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Technology entrepreneurship : a process framework

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Technology entrepreneurship – A process framework

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Summary

The academic field of entrepreneurship has strongly evolved since 2000. Scholars are in search of an integrated perspective to explain entrepreneurship in a coherent way. This study is set to contribute to this search with a process framework for understanding similar patterns of entrepreneurship actions over time in different settings. Departing from conceptual literature, this research uses the multi-case study approach to observe the entrepreneurial process in 12 technology-based start-ups, to capture the actions and interactions that took place.

The result of this study is a framework of entrepreneurship as a social design process. This translates into a number of concrete insights. First, in addition to the widely accepted path of scanning to discover entrepreneurial idea, two complementary paths towards the initial ideas are added: sensing via experiencing and sensing via visioning. In the latter cases, especially engineers follow their experience, vision or belief to create a solution or product which finally motivate them to engage into entrepreneurship. Second, a process framework allows modeling initial input as vague, simple and incomplete idea, in comparison to detailed business plans. Third, upon identification of the initial idea, the entrepreneur engages in a deliberate conceptualization process of many iterative interactions with external stakeholders in order to test, develop and evaluate the idea. Fourth, feedback not only makes the ideas explicit but also serves as the basis for the entrepreneurs' growing confidence. In this sense, the conceptualization process creates the entrepreneur as much as the entrepreneur creates the enterprise. Fifth, adaption actions sustain the entrepreneurship process. Adaptions occur in the developmental processes of new ventures as "abandoning idea components", as a result of an internal or external misfit, and "sensing new idea components". In conclusion, these five findings characterize technology entrepreneurship as a process in which entrepreneurs proactively and iteratively engage in conceptualizing, implementing and adapting actions, until they reach the status of a viable configuration.

This dissertation contributes to theory building mainly in three ways. First, I empirically ground the conceptual insights derived from prior research. According to these insights, a social design perspective of entrepreneurship helps to gain an alternative understanding of the entrepreneurship process. This has been done in a systematic way. I identify actions and interactions performed during the entrepreneurship process from the emergence of ideas to the exploitation of ideas.

Second, I advance theory building by developing a process framework. I identify and categorize actions and interactions, explain their rationale, and define constructs to link them. Third, my study contributes to theory building by developing propositions which can be tested in future quantitative research.

The thesis not only contributes to theory building, but can also be beneficial for diverse practitioners, such as prospective entrepreneurs, entrepreneurs and policy makers. Moreover, the findings are relevant for other stakeholders engaged in the process of technology entrepreneurship as well, such as incubators or venture advisors. By considering the importance of actively testing, experimenting and adapting in the entrepreneurship process, these stakeholders may put more emphasis on constant learning from proactive engagement with the environment as the process unfolds. The identified list of actions and interactions over time may provide a contextualized checklist in this respect. Moreover, practitioners could benefit from this research by incorporating the idea of creating a viable configuration that might not be the perfect as the outcome of the entrepreneurship process.

Samenvatting

Ondernemerschap heeft zich sinds ongeveer het jaar 2000 tot een substantieel, onafhankelijk veld ontwikkeld. Wetenschappers zijn zoekende naar een gedeeld perspectief, dat een coherente verklaring van ondernemerschap biedt. Het doel van deze studie is om hier een bijdrage aan te leveren door een proceskader te bieden waarmee we patronen van ondernemerschap in verschillende settings door de tijd heen kunnen begrijpen. Het wijkt daarmee af van de huidige literatuur, die veelal conceptueel en speculatief is. Dit onderzoek is gebaseerd op een multi-case study aanpak. Het brengt het ondernemersproces in kaart in twaalf *technology-based start-ups*, en toont de handelingen en interacties die in dat verband plaatsvinden.

Het resultaat van deze studie is een kader van ondernemerschap als een sociaal ontwerpproces. Dit vertaalt zich in een aantal concrete inzichten. Ten eerste zijn er drie mogelijke routes gevonden om tot het oorspronkelijke idee te komen. Als eerste route moet *scanning* genoemd worden, de momenteel breed geaccepteerde manier om tot nieuwe ideeën te komen. “*Sensing via experiencing*” en “*sensing via visioning*” zijn toegevoegd als twee aanvullende routes. In deze laatste routes blijken het ervaring, visie of geloof te zijn bij het creëren van een oplossing of product die – vooral-ingenieurs tot ondernemerschap brengen. Ten tweede, de oorspronkelijke ideeën zijn in alle casussen basaal, simpel en onvolledig in vergelijking met de latere, gedetailleerde businessplannen. Ten derde, als de ondernemer het aanvankelijke idee eenmaal heeft, gaat hij een weloverwogen conceptualiseringsproces in dat bestaat uit vele iteratieve interacties met externe betrokkenen, om het idee te testen, te ontwikkelen en te evalueren. Ten vierde, terugkoppeling maakt het idee niet alleen meer expliciet, maar draagt ook bij het zelfvertrouwen van de ondernemer. Met andere woorden: het conceptualiseringsproces maakt de ondernemer. Ten vijfde, aanpassingshandelingen vormen het ondernemersproces verder en stabiliseren het uiteindelijk. Aanpassingen vinden in het ontwikkelingsproces van nieuwe ondernemingen zowel plaats door het “loslaten van ideeën”, als ze toch niet blijken aan te sluiten bij interne of externe opvattingen, als door het “oppikken van nieuwe ideeën”. Resumerend: deze vijf bevindingen karakteriseren het ondernemersproces als een proces waarin ondernemers proactief en iteratief verschillende conceptualiserende, implementerende en aanpassende handelingen uitvoeren, tot hun ideeën de status van een configuratie bereiken.

Dit proefschrift draagt op drie manieren bij aan theorievorming. Ten eerste geef ik een empirische onderbouwing van de conceptuele inzichten uit eerder onderzoek. Deze inzichten houden in dat een sociaal-constructivistisch perspectief op ondernemerschap helpt om het ondernemersproces beter te begrijpen. Een dergelijk perspectief wordt in dit onderzoek systematisch uitgewerkt. Ik identificeer de handelingen en interacties die in het ondernemersproces voorkomen, van het ontstaan van nieuwe ideeën tot het exploiteren ervan. Ten tweede draag ik bij aan theorie ontwikkeling door een proceskader te ontwikkelen. Ik identificeer en categoriseer handelingen en interacties, verklaar hun grondgedachte, en definieer constructen om ze aan elkaar te koppelen. Ten derde draagt mijn studie aan theorie ontwikkeling bij door stellingen te poneren die in toekomstig kwantitatief onderzoek kunnen worden getest.

Dit proefschrift draagt niet alleen bij aan theorie ontwikkeling, maar kan ook nuttig zijn voor verschillende mensen in de praktijk, zoals aankomende ondernemers, huidige ondernemers en beleidsmakers. De bevindingen zijn ook relevant voor andere actoren in het proces van technologisch ondernemerschap, bijvoorbeeld voor incubators of adviseurs. Ze zouden uit dit onderzoek het idee kunnen meenemen dat actief testen, experimenteren en aanpassen van belang zijn in een ondernemersproces. Vanuit die gedachte zouden ze meer de nadruk kunnen gaan leggen op het aanhoudende leerproces dat ontstaat uit een proactieve betrokkenheid van de ondernemer met zijn omgeving. De in kaart gebrachte lijst van handelingen en interacties over de tijd heen kunnen daarvoor een gecontextualiseerde checklist vormen. Tenslotte kunnen mensen uit de praktijk lering trekken uit dit onderzoek door het idee over te nemen om, aan het einde van het ondernemersproces, eerder een werkbare configuratie na te streven dan een perfecte.

Table of Contents

Summary	5
Samenvatting	7
List of figures	13
List of tables	14
List of definitions	15
Chapter 1 Introduction	17
1.1 Motivation and problem statement	17
1.2 Research objectives, questions and focus	20
1.3 Research epistemology and methodology	21
1.4 Structure of the thesis	24
Chapter 2 Interdisciplinary literature review of the entrepreneurship phenomenon	27
2.1 Definition of entrepreneurship	27
2.2 Three fundamental themes of entrepreneurship research	29
2.2.1 <i>Opportunity</i>	29
2.2.2 <i>Entrepreneur</i>	32
2.2.3 <i>Environment</i>	33
2.3 Entrepreneurship process	34
2.3.1 <i>Theoretical framework in studying the entrepreneurial process</i>	35
2.3.2 <i>The contextualization of process studies</i>	37
2.3.3 <i>Methods used to studying entrepreneurial process</i>	38
2.3.4 <i>Unit of analysis of entrepreneurial processes</i>	39
2.4 Summary	40
Chapter 3 Discovering whilst interpreting: A social design perspective of the entrepreneurship process	43
3.1 Entrepreneurship as opportunity discovery	44
3.2 Entrepreneurship as social design process	48
3.3 A social design process framework of entrepreneurship	51
3.3.1 <i>The input of the social design process</i>	51
3.3.2 <i>Entrepreneurial configuration as output of social design actions</i>	52
3.3.3 <i>Conceptualization</i>	53
3.3.4 <i>Implementation</i>	54
3.3.5 <i>Adaptation</i>	55
3.3.6 <i>Summary</i>	56
3.4 Technology entrepreneurship as setting for social design perspective	58
Chapter 4 Process research of 12 cases	61
4.1 Formulating the research plan	61

4.1.1 Clarify the meanings of process	62
4.1.2 Frame of reference from which to view the research question	63
4.1.3 Observational method.....	64
4.1.4 Sampling	64
4.2 The implementation of process research design.....	65
4.2.1 Research setting.....	65
4.2.2 Sample selection	67
4.2.3 Data collection.....	68
4.2.4 Data analysis	70
4.2.5 Methodological rigor check.....	75
4.3 Summary.....	78
Chapter 5 Case and cross case analysis.....	79
5.1 The emergence of an initial idea	79
5.1.1 An initial idea – the initial input.....	79
5.1.2 Three paths towards the formation of initial ideas.....	82
5.2 Conceptualization: testing, developing the initial idea and becoming an entrepreneur.....	89
5.2.1 Informal interaction and formal engagement.....	90
5.2.2 Conceptualizing interactions yield general feedbacks and new information	92
5.2.3 The conceptualizing process creates the entrepreneur	96
5.2.4 The role of “530 program” in creating entrepreneurs	98
5.3 Implementation: co-creation of conceptualized idea by convincing external stakeholders	99
5.3.1 Conveying the entrepreneur’s claim.....	100
5.3.2 Legitimizing conveyed claims	104
5.3.3 The interactions between actions of claim conveying and legitimizing	115
5.3.4 The sequence of technology development and market creation	115
5.4 Adaptation towards entrepreneurial configuration	118
5.4.1 The transformation of business.....	118
5.4.2 Adaptation in the form of sensing new idea components	127
5.4.3 Adaptation in the form of abandoning idea components	129
5.5 Summary.....	135
Chapter 6 Conclusion: A social design perspective of entrepreneurship.....	139
6.1 A refined social design process of entrepreneurship	140
6.1.1 Enriched initiating conditions	140
6.1.2 The elaborated conceptualization process	141
6.1.3 The elaborated implementation process.....	146
6.1.4 Concurrent adaptation, conceptualization, and implementation processes and entrepreneurial configuration	149
6.1.5 Theoretical implications	150
6.2 Connecting the results with associated entrepreneurship research.....	151
6.2.1 Conceptualization and planning.....	152
6.2.2 Implementation and collaborative innovation in SMEs	155
6.2.3 The social design process and entrepreneurial leadership	158

6.3 Implications	160
6.4 Limitations	162
6.5 Future research directions.....	162
Appendix	165
Reference.....	171
About the author	187

List of figures

Figure 1 Thesis structure	25
Figure 2 Three fundamental themes of entrepreneurship research	28
Figure 3 Two alternative perspectives of opportunity	31
Figure 4 Four themes of entrepreneurship research	34
Figure 5 An overview of entrepreneurship process research	35
Figure 6 Discovery process and supply-demand curve	46
Figure 7 The social design process	57
Figure 8 The elaborated social design process of entrepreneurship	137
Figure 9 Three research themes in the inquiry into collaborative innovation in SMEs	156

List of tables

Table 1	Key issues towards a process research plan	61
Table 2	Description of sample firms	69
Table 3	Case descriptions of selected firms	72
Table 4	Justification of the methodological rigor of case studies	76
Table 5	The initial input for the entrepreneurship process	81
Table 6	Evidences of sensing via experiencing	84
Table 7	Evidences of sensing via observing	86
Table 8	Evidences of sensing via visioning	88
Table 9	Various forms of conceptualizing actions	91
Table 10	Evidences of conceptualizing actions	94
Table 11	Evidences of achieving interim accomplishments	107
Table 12	Observations of networking with legitimized stakeholders	111
Table 13	The transformation of business	119
Table 14	Observations of abandoning ideas caused by misfits	131

List of definitions

Technology entrepreneurship

...is engagement in a speculative activity with a purpose of creating future goods and services from new technical knowledge.

Initial idea

...is the initial trigger of the entrepreneurship process. It (1) is vague, and does not yet have an explicit goal; (2) is spontaneous, not necessarily result of planned activity like scanning of the external environment; and (3) has no timeline of the implementations.

Business idea

...is entrepreneur's interpretation of how to recombine resources in a way that allows pursuit of entrepreneurial opportunity (Shane, 2012: 15).

Entrepreneurial configuration

...is a status that a new business reaches, wherein core elements (e.g., value proposition, customer, finance and infrastructure) are connected in a way which allows it to achieve viability.

Chapter 1 Introduction

1.1 Motivation and problem statement

We are living in an era of entrepreneurship. Over the past 20 years the entrepreneurial idea has become mainstream, championed by politicians, strengthened by the growing infrastructures of universities, incubators and venture capitalists, and represented by well-known entrepreneurship heroes such as Steve Jobs and Steve Wozniak (Apple Inc.), Mark Zuckerberg (Facebook Inc.), and Jack Dorsey (Twitter Inc.). A 2009 special report in the Economist¹ finds that entrepreneurs are enjoying a renaissance across the world, despite the economic downturn.

Governments in both developed and developing regions have introduced many ambitious, publicly-funded initiatives which focus on stimulating entrepreneurship, including in the high-tech industries. With these initiatives infrastructures ranging from science parks to the financing of new ventures, have been created (Phan, Siegel, & Wright, 2005). In doing so, the governments hope to help spawn more “Silicon Valleys”. Technology entrepreneurs, venture capitalists and policy makers dream furthermore not only of inventing new technologies, but turning them into lucrative commercial products/services, and therein create many innovative enterprises and jobs which in turn contribute to the wealth of society.

The success of government funding initiatives is mixed however, although the number of these innovation programs keeps growing. While some publicly funded entrepreneurship programs in Israel and Singapore are reported to have dramatically stimulated entrepreneurial activities, many more have failed (Lerner, 2010). Some studies even suggest that the cost associated with public funding programs outweighs their benefits (Colombo & Delmastro, 2002; Cumming & Fischer, 2012). Apart from these discouraging experiences in practice, scholars have also begun to question the theoretical base of these initiatives (Parker, 2007). They point out that most entrepreneurship knowledge does not deal with the critical aspects of entrepreneurship. Such aspects include, for example, how entrepreneurial actions interact with their external environment (Venkataraman, Sarasvathy, Dew, & Forster, 2012; Wiklund, Davidsson, Audretsch, & Karlsson, 2011).

¹ See: <http://www.economist.com/node/13216025>

On top of the doubt mounding about available theories, entrepreneurship also has to cope with persisting stereotypes. In the popular imagination, for example, entrepreneurs are often considered to be lonely geniuses who set up a new company to make lots of money and create lots of jobs (Shane, 2008: 40). This neglects the fact that entrepreneurship is a social activity and only happens in interaction with the environment. Another stereotype is that venture capital drives entrepreneurship. Studies have shown that venture capital does not help to create the business opportunities and trigger entrepreneurship (Saxenian, 1999). In fact, it rather furthers later growth of ventures by providing entrepreneurs with advice, networks and financial resources. A third, but surely not final stereotype, is that business planning predicts the performance of start-ups. A well-written business plan certainly can help start-ups to win a business plan competition and to get public funding. Yet some scholars observe that in the entrepreneurial process, entrepreneurs rarely referred to their written business plans (Brinckmann, Grichnik, & Kapsa, 2010). In conclusion, we need better explanations of what entrepreneurship entails, beyond such stereotypes.

The academic field of entrepreneurship has strongly evolved into a substantial academic field since 2000 (Shane & Venkataraman, 2000). Scholars are searching for an integrated perspective to explain entrepreneurship in a coherent way and to justify entrepreneurship as a distinct discipline (Shane, 2003: 2), at the same time that it has drawn considerable attention from scholars from disciplines like psychology, sociology, and strategic management. Insofar as their contribution to the discipline-building, these preliminary efforts can be categorized into 4 groups: (1) the definition of entrepreneurship as a phenomenon, (2) the building of a coherent body of knowledge, (3) the search for an adequate research methodology, and (4) the building of a dedicated research community for entrepreneurship.

First, the phenomenon of entrepreneurship as a research topic has well found its place accepted by scholars. Since the beginning of the 2000s, it has increasingly attracted contributions from broad domains of business studies including strategic management (Hitt, Ireland, Sirmon, & Trahms, 2011; Ireland, Hitt, & Sirmon, 2003; Ketchen, Ireland, & Snow, 2007), marketing (Hills, Hultman, & Miles, 2008; Miles & Darroch, 2008) and financing (Denis, 2004). Despite these diverse approaches and opinions, scholars from those different disciplines largely agree on what entrepreneurship research is about.

Second, despite the growing research interests, a coherent body of knowledge has yet to be developed. The fact that scholars tend to apply views and existing theories from other domains to study entrepreneurship, has led to the

generation of fragmented knowledge (Shane & Venkataraman, 2000). This is doing little for the development of an integrated framework. This knowledge does indeed advance entrepreneurship research in terms of enriching approaches, perspectives, and insights, and providing opportunities to incorporate divergent research findings nevertheless (Okhuysen & Bonardi, 2011).

Third, along with efforts to generate a coherent body of knowledge, scholars are looking out for an adequate research methodology for examining entrepreneurship. Entrepreneurship studies are dominated by the “causal variance theorizing” approach (Poole, Van de Ven, Dooley, & Holmes, 2000: chapter 1) which tends to examine the antecedents and consequences of the changes in entrepreneurship. The studies with this approach have a strong emphasis on building simple and general entrepreneurial models at the expense of accuracy (Bygrave & Hofer, 1991; Wiklund et al., 2011). Knowledge generated in this way therefore is not suitable for transferring into practice (Langley, Smallman, Tsoukas, & Van de Ven, 2013), as, it mostly abstracts away the information regarding what to do at what point in time, and in what context. To overcome the limitations of the variance method, scholars recommended using the process study approach (Poole et al., 2000) that focuses on how a sequence of events unfold over time. They believe that this approach helps to understand the sudden changes and discontinuities which inherently characterize the phenomenon of entrepreneurship, because it incorporates temporal sequences and contextual factors in the research (Venkataraman et al., 2012; Wiklund et al., 2011).

Fourth, the academic community dedicated to entrepreneurship research still lacks visibility. Although the number of endowed chairs in entrepreneurship in America between 1999 and 2003, grew from 237 to 406 and from 271 to 536 in the rest of the world (Katz, 2004), they are widely scattered over scholarly communities and are often treated as a subgroup of existing other disciplinary communities. An independent entrepreneurship community, like the Strategic Management Society or the Academy of International Business, remains to be built.

In short, entrepreneurship is a phenomenon well accepted by scholars from multidisciplinary backgrounds. Yet the fragmented body of knowledge, the dominance of the variance theorizing approach, and the still not-very-well developed research community are the challenges to be tackled, in order to establish entrepreneurship as a distinct discipline.

To address these remaining challenges, a growing number of entrepreneurship scholars in recent years have proposed that entrepreneurship

research should shift research efforts towards understanding the field of entrepreneurship in its own right, in order to develop a unified and coherent entrepreneurship theory (Alvarez & Barney, 2007; Sarasvathy, 2001; Shane, 2003: 2). This has motivated considerable efforts to identify distinct elements of an entrepreneurship theory.

In an attempt to contribute to this discussion in this study, I take the “entrepreneurship process” as a candidate concept in which entrepreneurship theory can be rooted. This choice is arbitrary, yet it is indeed shared by a growing number of scholars (Alvarez & Barney, 2007; Moroz & Hindle, 2012; Sarasvathy, Dew, Velamuri, & Venkataraman, 2005; Venkataraman et al., 2012). In this study, I intend to elaborate the concept of the “entrepreneurship process” and test it in an empirical setting, and then to examine how much this concept could contribute to the development of a unitary and distinctive entrepreneurship theory.

1.2 Research objectives, questions and focus

The aim of this dissertation is to contribute to the search for an integrated entrepreneurship theory. I do so with a process framework to understand patterns of entrepreneurial actions over time, to get a picture of how entrepreneurship unfolds and thus to generate more applicable knowledge for practitioners.

I seek answers to the following questions:

- a) *What are entrepreneurial actions?*
- b) *Are there patterns of actions that make an entrepreneurship process*

I restrict my research to technology-based ventures, as, the entrepreneurship process in the field of technology is long and therefore well observable. First, the developmental processes of technology-based ventures are incremental, enacted, and improvised, and are characterized by iterative and dynamic entrepreneurial actions (Baker, Miner, & Eesley, 2003; Beckman, Eisenhardt, Kotha, Meyer, & Rajagopalan, 2012; Shane & Venkataraman, 2003). This is due to the fact that technical entrepreneurs have to address both technology invention and entrepreneurship. These features, in turn, offer rich data of entrepreneurial actions to be recorded. Second, technology-based ventures provide a long time frame for observation, for, it may take several years before products and opportunities are fully developed and customers adopt them. This feature of technology entrepreneurship enables researchers to better capture the time-related dimension of the entrepreneurship

process. I will further elaborate on this specific research setting in the methodology part of the thesis.

1.3 Research epistemology and methodology

Research in social science is dominated by two research philosophies: positivism and naturalism. The positivist assumes there is a single objective reality and that it can be observed and measured with standard instruments. In the positivistic inquiry, in order to exclude the bias, the researcher does not interact with the reality. The methodologies mostly used, furthermore, are laboratory experiments, field experiments, and surveys. Following this research philosophy, knowledge generated from positivistic inquiry is in the form of generalization which is supposed to hold irrespective of time and place (Tacconi, 1998). This approach is preferred when the research aims to identify the cause and effect of a phenomenon (Patton, 2005). In contrast, the naturalist assumes that the reality is constructed and perceived by people. The reality and researchers who inquiry it cannot be separated from one another. The methodologies mostly used are qualitative research methods, e.g. case studies. In this sense, knowledge generated is typically in the form of propositions that describe the individual cases. This approach is mostly used when little is known about a phenomenon (Patton, 2005).

In this study, I choose naturalism as research philosophy for two reasons. First, the research object is the technology-based ventures while the phenomenon under study is how the entrepreneurship process unfolds. The boundaries between the object and phenomena are not clear. To understand this process well, an intensive information exchange between the researcher and research object to reflect on human action therefore is necessary. Secondly, the fact that the existing theories from other fields lack sufficient explanatory power to understand entrepreneurship, and given the fact there is not yet a unified theory of entrepreneurship available, I am compelled thus to take naturalism as the research philosophy for this study.

As mentioned before, I focus on the entrepreneurship process and therefore choose a process study approach. There are two definitions of “process” to understand change:

“(1) a category of concepts or variables that pertain to actions and activities; and (2) a narrative description on how things develop and change ” (Van de Ven 2007: 196).

This study takes the second definition, as, it is inline with the objective of this study and the nature of naturalistic inquiry. To operationalize this process study, I adapt inductive multiple case studies (Yin, 2003) and select more visible cases. This approach is in line with the proposition that to avoid the risk that cases do not contribute to the literature, the cases are not randomly selected (Siggelkow, 2007).

