Thus, the trade-off is positively affected.

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

## 4. Methodology

As previously introduced, this research involves a pre-accelerator program, called InnoVentureLab. This program aims to help entrepreneurs in validating their business idea by providing training classes, workshops, and other events. 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 analysis is structured into two levels. Firstly, it is assessed whether the entrepreneurial knowledge learned in the classes is shared within the startup team. Once the presence of knowledge sharing is demonstrated, it is 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 is designed as a function of two dynamics: the overall participation in the training classes (Sum\_Att), and the overall participation of the other team members in the training classes (Sum\_Att\_Oth\_B).

The impact of these dynamics is tested on three dependent variables (Theory\_RD5, Hypotheses\_RD5, and Test\_RD5) which represent, on a scale from 0 to 5, the level of entrepreneurial knowledge. This model assumes that knowledge sharing exists whether entrepreneurs improve their level of entrepreneurial knowledge thanks to the participation of the other team members in the classes. Since InnoVentureLab spitted startups into three slightly different programs, it is introduced a moderation Boolean variable (Scientificity) to consider whether entrepreneurs are allocated in the scientific group. Indeed, the three dependent variables concern scientific aspects.

Moreover, a set of eight control variables consider other startup and entrepreneur characteristics, such as gender, age, educational level, working experience, entrepreneurial experience, team size, and startup stage.

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 (Sum\_Att\_Startup). 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.

Regarding the pivoting proposition, 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 (N\_Inc\_Pivots and N\_Rad\_Pivots).

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 measure in a range from 0 to 5 these two formalization aspects (Roles\_Def and Milestones\_Def).

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 as control variables.

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. Specifically, to have a constant time gap between data collected, these sessions are scheduled by Research Assistants, who are responsible for data collection, every seven weeks. 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.

## 5. Results

The first-level analysis shows significant results solely in the correlation between the others team members' attendance and Theory. Specifically, as shown by Table 5.1 there is a significant positive

correlation, with a coefficient of 0.226 and a confidence level of 99,6%, between the participation of the other team members of scientific entrepreneurs (Prod\_Sum\_Att\_Oth\_B) and Theory.

Table 5.1: Other team members attendance on Theory\_RD5

Variable Name	Scientificity	Coefficient	P >  t
Sum_Att_Oth_B	0	0.008	0.861
Sum_Att_Oth_B	1	0.226	0.004

Consistently with the scientific nature of Theory, non-scientific entrepreneurs have no significant correlation. The increase of the entrepreneurial knowledge level based on the participation of the other team members evidences knowledge sharing. On the other hand, as shown in Table 5.2, Hypotheses and Test variables show only non-significant correlations.

Table 5.2: Overview of Knowledge Sharing

Variable Name	Theory _RD5	Hypotheses _RD5	Test _RD5
Sum_Att	0.045 (0.225)	0.004 (0.923)	0.024 (0.548)
Sum_Att_Oth_B	0.008 (0.861)	0.022 (0.662)	0.006 (0.909)
Scientificity	- 1.420 (0.051)	- 0.199 (0.767)	- 0.631 (0.548)
Prod_Sum_Att	0.026 (0.703)	0.054 (0.432)	0.054 (0.535)
Prod_Sum_Att_Oth_B	0.217 (0.019)	- 0.001 (0.999)	0.051 (0.720)
Gender	0.172 (0.410)	- 0.066 (0.712)	- 0.133 (0.510)
Beachelor_D	0.143 (0.498)	0.105 (0.680)	0.226 (0.304)
Master_D	- 0.040 (0.881)	- 0.412 (0.098)	- 0.282 (0.206)
Early_Entr	0.037 (0.885)	- 0.063 (0.815)	0.436 (0.115)
Ln_Age	- 0.987 (0.121)	- 1.839 (0.004)	- 0.955 (0.231)
Ln_Y_Work_Exp	0.210 (0.224)	0.358 (0.030)	0.017 (0.919)
Ln_N_Members	0.281 (0.250)	0.139 (0.597)	- 0.235 (0.449)
Ln_Startup_Stage	0.353 (0.065)	- 0.027 (0.908)	0.541 (0.007)

Since the training program focuses more on Theory rather than the other two scientific aspects and, in addition, Hypotheses and Test are more complex

topics to be shared, the positive correlation between the other team members' participation and Theory is considered sufficient to prove the presence of entrepreneurial knowledge sharing.