The research setting is the “530 program” in Wuxi, China. It is a regional innovation scheme designated to facilitate and fund technology ventures that are started by Chinese migrant returnees. It aims to build up Wuxi as a preferred habitat for them in China. It was first introduced in May 2006 by the local government and is open to Chinese citizens who aim to launch technology-based ventures in Wuxi. To be eligible for this program, the applicant should have a number of years of working or studying experiences abroad. Applicants who are selected for this program receive a support package consisting of: 1) an initial test seed fund between RMB 400,000 and RMB 1,000,000 (around Euro 50,000 to 125,000 Euro) which the entrepreneur doesn’t have to pay back; 2) free office space located in one of the 23 incubators/science parks in Wuxi for 3 years; 3) free accommodation for the founders for 3 years; and 4) policy and accounting consulting services free of charge. Until June 2010, the “530 program” has supported 835 start-ups.

This setting is chosen because: 1) the “530 program” supports technology entrepreneurship. The intake criteria stipulates that the projects funded by this program are technology-based ideas with undefined product attributes, unclear customers, and a lack of dominant logic with which to guide entrepreneurial actions. 2) Rich archival data is available about “530 companies”. Due to its regional innovation setting, many start-ups attracted extensive press coverage. A large amount of secondary data has made it helpful to identify actions, interactions, and transformation throughout its unfolding history. In conclusion, the “530 program” is a kind of laboratory setting. The shared features of the “530 ventures”, e.g. well-educated entrepreneurs and geographic concentration, allows this study to focus on how entrepreneurial action unfolds in a similar setting without being distracted by the impacts of diverse contextual factors.

Of course, such a particular research setting raises concern about generalization. The “530 companies” are not randomly picked. The entrepreneurship process of these companies might unfold differently from those which are not a part of the “530 program”. The intention of this study, however, is to provide a populated process framework of entrepreneurship within a certain context, rather than to put forth a representative process framework for all. It furthermore proposes serving as a

starting point for contributing to the emerging entrepreneurship research. In this sense, the research setting is appropriate.

Data collection. I first examined science parks/incubators because they have the access to the research objects. Ultimately, 6 science parks/incubators have shown interest in this research. Further I asked for “530 entrepreneurs” who (1) had launched his/her companies longer than 6 months ago, (2) who had had technology play a crucial role in his/her business, (3) who was willing to participate in a research project that requires time commitment. This allows for gaining as many as possible details about the entrepreneurship process.

I received 33 replies from companies in the 6 science parks/incubators showing interests in participating in this study. I then called the entrepreneurs by phone to confirm the interview appointments and to determine if they really met our selection criteria. It turned out that 7 cases did not fit our criteria. A total of 4 of these cases were just launched, and 3 entrepreneurs were not available for the time period we scheduled for interviews. Ultimately, 26 cases remained for data collection.

I combined multiple data collection methods to ensure good data quality. First, archival data was gathered from the homepage of each company and media articles were sought concerning the company and founder (found using Baidu, the biggest Chinese Internet search engine). The profile of each company was kept in the offices of science parks where the companies are accommodated was studied. Video and audio files of presentations made by executives of the relevant firms at various points in time were also viewed. I then interviewed the founders. The interviews were semi-structured. Each interview took between one and two hours. Third, interviews with science park managers and government officers were taken to triangulate the data from the entrepreneur’s narration. Finally, after the interview with the company, informants were asked to fill out a quantitative questionnaire to provide figures covering financial issues, human resource management and sales.

Data analysis was guided by the case-replication method (Eisenhardt, 1989). In order to address the challenges posed by over 30 hours audio file, and almost 800 pages of documents about all 26 cases, I started with an internal case analysis and took each case as an independent experiment. I first tried to identify more observable cases that featured the noticeably social design process. I did so by analyzing the uncertainty regarding technology development and market creation. As a result, cases introducing more cost-effective solutions in the existing market (9 cases) have been filtered out. In addition, I also excluded 3 start-ups in the field of pharmaceuticals, since research found that entrepreneurship in sectors where

government, research institutions, large companies, and venture capitalists play crucial roles, shows different features, compared to other technology industries like IT and electronics (Müller, Fujiwara, & Herstatt, 2004). Lastly, because of the low level of data quality, I also decided to exclude two other firms. After the filtering, 12 cases remain in this study. For analyzing unstructured data in this study, the qualitative data analysis tool ATLAS.ti has been employed in the data analysis process.

1.4 Structure of the thesis

Figure 1 presents the structure of this thesis. The first chapter describes the motivation and problem statement, and defines research objectives and research questions. In addition, details of research epistemology and methodology are provided.

The theoretical part of the dissertation starts with the second chapter. It reviews the interdisciplinary literature on the entrepreneurship phenomenon to abstract elements that can form a basis for entrepreneurship discussion. Research associated with individuals, opportunities, environment and entrepreneurial process are examined with special care.

Chapter 3 focuses on the emerging process perspectives of entrepreneurship. In this section I first juxtapose two streams of process perspectives by comparing the underpinning assumptions regarding the entrepreneur, opportunity, and entrepreneurial action. Furthermore, I develop a framework based on prior research with a strong social design stance that represents the theoretical framework for this dissertation. This framework also incorporates several open questions and issues that are related to the development of a coherent process framework.

Chapter 4 and Chapter 5 contain the empirical parts of the study. Chapter 4 lays out the empirical research design of this study and the implementation of the field research. It comprises the description of the research setting, sample selection, data collection, data analysis, and a rigorous check of methodology. In Chapter 5, the interpretation of the data is presented. Patterns of entrepreneurial actions are determined and developed.

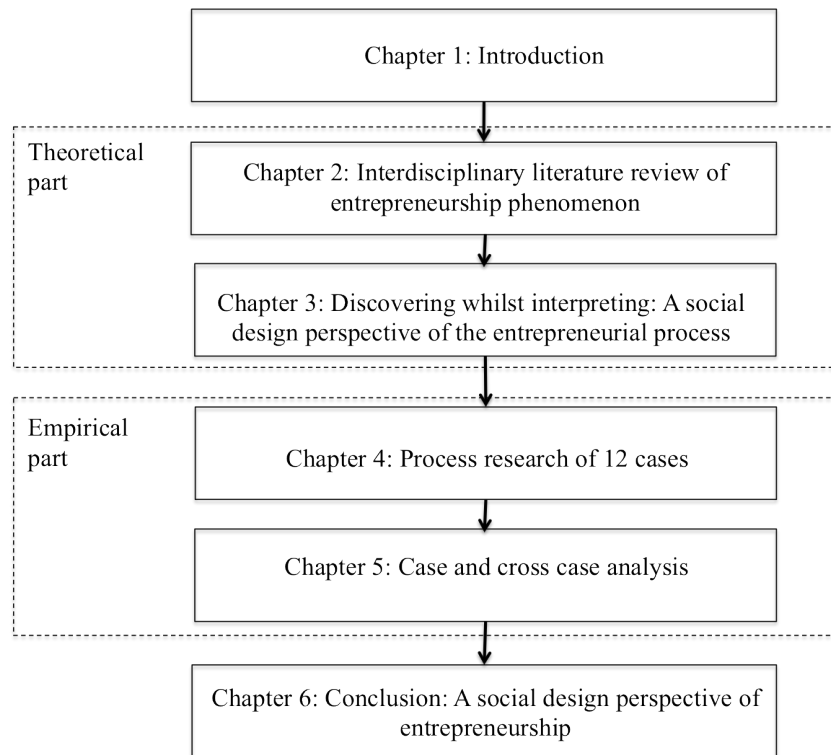


Figure 1 Thesis structure

Chapter 6 completes the model of entrepreneurship. It firstly revisits the development of the social design perspective and develops propositions for future study. Results are embedded into the literature, and the findings of contradicting and confirming prior research results are discussed. Building on that, it also provides a discussion of practical implications, research limitations and research outlook.

Chapter 2 Interdisciplinary literature review of the entrepreneurship phenomenon

In this chapter, I provide a review of interdisciplinary studies of the entrepreneurship phenomenon. First I will deal with definitions of entrepreneurship used in previous studies. Later I will focus in-depth on the four themes that can be abstracted from these studies: (1) individual, (2) opportunity, (3) environment and (4) entrepreneurship process. Upon reviewing the studies associated with the first three themes, strong emphasis will be placed on studies of the entrepreneurship process, as this fourth themes potentially plays a crucial role in integrating the three other topics and in so doing, advancing our understanding of the entrepreneurship phenomenon.

2.1 Definition of entrepreneurship

Entrepreneurship as a research topic has long been described as a broad assortment of diverse research approaches, rather than a unique and distinct discipline. Scholars from a broad domain of business studies use existing theories to examine different aspects of the entrepreneurship phenomenon. Such theories include, for example, economics theory, psychological theory and sociological theory.

Despite the diverse approaches and lenses used in studying entrepreneurship, scholars widely agree on the definition of entrepreneurship. Most scholars accept the definition introduced by Shane and Venkataraman in their seminal article “The Promise of Entrepreneurship as a Field of Research”, published in *Academy of Management Review* in 2000 (Aldrich & Cliff, 2003):

“We define the field of entrepreneurship as scholarly examination of how, by whom, and with what effects opportunities to create future goods and services are discovered, evaluated, and exploited.” (Shane & Venkataraman, 2000:218)

Building on this definition in recent years, some scholars have expanded on it by arguing that entrepreneurship does not only involve “discovering”, “evaluating” and “exploiting”, but also “creating” new opportunities and possibilities (Alvarez & Barney, 2007; Sarasvathy, 2001; Wood & McKinley, 2010; York & Venkataraman, 2010).

“We define the act of entrepreneurship as one of discovering and evaluating opportunity as well as creating new opportunities and possibilities.” (York and Venkataraman 2010: 451)

This updated definition of entrepreneurship incorporates the conventional idea that entrepreneurs address the objective opportunity on the one hand, and the emerging perspective that entrepreneurs can also create a new one, on the other.

Parallel to the introduction of this expanded definition of entrepreneurship, many scholars (Alvarez & Barney, 2007; Sarasvathy, Dew, Velamuri, & Venkataraman, 2005; York & Venkataraman, 2010) have engaged in the discussion of its divergent implications, in comparison to that of the conventional definition. According to Alvarez and Barney (2007), for example, it may now be accepted that entrepreneurs do not always passively respond to market imperfection, but rather they create market imperfection. It follows then that the prototype model of the person scanning the external environment to identify existing unmet market demand and further develop products to meet this demand, is not always the top priority for an individual on the route to becoming a successful entrepreneur. Instead an entrepreneur could also actively create market demand.

Despite the discussion of diverse implications, both definitions still imply that entrepreneurship research fundamentally addresses three themes including entrepreneur, opportunity and environment (Shane & Venkataraman, 2000). Most existing research can be placed in this framework, shown in the following figure which is adapted from the work of Shane and Venkataraman (2000).

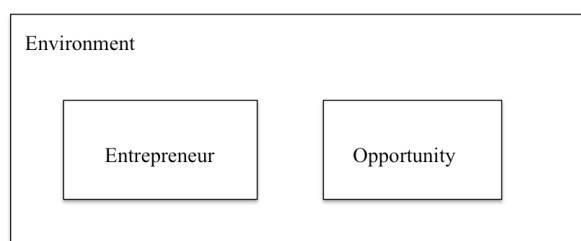


Figure 2 Three fundamental themes of entrepreneurship research

- Opportunity: research addresses questions including the nature of an opportunity--why, when and how do opportunities emerge?
- Entrepreneur: research focuses on such questions, as, who becomes an entrepreneur? What makes the entrepreneur different from a non-entrepreneur?

- Environment: research examines the conditions in which entrepreneurship unfolds--how do the interactions between opportunity and entrepreneur proceed differently in diverse settings?

2.2 Three fundamental themes of entrepreneurship research

2.2.1 Opportunity

Many scholars consider the opportunity as a central concept in studying entrepreneurship. They believe that a clear definition of “opportunity” allows for the establishment of a distinct research unit, and enables researchers to go beyond the examination of the nature of an opportunity and focus on the interactions between this distinct entity and its environment (Busenitz et al., 2003; Eckhardt & Shane, 2003; Short, Ketchen, Shook, & Ireland, 2010).

Unfortunately, despite the claimed importance of defining an opportunity, scholars are far away from reaching an agreement on what exactly constitutes an opportunity. Scholars on entrepreneurship frequently define the term of opportunity depending on the perspectives they have adopted and on which parts of the entrepreneurship phenomenon they intend to study (Casson & Wadeson, 2007; Short et al., 2010). Some researchers, for instance, define “opportunity” in a pragmatic way as easily observable and measurable entities or events like the establishment of a new organization (Ruef, 2005), while others go for the subjective content of opportunity and try to define it in a general way. Eckhardt and Shane (2003:336), for example, define an entrepreneurial opportunity as a “*situation in which new goods, services, raw materials, markets and organizing methods can be introduced through the formation of new means, ends or means-ends relationships*”. However, this “general” definition hasn’t been widely adopted mainly due to the reason that this definition is difficult to operationalize in the research.

Although these studies have introduced knowledge toward the cause of advancing the understanding of entrepreneurship, researchers are concerned with the varied definitions of opportunity. They believe that the proliferation of definitions on opportunity tends to confuse the researchers on entrepreneurship (Casson & Wadeson, 2007), and even impede the progress of the development of the entrepreneurship field itself (Dimov, 2011; Venkataraman, Sarasvathy, Dew, & Forster, 2012).

Recently, some scholars have adopted a different approach to discussing the philosophical underpinnings in the study of entrepreneurial opportunity (Alvarez & Barney, 2007, 2010; Sarasvathy et al., 2005) without however joining the debate on which definition of opportunity is the best. To that end, Alvarez and Barney (2007) simplified the ontological perspectives towards the opportunity: opportunities as concrete realities or as a result of the enactment of an entrepreneur's unique vision. According to them, the first view describes opportunities as something objectively existing out there and waiting to be discovered (Eckhardt & Ciuchta, 2008; Eckhardt & Shane, 2003; Shane & Venkataraman, 2000). In order to make this view explicit, Alvarez and Barney (2007) use the metaphor of a mountain climber to describe the entrepreneur and a mountain to describe the opportunity. Following this perspective, they further explain that the reason for a mountain climber to conquer a mountain is the fact that the mountain exists. The second view states that the opportunity is the result of entrepreneurial actions and is endogenously created in the process (Sarasvathy 2001, Sarasvathy 2008, Baker & Nelson 2005, Sarasvathy et al 2003a, Alvarez & Barney 2007). Following the same metaphor, the entrepreneur, according to this perspective, is the "mountain builder". The entrepreneur builds his or her own mountain. This simplified juxtaposition of exclusive philosophical foundations has brought about quite a number of debates on whether opportunities can always be defined as existing independent of human cognition (Alvarez & Barney, 2013; Eckhardt & Shane, 2013; Garud & Giuliani, 2013).

Given the contradictory assumptions of these two alternative perspectives, it might be thought that these two views are exclusive to each other. Yet, both perspectives share a common feature concerning the sources of the opportunity, as figure 3 illustrates. Both views agree that opportunities emerge from competitive imperfection which is caused by changes of the environment, i.e., changes in industry structure or market structure (Drucker 1985: chapter 6), or new knowledge (Audretsch & Keilbach, 2007).

Similar observations can also be drawn from the juxtaposition between the contradictory Kirznerian perspective and the Schumpeterian perspective of opportunity, which are frequently labeled as "discovered" opportunities and "created" opportunities respectively (Alvarez, Barney, & Young, 2010). Following the Kirznerian perspective, the entrepreneurial opportunity exists out there, but not everyone has the same access to it, nor the same likelihood of recognizing it (Shane, 2003: chapter 2). This perspective is in line with the idea of uneven knowledge distribution in society (Hayek, 1945). According to this idea, knowledge/information is not uniformly distributed among individuals. As a result, those individuals who

possess unique information will sense opportunities, whereas individuals without information will not discover opportunities. In contrast, the Schumpeterian perspective states that individuals do not only discover and receive information, but are able to create new information as well, for example, by inventing new technologies or introducing new institutions.

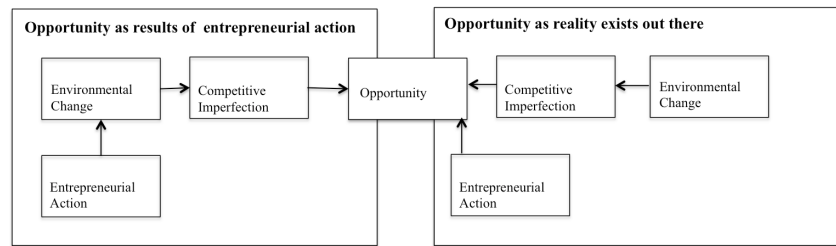


Figure 3 Two alternative perspectives of opportunity

These different perspectives lead to different suggestions/recommendations concerning the entrepreneurial action. The Schumpeterian perspective of opportunity implies that entrepreneurs proactively engage with the external environment (e.g., technology, political forces, and so forth), create new information, and creatively utilize resources to exploit opportunities (Shane, 2012). Entrepreneurs therefore should not only pay attention to external changes but also get actively involved with them. The Kirznerian perspective of opportunity suggests that entrepreneurs should be alert to changes in the environment in order to seize opportunities (Kirzner, 1997). As a consequence, searching by means of scanning the environment to identify and discover changes, becomes a top priority for entrepreneurs.

In addition to the diverse implications for practitioners, both perspectives also imply different research focuses for researchers. The Kirznerian perspective of opportunity emphasizes the concept of the event. Researchers with this perspective tend to focus on the entrepreneurs' "alertness". They stress the concept of the "event", i.e. the point in time when entrepreneurs perceive and recognize unique knowledge or information. The Schumpeterian perspective, on the contrary, focuses on the process. It emphasizes how individuals interact with the environment to generate new information or knowledge, thereby initiating and driving the changes of the environment.

2.2.2 Entrepreneur

A second theme of entrepreneurship research is “entrepreneurs”. Research associated with this theme mostly deals with the question of whether entrepreneurs differ from non-entrepreneurs and what kind of person becomes an entrepreneur. Schumpeter, in his early work, introduced the term “entrepreneur spirit” which is called “Unternehmergeist” in German, to describe the agent who drives the “creative destruction”, or, the changes in the environment or economic development which arise from the destruction of old economies. His discussion on the “entrepreneur spirit” incorporates the concepts of innovation, achievement orientation and other personality factors on the part of the entrepreneur, into the theories of economic development (Schumpeter, 1934).

To achieve a better understanding on these factors, scholars and psychologists try to explore the distinguishing elements in the personality of an entrepreneur in contrast to those members of society who are not considered “entrepreneurial individuals”. A recent study found, for example, that entrepreneurs are more willing to accept uncertainty in a situation when economic decisions need to be made and the outcome depends on the responses of other parties involved (Holm, Oppen, & Nee, 2013). In addition, some scholars even use quantitative genetics techniques to examine the role of a genetic factor in explaining people’s tendency to engage in entrepreneurship (Nicolaou, Shane, Cherkas, Hunkin, & Spector, 2008). They found that genetic factors do matter in turning individual into entrepreneurs.

In short, in addition to the above mentioned factors, a variety of other factors and constructs which are associated with the questions of what distinguishes entrepreneurs from non-entrepreneurs and who becomes an entrepreneur, have been derived in previous studies, for example, personality (Baron, 2008; Hayton & Cholakova, 2012), judgment and self-perception (de Jong, 2013), risk taking propensity (Stewart & Roth, 2001) and experience (industrial, functional, and start-ups) (Shane, 2000).

While many scholars agree on the importance of individual differences in entrepreneurship research (Brandstätter, 2011; Rauch & Frese, 2007; Shane & Venkataraman, 2000), many others believe that it is unimportant (Gartner, Carter, & Reynolds, 2010) or even problematic in explaining entrepreneurship. They give two reasons for this argument. First, entrepreneurial behavior is transitory (Carroll & Mosakowski, 1987; Hayton & Cholakova, 2012), which makes it difficult to explain it in terms of stable “personal traits” that influence human actions. The observations of Baron (2008) suggest, for example, that in addition to the “trait affect” (stable

specific affective reactions across many situations), the state affect (shifts in current moods primarily produced by external events) also influences several aspects of the entrepreneurs' actions and the reactions which result and, hence, important elements of the entrepreneurial process. Second, from a methodological point of view, the constructs developed in this strand of research are hard to observe and measure. As a result, researchers tend to apply the variance approach to study the causal relationship between the construct as a cause and the resulting changes and events as the effect. This is evidenced in studies such as the one aforementioned which examines the impact of genetic factors on the propensity of becoming an entrepreneur (Nicolaou et al., 2008). Undoubtedly, this research has made a considerable contribution to understanding the complex phenomenon of entrepreneurship. They offer explanatory factors that help to achieve a comprehensive understanding of entrepreneurship. Still, the nature of the variance approach constraints its explanatory power to the question of how these various individual differences influence the entrepreneurial process.

2.2.3 Environment

A third theme in entrepreneurship research is the environment in which entrepreneurship takes place. Environment, in the entrepreneurship research, mainly refers to the institutional environment consisting of the economic, political and cultural context in which entrepreneurs operate (Shane, 2003: 145). Research associated with this topic typically addresses the questions of which conditions favor the propensity of individuals to engage in entrepreneurship, how the transformation of the environment leads to opportunities, and how the environment influences entrepreneurial processes.

To study the environment, scholars have made considerable efforts that can be split into two streams. The first stream is closely related to the territorial innovation theory. It includes research on, for example, the national (regional) innovation system (Freeman, 1995), the innovation network (Saxenian, 2007) and industrial clusters (Porter, 1998). Research within this stream typically deals with the question of how entrepreneurship activities, i.e. the generation of business ideas and the founding of companies, can be boosted. The second stream centers on entrepreneurship in an intra-organization setting. Researchers from this stream are essentially dedicated to the research question of how to achieve and sustain competitive advantages in a dynamic environment of established firms. As the result, approaches such as open innovation (Chesbrough, 2006), corporate venturing (Birkinshaw & Hill, 2005), and corporate entrepreneurship (Phan, Wright, Ucbasaran,

& Tan, 2009; Zahra & Garvis, 2000) have been introduced. These approaches are considered to be helpful for established companies for coping with rapidly changing environments.

In addition to the research on the environment's impact on the individual, some other scholars have shed light on the transformation of the environment. Based on institution theory, for example, studies examine institutional changes and their impact on the emergence of entrepreneurial opportunities (Aldrich & Fiol, 1994; Sine & David, 2003; Sine, Haveman, & Tolbert, 2005). In a similar way, researchers also investigate the influence of changes in the technical environment on the creation of opportunities, specifically changes of technology standards (Shapiro & Varian, 1999), regimes of appropriability (Teece, 1986), and the technology regime (Shane, 2001).

Drawing on these contributions, scholars advocate that research should pay attention to the interaction between the environment, the individual, and the opportunities (Shane & Venkataraman, 2000). Thus far, studies have advanced very little knowledge on how environments influence the individual-opportunity nexus (Shane, 2012). As a response to this issue, researchers have recently proposed that entrepreneurship be defined as an interwoven phenomenon (Harms, Kraus, & Schwarz, 2009), which is not separable from its environment.

2.3 Entrepreneurship process

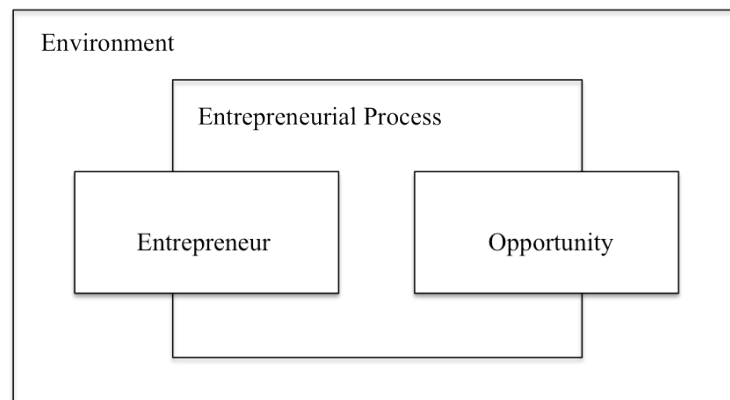


Figure 4 Four themes of entrepreneurship research

The research on the evolution of individuals, opportunities and environments, as well as the interrelationship between them, leads to a fourth research theme - the

entrepreneurship process. With its strong emphasis on changes and actions, scholars believe that studying the entrepreneurial process can help to better understand the inherent dynamics of entrepreneurship (e.g., temporal changes, interactive actions) (Van de Ven & Engleman, 2004). They even take the “entrepreneurial process” to be a potentially distinct element, in which a unitary entrepreneurship theory could be rooted (Moroz & Hindle, 2012; Venkataraman et al., 2012).

In this section, I provide a brief summary of previous research on the entrepreneurship process. To get a clearer understanding of the literature, this review is framed according to four important subject matters involved in the study of the entrepreneurial process: (1) the theoretical framework of the entrepreneurial process study, (2) the contextualization of process studies, (3) research methods used to studying entrepreneurial process, and (4) the unit of analysis of process studies (figure 5). The first two issues are associated with the process models developed from prior studies; the latter two deal with practical issues involved in implementing process study. In a study of the entrepreneurship process, these four issues are closely linked to each other. For example, the theoretical framework has implications for the methods used and the research unit. At the same time, the methods used also impact the generalizability of the research findings.

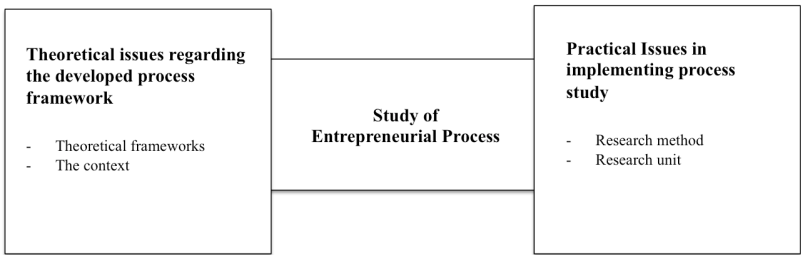


Figure 5 An overview of entrepreneurship process research

2.3.1 Theoretical framework in studying the entrepreneurial process

The theoretical frameworks generated from the studies of the entrepreneurship process are diverse. According to their epistemological basis, scholars group these theoretical frameworks into seven categories (Steyaert, 2007): (1) equilibrium-based understanding, (2) order creation, (3) interpretive and phenomenological attempts, (4) social constructionist approaches (5) pragmatist and practice-based perspectives, (6) relational materialist perspective, and (7) the social ontology of becoming.

Despite their different epistemological foundations, these theoretical frameworks can be generally divided into two groups according to their origins: 1) “extended frameworks” based on the existing theories from other domains, and 2) theoretical frameworks exclusively dedicated to and developed for entrepreneurship. I will refer to them here as “entrepreneurship-dedicated” frameworks.

The extended theoretical frameworks for the entrepreneurial process study theories ranging from the “resource based view” (Ireland, Hitt, & Sirmon, 2003), “cognition theory” (Baron, 2008; Busenitz & Lau, 1996), to “structuration theory” (Mole & Mole, 2010; Sarason, Dean, & Dillard, 2006). They originate from a variety of existing theories. For example, the widely used strategic entrepreneurship framework (Hitt, Ireland, Sirmon, & Trahms, 2011; Ireland et al., 2003; Ketchen, Ireland, & Snow, 2007) is developed from the traditional strategic management framework, which focuses on the exploitation of a current competitive advantage.

These extended theoretical frameworks have advanced the understanding of the entrepreneurship process in two ways. First, the investigation of the entrepreneurial process is enriched in terms of concepts, perspectives, and insights. Second, it also provides researchers with the opportunity to incorporate divergent research findings. An example could be that scholars apply economic and psychological theories to a family business and build an integrated entrepreneurship process model based on it (Spinelli, Neck, & Timmons, 2006). This may advance our understanding of the complex entrepreneurial phenomena by connecting the dots between circumstances and agents coming from different spheres and it may also help to address the challenges entrepreneurs confront in the process of managing entrepreneurship (Okhuysen & Bonardi, 2011; Zahra, 2007). These extended frameworks designated for other disciplines or phenomena are only able to explain and predict parts of entrepreneurship, however, for the simple fact that the entrepreneurship phenomenon goes beyond those boundaries (Shane & Venkataraman, 2000). A recently published literature review on 32 models of the entrepreneurship process also reports that existent entrepreneurship process studies are highly fragmented in their results (Moroz & Hindle, 2012), due to the lack of a unitary and harmonized model of the entrepreneurial process.

The second group of theoretical frameworks involved in the study of the entrepreneurship process is labeled “entrepreneurship-dedicated” frameworks, as, these frameworks are developed by entrepreneurship scholars for dealing exclusively with the entrepreneurship phenomenon. Such theoretical frameworks include, for example, the “opportunity–individual nexus” (Shane & Venkataraman, 2000), the “entrepreneurial effectuation” (Dew, Read, Sarasvathy, & Wiltbank, 2011;

Sarasvathy, 2001), the “creation perspective of entrepreneurship” (Alvarez & Barney, 2007; Luksha, 2008), and “bricolage” (Baker & Nelson, 2005).

Given the constraints associated with using extended frameworks, these entrepreneurship-dedicated theoretical frameworks are considered to have the potential for conceptualizing the entrepreneurial processes and thereby simultaneously deriving both the general process elements that all entrepreneurship processes share, and the distinct process elements that distinguish all entrepreneurship processes from other management processes (Alvarez & Barney, 2007; Moroz & Hindle, 2012; Sarasvathy, 2001; Steyaert, 2007).

Despite their different contents, both approaches have in common that they are trying to develop a universally applicable framework for entrepreneurship. The majority of the entrepreneur process studies aims to develop a general and simple process model for all entrepreneurial processes, for example, the process of opportunity identification describes entrepreneurship as a process consisting of the phases of preparation, incubation, insight, evaluation, and elaboration (Corbett, 2005). A less specific process model is one which is confined to a certain type of domain or industry, for example, a process model of corporate venturing (Badguerahanian & Abetti, 1995; Burgelman, 1983). Process theory is, however, inherently context-related (Langley, Smallman, Tsoukas, & Van de Ven, 2013). The process studies are set to answer the questions of what to do at what point in time, and in what context (Sandberg & Tsoukas, 2011).

2.3.2 The contextualization of process studies

In a response to the fact that extant research focuses on the development of general and simple process models, scholars have recently proposed contextualizing entrepreneurship research (Welter, 2011; Zahra, 2007) to link theory, research objective and research setting. They believe that entrepreneurship can be better understood within its specific context, as, the context sets the boundaries for entrepreneurial action. Here I define “context” as causes of events, which can be represented as a set of factors that helps to understand why certain entrepreneurship phenomena happen. It includes factors related to three dimensions (Whetten, 1989): “where” (e.g., industry, geographical location), “when” (e.g., the growth stage of ventures), and “who” (e.g., novice entrepreneurs). Defined in this way, the context is phenomenon-specific, and exists in the external environment. This definition is in line with some previous research in organizational studies (Mowday & Sutton, 1993).

There are two major challenges to contextualizing theory building in entrepreneurship research (Welter, 2011). The first one is to make the context explicit by providing enough information about the situational and temporal boundaries of the research. Although it is unrealistic to expect that researchers take all possible boundaries into account, it is nevertheless important to include enough information about the context, instead of asking the readers to use their imagination to appreciate the work (Zahra, 2007).

The second challenge is identifying theories for the entrepreneurship context. In addition to making the context explicit in the research, scholars suggest that researchers should include the context in the theory (Bamberger, 2008). Context is not something that is static, but evolves as the actors interact with environments over time (Meyer, Gaba, & Colwell, 2005). This challenge, in turn, calls for a theory that incorporates the recursive interactions between actors and different context factors.

In addition to the implications of the chosen theory, entrepreneurship research is also connected to the practical issues in implementing process studies. For example, the diversity and richness of the entrepreneurship contexts pose a challenge to the quantitative methods.

2.3.3 Methods used to studying entrepreneurial process

Mainly two approaches are used in studying the entrepreneurial process: 1) the outcome-driven approach, and 2) the event-driven approach (Van de Ven & Engleman, 2004). The outcome-driven approach takes a backward perspective. It starts with the observed outcomes, and subsequently identifies the hidden causes. In contrast, the event-driven approach uses a forward perspective. It begins with recorded events and observes their occurrences over time (Aldrich, 2001).

These different approaches correspond with the use of different research methods: the variance theorizing method, on the one hand, for the outcome driven approach and also a narrative method which is called the “process theorizing method” (Van de Ven & Engleman, 2004) for the event-driven approach, on the other hand. For consistency sake, hereafter I use the term of “process method”. The variance approach explains the process with independent variables to represent causes, and dependent variables for outcomes, and thus describes a cause-effect relationship. The narrative method, in contrast, explains the process with a sequence of incidents, actions and activities that unfold over time (Poole et al., 2000: chapter 2).

The variance method works perfectly for the “what” type research questions, for example, what are the antecedents of certain consequences? With its convincing mathematical representations, the variance method dominates previous entrepreneurship research. According to a literature review of 291 entrepreneurship publications in top-tier academic journals from 1989 to 1999, 80% of them took a variance approach (Chandler & Lyon, 2001).

The process method, as discussed above, emphasizes different aspects of change and development. It suits the “how” type of research questions, i.e., how does the entrepreneurial process unfold over time? This method has recently been recommended by a growing number of researchers for two reasons. First, scholars (Sarasvathy et al., 2005; Wiklund, Davidsson, Audretsch, & Karlsson, 2011; Wood & McKinley, 2010) suggest that a process approach observes what entrepreneurs actually do and how they interact with the environment. This approach offers a more comprehensive view of entrepreneurship compared to the variance abstracted model of entrepreneurship that is grounded in economic theory (Wiklund et al., 2011). Second, the knowledge about what action should be taken at what time helps practitioners to transfer the theory into practice, making the knowledge actionable (Sandberg & Tsoukas, 2011).

2.3.4 Unit of analysis of entrepreneurial processes

The second practical question in implementing process study is the choice of the unit of analysis. This choice is also essential for the utilization and the development of different theories (Davidsson, Low, & Wright, 2001).

Different process studies may have different units of analysis, as, the entrepreneurship process involves stakeholders across multiple levels. Previous research, however, tends to take the actors in the environment as the unit of analysis, because it is easier to observe (Wiklund et al., 2011). Such actors include, for example, entrepreneurs (Corbett, 2005), established firms (Badguerahanian & Abetti, 1995), or institutions (Sine & David, 2003).

The tendency that research only examines the actors, has led to the situation wherein we only understand part of the entrepreneurial process (Shane, 2003: 2). Therefore, to enhance our knowledge, the entrepreneurship process research should examine the interactions between actors. In that vein, Shane (2003: 11) has developed an entrepreneurship process model that starts with the existence of the entrepreneurial opportunities. Once the opportunity has been discovered by the entrepreneur, he or she will make a decision to further explore the opportunities. In

the exploitation process, entrepreneurs will engage in acquiring resources, making entrepreneurial strategies and organizing activities. Some scholars further look into the process of opportunity recognition and describe it as the detection of a meaningful pattern (Baron & Ensley, 2006). According to them, the recognition of the opportunity often emerges when detecting meaningful patterns. A possible example could be that an entrepreneur notices the links between seemingly independent events, such as advances in IT technology, demographic changes, and healthcare policy changes, and subsequently introduce a new healthcare solution for the aging population living at home.

The examination of the relationship between individuals and opportunity has recently been questioned by some scholars, because this line of research implicitly takes the source of opportunities as a given (Audretsch & Keilbach, 2007). Researchers assume that the opportunity exists independent of the entrepreneur and is objective in essence (Shane, 2012). As a result, the dynamic interactions between the entrepreneur and the environment become a “one-way relationship”, seeing as the entrepreneurs are assumed to be taking the opportunity as a given. Furthermore, previous studies in line with this thinking have typically examined the ability of entrepreneurs to discover opportunity and then to act on it by setting up a new venture (Audretsch & Keilbach, 2007).

Going beyond the “opportunity” and “actors” approach, researchers suggest moreover that understanding of the entrepreneurship process can be advanced by honing in on actions and interactions (Venkataraman et al., 2012) to identify the patterns behind them. Doing this allows for a finer level of analysis for conceptualizing the process as a sequence of actions/events, compared to the individual-opportunity nexus analysis, which is very likely to have researchers only examining the personal traits and creation of organizations. This line of thinking also corresponds with the suggestion discussed in Section 2.2.1 that viewing opportunities in terms of what is actually happening, by focusing specifically on what entrepreneurs actually do, helps to advance the understanding of complex entrepreneurship (Wiklund et al., 2011).

2.4 Summary

Research of the entrepreneurship phenomenon has become a fast-growing area in management studies in the past decade. Researchers of diverse disciplines, backgrounds and interests, have devoted considerable effort to this hot topic. Yet, a unitary and distinct entrepreneurship theory remains to be developed.

The entrepreneurial process, which addresses the interactions between individual, opportunity and environment, has been suggested to have the potential for becoming an element in which a distinct entrepreneurship theory could be rooted.

However, a review of existing studies of the entrepreneurial process reveals that existing process frameworks of entrepreneurship are highly fragmented in their theoretical claims and remain insufficient for establishing a foundation of an entrepreneurship theory.

In Chapter 3, the focus is switched to the emerging entrepreneurship-dedicated theoretical perspective. Compared to the extended theoretical frameworks, it has been considered to have the potential for conceptualizing entrepreneurial processes and thereby simultaneously derive both the general process elements (all entrepreneurship processes share) and the distinct process elements (that distinguish all entrepreneurship processes from other management processes).

Chapter 3 Discovering whilst interpreting: A social design perspective of the entrepreneurship process

This chapter focuses on the emerging theoretical frameworks that are dedicated to the entrepreneurship process. As described in section 2.3.1 of chapter 2, these theoretical frameworks have recently been considered to have the potential to conceptualize the entrepreneurship process (Alvarez & Barney, 2007; Moroz & Hindle, 2012; Sarasvathy, 2001; Venkataraman, Sarasvathy, Dew, & Forster, 2012), in that they can go beyond the constraints of using existing theoretical frameworks from other disciplines. This outlook has motivated increasing efforts in the past few years toward the development of an entrepreneurship theory in its own right.

Parallel to those efforts in search of a unitary and coherent entrepreneurship theory, some scholars have also been trying to categorize the emerging theoretical perspectives (Alvarez & Barney, 2007, 2010; Sarasvathy, Dew, Velamuri, & Venkataraman, 2005). They have gone about this generally, by juxtaposing the ontological and epistemological underpinnings of different theoretical perspectives. To that end, Alvarez and Barney (2007) have proposed two alternative approaches toward entrepreneurial actions, which are labeled “discovery perspective” and “creation perspective” respectively.

Using this approach, which simply contrasts the philosophical roots of distinct perspectives, unsurprisingly, has lead to considerable debates regarding the interpretations of various perspectives by different scholars (Alvarez, Barney, & Young, 2010; Alvarez & Barney, 2013; Eckhardt & Shane, 2013; Shane, 2012). The nuclei of these debates are focused on themes of “entrepreneur”, “opportunity”, and “entrepreneurial actions” which involve the questions, for example, whether the opportunity always exists independent of the perceptions of individuals.

In this chapter, I will scrutinize these emerging perspectives with respect to the entrepreneurship process. Specifically, I first recapitulate the ongoing academic debates on these perspectives. Attention focuses on “entrepreneur”, “opportunity” and “entrepreneurial actions” that have been the center of the debate in the past years. I then describe their different implications for conducting entrepreneurship research. Secondly, I switch my focus from these debates in the areas that seem to evade consensus, towards the area that the different approaches share— the entrepreneurship process--and derive a social design process framework from existing empirical

findings and concepts related to the social design perspective. Thirdly, I summarize the open questions and theorizing efforts that still need to be undertaken in order to develop a coherent social process framework. Lastly, I discuss technology entrepreneurship as a setting for developing a social design process framework.

3.1 Entrepreneurship as opportunity discovery

The discovery perspective of entrepreneurship has received significant attention in previous studies (Alvarez & Barney, 2007; Shane, 2003). Epistemologically, this perspective is consistent with the ideas of positivism (McMullen & Shepherd, 2006) in which the central doctrine entails that reality exists independently from the individual who observes it. Following this vein of thought, entrepreneurship scholars make three rudimentary assumptions about the discovery perspective (e.g. Alvarez & Barney 2007).

Exogenous opportunities. Consistent with the positivist perspective, opportunities are objective, and exist independent of the perceptions of individuals (Shane, 2003: 12). The opportunity is formed by exogenous changes of environment, e.g. consumer preference changes, technology changes (Kirzner, 1997), and the changes of industry and market structure (Drucker, 1985: chapter 6). The opportunity in this perspective is defined as “*situations in which new goods, services, raw materials, markets and organizing methods can be introduced through the formation of new means, ends, or means-ends relationships*” (Eckhardt & Shane, 2003: 336). It is like a natural diamond exogenously formed at a high temperature and pressure in the earth’s mantle. It is waiting out there to be discovered.

“Special” entrepreneurs. If opportunities are independent of entrepreneurs, a natural follow-up question is: does every individual have the same likelihood of recognizing them? Of course the answer is no. To explain why only some people recognize opportunities while some others do not, scholars turn to the concept of “information asymmetry”, that knowledge and information is not equally distributed amongst all individuals (Hayek, 1945) and the construct of individual “alertness” (Kirzner, 1997) is described as an internal element of the entrepreneur.

Management scholars generally focus on the latter one and elaborate on the construct of “alertness” to identify cognitive and motivational factors to distinguish entrepreneurs between non-entrepreneurs, and successful entrepreneurs from unsuccessful entrepreneurs. Thus far, a set of factors that distinguish entrepreneurs from non-entrepreneurs have been described, including: affect and cognition (Baron,

2008), prior work experience (Shane, 2000), locus of control (Evans & Leighton, 1989), and risk-taking propensity (Stewart & Roth, 2001). These studies conclude that entrepreneurs are those people who display some unique feature and attributes and who can recognize opportunities earlier or faster than other individuals. However, these studies don't bring answers to another important question as to who becomes an entrepreneur, nor do they identify whether these individual differences don't result from entrepreneurship itself.

Rational decision-making. The assumption of objective opportunities has been further interpreted that, in the discovery process, entrepreneurs are supposed to deal with an accurate picture of “reality” (McMullen & Shepherd, 2006). They scan the external environment to collect information as much as possible in order to precisely calculate the risk and predict the outcome associated with exploiting a specific opportunity (Shaver & Scott, 1991). According to this perspective, entrepreneurs can, in principle, use a variety of risk-based data-collection and analysis techniques to collect enough information required to calculate the risk and the probability associated with each decision which is also assumed to be rationally made (Alvarez & Barney, 2010; Miller, 2007).

Interpreted in this way by the scholars (Alvarez et al., 2010; Klein, 2008), the discovery perspective of entrepreneurship demonstrates strong roots the neoclassical economic theory. In the neoclassical economic framework: 1) market is the central mechanism that determines price; 2) market is represented by the exogenously given supply and demand curve. In this way, for the actors in this framework, the price is given exogenously. Based on this market-determined price signal, the companies make decisions about allocating resources to produce products and services that satisfy the consumer's demand, and the individuals make decisions regarding consumption and work (Audretsch & Link, 2012). They change behaviors as the market price varies. In this framework, the decision-making processes for both firms and individuals are assumed to be rational.

Building on these strong assumptions of exogenously given market conditions to individuals and companies, the neoclassical economic framework leaves little room for entrepreneurs. As Lazonick (2010) states,

“The rule of profit maximization, imposed on the firm by given technical and market constraints, determines the firm's strategy about the industry in which firm should compete and the quantity of output that the firm should produce. The appearance of supernormal profits in a particular sector or industry as a result of exogenous changes in

technology and markets induces ‘entrepreneurs’ to allocate resources to produce in that industry” (Lazonick, 2010:320-321)

Entrepreneurs in this framework would take action only when there is “disequilibrium” – a gap between supply curve and demand curve, as the following figure exhibits. Once the gap has been filled, the market reaches a state of “equilibrium” when the market price and quantity reach the equilibrium point (P^* , Q^*), so that entrepreneurs have to wait for another exogenous changes which might cause a new “disequilibrium”.

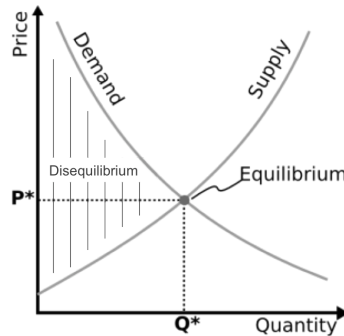


Figure 6 Discovery process and supply-demand curve²

Firstly, disequilibrium conditions (e.g. technology and market) are given. They arise by themselves without influence from the outside. The proactive impacts of actions taken by individuals and organizations on both supply curve and demand curve are not taken into account. Entrepreneurs, in this framework, play no role in creating disequilibrium conditions. In this system, once the industry in which the entrepreneur intends to compete is chosen, it requires no special expertise for an entrepreneur to start a business in one industry or another, because all they need is to follow the principle of profit maximization (Lazonick, 2010). However, this is no longer true in certain settings (e.g. technology entrepreneurship) where entrepreneurs very often go about inventing a new technology and therewith in the creation of disequilibrium conditions. In the cases of Facebook and Microsoft, for example, the entrepreneurs have created new technologies and new markets, and to some extent have even changed the way people live and work.

Second, decision-making is assumed to be rational. The neoclassical framework assumes that every agent (firms/individuals) has perfect information (e.g. about price) all the time. They therefore can always make optimal decisions about

² This figure is based on Lazonick's (2010) interpretation of the neoclassical economic model.

buying or manufacturing based on the price information. Yet in the setting of entrepreneurship, the information is not always available to every one due to the fact that individuals have finite capabilities and limited resources (e.g. money) to be allocated for collecting and processing information (Casson & Wadeson, 2007). In some cases, the information doesn't even exist at the moment when the agent needs to make a decision (Alvarez & Barney, 2007).

With these increasing doubts on the discovery perspective of entrepreneurship, the scholars who hold the discovery perspective have recently clarified that they do incorporate uncertainty in the discovery perspective. The construct of "conjuncture" (Eckhardt & Shane, 2003; Shane, 2003: chapter 3), for example, more recently called "business idea" (Shane, 2012), which represents the entrepreneur's subjective interpretation of the external environment which has been introduced to incorporate the "subjective elements" in the discovery process. By doing this, they have also confirmed that decisions can be non-optimal and therein lies importance in describing entrepreneurial decision-making as a creative process (Casson & Wadeson, 2007; Gaglio & Katz, 2001). Moreover, they also make it clear that the discovery process of entrepreneurship does not always unfold in a linear way, since some scholars (Baker & Nelson, 2005; Ensley, Pearce, & Hmieleski, 2006; Hmieleski & Corbett, 2006) interpreted it as a sequential process. As the following section of 3.3.3 presents, there are considerable overlaps in terms of the entrepreneurship process between the discovery perspective and other perspectives.

To summarize, despite the increasing overlaps amongst the discovery perspectives of entrepreneurship and the emerging perspectives, the debates don't seem to be coming to a consensus very easily, as, the heart of the debates lies in the opportunities. Furthermore, according to some scholars (Alvarez & Barney, 2013), those from the discovery stream are in essence claiming that the existence of the opportunity is independent of human knowledge and entrepreneurial actions.

3.2 Entrepreneurship as social design process³

In contrast to the discovery perspective, which indicates that entrepreneurship is about paying attention to exogenous changes to recognize opportunity, evaluate it and exploit it, another group of theoretical perspectives believes that entrepreneurship very often begins with endogenous ideas that individuals are passionate about. These perspectives include, the creation perspective (Alvarez & Barney, 2007), the effectuation perspective (Sarasvathy, 2001) and the constructivist perspective (Wood & McKinley, 2010). Despite the diverse names, these emerging theoretical perspectives all show a strong inclination towards the “social design concept” introduced by Herbert Simon (1996). Hence I refer to them as “social design perspective”. This approach emphasizes how elements in the internal environment interact with those of the external environment. Internal environment here is defined as “the entrepreneur’s cognition and emotions, actions and aspirations”; the external environment includes market structures, institutions and stakeholders (Venkataraman et al., 2012).