The core analysis consists of four multivariate linear regressions. The first two tests the correlation between knowledge sharing and pivoting. As shown in Table 5.3 both the analyses show non-significant results. Therefore, there is not any correlation between knowledge sharing and pivoting. This evidence rejects hypothesis 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, Table 5.3 shows that knowledge sharing has a coefficient of - 0.298, with a confidence level of 97,2%, concerning the formalization of roles. On the other hand, it has a coefficient of - 0.374, with a confidence level of 99,3%, concerning the formalization of milestones. Since the two results are significant and consistent, Proposition 2 can be rejected. Indeed, the evidence shows an opposite correlation to that assumed.

Table 5.3: Overview of Knowledge Sharing Impact

Variable Name	N_Inc _Pivots	N_Rad _Pivots	Roles_ Def	Milestoness _Def
Sum_Att_ Startup	- 0.164 (0.515)	0.012 (0.783)	- 0.298 (0.028)	- 0.374 (0.007)
Typology	- 0.239 (0.464)	- 0.038 (0.746)	- 0.525 (0.152)	- 0.142 (0.693)
Entr_Exp	- 0.381 (0.254)	- 0.038 (0.746)	0.136 (0.749)	0.064 (0.857)

The analysis is complemented by robustness tests which take into consideration other startup factors and perspectives. These other tests are necessary because of the limited number of control variables considered in the main analysis.

Firstly, other pairs of control variables are included in the same model of analysis. The first couple of control variables concerns the startup stage and the number of members. In addition, it is considered a second pair of control variables that consider the total year of working experience and the presence of a member with a master's degree.

Both the robustness tests show the same results as the main analysis. Hence, knowledge sharing has no significant correlation with incremental and radical pivoting, while it has a negative and significant correlation with roles and milestones formalization.

The last robustness test considers 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 first-level analysis.

On the other hand, pivoting and business formalization, which are startup-level aspects, are associated with their startup members.

Since the entrepreneurs' observations are much more than the startups' ones, it is possible to consider more factors as control variables. Specifically, are considered eight characteristics: the startup stage, the number of members, the startup typology, the startup year of working experience, the presence of a member with a master's degree, the presence of a member with entrepreneurial experience, and, finally, the class attendance of the entrepreneur.

Considering that the analysis tests startup performance, control variables mainly refer to startup characteristics.

Even with the change of perspective, the results are coherent with the other analyses. Both the multivariate linear regressions concerning pivoting show non-significant results. Conversely, the multivariate linear regressions concerning business formalization evidence 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 found.

## 6. Conclusion and Future Developments

From the analysis emerged that entrepreneurial knowledge sharing has no impact on pivoting, while it affects negatively business formalization. The reasons behind these divergent results from the assumption 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 mentors 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 pivoting, 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 business formalization, the limited number of observations seems not a limitation for the analysis. Indeed, both the main and the robustness tests show the same significant results. 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, the negative correlation 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 the benefits of formalization are lower than the cost of a less flexible 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, this research contributes to the literature about entrepreneurial knowledge sharing in pre-seed stage startups. Since it is a poorly researched topic, it could be intriguing for researchers to study the impact of entrepreneurial knowledge sharing on other performances. Moreover, it could be interesting to study whether entrepreneurial knowledge learned and shared at a later stage of the startup change the impact on pivoting and business formalization. This topic is interesting even for entrepreneurs. Indeed, from this research emerged how entrepreneurial knowledge shared with the team reduced the level of formalization, increasing the flexibility of the startup.

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