The social design perspective is philosophically in line with Kant’s work of constructivism emerging from the debate between positivism and interpretivism (Berger & Luckmann 1967). This constructivist approach assumes that reality is as individuals subjectively perceive it (Azevedo, 2002). Individuals, according to Kant’s idea, are capable of constructing the social conditions in which they operate (as in interpretivism). Their subjective perceptions about the how the world works are subject to testing against objective reality (as in positivism). Developed as an offshoot of constructivism, the social design perspective of entrepreneurship has very different assumptions about the opportunity, the entrepreneur and the entrepreneurial actions, compared to the discovery perspective.

Opportunity as result of actions. In the discovery perspective, opportunities emerge from changes in the external environment which are independent of entrepreneurs. People might be seen as waiting at home for the postman to arrive, who plops a newspaper on the kitchen table containing a detailed advertisement about some opportunity for a business partnership. In the social design perspective, however, opportunity is the result of entrepreneurial actions and interactions that take place over time (Alvarez & Barney, 2013; Sarasvathy, 2001). They do not plop down from the sky or the postman’s satchel in a neat format clearly presenting themselves

³ This section is largely based on: Zhou, Z., Zhao, Y., & Katzy, B. R. 2012. *Entrepreneurship as a field of study in engineering management*, in *Proceedings of IEEE International Conference of Technology Management 2012*, Dallas, The United States, 2012.

as such. Hence, they are not exogenously formed by changes in the environment. The actions of the entrepreneur and interactions between entrepreneurs and other stakeholders can actually proactively transform the environment. In this sense, opportunities are artifacts that cannot be separated from the interface between the internal environment and external environment (Simon, 1996; Venkataraman et al., 2012). An opportunity, thus, might be something which presents itself over time in the context of one's relationship with a colleague on the job, for example. As noted earlier, the internal environment here is defined as "the entrepreneur's cognition and emotions, actions and aspirations"; the external environment includes market structures, institutions and stakeholders (Venkataraman et al., 2012). They are both objective and subjective which suggests that they are formed both by exogenous changes and enacted by entrepreneurial actions (Alvarez & Barney, 2007; Venkataraman et al., 2012). Yet the answer to what exactly opportunity entails according to the social design perspective, remains to be illuminated (Eckhardt & Shane, 2013).

Entrepreneur as designer or creator. Design lies at the crux of the concept of artifact (Simon, 1996). In this sense, the entrepreneur is a designer in the creation of an artifact. According to the Cambridge English dictionaries online (dictionary.cambridge.org), a designer is a person who imagines how something could be made and draws up plans regarding how to make it. She/he incrementally specifies the structural properties of a design object as the design process continues over time. In the entrepreneurship setting, contrary to the dominant picture of entrepreneurs who are viewed as discoverers, the design perspective proceeds from the idea that entrepreneurs subjectively perceive something and get new ideas. They believe that an acceptable result can be achieved if the perceived ideas are executed properly. In this sense, instead of scanning the external environment to recognize an opportunity and develop a product or service based on it, an entrepreneur, according to the social design perspective, is a proactive agent concerned with how things ought to be, instead of figuring out how things are (Simon, 1996).

Of course, this view does not mean that the designers/creators can ignore the laws of nature or of economics. Instead, the "designer" frequently interacts with the environment to test, validate and alter those designed ideas as the entrepreneurship process unfolds. What's more, very often the initially perceived ideas ultimately turn out not to be viable at all.

Moreover, the social design perspective also assumes that, ex ante, the difference between entrepreneurs and those who are not may be minute before creating opportunities (Alvarez & Barney, 2007; Wiltbank, Dew, Read, &

Sarasvathy, 2006). Yet these small differences at the beginning are amplified as the social design process unfolds, which brings some individuals to create opportunities and others not. In this sense, the difference between entrepreneurs and non-entrepreneurs identified in the previous study, for example, behavioral differences in response to various uncertainties (Holm, Oppen, & Nee, 2013) is viewed as a result of the entrepreneurship process. Taken in this way, the design perspective provides an additional lens to one of the central questions of entrepreneurship literature - whether entrepreneurs are different from those who are not, and who exactly turns into an entrepreneur.

Bounded rational decision making. Entrepreneurship is considered a process of reducing uncertainty about new opportunities (Alvarez & Barney, 2005; Casson & Wadeson, 2007). Pragmatically speaking, no matter how hard they work, it is impossible for the entrepreneurs to collect all the information needed for rational decision-making. Uncertainty in the entrepreneurship process is caused by information asymmetry, the tacitness of entrepreneurial knowledge during the innovation process (Katila & Mang, 2003; Urban & Von Hippel, 1988) that is not yet widely adopted, and the absence of not yet existing information (Alvarez & Barney, 2007). Two other explanations for the uncertainty are finite capabilities and limited capital and other resources to be allocated for collecting and processing information (Casson & Wadeson, 2007). Consequently, the entrepreneurial decision cannot be optimally made by estimating the probability of the success of these alternatives (Baumol, 1993). As a result rational decision-making is not feasible in practice.

The social design perspective assumes that information needed to exploit an opportunity is created in the course of the process itself. In other words, knowledge is socially constructed (Kogut & Zander, 1992), which is the case for entrepreneurial beliefs (Daft & Weick, 1984), socially constructed confidence (Hayward, Shepherd, & Griffin, 2006), and prior knowledge and experience (Shane, 2000) that have been found to matter for entrepreneurship. Putting it differently, the design logic in decision-making is not dependent on the analysis of the external environment. Prediction of an unknowable future is replaced by its design and creation through one's own actions, knowledge, skills, and available means (Baker and Nelson, 2005; Sarasvathy et al., 2003a).

To summarize, the social design perspective is shaped by these three rudimentary assumptions: 1) entrepreneurs as designers and creators; 2) opportunity as the result of entrepreneurial actions; and 3) bounded rational decision-making, the social design framing allows studying "planning without goal", and the individual learning of the entrepreneur (Berger & Luckmann, 1967; Weick, 1979). With these

features, the design perspective is recommended by a growing number of scholars for the development of a unitary entrepreneurship theory (Alvarez, Barney, & Anderson, 2012; Sarasvathy, 2001; Venkataraman et al., 2012). This is true in particular, in the area of the entrepreneurship process where entrepreneurship scholars haven't advanced very much knowledge of how the entrepreneurship process has unfolded in the past decade (Shane, 2012).

3.3 A social design process framework of entrepreneurship⁴

In this section, I will focus on the process studies that are in line with the social design process. Building on these prior studies, I intend to derive a social design process framework. A process is basically characterized by three features: the input, the output and the transformations in between (Moroz & Hindle, 2012). This section is structured by three fundamental process issues: 1) what goes in the social design process? what is the input? 2) what comes out of the social design process? what is the output? and furthermore 3) how do the transformations take place in the social design process?

3.3.1 *The input of the social design process*

Perceived ideas trigger the social design process and in so doing form the input for the social design process. The evolutionary theory of actions provides an internal perspective that ideas create variation which is followed by a process of social interaction (Weick 1979a, Aldrich & Kenworthy 2006). From an outside perspective, random or blind variations are the raw material from which a selection process filters those activities that are most likely to ultimately constitute an opportunity (Aldrich and Kenworthy, 2006).

Entrepreneurship scholars have elaborated on the construct “variation” in the sociocultural evolution which was originally introduced in evolutionary biology referring to blind and random (but not necessarily) change caused by mutation and recombination (Campbell, 1969). They suggested that the variations triggering the social design process need not be as comprehensive and precise as a business idea which usually includes detailed descriptions regarding how to recombine resources in a way that allows pursuit of an entrepreneurial opportunity (Shane, 2012). Instead

⁴ This section is largely based on: Zhou, Z., Zhao, Y., & Katzy, B. R. 2012. *Entrepreneurship as a field of study in engineering management*, in *Proceedings of IEEE International Conference of Technology Management 2012*, Dallas, The United States, 2012.

there might be simple hypotheses regarding how the external environment will react to their efforts to create a new opportunity (Alvarez & Barney, 2010), or just prior naïve beliefs (Baker & Nelson, 2005; Sarasvathy, 2001). In this sense, the business idea is an intermediary concept in the social design process of entrepreneurship.

In addition to the investigation of the diverse forms of variations, scholars also engage in the examination of underlying patterns in the emergence of variations. For example, scholars have identified the important role of the entrepreneur's creativity (Alvarez, 2008), and the capability to improvise and take advantage of emerging resources and opportunities, and also tolerate ambiguity, messiness and setbacks (Baker & Nelson, 2005).

3.3.2 Entrepreneurial configuration as output of social design actions

Although the research of the social design process has received considerable attention in recent years, the outcome of the process remains undefined (Eckhardt & Shane, 2013). Scholars simply describe the outcome of the entrepreneurship process as a result of entrepreneurial actions. As briefly discussed in section 2.2.1 of Chapter 2, the term “opportunity” is broadly used in entrepreneurship research but without a clear and generally accepted definition (see also chapter 2.2.1 of this thesis). In this study, in order to avoid the confusion that could arise if the undefined term “opportunity” is used to describe the result of social design, I introduce “configuration” as a process output.

The meaning of configuration⁵, in essence, describes a situation in which core elements of a system are arranged in a certain way to make the system run. In the language of entrepreneurship, I define entrepreneurial configuration as *a status that a new business reaches, wherein core elements are connected in a way which allows it to achieve viability*. As previous studies suggest, the core elements could be, for example, value proposition for the stakeholders, customers, finances and infrastructure activities (Osterwalder & Pigneur, 2010), or individuals, resources, strategy, and environment (Sarasvathy, 2004). Furthermore, the viability refers to the results that entrepreneurs take as acceptable. Prior studies suggest that for most entrepreneurial teams, the fundamental objective is to attain sustainable revenue and to survive (Blank, 2013; Vohora, Wright, & Lockett, 2004).

Defined in this way, several characteristics are implied. First, the configuration contains relationships elements (Dess, Newport, & Rasheed, 1993),

⁵ <http://dictionary.cambridge.org/>

and it focuses the interactions among elements of a running start-up. Second, the configuration is a quality or status that varies among organizations and doesn't necessarily need to be optimal to create value for the organization (Miller, 1999; Simon, 1996). Third, the configurations are in essence dynamic. The status of the configuration is subject to change over time (Harms, Kraus, & Schwarz, 2009; Miller, 1996).

After having discussed the input and the output of the social design process I will now focus on the transformations in between: the conceptualization, the implementation and the adaptation.

3.3.3 Conceptualization

Social design processes are not linear. Once an initial idea is conceived in the mind of the entrepreneur, she or he will engage in a set of actions to make the initially sensed ideas concrete and explicit, and mitigate the related "uncertainty" which is subjectively perceived by the entrepreneur (Alvarez & Parker, 2009; Baker & Nelson, 2005). I call these kinds of actions "conceptualizing actions". Before making a decision to start a new business, prospective entrepreneurs take actions to minimize the perceived uncertainty to a level they can accept. In this process, most of them try to make sense of their ideas by paying attention to parts of the environment that relate to the ideas and by communicating with external stakeholders. From these steps, they expect to receive suggestions and information regarding instructions for further measures (Kogut & Zander, 1996; Weick, 1979).

Research has been undertaken to examine the process of conceptualization, to see what is happening from the inside out. To that end, Wood and McKinley (2010) theoretically discuss the ways in which entrepreneurs go about conceptualizing their ideas, which can be informal or formal. The informal approach is usually confined to short conversations or other verbal exchanges, such as speaking to colleagues, close friends, supervisors, and to family members. The formal way of conceptualizing actions usually requires following certain predefined procedures, such as participating in a business plan competition (Delmar & Shane, 2003), engaging in pre-startup planning (Castrogiovanni, 1996), applying for public subsidies, etc.. Apart from the way in which the conceptualization takes place, it is also important to take into consideration, just who exactly are the people involved. Gemmell et al. (2012) found that the conceptualization is facilitated by interactions between entrepreneurs and their "trusted" partners. This could be, for example, entrepreneurs

only frankly discussing their business secrets to others whom they believe to be reliable, to prevent potential misappropriation.

Furthermore, attributes of the individual have an impact on the conceptualization process, such as the individual's motivation, propensity to take risks, (Baum & Locke, 2004), his/her socially-constructed personal belief system (Hayward et al., 2006), or the entrepreneur's attitude towards the ideas at hand (de Jong, 2013).

3.3.4 Implementation

After having conceptualized the ideas, the next step of the social design process is the implementation. For implementation, those entrepreneurs who have decided to exploit the conceptualized ideas will engage in a new process of attempting to gain sufficient support from external resource holders in order to turn the idea into a working venture and subsequently sustain it (Alvarez & Barney, 2010; Luksha, 2008; Wood & McKinley, 2010). In the words of constructivism, the interactions between the entrepreneurs and the external environment act as a test of the applicability of ideas emerging from the cycle of conceptualization. Over time, these interactions between entrepreneurs and their external environments will lead to a socially constructed reality.

Examining the extant literature, it turns out that prior research has described certain aspects of the implementation process in both empirical and theoretical ways. According to their underpinning theories, the research can be grouped into two streams: 1) the "cognition perspective" dominant stream, which focuses on the cognitive characteristics of individual entrepreneurs and the possession of prior knowledge as the primary basis for designing new ventures; and 2) the "institutional perspective" dominant stream, which places the implementation of the business idea within a social context and focuses on the cultural and symbolic realms of meaning construction surrounding the new ventures.

Research falling into the cognition perspective dominant stream includes, for example, scholars (Baker & Nelson, 2005) who have empirically discovered the bricolage mechanism that was originally defined as doing things with the resources at hand (Lévi-Strauss, 1966). They observed that in a resource-poor environment, entrepreneurs are able to create value by recombining materials at hand for new purposes. In a similar vein, research also engages in theoretical development. Sarasvathy (2001) introduces the effectuation process in which entrepreneurs create new ventures through the enactment of imagination. Starting with an assessment

about themselves, entrepreneurs engage in a process of accepting surprises and constant learning.

Instead of focusing on entrepreneurs, as the cognitive perspective does, the institutional perspective emphasizes cultural and symbolic realms. For instance, Zott and Huy (2007) examine the social meaning of an action that goes beyond the functional use of acquiring external resources. They find that four types of actions can facilitate resource acquisition: conveying the entrepreneur's personal credibility; professional organizing; demonstrating organizational achievement; and the quality of stakeholder relationships. This approach is similar to that of Casson and Wadeson (2007), who propose that reputation helps entrepreneurs to get other people to accept their claim. Following this approach, if the entrepreneur achieves reputation, his or her claim will become valid in other stakeholders' perception, and then he or she will be more likely to acquire sufficient support from related stakeholders, which ultimately leads to a configuration.

3.3.5 Adaptation

However, the creation of an entrepreneurial configuration is rarely achieved in a linear way. Another transformation connected with the social design process is "adaptation". Adaptation is considered to be a central feature in the social design process. It is rare that the creation and running of a business actually follows precisely the initial plans or beliefs (Mosakowski, 1997). Instead, the entrepreneurs continuously act and test, and receive response to their efforts--usually from the environment--and then revise their beliefs or plans and act again (Weick, 1979). This is similar to Shane's (2012) outlook, which clarifies that entrepreneurship is a dynamic process involving constant adjustments.

Failure to adapt to the circumstances yielded based on the results received from testing and experimenting certain actions, will not necessarily lead to the creation of an entrepreneurial configuration, unless the entrepreneurs happen to be very lucky. While trying to achieve the envisaged future, entrepreneurs very often realize that they have misinterpreted the results of previous actions or responses from the environment, and need to go back several steps and start over, or even abandon the whole process (Mosakowski, 1997). Similar observations are also made in the examination of academic spin-offs, wherein scholars (Vohora et al., 2004) found that entrepreneurs may revisit some of the earlier decisions and activities in the entrepreneurship process. In short, adaptation is a crucial element of the design process.

Entrepreneurial adaptations can take place in different conditions, in the form of abandoning ideas when they do not meet selection criteria, or in the form of sensing new ideas (Eckhardt & Ciuchta, 2008; Wood & McKinley, 2010). Situations, in which one of those two occur, include the following: when the perceived ideas are incongruent with the environment in terms of inability to acquire sufficient resources; when the market demand proves to be non-existent, as well as for many other reasons, so that entrepreneurs in the end, have to abandon their pursuit.

Going beyond the adapting action itself, prior studies also investigated the antecedents to the adaptation behavior. For example, some scholars studied the influence of prior experience in the industry or market, and reported that experience may actually hinder adaptation actions, rather than that having a facilitating impact. This is particularly true in the creation of new opportunities that are largely unrelated to the current market and industries, which may require the development of fundamentally new knowledge (Schoonhoven, Eisenhardt, & Lyman, 1990; Sine, Haveman, & Tolbert, 2005).

Moreover, prior theoretical discussions on the adaptation process also show that it is an ongoing process that emerges from iterative social interactions with the environment. It involves learning about what entrepreneurs thought and did earlier. The entrepreneurs take actions and receive feedback at the same time, which leads to an adjustment in the entrepreneurs' expectations and understanding of what is feasible and valuable (Chiesa & Frattini, 2011). The iterative interaction of the entrepreneur with the environment allows entrepreneur to learn and make the properties and parameters of the configuration explicit.

3.3.6 Summary

Figure 7 presents a social design process framework extracted from prior studies. The social design process is driven by entrepreneurs' perceptions about the external environment, i.e. new beliefs, new ideas, or new framings (Sarasvathy et al., 2005). These are followed by conceptualizing actions with the current social structures in order to objectify and make sense of these perceptions (Kogut & Zander, 1996; Weick, 1995a; Weick, Sutcliffe, & Obstfeld, 2005). Prior to the engagement in the process of implementation aimed at acquiring resources from external participants, entrepreneurs must address the uncertainty of ideas perceived by them. Finally, with the conceptualized ideas, entrepreneurs attempt to convince external stakeholders and acquire resources to implement them, through iterative action and reaction processes (Luksha, 2008; Rindova & Kotha, 2001). As the interactions between

entrepreneur and external environment proceed, the entrepreneurs constantly adjust their ideas to pass the test of the external environment, until the implementation of the ideas reach a status of configuration.

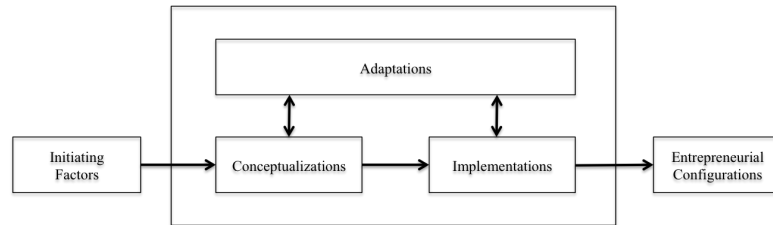


Figure 7 The social design process

All in all, the conceptual discussions and empirical examinations that are related to the social design perspective have generated some preliminary conclusions regarding entrepreneurs, opportunities and the entrepreneurial process.

However, this social design process framework, compared to the richness of both empirical and theoretical research from other frameworks, still calls for theorizing efforts. Specifically, two important issues concerning these theorizing activities (Weick, 1995b) remain insufficiently addressed: developing a coherent process framework and grounding theoretical ideas in empirical data.

To achieve a coherent process framework for a social design perspective, at least three open questions must be addressed. First, how do individuals become entrepreneurs? Entrepreneurs are assumed to be not significantly different from those who are not. Yet an open question remains--what is it that makes an individual become an entrepreneur? Second, how do initial factors emerge? Scholars speculate that endogenous factors like belief could trigger the social design process. Furthermore, what are the sources of these endogenous factors? How do they emerge? Thirdly, how do initial factors lead to entrepreneurial configuration? Researchers have described the social design processes as consisting of conceptualizing, implementing, and adapting process, and have also addressed parts of the social design processes separately. However, the interactions between conceptualizing actions, implementing actions and adapting actions, as well as how they are interconnected, remain underdeveloped.

Next, as for the development of a coherent process framework, research has yet to provide a more empirically grounded social design perspective (Alvarez & Barney, 2007; Luksha, 2008; Wood & McKinley, 2010). Ample research focuses on the general description of sequential events or stages. Groundwork processes, such as

sensing ideas, conceptualizing ideas, and implementation, have yet to be openly and clearly illustrated. An empirically grounded process model illustrating a more coherent and elaborated picture of what kinds of actions entrepreneurs take to address uncertainty, how they use them, and why they use them, is warranted thus.

3.4 Technology entrepreneurship as setting for social design perspective

To this end, I have introduced the research objective and the development of the social design perspective. To contextualize this study, an effective link between the research objective, theory and research setting remains to be built. Looking into the previous entrepreneurship research, technology entrepreneurship turns out to be revealing when it comes to the development of an emerging social design process perspective.

Technology entrepreneurship has attracted increasing attention from academics in past decades. Researchers have been engaging in studies related to diverse aspects of technology entrepreneurship phenomena, i.e. the environmental factors that impact technology entrepreneurship (Di Gregorio & Shane, 2003; Sine & David, 2003), the technology entrepreneurship process (Baker, Miner, & Eesley, 2003; Garud & Karnøe, 2003), the role of entrepreneurs (Eesley & Roberts, 2012; Li, Zhang, Li, Zhou, & Zhang, 2012), and strategy (Gans & Stern, 2003; Katila, Chen, & Piezunka, 2012).

However, in contrast to the widely accepted definition of entrepreneurship, a clear definition of technology entrepreneurship remains to be seen. In this study, I define technology entrepreneurship as *engagement in a speculative activity with a purpose of creating future goods and services from new technical knowledge*. Defined in this way, technology entrepreneurship differs from mainstream entrepreneurship insofar as the critical role which technology plays in the entrepreneurship process. Technical innovation constitutes a core element in creating and capturing market value for the project. Similar arguments for technology entrepreneurship can be found in some other scholars' studies (Beckman, Eisenhardt, Kotha, Meyer, & Rajagopalan, 2012; Shane & Venkataraman, 2003). The way that this technical element presents itself could be found in the development of a totally new product or invention, in the manufacturing process itself, or in the distribution channel.

Technology entrepreneurship is chosen as the setting for the social design perspective for at least three reasons. Firstly, the dynamics of technology entrepreneurship provide an opportunity to examine disequilibrium (Beckman et al., 2012). Technology entrepreneurs don't take technological constraints as exogenously given. Instead, they very often engage in the development of new technologies to address the constraints, which then constitutes a core element in enabling the emergence of a venture, market, cluster, or industry.

Secondly, uncertainty characterizes the technology entrepreneurship process. The technology entrepreneur faces three types of uncertainty: technological uncertainty (what needs to be learned), market uncertainty (whether there is sufficient demand for the product to generate revenues), and competitive uncertainty (whether the competitors can do it better) (Lazonick, 2010). In such a setting, processes of development are usually incremental, enacted, and improvised (Baker et al., 2003; Shane & Venkataraman, 2003). This is in sharp contrast to the textbook notions emphasized by the mainstream entrepreneurship literature, wherein an entrepreneur acts on foresight and prediction (Shane & Venkataraman, 2003). Meanwhile, this also indicates that the research of technology entrepreneurship should not focus exclusively on the entrepreneurs themselves, but incorporate the role of technology and the institutions in which they are embedded.

Lastly, technology entrepreneurship as a setting for social design thinking is also in line with the proposition of contextualizing theory building in entrepreneurship research (Zahra, 2007). Alvarez and Barney's (2007, 2010) discussions on alternative theories towards entrepreneurial actions, creation theory and discovery theory, have provided a good basis for further development both at constructing a unified theory and at contextualizing entrepreneurship research. Both scholars argue that entrepreneurs operate in settings that vary in terms of the availability of the information concerning opportunity, and vary in how the entrepreneurs perceive the analyzability of the environments. These differences will actually influence how they behave in the entrepreneurship process.

All in all, technology entrepreneurship provides an intriguing setting for the development of the social design process. In the next chapter, I start the empirical part of this study. I present the research design of this study and describe the implementation details including the description of the research setting, sample selection, data collection, data analysis, and a rigorous methodology check.

Chapter 4 Process research of 12 cases

Building on prior studies, I have developed a theoretical framework for this dissertation in section 3.3 of chapter 3. As the summary of the framework reveals, several open questions and issues that are related the development of a coherent process framework remain to be addressed. This study is set to join these theorizing efforts. Specifically, I plan to answer these questions:

- 1) What are entrepreneurial actions?
- 2) Are there patterns of actions which constitute the entrepreneurial process?

With a process framework as the intended result, I choose a process study approach, because this approach is centrally concerned with how change unfolds over time (Van de Ven, 2007: 195). In this chapter, I will describe the operational issues and decisions involved in implementing this study. Specifically, I will first explain the research design of this process of research, and then continue with the description of how the empirical work is implemented. The issues associated with research setting, sample selection, data collection and details of data analysis procedures are presented.

4.1 Formulating the research plan

Scholars advise clarifying a few issues prior to the implementation of a process research (Van de Ven, 2007: chapter 7). These issues include: meaning of process, frame of reference, observational method, and sampling. The following table summarizes the decisions on these issues in this study and their rationale.

Table 1 Key issues towards a process research plan

Issues	Decision	Rationale
Meaning of process	Process as a developmental sequence	1) Naturalistic inquiry 2) How question 3) Process nature of social design perspective
Frame of reference	Entrepreneur's point view	The study intends to observe actions and interaction which are directed and conducted by the entrepreneur

Table 1 Key issues towards a process research plan (Continued)

Issues	Decision	Rationale
Observational method	Retrospective longitudinal data collection	Knowing how things developed and the outcomes are produced allows a “big picture”
Sampling	<i>Diversity</i>	Tradeoff between more general results and pragmatic constraints
	1) Choose extreme situations	
	2) Go for more accessible cases	A multiple case study involving four to 10 cases provides a good basis for the generation of theory from empirical observations (Eisenhardt, 1989)
	<i>Size</i>	
	Involve between 4 to 10 extreme cases	

4.1.1 Clarify the meanings of process

The meaning of “process” is the rudimentary foundation for designing a process study. As I discussed in the chapters of the literature review, two different ontological definitions of “process” are often adopted to understand and to explain changes in social science (Tsoukas & Chia, 2002; Van de Ven & Poole, 2005). The first one defines process as changes in things. The ontological assumption of this view is that a world is made of things which exist independently of others. In the entrepreneurship research, for example, scholars examine the impact of industry change on the creation of fast growing ventures (Eckhardt & Shane, 2011). The “ventures” in this study are viewed as things. “Fast growing” is the quality of the thing measured by revenue growth. As the growth rate changes, for instance, it drops, the venture stops growing, but it does not stop being “venture”. Studies holding this ontological perspective typically apply the variance theorizing methodology. This sort of outcome-driven explanation approach suits the situation perfectly for examining “what” kind of research questions (Van de Ven & Poole, 2005).

The second perspective emphasizes process as a narrative describing how things transform and evolve (Van de Ven, 1992). The ontological assumption of this perspective is that the world is made up of processes rather than things. A process study adopting this perspective usually takes an event-driven approach, and is often called a process methodology (Pentland, 1999; Van de Ven & Poole, 2005). It focuses on the sequence of events, actions and activities that unfolds over time,

rather than “things”. In the setting of entrepreneurship research, studies with this process perspective intend to describe entrepreneurship as a progression of activities or events that a start-up or an entrepreneur undergoes. For example, Santos and Eisenhardt (2009) describe the construction of a market in nascent fields as the processes of claiming, demarcating, and controlling.

The process method, compared to the variance one, appears more appropriate for this study for two reasons. First, this research is set to identify the entrepreneurial actions and to investigate patterns in the entrepreneurial process. Addressing these two questions means that research should focus on the sequences of activities which only a process method is capable of delivering. Second, the theoretical framework of this study – the social design perspective, in essence, is a process theory. In place of an outcome-driven logic, the social design theory employs an event-driven approach stressing actions and interactions (Alvarez & Barney, 2010).

4.1.2 Frame of reference from which to view the research question

As soon as the meaning of process has been established, the second issue to be clarified is to decide whose viewpoint is featured in this study. In principle, a topic can always be studied from the different viewpoints of many stakeholders. For the purpose of studying the performance of a publicly funded incubator for social entrepreneurship, for example, one could take the perspective of the incubator manager, the entrepreneur, or even the perspective of the government. Given the fact that the entrepreneurship process involves stakeholders at all levels, scholars admit that results generated from a single viewpoint can be biased. Nevertheless they suggest that instead of achieving a balanced representation of all stakeholders involved, it is also worthwhile to focus on certain stakeholders’ viewpoints exclusively (Alvesson & Sköldberg, 2010).

In this study, I will take entrepreneurs to be key informants. Observing a process of change from the entrepreneur’s point of view, a researcher’s task is facilitated by understanding the dynamics of entrepreneurial actions. This is due to the simple fact that these actions are carried out by the entrepreneur as a key-stakeholder. Although honing in on entrepreneurs as informants will be of considerable benefit to this study, there are also concerns regarding the data collection due to skewed memory issues on the part of the entrepreneur. According to a social constructionist view, memories are regarded as justifications for previous actions, and therefore the quality of the self-reported data is influenced as a result (Stone, Bachrach, Jobe, Kurtzman, & Cain, 1999).

4.1.3 Observational method

The third issue to be clarified is the data collection plan. This study aims to develop an entrepreneurial process framework and therefore necessarily entails collecting longitudinal data. In general, two observation methods are widely used for gathering longitudinal data (Van de Ven, 2007: 208): 1) a “strict” longitudinal data collection approach making repeated observations of the same entities over a long period of time; and 2) a retrospective account of the change process looking back at events/activities that already happened. The latter one compared to the “strict” approach, is taken after outcomes are already known to the researchers before data collection begins. This post-hoc approach helps to gain knowledge about the “big picture”, i.e., how things develop and the outcomes are produced, and allows for the reconstruction of how entrepreneurial actions evolve over time (Van de Ven, 2007: 208). In this study, I plan to use the retrospective approach to put together the developmental processes of all the cases by asking the informants to recall the activities and events which occurred in the past.

4.1.4 Sampling

The fourth issue to be planned is the sampling of cases. The case study approach is well suited to the longitudinal processes research, in particular to research in an area for which existing theory seems underdeveloped (Eisenhardt, 1989; Eisenhardt & Graebner, 2007; Van de Ven & Poole, 1990).

The sampling mainly involves two issues: sampling diversity and sampling size. Regarding the sampling diversity, scholars (Pettigrew, 1990) suggest four useful guidelines for selecting cases: 1) choose extreme situations; 2) go for polar types that show completely different features; 3) go for cases that have a long experience track record in the case of new phenomenon under study, and 4) go for the cases that have interests in the study and are willing to cooperate. In this research I take a strategy of combining 1) and 4) for two reasons. First, choosing extreme cases would increase the probability of making theoretical contributions to the literature (Siggelkow, 2007). Second, for pragmatic reasons, seeing as though I take a retrospective longitudinal data collection approach, still the proposed face-to-face interviews require time commitment from the entrepreneurs.

The sample size in a longitudinal setting depends on the number of events/actions of a process of change in each case, as well as on the temporal duration of the change process which in turn influences the capture of the actions/events (Van de Ven, 2007: 212). Moreover, logistical issues like the

availability of the cases and the cost involved in gathering and analyzing data must be taken into account as well. In short, the planning of the sample size should allow researchers to balance the tasks of generating a sound theory and dealing with a large amount of data (Huy, 2002). For sake of consistency with prior studies, I plan to involve between four to ten cases in this study (Eisenhardt, 1989).

4.2 The implementation of process research design

4.2.1 *Research setting*

The research setting is the “530 program” in Wuxi, China. It is a regional innovation scheme designated to facilitate and fund technology entrepreneurial ventures that are started by Chinese migrant returnees – people who had studied or worked in other countries and later returned to China. This innovation program was initially inspired by the successful story of Suntech Power - an energy company headquartered in Wuxi and founded by a Chinese returnee from Australia in 2001. In four years Suntech Power has grown into the world’s largest silicon solar modules maker and became listed on the New York Stock Exchange. With such a huge success, the local government planned to copy the case of Suntech Power, by introducing the “530 program” with the meaning of creating 30 “Suntechs” within five years.

In May 2006, the “530 program” was officially introduced by the local government. It is open to Chinese citizens who want to start technology-based ventures in Wuxi. To be eligible for this program, the applicant should have a number of years of working or studying experiences in other countries and regions, typically in developed countries such as USA, Germany, Japan.

The application procedure mainly consists of three phases: an online application, anonymous reviewing, and face-to-face pitching. In the stage of the online application, the applicants are asked to document their ideas and submit them to the “530 program” office via the Internet. The “530 program” office is a new department in the local government that is dedicated to the “530 program”. After the applicants have completed the submission, the “530 program” office starts the reviewing phase to evaluate the project proposals. This is done by a screening team which typically consists of technology experts and business consultants. The applicants with successful proposals in the screening phase are invited to a round of face-to-face pitching before signing a supporting contract.

The applicants who are ultimately selected by this program receive a package consisting of: 1) initial seed fund between RMB 400,000 to RMB 1,000,000 (around

50,000 to 125,000 Euro) that the entrepreneur doesn't have to pay back; 2) free office space for 3 years located in one of 23 incubators/science parks in Wuxi; 3) free housing for 3 years; and 4) policy and accounting consulting service free of charge. As of June 2010, the "530 program" had supported 835 start-ups.

The setting of the "530 program" is chosen because:

1) Technology based ventures

The intake criteria stipulate that the projects supported by the "530 program" mostly operate in emerging industries which are characterized by unclear market positioning, undefined product features, and a lack of apparent guidelines for entrepreneurial actions. Just as the head of the "530 program" pointed out during the interview, *"the program only supports technology entrepreneurship, in particular, those in the emerging fields like the Internet of things, mobile internet service, new energy."* In the screening process, the "530 program" office weighs heavily the potential technological and industrial impact of the candidate projects.

2) Rich archival data about "530 ventures"

Due to the intriguing regional innovation program setting, the "530 ventures" attract extensive media coverage. This has generated a large amount of secondary data about the progress and changes which took place throughout the companies' history. Moreover, all the "530 ventures" are provided accommodation by the incubators and science parks. Data of their profile are kept in these incubators and science parks.

3) Short history of "530 ventures"

Next to the rich archival data, a second feature related to data collection is the short history of "530 ventures". The "530 program" was first introduced in 2006, which means that the age of all "530 ventures" was up to four years at the time when the interviews took place. The short history also allows the entrepreneurs to recollect rich data regarding their actions and interactions and perceptions in those recent past years which usually are not kept in the company's profiles.

In short, the "530 program" is a kind of a laboratory setting. The start-ups supported by this program share quite a number of group features. Most of the founders are well educated. According to a special report published in the entrepreneurship magazine <The Founders> in China in June 2010, 71% of the founders of 835 ventures hold a Ph.D. title in science or engineering related fields. Moreover, all the funded start-ups are provided accommodation in science parks/incubators that are dispersed throughout the Wuxi region. These shared

features of geographical concentration and similar background allow this study to focus on how entrepreneurial action unfolds without being distracted by the varied factors in diverse contexts.

Of course, such a particular research setting would raise questions about the generalization of the research results. “530 ventures” are special cases which are more or less supported by the local government in the forms of financial, fiscal, tax, and industrial policy support. In this way, the developmental process of “530 ventures” might unfold differently from those who are not supported. However, the objective of this study is to provide a populated process framework of entrepreneurship in a certain context, rather than developing a representative process framework for all entrepreneurship processes that can be universally applied. Furthermore, this framework is expected to serve as the starting point for contributing to emerging entrepreneurship research. In this sense, this research setting is appropriate.

4.2.2 Sample selection

Instead of contacting entrepreneurs directly, I first searched for appropriate science parks/incubators, as, they have access to the research objects. After I explained the purpose of my research, 6 of the science parks/incubators were interested in taking part in this study. In these 6 science parks/incubators, I further asked for “530 ventures” where it was the case that (1) they were launched no longer than 6 months ago, thereby ensuring the selected entrepreneurs had already engaged in the operational activities, e.g. hiring people, and buying devices; (2) technology plays a crucial role in the business, and (3) the founders were willing to participate in a research project that requires time commitment.

I received 33 replies from companies showing interest in participating in this study. I then called them to confirm the interview appointments and to determine if they really met the selection criteria. It turned out that seven cases did not fit into the criteria. A total of 4 of these cases had just been launched and not many exploitation activities could yet be observed, and 3 entrepreneurs were not available for the time period I scheduled for the interviews. In the end, 26 cases remained for data collection.

4.2.3 Data collection

Data collection work took place from June 2010 to August 2010. Following suggestions on conducting multiple case studies (Yin, 2003), I combined multiple data collection methods including archival sources, interviews and a quantitative questionnaire.

Firstly, I began data collection by gathering archival data from the homepage of each company, media articles regarding the founder and the company (search through Baidu, the biggest Chinese Internet searching engine in China), the profile of each company which was kept by the incubators or science parks where the companies were accommodated, as well as video and audio files of presentations made by the founders of the firms at various points in time.

Secondly, I continued data collection with semi-structured interviews. Each interview lasted approximately one hour and a half. The interviewees were the founders of the companies, except for 6 startups where interviews were conducted with members of the management team who had joined the companies at the founding stage. Interview questions ranged from the whole entrepreneurship process to the emergence of the initial idea, and to the pursuit of those ideas up to August 2010. The semi-structured questionnaire guiding the interviews included questions designed to gather information on how entrepreneurs come up with their initial idea, how they make decisions on how to turn their idea into a working venture, and how they manage commercialization activities etc. The interview questions have been included in the appendix in this dissertation. During the interviews, I asked open-ended questions and led informants to provide precise example of actions and events with questions like “How did you come up with the idea to launch a business?” “Which one?” and “Why did you do that?”

Thirdly, I conducted interviews with the incubator/science park manager and government officers. These complementary interviews provided me with information about the management of the “530 program” and the environment in which these technical entrepreneurs operate. Together with archival data, these extra data sources allowed for the triangulation of the data from entrepreneurs’ narration to build stronger interpretations (Yin, 2003: 33-39).

Fourthly, after the semi-structured interviews had been completed, I also distributed a quantitative questionnaire to get some numbers covering financial issues, human resource management, and sales. These quantitative data served well to some extent at keeping me from being distracted by vivid, but eventually distorted expressions in qualitative data.

Relying on the self-reported data of entrepreneurs might pose serious issues related to accurate memories, as I mentioned in the research design. Especially from a social constructionist view, memories are generally regarded as justifications for previous actions rather than objective accounts of what went on (Stone et al., 1999). To dispel this concern, I followed the research design described earlier in this chapter. In addition to the data collection from multiple sources described above to triangulate with entrepreneurs' descriptions, I also avoided stressing the terms related to performance during the interview, as suggested in similar studies (e.g. Zott & Huy, 2007), and pointed to some important actions or events that emerged from archival data and which the entrepreneurs hadn't mentioned.

The following table presents a brief description of the sample firms.

Table 2 Description of sample firms

Case	Domain	Business description
HERO	Electronics	Develop new chemistry treatment solution and sell it to IC manufacturers
ALDO	Software system	Sell cost-effective manufacturing process software to manufacturers
BIBI	Internet	Develop specialized internet search engine
JUDE	E-commerce	Sell e-commerce software solution to companies with intention to build on-line shops
ROAD	Electronics	Design and produce IC for industrial customers
GIANT	Mobile Internet	Develop mobile office solutions for industrial customers
CAPITAL	Mobile Internet	Develop Mobile Internet Device (MID) for industrial customers
VENUS	Software system	Develop facial recognition solution for industrial customers
ACCEL	Software	Provide software outsourcing service
MTLH	Bio-tech	Develop and sell new test technologies to bio-pharmaceutical companies
VISION	Hardware system	Sell cost-effective Machine Vision (MV) system used for quality assurance in production process to manufacturers
TOPPER	Electronic insulating material	Sell cost-effective PET polyester film to industrial customers

Table 2 Description of sample firms (Continued)

Case	Domain	Business description
ZEBRA	Environment and new energy	Develop new sewage treatment solution for manufacturers
WIND	Environment and new energy	Develop Concentrator Photovoltaic solution to power plants/energy companies
TRAVEL	Hardware/software system	Develop new smart driving solution for both private and industrial market
THUNDER	Lighting	Develop new magnetic induction lamps
HOBBY	Unmanned helicopter	Develop unmanned helicopter for industrial customers
MARS	Internet	Develop an Internet-based B2B platform for SMEs involved in software outsourcing
HOSO	Business software	Develop cloud computing based human resource management solution for large organizations/companies
YOUNG	Manufacturing device	Sell cost-effective automatic screwdriver system to manufacturers
TRUST	Lighting	Sell cost-effective LED solution to industrial customers
TARGET	Healthcare	Develop new solution for early diagnosis of diseases
TIDE	Software system	Introduce cost-effective database solution for industrial customers
PALM	Environment and new energy	Develop new battery solution for both private and industrial companies
COSIS	Electronics	Introduce cost-effective spectrum analyzer device for telecommunication device manufacturers
YIKAN	Healthcare	Sell cost-effective rehabilitation devices to private market

4.2.4 Data analysis

Selecting case. I first tried to identify highly observable cases which have the potential to prominently feature the social design process, to avoid the risk that cases fail to make a theoretical contribution (Siggelkow, 2007). I did so by analyzing the

uncertainty regarding technology development and the market creation implied, and chose the cases that either address inventing new technology, or create a new market, or both. As a result, 9 cases that introduce cost-effective solutions for existing market have been filtered out. In addition, I also excluded 3 start-ups in the pharmaceuticals industry, since studies found that entrepreneurship in this sector show different features in comparison to entrepreneurship in other technology industries like IT, because in the pharmaceutical industry, the government, research institutions, large companies and venture capitalists all play a crucial role (Müller et al., 2004), which is not true for the other mentioned industries. Finally, due to the bad quality of the available data, I also excluded BIBI and PALM as sample firms. After the filtering, 12 cases remained for data analysis. The following table briefly describes the remaining sample cases.

It is also worth pointing out that in 3 cases, the interviews were conducted with members of the management team instead of with the founder. These 3 cases are CAPITAL, ZEBRA and TRAVEL. In the case of CAPITAL, the interview was conducted with two CEO assistants who were the very first employees of the company. For ZEBRA, it was done with the CEO. He was a student of the founder and had been working together with him before the venture was launched. As for the case of TRAVEL, I interviewed the CFO of the company, who is the founder's wife. The description of the entrepreneurial process by non-founders might raise a concern about the validity of the research results, for, this study intends to examine the interactions between the individual, the opportunity presented, and the environment. The individual here stands for the entrepreneur. However, upon consideration, I decided to keep these three cases for three reasons. First, indeed this study does look at the links between individuals, the opportunity presented, and the environment, but, instead of exploring the internal elements of the entrepreneurs involved, this investigation focuses more on the actions that have been taken. This makes it possible to collect data about entrepreneurial actions also from other actors who are close to the entrepreneurs. Second, all the three interviewees were closely related to the founders, and their experience allowed them to describe the changes or movements that unfolded in the entrepreneurial process. Third, with data gathered from other sources, I redeveloped the developmental processes for these 3 cases. The narratives from management team members were well aligned with data collected from other sources.

Table 3 Case descriptions of selected firms

Case	Founding context	Founding Team	Founding Team Career Experience	FD*	E**
HERO	Inventing new technology to replace existing product, and reshape the market structure	One scientist	15 years R&D experience (92-07)	Dec 2008	10
ROAD	Developing new technology to address emerging market	One scientist	10 years industrial R&D experience (96-06)	Dec 2006	30
GIANT	Integrating existing technologies to address emerging market	One serial entrepreneur	12 years R&D (95-07) and 2 years entrepreneurship experience (07-09)	Jul 2009	20
CAPITAL	Developing new technology to address emerging market	Two engineers	CEO, 9 years R&D and general management experience (98-07); CTO, 9 years R&D experience (99-08)	Aug 2008	100
VENUS	Developing new technology to address emerging market	One serial entrepreneur; one engineer	The leading entrepreneur, 2 years entrepreneurship (06-08) and 4 years R&D experience (02-06); the engineer, 6 years R&D experience (2002-2008)	Dec 2008	15
ZEBRA	Inventing new solution to replace existing product, and reshape the market structure	Two professors	Both professors have more than 20 years R&D experience	Aug 2008	20
WIND	Inventing new technology for existing market and reshape the market structure	One serial entrepreneur; one scientist	CEO 3 years entrepreneurship (04-07) and 5 years R&D experience (99-04); CTO 7 years R&D (00-07)	Aug 2008	50

*Founding date; **Employees in July 2010

Table 3 Case descriptions of selected firms (Continued)

Case	Founding context	Founding Team	Founding Team Career Experience	FD*	E*
TRAVEL	Develop new solution to emerging market	One professor; one serial entrepreneur	The leading founder (professor) has 10 years R&D experience (00-10); The information regarding the serial entrepreneur is not available	Jul 2009	11
THUNDER	Inventing new technology replace existing product, and reshape the market structure	One serial entrepreneur	2 years entrepreneurship (00-02) and 15 years R&D experience (91-00; 02-08)	July 2008	4
HOBBY	Developing new technology for new market	Two serial entrepreneurs	CTO, 11 years entrepreneurship (97-08) and 10 years R&D experience; CEO, 20 years entrepreneurship experience	Nov 2008	10
MARS	Developing new solution to address emerging market	One serial entrepreneur	7 years entrepreneurship (95-98; 00-01; and 06-09), 2 years management (04-06), and 7 years R&D experience (93-00)	Sep 2009	7
HOSO	Developing new solution to address emerging market	Six senior managers	All the 6 entrepreneurs were serving in the management positions, all together they have more than 100 years management experiences	Sep 2009	6

*Founding date; **Employees in July 2010

Construction of timeline. For the remaining 12 cases, I first reconstructed their developmental processes based on the transcripts of the interviews and the archival data gathered. When this was completed, I applied narrative analysis for each case, which is considered useful for organizing longitudinal data (Langley, 1999). By doing so, I rebuilt the “story” of what triggered the entrepreneurship process and how entrepreneurship evolved to make sense of the unstructured data (Miles & Huberman, 1994).

Within cases analysis. Based on the developmental story that was built up in step 1, I then began with in-depth analysis of each case by posing the research question of what made up the entrepreneurial actions. For this I had no theoretical preferences or prior hypotheses. I simply read the cases independently to figure out what entrepreneurs were doing at what point in time. The goal was to identify independently the variety of entrepreneurial actions performed by entrepreneurs over time. To facilitate analyses, I also used tables and graphs to illustrate data (Miles & Huberman, 1994).

The emergence of categories. Before proceeding with pattern identification, I applied a theory-elaboration approach (Lee, Mitchell, & Sablinski, 1999) and went back to the framework discussed in chapter 3 and developed categories of entrepreneurial actions including: sensing, conceptualizing, implementing, and adapting. The previously identified entrepreneurial actions can be well categorized with these labels. With them at hand, I was able to tract and analyze the developmental process of each case in a more structured way. It is worthy noting that technology entrepreneurship unfolds in a non-linear way. Actions are performed iteratively. For example, as the entrepreneurship process evolves, entrepreneurs iteratively perform conceptualizing actions as new ideas emerge. In this sense, the conceptualization, implementation, and adaption process are not sequential, but occur concurrently. As a result, instead of identifying benchmarking for different phases or stages, I only categorize actions, according to their impact on the entrepreneurship process.

Cross-case analysis and the emergence of patterns. To find the patterns of entrepreneurial actions, I proceeded with cross-cases examination, in which the insights emerged from each case were compared with those from other cases, to recognize consistent patterns (Eisenhardt & Graebner, 2007). In this stage, I used both a theory-elaboration and theory building approach (Lee et al., 1999) to develop a framework for entrepreneurial processes. Theory-elaboration of the emerging social design perspective facilitates the categorization of the iterative entrepreneurial

actions. Theory building, moreover, allows inducing subcategories of entrepreneurial actions in the context of technology entrepreneurship.

As the cross-cases examination proceeded, new categories of entrepreneurial actions emerged. The search for similarity among different cases led to a more sophisticated understanding of the entrepreneurial process. New findings emerging from these cross-case analysis brought new categories of social design actions. For example, I first labeled the actions entrepreneurs take to make the information conveyed acceptable to resource holders as generally “legitimizing”. As the cross-case analysis proceeded, the data showed that the legitimizing actions could be further classified. Finally, a categorization of legitimizing actions into demonstrating interim achievement, organizational networking, and harnessing of third parties’ neutrality has been identified. The coding book that developed to extract the patterns of entrepreneurial actions is included in the appendix of this thesis.

As patterns emerged, other cases were added to develop a more robust theoretical entrepreneurial process framework that consists of diverse categories of entrepreneurial actions. To enhance the coherence of this process framework, I revisited the data and analyzed how various actions influence each other and how they are interconnected. To summarize, in this study I followed the widely used iterative process (Santos & Eisenhardt, 2009; Siggelkow, 2002) of going back and forth between theory and data to refine findings, relating them to existing literature, and making the contribution explicit.

4.2.5 Methodological rigor check

Scholars have developed measures to check the quality of utilizing a case study, (Gibbert, Ruigrok, & Wicki, 2008; Klosek, Linke, & Nippa, 2012). These measures consider four dimensions that were originally developed by Yin (2003: 33-39): internal validity, construct validity, external validity, and reliability. The following table summarizes the fulfillments of these criteria in this study.

Table 4 Justification of the methodological rigor of case studies

Criterion	Measure	Treatment within study	Fulfillment
Internal Validity	A explicit research framework	Rudimentary framework derives from pioneering study that in line with the social design perspective	Done
	Pattern matching	Observed patterns are in line with propositions from the emerging social design framework and previous findings	Done
	Theory triangulation	Social design perspective is compared with the discovery perspective of entrepreneurship	Done
Construct Validity	Data triangulation	Newspaper article, experts from consulting company and incubator managers were asked; personal interviews with informants of sample firms were performed	Done
	Review of transcript by academic peers	A review of the transcripts by academic peers have been conducted	Done
	Review of transcript by informants	Two key informants from two cases have reviewed the transcript. However, the rest of the informants were not interested in reviewing the transcript	Not
	Clear chain of evidence	To examine the validity of the interview protocol, a pilot test with a manager of a consulting company serving “530 companies” has been conducted	Done
	Indication of data collection circumstances	Description of how access to data (e.g. contacting science park and incubators, searching for archival data sources through Baidu.com)	Done

Table 4 Justification of the methodological rigor of case studies (Continued)

Criterion	Measure	Treatment within study	Fulfillment
External Validity	Check for circumstances of data collection vs. actual procedure	The interviews were all around 90 minutes. By following a semi-structured interview protocol, it allows for asking similar questions and, therefore, receiving similarly structured answers.	Done
	Explanation of data analysis	A detailed data analysis procedure of the study has been provided with an intention of offering a traceable interpretation process	Done
	Cross case analysis	Multiple cases from 12 high-tech start-ups	Done
	Rationale for case study selection	The study is of naturalistic inquiry and theory building nature; process framework as intended result	Done
	Details on case study context	Company profiles are provided in the text	Done
Reliability	Case study protocol	All interviews were recorded, transcribed. A description of how the entire case study performed has been provided	Done
	Case study database	The research diary and all documents relating to this study are captured and kept in a database at CeTIM.	Done
	Organization's actual name given	Actual names of all companies involved in this study are kept in a database at CeTIM. For privacy consideration, the actual names are not given in the dissertation	Not

4.3 Summary

In this chapter a process study of entrepreneurial actions is introduced. I first described the design of a process study. This was followed by a detailed description of how this process study is implemented. In this study, I specifically presented: (1) the research setting; (2) sampling strategy; (2) data collection; (4) data analysis procedure. In the following chapter 5, the results of data analysis will be presented.

Chapter 5 Case and cross case analysis

This chapter presents the research findings. The patterns of entrepreneurial actions have been identified. Interpretation of the data reveals a coherent entrepreneurship process framework which is characterized by frequent and iterative testing, and maneuvers of experimentation and adaptation until a status of configuration is reached. For the entrepreneurs in this study, addressing the deep uncertainty associated with technology and market is the central challenge in managing the entrepreneurship process. Just as the founder of HOBBY and many other entrepreneurs, who made similar comments, describes during the interviews:

“Investing in R&D to invent new technologies, and develop new technical solutions is not the only challenge to be solved. In addition, we also have to put a lot of efforts, even more efforts than that for R&D, to develop a product and create a market, educate potential customers, and getting people to know and accept our relatively new products.”

In this process framework, entrepreneurs are first inspired by fleeting initial ideas. Subsequently, they invariably pursue courses of actions which ultimately result in configuration as the outcome of the whole process. These patterns of actions are organized into three sub-processes: conceptualizing, implementing, and adapting. That is, the entrepreneurs attempt to: 1) elaborate, develop, and test the initial idea until they are convinced of the viability associated with the conceptualized idea; 2) acquire resources from resource holders to implement the conceptualized ideas; and 3) constantly adapt the actions and plans in response to changes occurring in the conceptualization and implementation processes. Together, the iterative processes take an initial idea into an entrepreneurial configuration. I expound on each process next.

5.1 The emergence of an initial idea

5.1.1 An initial idea – the initial input

The answer to the question of “what initiates the entrepreneurship process?”, according to the conventional entrepreneurship literature, is a recognized “opportunity” (Shane, 2003: 12) or a business plan (Blank, 2013). This kind of post-hoc description, however has largely neglected the question of how this “recognized

opportunity” and this “plan” occur to entrepreneur in the first place? Furthermore, what are the initial forms?

The analysis of the cases shows that a variety of initial ideas may initiate the entrepreneurship process. Here I use the term “initial idea” because the ideas that trigger the entrepreneurship process in fact are different from the business idea, which usually includes detailed descriptions regarding how to recombine resources in a way that allows for the pursuit of entrepreneurial opportunity (Shane, 2012). For the cases in this study, the initiating factor: *(1) is vague, and does not yet have an explicit goal; (2) is spontaneous, not necessarily result of planned activity like scanning of the external environment; and (3) has no timeline of the implementations.*

The initial ideas observed in this study come in a variety of forms. For example, in the case of THUNDER, a start-up which designs and manufactures Magnetic Induction Lamps, the founder describes how the entrepreneurship process came about:

“...If you ask me what pushed me to leave my job and start engaging in the magnetic lighting, I would say, it’s my belief on the future of this new technology. Compared to the LED technology, the Magnetic lighting technology is of higher efficiency in electromagnetic power conversion, and is more environmentally friendly. With these technical features, it has a huge potential to develop a wide range of industrial downstream applications, e.g., soilless cultivation of rice, water disinfection and so on...”

The technical superiority of the magnetic induction lamp and its prospective applications, of course, are just the entrepreneur’s perception that exists in his mind alone at that moment. It’s a belief emerging from his interpretation of the external environment. This founder didn’t have a specific image of the final product he would develop, nor a clear “goal” or “time schedule” regarding the implementation of this envisaged project at the point in time when he first sensed the idea.

Furthermore, as for the belief in the future of certain technologies or certain industries, the shape of those initial ideas spans a whole range of factors. They include, for example, the idea of developing a solution for a technology deficiency, which was sensed in the case of HERO. In the case of TRAVEL, it was integrating technical project results to develop a solution for an emerging market. In the case of HOBBY, it was as simple as investing in a hobby. Hence, it is clear that THUNDER is not the only case where the developmental process begins with initial ideas. The following table gathers the initial factors of all cases in this study.

Table 5 The initial input for the entrepreneurship process

Case	Initial idea
HERO	To develop a technical solution for a deficiency in the existing chemical treatment approach in manufacturing Integrated Circuits (IC).
ROAD	To commercialize the technical knowledge accumulated from years' work in the emerging Integrated Circuit (IC) designing industry in China.
ZEBRA	To develop a solution for sewage treatment based on results from a government-founded research project.
TRAVEL	To develop a "smart driving" system for the emerging Chinese market, by integrating research results generated from scientific work that the founder has performed in different fields, e.g. image processing, mapping, and sensor technology.
THUNDER	To engage in the development of the Magnetic Induction Lamp which is envisaged as the future in the lighting industry for its higher efficiency in electromagnetic power conversion, and environment-friendly features.
GIANT	To develop 3G and Wi-Fi solutions for SMEs and potential customers located in places where a fiber optic cable connection is not available or is not suitable.
VENUS	To develop facial recognition solutions for TV stations and video editing companies which can intelligently blur the faces in the videos.
WIND	To develop a concentrated solar power system, by teaming up with two friends who were working in the associated research fields.
MARS	To build an internet-based B2B platform for software outsourcing, to bridge the service buyer from North America with service providers from mainland China.
HOSO	To create a cloud computing-based HR management system which is envisaged as the last area remaining under-developed in the business software market.
CAPITAL	To find a proper project in the emerging 3G industry.
HOBBY	To invest in the founders' hobby of playing with aircraft models which could be dated back to their childhood.

5.1.2 Three paths towards the formation of initial ideas

The various forms of an initial idea have provided a snapshot of what the initial input triggering the entrepreneurship process looks like. Yet, another relevant question remains unaddressed: how do these initial ideas emerge? In an attempt to answer this question, I examine the founders' resumes, and as well their answers to the questions I put during the interviews – “how and when did the idea occur to you?” and “what made you to come up with this idea and start a business to exploit it?”

The interpretation of the data suggests three possible paths towards the formation of the initial input. The formation occurs according to the link between the initial idea and the knowledge base of the founders before the idea emerges, and also between the temporal sequence of the relevant knowledge accumulation efforts and the ambition of becoming entrepreneur - a personal appeal to start a business. These three paths⁶ are as follows: (1) “sensing via experiencing”-- this refers to a situation in which the knowledge accumulated bears a close connection to the initial idea, and the knowledge accumulation efforts occurred before the ambition was formed; (2) “sensing via observing”-- this describes a situation in which knowledge accumulation has a close connection to the initial idea, but the knowledge accumulation is instead driven by the ambition of becoming an entrepreneur; and (3) “sensing via visioning”-- this depicts a situation in which the link between knowledge accumulation efforts and the initial idea was not obvious. The entrepreneur is mainly driven by the ambition of becoming an entrepreneur and other endogenous factors such as one's hobby, for example.

5.1.2.1 Sensing via experiencing

Five cases within this study show that individuals run into technical ideas whilst they were engaging in the field before an entrepreneurial ambition had formed. The initial ideas, in such cases, grew out of the work which the individuals had been doing in a function as engineers or researchers, for example. The knowledge gained from work plays a crucial role in the initial idea formulation thus.

HERO is a good example that falls into this group. It is a start-up that develops chemical solutions for the manufacturing of Integrated Circuits (IC). The founder describes how and when the idea occurred to her:

⁶ Parts of earlier version published as: Zhou, Z., Katzy, B.R. (2011) Creation theory: an alternative theory towards technology entrepreneurship, In *Proceedings of EuroMOT 2011: “Platforms and innovation: In search of efficiency and effectiveness”*, Tampere, Finland, 2011.

“...The project idea could be dated back to the period when I got my first job in the field of semiconductor manufacturing in 1990s. This field was completely new for me, because before this experience, I was studying analytical chemistry and working as an environment protection analyst in the construction sector. As my work in this new field proceeded, I found a technical deficiency existing in the chemical treatment approach used in manufacturing semiconductors. The existing approach consumes a large amount of water, and is also potentially dangerous to workers...”

The idea of developing a new chemical treatment grew out of a technology deficiency discovered during the founder’s daily work. What’s more, she became inspired to further exploit this issue and to think of a solution by taking relevant courses at Stanford University, discussing her ideas with colleagues from work and professors in the class. As she further describes:

“...The more I learned about the existing chemical treatment, the more I became confident about the value of my solution. This inspired me to further pursue this idea...”

HERO is not the only observation from this study which entails entrepreneurs running into their initial ideas unintentionally. Similar stories are also heard from the cases of ROAD - a start-up that designs and manufactures Integrated Circuits (IC), ZEBRA – a start-up that develops sewage treatment solution, TRAVEL – a start-up that builds ‘smart driving’ systems, and THUNDER – a start-up that develops magnetic induction lamps. The evidence illustrating how initial ideas emerge in these five cases have been presented in the following table 6.

For these 5 cases, despite the diverse forms which their initial ideas took, all the founders had already been engaging in technology research which was closely associated with those initial ideas for quite some time. They delivered research efforts not because they were preparing for entrepreneurial projects. Rather, it was part of their daily jobs. Furthermore, all the entrepreneurs who sensed the initial ideas in this way have engineering or research backgrounds. Specifically, the founders of HERO and ROAD had been working in the R&D department within large companies for over 10 years; the founders of ZEBRA and TRAVEL were professors working at universities for over 10 years; and the founder of THUNDER was working as a researcher for three years at the largest research institute in China - Chinese Academy of Science (CAS).

Table 6 Evidences of sensing via experiencing

Case	Description
HERO	“...The project idea could be dated back to the period when I got my first job in the field of semiconductor manufacturing in 1990s. This field was completely new for me, because before this experience, I was studying analytical chemistry and working as an environment protection analyst in the construction sector. As my work in this new field proceeded, I found a technical deficiency existing in the chemical treatment approach used in manufacturing semiconductors. The existing approach consumes a large amount of water, and is also potentially dangerous to workers...”
ROAD	“...I have been working in the R&D department in a large company in the USA, another two founders have similar backgrounds and were also doing jobs as engineers at large companies as well. We were colleagues and none of us had any entrepreneurship experience. We were thinking of doing something that could turn our knowledge into some products and services. The intention to engage in the entrepreneurship was sparked when we met the people from ‘530 program’ in 2006. Since then we started to assess the viability...”
ZEBRA	“...The leading founder works in the university. He is a well-known professor in the field of water pollution control. The idea appeared from a nationally founded research project which was coordinated by him. He wanted to apply the research results in the practice...”
TRAVEL	“...The founder has been working for the R&D department in an industrial company and at the university full time for almost 15 years. This allows him cutting edge knowledge regarding mapping, sensor and image processing technologies...he thought about a smart driving solution out of the knowledge accumulated...”
THUNDER	“...The project idea emerged from my experience in the lighting research institute of Chinese Academy of Science (CAS). I was working there for three years as researcher. Later I left the CAS, and started engaging in the Magnetic Induction lighting research by myself...because I believe that Magnetic Induction Lighting is the future in the lighting industry for its higher efficiency in electromagnetic power conversion, and more environmentally friendly features...”

I label this path towards initial idea as “sensing via experiencing” because 1) the initial idea sensed is based on the technical knowledge or experience accumulated from the entrepreneur’s previous work, and the technical knowledge plays an essential role in the initial idea; 2) the formation of this initial idea is not initiated by the ambition to become an entrepreneur. Despite the important role of

research experience in sensing that initial idea, still, it is worthwhile noting that the initial idea is the combined result of knowledge and the ambition of becoming an entrepreneur. Without the ambition to become an entrepreneur, knowledge does not turn into ideas by itself.

5.1.2.2 Sensing via observing

In addition to sensing via experiencing, there are five cases within this study which point to an alternative path for forming an initial idea. This path starts with the ambition of becoming self-employed, followed by the efforts attached to looking for a proper idea. In such cases, the initial ideas typically emerge from market research and are driven by a perceived market demand.

The process of how the founder of MARS came up with the initial idea fits well into this path mold. MARS is a company that aims to develop an internet-based software-outsourcing platform (B2B) for stakeholders involved in the software outsourcing value chain, in particular for SMEs. This platform is supposed to create value for both contractor and subcontractor by tracking and monitoring the workflow and quality of software co-contract activities, guaranteeing the payment security. The founder of MARS had previously worked for IBM, Oracle, Netscape and Sun Microsystems as a software engineer. Moreover, he is also a serial entrepreneur, having several successful entrepreneurial experiences in the IT field. During the interview, the founder described how he and his team got to the initial idea:

“...The platform we want to develop is based on three years’ market observation. We saw the demand before launching this company. The idea is not only a technical platform. If we look at the technological aspects, all the technologies to be used for the development of the platform are not new. Only the well-combining of the technical platform and market expertise can address the identified market demand...”

Other than following the path of sensing via experiencing, the case of MARS suggests an alternative path for illustrating the emergence of an initial idea. As the resume of the founder reveals, he didn’t have technical research experience or management experience that was close to the business of software outsourcing platform, despite his vast experience in the IT field. During the interview, after he answered the question of how he came up with this idea, he added:

“...The information flows among different networks, communities in the Silicon Valley, allow you easily get what is happening out there...”

Furthermore, as for the case of MARS, similar ways of forming initial ideas can also be observed in the cases of GIANT – a start-up that develops 3G solution for SMEs, VENUS – a start-up that develops facial recognitions solution, WIND – a start-up that develops concentrated solar panel systems, and HOSO – a start-up that develops cloud-computing-based HR management solutions. I label this kind of sensing mechanism as “sensing via observing” because 1) the initial idea sensed is close to the market knowledge that is based on the observation of the external environment, and the interpretation of market demand plays an important role in the initial idea; 2) the technical knowledge accumulation effort is driven by the ambition of becoming an entrepreneur.

The following table collects the evidence of five cases that fall into this category. As the data show, the formation of the initial idea is triggered by the ambition of becoming an entrepreneur. After the ambition is formed, the prospective entrepreneurs usually engage in searching actions (e.g. scanning the changes in the environment, monitoring market) to identify unmet gaps, and only later come back to the technical aspects, to form initial ideas. In such cases, the uncertainty regarding technology development is relatively low compared to the ideas sensed via experiencing. Moreover, although the initial ideas are associated with technology, it is not a must that the entrepreneurs have direct research experience associated with the technology. Pronounced knowledge regarding the technology is not a prerequisite for sensing the new idea. Different from the strong engineering/research backgrounds that the entrepreneurs of “sensing via experience” have, entrepreneurs of “sensing via observing” have more entrepreneurial experience or management experience. Specifically, the founders of GIANT, VENUS, WIND, and MARS are serial entrepreneurs. For the case of HOSO, the founders don’t have entrepreneurial experience, yet six of them were working in management positions of large companies.

Table 7 Evidences of sensing via observing

Case	Description
GIANT	“...Before coming to Wuxi I was the co-founder for a start-up operating in the field of wireless communication and was in charge of the software development in that company... the idea we are engaging now comes from the investigation of the unmet market demand of 3G and Wi-Fi solutions for SMEs and for the remote area where the fiber optic cable network hasn’t reached yet...”

Table 7 Evidences of sensing via observing (Continued)

Case	Description
VENUS	“...It was in 2008, one of my friends came over and asked me to join him to do something in the field of facial recognition computation... We were quite confident about the market potential for this technology, but we didn't know where to start...later another classmate from my college time came and brought the idea of providing facial recognition solution for TV stations...the market became clear. It's hard to say no...”
WIND	“...My business partners and I had been working in the USA for quite some time. We had long been thinking of doing something together. Actually before setting up this business, I had one start-up in the field of wireless communication since 2004 in Beijing, but the business there has nothing to do with this one I'm running...this idea emerged from my scanning of the market and network. I identified the surging solar panel market in China, and I see the connections between this market demand and the expertise from my network...”
MARS	“...The platform we want to develop is based on three years' market observation. We saw the demand before launching this company. The idea is not only a technical platform. If we look at the technological aspects, all the technologies to be used for the development of the platform are not new. Only the well-combining of the technical platform and market expertise can address the identified market demand...”
HOSO	“...All the founding members were friends. We started thinking about a potentially proper idea for doing something together 6 years ago...We saw an opportunity in the intelligent H&R management...HR management is the only area that has not been fully exploited in the field of business software service...”

5.1.2.3 Sensing via visioning

As many cases within this study fall into the groups of “sensing via experiencing”, and “sensing via observing”, two remaining cases show that the way in which they formed the initial ideas cannot be well explained by these two paths.

For example, the case of HOBBY, a start-up that designs and manufactures unmanned helicopters. One of the two founders explains how they formed the initial idea:

“...It’s our hobby. I think almost every boy is fascinated by aircraft models just like when we were young boys. But my family couldn’t afford it at that time. Now we have time and some money that could be invested in our hobby...”

The brother founders had no working experience in the unmanned helicopter field. The younger brother was working in a chemical engineering company as a system development engineer after his graduation with a Master of Science degree in physics in the 1980s in Japan. In 1997, he launched his own business in the IT field. Moreover, the older brother had also been an entrepreneur in the field of IT software. In this case, the initial idea of developing an unmanned helicopter has no clear relationship with their experience in the way that the path of sensing via experiencing shows, neither does the idea emerge from considerable market searching efforts in the way that the path of sensing via observation indicates. They simply wanted to invest in their hobby.

Table 8 Evidences of sensing via visioning

Cases	Description
CAPITAL	“...At the beginning of 2006, we were planning to do something in the emerging 3G industry. It was just emerging. We believe it’s a future industry. ...It is the future of 3G industry that drives us into becoming entrepreneurs...”
HOBBY	“...It’s our hobby. I think almost every boy is fascinated by aircraft models just like when we were young boys. But my family couldn’t afford it at that time. Now we have time and some money that could be invested in our hobby...”

A similar pattern can be found in the case of CAPITAL - a start-up that designs and manufactures Mobile Internet Devices (MID). Both founders of CAPITAL had no direct experience associated with MID. They also hadn’t conducted searching efforts, for, the market for the MID was only a concept existing in the eye-catching media at the point in time when they sensed the idea. I label this

path as “sensing via visioning” because 1) the link between the founder’s working experience and the initial idea is not clear; 2) the initial idea has a strong emotional element in being a dream, hobby, or vision. The table 8 presents the evidences of “sensing via visioning” regarding the cases in this study.

The “sensing via visioning”, to some extent, could be considered sensing via observing as well. For the cases that fall into sensing via observing, the prospective entrepreneurs sometimes sensed initial ideas, also without direct involvement in that field. Yet, compared to the “sensing via observing”, the “sensing via visioning” is more endogenously driven. The entrepreneurs come up with the ideas not because they see a concrete demand based on scanning the environment. Rather they simply believe in the future of the ideas or are committed to the ideas for their own personal reasons. Very often, only very little explicit information regarding technology and the market is available. In such cases, prospective entrepreneurs come up with an idea purely because there is an alleged, imagined or expected future out there, or because there are some hidden endogenous factors playing a role in the way of hobbies or dreams.

These three possible paths towards the initial idea illustrate the emergence of the initiating conditions for the entrepreneurship process. The findings suggest that there is no single way towards the initial idea. “Sensing via experiencing” and “sensing via visioning” as two complementary patterns are thus added to the widely accepted pattern of “sensing via observing”. These observations add evidence regarding the initial conditions of the entrepreneurship process, for which scholars have traditionally taken a simplified approach, by now claiming that the initial inputs of the entrepreneurship process need not necessarily be a business idea that includes a detailed description on how to recombine resources in a way that allows creating value (Alvarez, Barney, & Anderson, 2012; Sarasvathy, Dew, Velamuri, & Venkataraman, 2005).

5.2 Conceptualization: testing, developing the initial idea and becoming an entrepreneur

The individuals do not implement ideas directly upon sensing them. They harbor doubts about the viability of their idea and are not yet sure if the sensed idea could become an operational venture bringing an acceptable outcome in the end. In this sense, until the moment when individuals actually decide to start a business, they remain prospective entrepreneurs.

Before making the decision to start a new business and explore the sensed ideas, prospective technology entrepreneurs in this study apply great dedication in the pursuit of a variety of actions to test, develop and filter those ideas by means of interacting with the external environment. I label these kind of actions as “conceptualizing actions”⁷. The observations are in line with the process of objectification in a previous study (Wood & McKinley, 2010) in which prospective entrepreneurs engage in a variety of actions to interact with the environment and make sense of the initial idea. Moreover, as these actions proceed, different forms of feedbacks are generated, which in turn help prospective entrepreneurs to make their ideas explicit and concrete, and ultimately help convince them of their viability, so that they then take the leap to become entrepreneurs.

5.2.1 Informal interaction and formal engagement

Entrepreneurs in this study use a variety of forms of actions to interact with the external environment. Prospective entrepreneurs speak, for example, to their friends, to colleagues from work, and to family members about their ideas to gain an opinion regarding their viability. The table 9 collects conceptualizing actions that have been performed by the entrepreneurs in this study, which can be grouped into “informal interaction” and “formal engagement”.

Informal interaction. The informal interaction refers to a situation in which individuals communicate with external stakeholders in the form of a short conversation or verbal exchange. As the cases reveal, the informal interactions can take various forms and with a variety of external stakeholders. They are not constrained to the people that entrepreneurs know well. More generally, they are comprised of these factors: 1) those people who are quite close to the entrepreneurs in daily life, for example, family members, friends; 2) knowledgeable people from the entrepreneur’s personal network. They are experts in certain fields, for example, colleagues from work, or professors from universities; and 3) experts who have achieved a high level of individual competence in a given domain which the entrepreneurs might not be familiar with personally, but which they somehow managed to gain access to, for example, VCs introduced via friends.

⁷ Giones, F., Zhou, Z., Miralles, F., and Katzy, B.R. 2013. From Ideas to Opportunities: Exploring the Construction of Technology-Based Entrepreneurial Opportunities. *Technology Innovation Management Review*, June: 13-20.

Table 9 Various forms of conceptualizing actions

	Examples
Informal interaction	Speaking to friends and family members Talking to colleagues from work Talking to mentors from studies Talking to experts from personal network Talking to potential customers Talking to potential investors
Formal engagement	Applying for innovation programs Participating in business plan competitions Applying for IPR Searching for entrepreneurship partners Participating in academic events Looking for sponsorship Doing technology experiments Conducting market research

Formal engagement. Besides the informal interactions, entrepreneurs from this study also take a more formal way to test, to develop, and to evaluate initial ideas. Compared to informal interaction, the formal engagements are well documented by the entrepreneurs and require active testing actions, rather than verbal information exchanges. They can be taken in the forms of applying for IPR, searching for entrepreneurship partners, doing technical experiments, doing market research, looking for sponsorship, and participating in business plan competitions, attending research seminars and so on. The external stakeholders involved in the formal engagement, compared to those involved in the informal interactions, are mostly independent organizations or individuals who are not part of the personal network of the prospective entrepreneurs, for example, VCs, business angels, and business plan competition organizations.

Different from the proposition of Wood and McKinley (2010) that entrepreneurs engage in the conceptual elaboration of initial ideas only via information exchange, the technology entrepreneurs in this study actively engage in testing, and experiment with the technology underpinning the initial ideas. They move back and forth between technology research and the conceptual analysis of their initial idea.

9 of 12 cases (excepting MARS, GIANT, and HOSO) told stories of how they tested and experimented with the technological component for their initial ideas

before they started a business. These testing/experiments mostly took the form of doing technological research, participating in technical research seminars, and filing for patents. For the cases that didn't engage in the technological experiments and testing before they started their business, one possible explanation is that the uncertainty regarding the technology development was quite low. All three of these cases are market demand driven. Just as the case of MARS aforementioned, the technologies that are used for the initial ideas are not new.

5.2.2 Conceptualizing interactions yield general feedbacks and new information

By undertaking these various conceptualizing actions, the conceptualization of the initial idea is enhanced by the response received. The cases in this study show that, as the interactions proceed, the external environment provides feedback in various forms. Quite often, after the prospective entrepreneur has presented an idea to others, she or he would hear comments like "...it's a very promising idea, I think it's quite viable in my eyes, if you find a good partner...well, one of my friends is working in the field, he might be a good candidate for that..." or "...it's a great idea, I think you will be successful with the implementation of this idea..."

These various responses, according to their impact on the development and evaluation of the initial ideas, can be categorized into groups which I would call "general feedback" and "new information". New information helps to make the initial ideas become concrete and more explicit. Furthermore, general feedback stands for other people's general perception about the viability of the ideas, and it includes both positive and negative feedback.

Positive feedback. Positive feedback stimulates prospective entrepreneurs to stay in the field and keep pursuing the sensed ideas. HERO is a good example to illustrate the role of general feedbacks. After the founder has sensed the technical deficiency in the semiconductor manufacturing process, she initially was not sure if it was a good idea or not. It took her more than 10 years to ultimately make up her mind to start a business exploring her idea. When I asked her what kept her pursuing this idea for over 10 years, she said:

"...When I came up with the idea of developing a solution for technical defects, I wasn't sure about its viability. To test it [technical idea], I started looking into books, talking to colleagues from work and professors at the university. They gave me quite some encouraging feedback. I would

say, this encouragement made me more confident about the viability of my idea...”

Two years after she sensed the initial idea, she found a new job in Fujitsu to continue her work as chemical analyst for the IC manufacturing process and subsequently worked there for eight years. In 2001, Fujitsu was shut down, and at that point in time, the idea of deploying this new technology in China first emerged in her mind. With this idea, she conducted a variety of activities to test its viability. For example, in 2002, the founder came back to China and visited almost all the research institutes on microelectronic technology (e.g. research institutes of microelectronics in Beijing and Shanghai) to seek out entrepreneurship partners. She got quite a number of proposals, but she turned them all down on account of the poor technical environment in China at that time – the potential partners were not able to provide complementary resources (e.g. competent technical personnel, experimenting devices). In the same year, built upon the technological idea, her husband wrote up a business plan and participated in a business plan competition organized by a business journal in Oregon. The business plan was rated among the top ten business plans in that event.

With the winning business plan, she was invited to make a presentation at Intel. It turned out that Intel was interested in her idea as well. In later 2002, Intel sponsored her in the form of providing her with experiment devices and researchers. The inspiration which this maneuver allowed the founder was tremendous.. Just as she said during the interview: “I really believed that I had won already.” However, setting up a new research unit at Intel is not easy. In 2006, the idea of following up on her project in China arose again and she started gathering and comparing entrepreneurship policies and applying for the support of innovation programs. In this long conceptualization process, the overall feedback which she received as a result of those actions,, played an important role. Just as the founder summarized her experience by the end of the interview:

“...As for the survival of this project, I would attribute it greatly to the people I met who really appreciated the technology, not only those providing resources. Their encouraging comments mattered a lot to me, for example, the department director I met in Fujitsu, my colleagues, and the experts from Chinese Academy of Science (CAS). Without these people, I have to say, I would have already given up a long time ago...”

The development process of HERO clearly shows the role of positive feedback in the conceptualization process. It kept the founder grounded in the field,

and encouraged her subsequent entrepreneurial actions, for example, by means of staying involved with peers to conceptualize ideas. In addition to the case of HERO, the founders of CAPITAL, THUNDER, MARS, and ROAD also provided detailed descriptions that positive feedback kept them remaining active in the field in pursuit of the initial ideas.

New information. Furthermore, overall feedback played an additional vital role in hooking up the prospective entrepreneurs with key information. That is, the interaction with external stakeholders generated feedback in the form of new information. With that new information, ideas became explicit and concrete. All the respondents provided detailed descriptions about the new information received as a result of the conceptualizing actions which they took. Such new information included, for example, new ideas about the potential market, or new information regarding implementation. A good example is the case of CAPITAL. At the onset, after the two founders came up with the idea of doing a project associated with MID, they didn't know what to begin with. But instead of waiting or mapping it out on their own, they went about interacting with people from their network. Gradually, they came to the conclusion to start with R&D activities that were related to the MID, and tried to build relationships with chip manufacturers via their private network.

The following table provides evidence on the conceptualizing actions and associated new information and overall feedback. This result adds to the widely held argument that the knowledge of entrepreneurs matters in developing initial ideas (Shane, 2000), and suggests however that responses generated from social conceptualizing actions play an essential role as well.

Table 10 Evidences of conceptualizing actions

Case	Description
HERO	"...To test it [technical idea], I started looking into books, talking to colleagues from work and professors at the university. They gave me quite some encouraging feedback. I would say, this encouragement made me more confident about the viability of my idea..."
ROAD	"...I was thinking about how doing something with friends, working at a big company, sometimes, doesn't bring the feeling of achievement...at the beginning when I first heard of '530 program', it only seemed interesting to me...this triggered me to know about the policy and I was serving [as a member] at the Association of Chinese Overseas Scholars which provided me with access to this information. As the interactions proceeded, I became more confident about my plan to set up a business in China..."

Table 10 Evidences of conceptualizing actions (Continued)

Case	Description
GIANT	“...After I got the idea, I talked to my friends to see the viability of my idea. I didn’t have much experience in marketing nor in the hardware in the 3G solution...that’s why I turned to my friends. Two of them became co-founders later. One of them is in charge of marketing, and another one takes care of the hardware part of the product...”
CAPITAL	“...The founders were serving in the Association of Chinese Engineers in the United States. This helped them to build up a large social network. The connections with Intel were also via the people they knew from the social activities organized by the Association...”
VENUS	“...In an effort to test our idea, we sent our business plan to a famous venture capitalist (VCs) in Beijing. Surprisingly we got a detailed reply. In that letter, he said, he liked my technology and idea, but from a VC’s point of view, they were not going invest money in this project, simply because the market is too small in their eyes. It’s a niche market...to some extent. It’s bad news on the one hand, but we were enlightened by this reply...”
ZEBRA	“...We are quite confident about our technology, but not on the market side. This technology has the potential to be applied in various water treatment areas, like sewage water, industrial wastewater. In order to identify the target market for our technology, we started contacting engineering projects. For example, through our network, we went to the potential customers who need the service on water treatment, to learn their needs, and working setting. From these activities, we made our product/service idea concrete...”
WIND	“...After coming up with the idea of developing a concentrated solar power system, I started thinking of the geographical location for my project...after visiting several cities to seek the possibilities to establish the project... we heard about the 530 program when we were in search of a good opportunity...after the consulting and discussion with friends, we thought it might be a good chance to make use of governmental resources to make it happen...”
TRAVEL	“...The market research on the developed countries revealed that the market for intelligent vehicle system is emerging, at the same time that China is soon to become the largest auto market. These two results make us believe that our product could create markets here in China...”

Table 10 Evidences of conceptualizing actions (Continued)

Case	Description
THUNDER	“...Since 2000, I have already started engaging in the Magnetic Induction Lamp research on my own. I have engaged in many technical research seminars to test my ideas...during the research, when I encountered some technical problems, I always went back to the CAS to ask for help... After several years’ efforts, my work received quite a reputation in various academic fields. By October 2004, the project reached the stage of small scale testing, and a couple of patents were approved, and some papers were published as well...”
HOBBY	“...Starting 2005, we did some market research, and it turned out that in the field of unmanned helicopter, there are only a few companies that are involved in the rotor helicopter. It is more challenging than developing fixed-wing unmanned aircraft, which means the entry barrier is higher... We believe it might be better for us to engage in the rotor helicopter...”
MARS	“...There is a small community in Silicon Valley which consists of former colleagues, friends. The information flows within the Silicon Valley, among different networks, communities, allow you to easily grasp what is happening out there, what is viable, and what is not...”
HOSO	“...All the team members are my friends, we have known each other for a long time. For the project we are doing, it could be dated back to 6 years ago. In the past 6 years, we did market research and engaged in product development, and made financial plans...”

5.2.3 The conceptualizing process creates the entrepreneur

Together with the observations on the emergence of initial ideas, the data suggests that becoming an entrepreneur is not a linear process as many conventional research claims (Ruef, 2005), which starts with the entrepreneurial ambition to become an entrepreneur, scanning of the environment, and, after the unmet demand has been identified, starting a new business to develop products and service to address the gap. Instead, we see that the process involves a lot of back and forth flows, spans a long period of time, even involving the person giving up the idea completely for a while, and entails a lot of information exchanges that result from social interactions.

For the cases where initial ideas were sensed from experiencing, the individuals run into the initial ideas and are pushed into entrepreneurship as the interactions with external environment proceed. Just as previously mentioned, the founder of TRAVEL had almost 15 years of research experience in the fields of

sensor technology and mapping related to intelligent vehicle systems before he came up with the idea of developing a smart driving system. Moreover, the initial idea didn't turn him into an entrepreneur immediately.

Like the founder of TRAVEL, other entrepreneurs who formed initial ideas via experiencing, including the founder of HERO, THUNDER, ROAD, and ZEBRA, all share similar paths of becoming an entrepreneur. They all share the following qualities in that they all 1) ended up founding companies, 2) didn't have any prior business training, and 3) were doing R&D related work in large organizations before turning into entrepreneur, and 4) the initial ideas had a close relationship to the work they were doing. Their career as an entrepreneur happened as a result of the interactions which took place between the ambition to become an entrepreneur, knowledge accumulation, and positive feedback.

For the rest of the cases in this study, including those sensing via observing and sensing via visioning, the processes of becoming an entrepreneur appear to have more linear features. They all start with the ambition of becoming an entrepreneur followed by the idea developing and then actions of conceptualization. Upon examining the data, however, they also show a more detailed social process which is characterized by iterative interactions with the environment.

In the case of VENUS, for example, after the first entrepreneurial attempt failed, one of the founder's friends came over, and suggested to him that they do something related to the facial recognition solution together. The first idea that came to their mind was to develop facial recognition software for a TV station and a video editing company. This idea had been turned down due to the "small market size". Later, after a series of conceptualizing actions, the founders decided to start with R&D. But still, one issue regarding where he should locate his business remained to be solved. In the beginning he was planning to settle his business in Shanghai. However, it turned out that their potentially biggest competitor at that moment had already acquired significant support from the Shanghai government. Coincidentally, he was invited by his friends and came to Wuxi for a visit, and ultimately became an entrepreneur in Wuxi.

To summarize, becoming an entrepreneur is a social process. In this process, prospective entrepreneurs interact with the external environment to test, develop and evaluate their initial ideas. As the interactions unfold, they receive overall feedback and new information which are strongly linked to the viability of the initial ideas. These feedbacks in turn push them into entrepreneurship. This is in significant

contrast to the prevailing image of a lonely entrepreneur who maps out a novel idea (Shane, 2008: chapter 3).

5.2.4 The role of “530 program” in creating entrepreneurs

Thus far, the interpretation of the data has suggested the role of new information and positive feedback in pushing individuals to become entrepreneurs. However, given the very unique setting of this study, it cannot be denied that the “530 program” also played a role in the developmental process of all cases. It is beyond the scope of this study to include a complete analysis of how the institutional environment influences the firm formation, but it is worth paying some attention to this issue.

The goal of the “530 program” is to attract overseas Chinese, in particular those highly educated ones, back to Wuxi, and to start a business. To do so, the program provides the approved projects with seed funds, free office space, and free accommodation. Without the favorable conditions of this program which ultimately facilitate and diminish the risk of their prospective ventures, these people would have remained in their prior engagements. All the interview participants admit a “facilitating” impact in driving them to start up a business in Wuxi, rather than somewhere else. For example, a representative quote comes from the founder of HERO:

“In 2007, I first heard of the ‘530 program’ and found it really attractive. It provides a package covering the basic issues you would have to take care about of yourself without this program. Although you didn’t expect that the package would matter a lot, still it greatly relieved my concern about starting a new business in Wuxi.”

These observations are in line with the findings of previous studies which state that governmental efforts in terms of providing resources lower entry barriers, and encourage the formation of new firms (Meek, Pacheco, & York, 2010). However, it doesn’t allow us to draw a similar conclusion that the institutional changes impact the emergence of initial ideas as previous studies show (Sine & David, 2003). In fact, as I presented in the section of 5.2.1, in 9 of 12 cases, except the cases of MARS, GIANT, and HOSO, the entrepreneurs already had the initial ideas to engage in the field, though those ideas were still vague. In this sense, the preferable conditions offered by the “530 program” act as new information which makes initial ideas concrete, and mitigates the concern regarding the viability of the ideas. To summarize, the “530 program” helps to conceptualize ideas.

5.3 Implementation: co-creation of conceptualized idea by convincing external stakeholders

Once ideas have survived the conceptualizing cycle, there is no longer doubt on the entrepreneur's side about the decision to further implement the conceptualized ideas. They are convinced of the viability of the ideas, and believe that proper implementation of these ideas will bring them acceptable results.

Before attaining the acceptable results, entrepreneurs need to acquire resources from external resource holders, e.g. investors, suppliers, and customers. This is a central challenge for entrepreneurs in this study, for at least three reasons. First, they lack resources and a proven profile for convincing external stakeholders about the viability of the conceptualized ideas (Higgins & Gulati, 2003). Second, the information asymmetry between entrepreneur and resources holders exists so that resource holders possess less information about the conceptualized idea (Amit, Brander, & Zott, 1998). Third, this challenge is exacerbated by the typical uncertainty associated with technology development and market creation (Lazonick, 2010).

The entrepreneurs are all aware of the challenges of convincing external stakeholders to acquire resources from them. To address these challenges associated with the information asymmetry, and with unproven competence and uncertainty, they engage in a variety of actions.

According to the impacts on addressing these challenges, I group these entrepreneurial actions attempting to acquire external support into two categories: "claim conveying actions", and "legitimizing actions"⁸. By taking these actions, they intend to: 1) communicate information, in particular the entrepreneurs' claim to external participants, to gain attention and to address the information asymmetry; 2) legitimize the information disseminated, to raise and reinforce the belief of the external resource holders about the conceptualized idea.

⁸ Parts of earlier version published as: Zhou, Z., Katzy, B.R. (2011) Creation theory: an alternative theory towards technology entrepreneurship, In *Proceedings of EuroMOT 2011: "Platforms and innovation: In search of efficiency and effectiveness"*, Tampere, Finland, 2011.

5.3.1 Conveying the entrepreneur's claim

Conveying the claim is an essential part of convincing external stakeholders. Prior to achieving a consensus on a certain belief or claim, the organization needs to communicate with its targeted stakeholders (Rindova & Fombrun, 1999). In the setting of technology entrepreneurship, this becomes particularly important because the entrepreneurs' claims or beliefs are mostly associated with a high level of tacit knowledge in the early stage of technology entrepreneurship (Katila & Mang, 2003; von Hippel, 1994). As a result, the entrepreneur needs to devote significant efforts in order to completely and clearly pass on his message to the external stakeholders and make them understand. By doing this, the potential information asymmetry between entrepreneur and resource holders is unleashed.

The data indicate that entrepreneurs use three methods for conveying information to the external environment: 1) point-to-point contacting, 2) presenting at professional events, and 3) leaning on media channels.

5.3.1.1 Iterative point-to-point communicating

Not surprisingly, entrepreneurs very much rely on the iterative point-to-point communication to convey their claim. This is especially true for the very beginning, when the entrepreneur doesn't have much concrete things to show about his or her claim (e.g. prototype of the final product) (Luksha, 2008). All entrepreneurs in the study have realized the importance of point-to-point communication and explicitly engaged in a variety of actions to convey their idea to external resource holders. As the founder of VENUS tells:

"...In the year of 2009, right after we developed our facial recognition computation solution, I was planning to build a pilot market. The biggest challenge for me is that the concept of facial recognition has been used like a buzzword that has been overused by some opportunists. People knew it, but also held heavy doubts about the solutions that are connected to this buzzword. To relieve their concern, what I did was to visit potential customers one by one, explain my solution to them again and again. If you don't do it, they ignore you..."

With its iterative and interactive features, the point-to-point contacting is useful for conveying a tacit message to the targeted individual or organization. Moreover, it also allows the entrepreneur to learn how other stakeholders will react to his or her idea or product concepts, and to figure out what they think of his or her claim.

All the 12 cases confirmed the importance of point-to-point communication in selling uncertain ideas. It is the most effective way to convey a message in terms of the accuracy of the information and appropriateness to the targeted stakeholders. Yet, at the same time, these sort of direct communicative channels also have limitations. The new venture may not be able to reach the right stakeholders. It is very often the case that the people you talk to might not be interested in your idea, or be interested, but not able to understand it. Even if the entrepreneur finds the right stakeholder, it could happen at the wrong time and in an improper context. As the founder of HERO describes:

“...After I won the business plan competition in Oregon, someone came to me and said Intel might be interested in my work. With his help, I was invited to make a presentation at Intel. It was a kind of interview presentation. First, I made a presentation to a colleague from the R&D department. Unfortunately, he didn't get my idea...but I was a bit lucky that instead of kicking me out, he asked his colleague to come over and to listen to my presentation again...after 5 minutes presentation, they decided to sponsor me...”

In short, the observation reconfirms knowledge from prior studies (Luksha, 2008; Rindova & Fombrun, 1999). The point-to-point communication is important in conveying tacit information because of its iterative and repetitive communication features. However, it also raises the issue of cost in terms of time and money, which is crucial in the beginning phase of entrepreneurship.

5.3.1.2 Presenting at professional events

In addition to point-to-point interaction, presenting at professional events, e.g. industrial conferences, fairs, business plan/idea competitions, exhibitions, and technology market tours, is another frequently used way to convey information regarding the product and the company. It is a way of riding a wave of publicity to access potential buyers, suppliers, and partners. Here is how the CEO assistants of CAPITAL describe how they disseminate information about their companies and products:

“...For marketing purposes, we present at industrial exhibitions quite often, for example, at the beginning of this year (2010) we participated in the exhibitions held in USA, in Taiwan (June 2010). We attended domestic exhibitions as well, for example, like the ones in Dalian, Shenzhen. Moreover, we are also interested in joining forums, conferences, in delivering speeches,

and setting up an exhibition booth. I would say, the combination of various marketing approaches works pretty well...”

The founder of WIND also takes a similar strategy:

“...The main channel for accessing the potential customer is solar panel exhibitions and relevant industrial fairs. We usually attend twice every year. One trip to a domestic one within China, and make another one to an international one...”

Presenting at professional events not only helps to gain access to potential customers, but also to co-developer/co-creators as well. For such an event, typically the participants come from almost every stage of the industry value chain. Participants include technology developers, industrial players like parts suppliers, investors, end-users and journalists as well. At these events, entrepreneurs expect to garner attention from potential buyers, suppliers, and partners, which might lead to a collaboration agreement, for instance, a technology development agreement, a market agreement, an investment agreement or an OEM (Original Equipment Manufacturer) agreement. For example, CAPITAL achieved a co-development agreement with one research group in University of California, Berkeley by participating in a working tour organized by the government. The CEO assistant describes how it happened:

“... In January 2010, CAPITAL signed a strategic cooperation agreement with a research group in University of California, Berkeley to jointly develop MID applications in water, air sensor and control system, as well as an intelligent transportation system. The cooperation is attributed to the technology exchange workshop held in Berkeley. The workshop is part of the business tour organized by the Wuxi government. One researcher from UC Berkeley gave a presentation about his research on the internet of things. After the workshop, our CEO built contacts with the researcher immediately for the common interests...In this project, we will provide the device, and share industry application relevant knowledge with them.”

Presenting at professional events mostly happens as soon as companies have succeeded at some interim achievements, for example a technology demo, or presenting on stage when the new ventures need to get external relationships for assistance in marketing and manufacturing, or delivering the message to the end-user through a journalist-which is also described as a ride on publicity.

5.3.1.3 Leaning on media channels

Relying on media channels is defined as using both the traditional media channels (i.e., the newspaper, journals, magazines and newsletters) and internet-based channels (i.e., online industrial forum, bloggers) to convey information. With media channels, the entrepreneur can communicate information regarding its venture and product to a big audience, in a unidirectional way. The cases within this study suggest that most entrepreneurs are aware of the value which these media channels bring. As the CEO assistant of CAPITAL explains during the interview:

“...In 2009, we got two contracts with two large industrial customers...as to the question of how they got these two contracts, I would say we were well known in China in this field in terms of technology development. The reputation is partly due to media articles. We are good at disseminating by articles. Just as an example, before we reached the stage of prototype, Chinese Forbes Magazine spent two and half pages introducing our company. Quite a number of companies (potential customers) found us through this article. In addition, we also have a good relationship with large portal websites in China, for example Sina, Tencent...”

However I only observe a few efforts that aim at disseminating information via these conventional communication channels. There are two possible rationales: 1) most businesses within this study take a Business to Business (B2B) model, and the recipients of traditional media are mostly end users. Therefore it doesn't make much sense to disseminate information via traditional media. 2) This kind of one-way communication doesn't fit into the early stage of the start-up, because final “product” mostly is not well defined at the beginning given the high uncertainty. Moreover, it is also worthy noting that in addition to information conveying, conveying the claim via media channels can also have a strong social meaning. This will be discussed in the later part of this chapter.

Overall, cases in this study show that there is a blend of disseminating activities that conveys the information from entrepreneur to external parties. This is in line with previous studies that multiple repetitions of communications are necessary for encouraging the external stakeholders to learn about the entrepreneurs' message (Luksha, 2008). The point to point contacting appears to work most efficiently when the entrepreneur intends to convey tacit or vague information. The iterative interactions that are embodied in this way of communication allow for the addressing of tacitness. Such tacitness can be minimized by repetitive interaction between the entrepreneur and external participants (von Hippel, 1994).

As the entrepreneurial process proceeds, the tacitness of the entrepreneur's claim decreases, because the entrepreneur achieves certain accomplishments like product prototype, or patents. Presenting at professional events then becomes more efficient. With this information conveying mechanism, entrepreneurs are able to ride on a wave of publicity, and to access potential customers, suppliers, and partners.

In addition to the point-to-point communication and presenting at professional events, entrepreneurs are also aware of the value that conventional media bring. However, I only observed a few efforts in this direction. Furthermore, it is worth noting that the media are becoming more and more sophisticated with the introduction of the Internet. It provides an alternative way to convey the entrepreneur's claim. It is well accepted that the internet-based media brings significant benefit to both disseminating information and searching for information (Sawhney, Verona, & Prandelli, 2005). The cases also show that the entrepreneurs have started learning to use it as a way to convey information.

5.3.2 Legitimizing conveyed claims

Although conveying the entrepreneur's claim is crucial, it is not enough to convince the resource holders. The following quote from the founder of VENUS precisely illustrates the challenge that most entrepreneurs in this study face:

"...Presenting our ideas to external actors is the first step, people mostly like it. But one question will definitely follow, 'We like your ideas, but do you have something concrete to show us?'"

These challenges have close links to the issues of the lack of resources, unproven profile (Higgins & Gulati, 2003) and uncertainty (Lazonick, 2010), discussed in prior studies. The data suggest that entrepreneurs deliberately perform actions that convey a social meaning beyond the intrinsic content of information regarding their products and companies. I label these sort of actions as "legitimizing actions".

The interpretation of the data further suggests three types of legitimizing actions: "achieving interim accomplishments", "networking with legitimized stakeholders", and "harnessing third parties' neutrality", which are closely related to the following questions: what has been achieved regarding the development of technologies or products? who is the company working with? what are other people saying about the company and product? "Achieving interim accomplishments" refers to actions reaching substantial progress concerning the implementation of the

objectified idea. Such substantial progress, for example, includes technological achievements like filing patents, and market achievements like developing a product prototype. “Networking with legitimized stakeholders” refers to actions of building both formal and informal connections with established organizations and individuals with social influence. “Harnessing third parties’ neutrality” refers to actions using third parties like public media, the government, and industrial organizations to achieve a greater level of trust concerning the disseminated information regarding company and product.

5.3.2.1 Achieving interim accomplishments - Actions speak louder than words

An interim accomplishment is a concrete achievement that a start-up has reached. It includes, for instance, patented technologies or partly working products. They are important in convincing resource holders, as, images of the ultimate technologies and products are now available. This reduces the uncertainty of technology and product development perceived by external resource holders (Zott & Huy, 2007).

The interpretation of the data further suggests that entrepreneurs usually engage in two different categories of achieving activities: achieving technical interim accomplishment, and achieving product interim accomplishments.

Achieving technical interim accomplishments. The data show that entrepreneurs use intellectual properties (IP) and technology prototypes, to represent the technical achievements. By doing so, entrepreneurs attract support for further technology development. The founder of HERO explains in the interview, for example, how the national science foundation granted her with a research project after the first trial failed:

“...We were joining one research institute from CAS to apply for a national grant on this field. But unfortunately, the first trial failed. Later we were planning to give another try. And during the preparation I said inadvertently that I have made a concept machine with my colleague from Intel. The people from CAS got excited about this information, and in the second version of the application, we highlighted this achievement, and our research proposal got approved...”

Similar observations on the impact of demonstrating interim achievements can be drawn from the actions of applying for patents. Conventional belief regards Intellectual Property Right (IRP) as an important mechanism for protecting knowledge, and for building and sustaining competitive advantages. Furthermore,

holding IPRs facilitates the process of resources acquisition from external resource holders. The founder of VENUS explains:

“...Indeed, IPR does help an organization to protect their knowledge to some extent. However, it doesn’t mean that much for new ventures in China...it takes time and money to for the filing, and you never know if it will work out or not...you might ask then why I still apply for IPR? The answer is quite simple, it helps you to get external resources...just for example, if you want to apply for government support, patent matters a lot...”

Achieving product interim accomplishments. Apart from achieving technological accomplishments, the entrepreneurs also use partly working products, product prototypes, and pilot market testing to show product interim achievements. The entrepreneurs believe that this can release the resource holder’s concern about market uncertainty. The demonstration of product interim achievements helps to attract external stakeholders involved in the commercialization, such as customers, investors and marketing partners. The founder of VENUS explains how he got a deal via a product demonstration of the trial version:

“...The facial computing recognition market is huge, but it was messed up due to low quality solutions offered by many other companies. In 2009, I was told by one of my marketing partners, one public security bureau in Shandong was going to do a wide search through a number of companies to get a facial computing recognition system. The person in charge of this project is a real expert in this field and he wasn’t really expecting my solution to perform a good job. But after a trial version of my solution, he really got excited about our trial system, because it helped them narrow down the search scope to three suspects based on an obscure snapshot from CCTV system. And we won a project from them...”

The following table summarizes the entrepreneurs’ actions to achieve interim accomplishments. In the implementation, entrepreneurs utilize a variety of forms of achieving interim accomplishments to acquire resources. They do not wait until the last moment when the final product is ready.

Table 11 Evidences of achieving interim accomplishments

	Technological interim accomplishments	Product interim accomplishments
Definitions	Actions to achieve technical accomplishments in the technology development process	Actions to achieve accomplishments in the product development process
HERO	• Patents • Technology prototype	
ROAD	• Patents	• Products (e.g., DVB-H circuit receiver for digital cable TV) • Products (demo version)
GIANT	• Software copyrights	• 3G solution (demo version) • Pilot market test
CAPITAL	• Patents	• Product prototypes with education application • Products (demo version)
VENUS	• Software copy rights • Patents	• Solution (demo version) • Pilot market test
ZEBRA	• Patents	• Product (demo version) • Pilot market test
WIND	• Patents	• Product (demo version) • Pilot market test
TRAVEL	• Patents	• Product (demo version) • Product prototype
THUNDER	• Patents • Technology prototypes with different technical parameters	
HOBBY	• Software copyrights in China • Technology concept machines with different technical parameters	• Product prototypes • Product (demo version)
MARS	• Patents • Software copyrights	• Demo version of platform
HOSO	• Software copyrights	• Demo version of system • Pilot market test

All in all, interim accomplishments are important for entrepreneurs to convince external resources holders for several reasons. First, the interim achievements provide an image of the final form of the product/service or a company,

thereby reducing the tacitness of the conveyed claim or message (von Hippel, 1994). Second, the interim achievements also signal the competence of the entrepreneur and the ventures, which partly addresses the unproven profile described in previous studies (Higgins & Gulati, 2003; Zott & Huy, 2007).

5.3.2.2 Networking with legitimized stakeholders - staying near vermilion to get red

The second type of legitimizing actions is networking with legitimized participants. The legitimized participants are those organizations with a proven profile or individuals with social influence. It is also crucial for new start-ups, which lack substantive achievements and solid reputations (Higgins & Gulati, 2003). The linkages with those established organizations or people are likely to have influence in convincing resource holders, in addition to the wider described role of access to resources (Ozcan & Eisenhardt, 2009; Rindova, Williamson, Petkova, & Sever, 2005). Many entrepreneurs (e.g. the founders of HERO, CAPITAL and THUNDER) make similar comments as the CFO of TRAVEL during the interview:

“...People care about with whom you are working. People have a widely hold belief that the technology or idea is more credible if the entrepreneur is working jointly with research institutes or universities or companies with reputations...”

The data indicates three types of networking actions: “multisided alliance building”, “social networking”, and “doing business with big players”.

Multisided alliance building, in this study, is defined as a contractual agreement between the entrepreneur and external stakeholders about jointly developing the envisioned future. Such an agreement usually involves clauses of resources investment, revenue-sharing, equity-investment, or knowledge-sharing. In this case, the stakeholders involved in alliance building are co-creators of the new venture. Like the entrepreneurs, they are convinced of the viability of the envisaged business or the value of the technology.

In addition to the contents in the agreements, alliance building also carries social meaning. As an example, the alliance with Intel helped the founders of CAPITAL to get quite some attention from the media and the local government. Just as the CEO assistant of CAPITAL described:

“...According to the agreement with Intel, our company is one of the five companies that can get the most advanced chips from Intel before those chips are available on the market. In addition to the chips, this agreement brings us more value, just for example, the media coverage, mainly because of the name

of Intel, Chinese Forbes Magazine wrote one special report about our company, at a time when we were still at the stage of developing the product prototype. And because of this report, we got some potential partners for co-developing products for downstream applications...”

Building a multisided alliance is the most useful way to legitimize the start-up, according to the entrepreneurs in this study. In addition to the substantial resources (e.g. technical knowledge, monetary investment), collaborating with external stakeholders helps to acquire more resources (Higgins & Gulati, 2003). At the same time, it is also one of the most difficult challenges mainly because of the unproven profile of new ventures, and the tension which arises as the new venture faces the matrix of needing resources from external stakeholders and at the same time weighing the potential risk of misappropriation of its own resources by those external stakeholders (Katila, Rosenberger, & Eisenhardt, 2008).

Organizational social networking. Contrary to the multisided alliance building which involves knowledge or capital investment and return, organizational social networking is like the social networking in greater society, but it is more between organizations and individuals with social influence. It refers to a range of actions associated with building linkages rather than alliance forming with those participants who might become the partners for an alliance, or with those who have non-capitalized resources (e.g. market information, technology information). By doing so, the entrepreneurs believe that it will signal they are part of the legitimized group or close to them.

Such networking activities include, for example, participating in academic exchange seminars, visits between the governmental innovation office and the entrepreneurial start-ups. These kinds of networking activities help to attract more attention from external participants. As the founder of THUNDER said:

“...Disseminating information on the frequent networking activities like participating in the industrial exhibition, organizing academic seminars, help in attracting more attention from a broad ranges of participants, for example, the venture capitalist, and potential customers...”

And doing business with big players. A third way of networking with legitimized players is doing business with big players. The acceptance by big players signals the competence of the start-up, and it enhances the legitimacy in the eyes of other stakeholders. Big companies are normally not the end-user that the start-up targets. Instead they very often include those customers that are interested in buying the start-up's technology. Research institutes, for example, buy emerging rather than

well-developed technology from new ventures for further development. I call these kinds of customers “intermediary customers” because these kind of customers: 1) are not targeted by the start-ups, but 2) have access or connections to the end-users that the start-ups aim to reach.

Very often, these big players work with the start-ups in the same direction but with a somewhat different focus. In addition to profiting from the reputation of the big players, the entrepreneurs sometimes use the transactions with big players as a pilot market test. This is particularly true for the start-ups working in the emerging industries where the market still needs years to mature. For example, the founder of HOBBY says:

“...Till now (July 2010), most of the customers are research institutes like CAS...they took our product doing some extra developments and resold them, or they just took it for research...they are not my target customers to be honest, but given the fact that there is no existing market for the products, and there is a urgent need of finance to support R&D activities...it might be not a bad thing... accepted by top research institutes signals the superior features of my products as well...”

Despite the positive influence, yet similar to the building of alliance with legitimized stakeholders, it is challenging for a young start-up to do business with a big player directly precisely because of the lack of a proven profile. As a result, they very often take an “indirect” strategy. The entrepreneurs drop these big names on their websites or brochures by doing side business with the big players. This side business only has a loose connection with the business that the entrepreneurs intend to achieve. The description from the founder of MARS on why he was doing side business with big players, is a good example:

“...Yes, we were delivering software service for two international companies Papal, and Bilis. To be honest, it’s more like a software sourcing service. I got this contract via my private network. It has nothing to do with my core business I’m developing. But still I think it is quite important for us; it definitively gives us a lot of credibility and was critical for getting supports/aid from other participants. Moreover, the payment from these software outsourcing service can also help us to survive...”

Doing business with bigger players to achieve legitimacy somehow is closely related to the description of the impact of the product development achievements beforehand. However, unlike with the actions toward achieving product development milestones which emphasize the development of the products, doing business with

big players hone in more on the social influence of the key stakeholders (Wood & McKinley, 2010).

Table 12 Observations of networking with legitimized stakeholders

Case	Multisided alliance building	Organizational social networking	Doing business with big players
HERO	• Government backed venture capital • Research agreement with an institute from CAS	• Interactions with research institutes	• Co-developing technology with Semiconductor Manufacturing International Corporation (SMIC)
ROAD	• State-owned venture capital corporation (Wuxi Industrial Group co. Ltd) • Co-develop product with Semiconductor Manufacturing International Corporation (SMIC) and China Resources Semiconductor (Crsemi)	• Interactions with Jiangnan Univ	• Outsource the manufacturing to the big IC makers - SMIC
GIANT		• Interactions with research institutes (China Mobile Research Center for Internet, Machine and Sensor application; China Unicom Research Institute for Internet, Machine, and Sensor) • Interactions with Jiangnan Univ	• Sell products to China unicom • Collaboration with Huawei for marketing channels • Collaborating with Shanghai Motor for 3G solution- data transfer unit (DTU) • Deliver outsourcing service for an American company (ATG)

Table 12 Observations of networking with legitimized stakeholders (Continued)

Case	Multisided alliance building	Organizational social networking	Doing business with big players
CAPITAL	• Coalition building with Intel • Downstream players CDMA • Research Institutes in UC Berkeley • State-owned industrial VC	• Interactions with government • Interactions with Microsoft • Interactions with Research institutes and universities • Interactions with academician and industrial experts	
VENUS	• Collaboration with the biggest home security service provider		• Sell products to the policy bureaus
ZEBRA		• Part of the university research	• Pilot demonstration in Baogang Group
WIND		• Interactions with Rochester Univ	• Sell products to China Nuclear Power Engineering Co., Ltd
TRAVEL		• Interaction with research institutes in China • Interaction with Universities • Interactions with a French company	• Sell product to top research institutes in the field of automobile research (Tongji Univ, Shanghai Jiaotong Univ, and Jilin Univ)

Table 12 Observations of networking with legitimized stakeholders (Continued)

Case	Multisided Alliance Building	Organizational social networking	Doing business with big players
THUNDER		• Interactions with academician • Interactions with government officer, big industrial players, Oslan, Philips	
HOBBY	• Working with a company in electricity energy sector	• Frequently invited to join the exhibition, and demonstration events organized by the governments • Interactions with Southeast University	• Sell product to CAS research institutes • Collaborating with North Industrial Group Corporations (CNGC) for technical solution
MARS		• Frequent Interactions with Paypal, Cisco, and Oracle	• Doing business with Bilis and Yahoo
HOSO		• Interactions with Shanghai Foreign Service Co.Ltd and China Open Tennis Amateur Competition Association	• Doing business with the local government as pilot project

Overall, the alliance building is difficult. As the table shows, most cases are silent in terms of alliance building, but active in social organizational networking and doing business with big companies. These observations are in line with the propositions of previous studies that in addition to the access to the resources (Gulati, 1998; Katila et al., 2008), networking with legitimized participants (e.g., prestigious customers, investors) also helps to acquire external resources for new companies which lack substantive achievements and solid reputations (Higgins & Gulati, 2003).

5.3.2.3 Harness the third parties “neutrality”

A third type of legitimizing action is termed “harnessing third parties’ neutrality”. It refers to actions that entrepreneurs take to add credit to the information they disseminate to the outside by engaging with third parties. The third parties are organizations or individuals who are not involved in a direct interest relationship with the entrepreneurs. They include, for example, the industrial organization, industrial association, media, and governments.

The entrepreneurs in this study are aware of the importance of third parties for disseminating information. The data show that entrepreneurs attempted to achieve these goals through actions such as conforming to regulations, rules, standards, and expectations created by third parties (Zimmerman & Zeitz, 2002) (e.g. participating in top ten innovative enterprises awards), achieving media commitments (e.g. attending eye-catching events, delivering speeches that make the story “newsworthy”), and profiting from the reputation of a group or an industry (e.g. joined industrial association). Just as the founder of WIND tells:

“...To deliver a speech at the top 10 potential innovative start-ups in China, does not really make sense, in my eyes. It’s just a title. There are quite a few ‘awards organizing’ organizations, they charge the attending organizations and make money out of that...people believe that title matters...in my case, of course, I’m not going to pay for it. It’s an award ceremony organized by one of the most influential magazines, <The Founders>. It might be a good opportunity to espouse my company in the flashlights...”

All in all, harnessing the third parties “neutrality” is important for at least two reasons. First, the innovations are assumed to have an ambiguous value for the adopters, which indicates that the adoption of the innovation is influenced by the opinions of other stakeholders involved (e.g., prior adopters) (Greve, 2011). Second, as the study on the adoption of gasoline-powered cars in the early 20th century (Rao, 2008) reveals, the wining of a publicized race helps to legitimize the gasoline-powered car makers and overtake electricity-powered car makers and therein become the mainstream automobile. This highlights two generally held beliefs: 1) winners are better, and 2) a contest organized by third parties is considered as impartial testing. The information about the company or the product/service from third parties is more trustworthy in the stakeholders’ eyes because of the perceived neutrality. Given the entrepreneur’s self-interest, the information disseminated by the entrepreneurs directly is usually viewed with less credibility by stakeholders.

5.3.3 The interactions between actions of claim conveying and legitimizing

More than the identification of claim conveying actions and legitimizing actions, the interpretation of the data also suggests that there are interactions in between those actions.

The actions of claim conveying impact the legitimizing actions. For example, presenting at professional events, on the one hand is used for communicating information about the company and the product to a variety of stakeholders, for example suppliers, end-users, and investors. On the other hand, it is also a way of signaling that the venture is part of the network or community. As the founder from the CAPITAL described in a report:

“...In April, 2009, we attended the Intel information technology summit in Beijing. Our product for an education application was among the 8 best practices of MID applications introduced by the Intel. You know in the year of 2008, we even didn't get an entry ticket for this event, but now we are sitting next to big players in the field like Aigo and Lenovo...”

Now we turn to the interactions in between legitimizing actions. In addition to the close relationship between claim conveying and legitimizing, the data also suggest that there are reinforcing interactions between legitimizing actions. For example, the achievement of interim accomplishments facilitates networking with legitimized stakeholders. These networking activities then further facilitate the new networking activities. These observations are in line with the findings of previous studies that the preexisting network can facilitate the formation of new networks that often lead to increased resources access (Podolny & Baron, 1997; Vissa & Chacar, 2009).

5.3.4 The sequence of technology development and market creation

Many of the claim-conveying and legitimizing actions described here appear quite obvious and most entrepreneurs are aware of their potential impacts. As a result, one might think that all entrepreneurs would make similar use of them and, consequently, little differences regarding the resource acquisition would result. I found variations in the variety, however, as well as the sequence of using these implementation actions.

Two extreme cases are found that follow a linear way of thinking, in the way that acquiring resources for market creation only took place after the development of the technology had been completed.

THUNDER - a company that designs and manufactures Magnetic Induction light bulbs is one of these two cases. Despite the fact that THUNDER was officially launched in 2008, its developmental process could be traced back to 2000. Already then the founder had already started engaging in the Magnetic Induction Lighting technology on his own.

The research of Magnetic Induction Lamp is capital intensive. The founder still successfully got a lot of support and managed the development of the technology. As the founder described during the interview:

“...For the development of the technology, I obtained a lot of support from other companies and people. For instance, the company provides mold devices for experimenting and testing. They didn't get money for offering these molds since 2005. I believe that they are convinced of the future of this technology as well. Without this support, the development of the technology wouldn't go that fast...”

To explain why THUNDER got so much support, the founder further describes:

“...We have a reputation in the research field...basically we regularly participated in industrial exhibitions. And we keep contacts with research institutes and potential investors. For example, the director of institutes of optics, fine mechanics and physics were visiting my company. If the academic has approved your work, usually, the customer comes to you. For example, the visits from Germany and England are due to my reputation in my academic field. They took my samples and made comparison tests with products from Osram and Philips...”

By the time of July 2010, THUNDER had achieved impressive progress in terms of patents, and the development of a technology prototype. However, the financing became a big concern and the funders started to lay off employees because of the financial crisis within the company. He tried several times to get external financing with marketing resources, but the venture capitalist agreed to invest only when the company had reached sale first. That made no sense in the founder's eyes, however. In order to survive, he went back to his personal network to borrow money.

A similar developmental process can be observed in the case of HERO. Like in the case of THUNDER, HERO had also achieved impressive progress in terms of patents, financial support for R&D research, and research collaborations with well-known research institutes and big companies. From 2010 on, for example, Hero

started to carry out research and development work which was supported by the key programs of the Ministry of Science and Technology (MOST) in China.

By the time of July 2010, despite the financial pressure, the founder believed that it was still too early for her project to go to the market because not enough patents had yet been filed. The founder believed that only enough patents could efficiently protect her technology competency. To sustain her strategy, the founder eagerly sought out external financing to purchase experimenting devices and to accelerate the research and development progress.

The developmental processes of HERO and THUNDER strongly indicate a sequential way of addressing the technology development and market creation. Both founders were almost exclusively focusing on the technology development before putting the product on the market for commercialization. In contrast to the concurrent involvement of market creation stakeholders that other cases show, these two cases rarely engaged in the potential stakeholders related market creation during the technology development process.

The observations of the study don't allow discussing the impact of the sequence of the implementation actions on the final performance of the ventures. However, the developmental processes of HERO and THUNDER do suggest that the development of technology and market creation cannot be seamlessly bridged. As the data show, both cases faced financial constraints for the market development.

5.4 Adaptation towards entrepreneurial configuration

In the previous section two processes were described that deal with the conceptualization of the initial idea and the co-creation of the conceptualized ideas. From those two processes, we got a picture of how entrepreneurs act in the environment during the entrepreneurship process. In this section, I switch the focus to the “discontinuity” of entrepreneurship – the adaptation process, and look at the adjusting actions and changes that take place in the entrepreneurship process.

To illustrate the changes, I borrow some ideas from business model research (Osterwalder & Pigneur, 2010; Zott & Amit, 2010; Zott, Amit, & Massa, 2011). The business model, as a helpful concept for delineating a running enterprise, has drawn considerable attention from both scholars and practitioners in the past decade (Blank, 2013; Zott & Amit, 2008). In particular, the business model canvas helps to draw a visual chart to describe a firm’s important operating activities, and group them into clusters: offering (value proposition), infrastructure, customers, and finances. The offering consists of a “value proposition” which is the collection of products and services a firm offers to meet the needs of customers; the “infrastructure” includes key activities in executing a company’s value proposition, key partners and key resources that are necessary to create value for the customer; “customers” include customer segments (target customers), product delivery channel, and customer relationship; at last, “finances” include cost structure and revenue streams of the venture.

With this tool, I can describe a venture as an organizational system composed of various running activities and plans/ideas regarding activities at any point in time. Therefore it is a good method to compare the actions that happen during the non-linear (discontinuous) phase of adaption. A comparison of the planned and realized actions will give hints about the adaptation process. In the following section, I use the term of “idea component” to present concrete operational activities included by the business model canvas.

5.4.1 *The transformation of business*

The following table compares the business description of the start-up at the time when they were just launched and at the time when the interviews took place. I do not include only the activities that have been implemented, but also incorporate the planned and yet-to-be-implemented idea components at both points in time. To

distinguish these two types of idea components, the planned one is bracketed. This allows for a more extensive examination of the adaption process.

Table 13 The transformation of business

Case	Conceptualized idea	Business description in August 2010
HERO	Founded in March 2009 Offering • (A new chemical treatment to be applied in the process of manufacturing IC) Infrastructure • Internal R&D • (IPR protection) Customers • (IC manufacturer) Finances • Seed fund from “530 program” • (Government subsidies)	Offering • (As a national lab providing testing service for stakeholders involved in the IC manufacturing industry) • (A new chemical treatment to be applied in the process of manufacturing IC) Infrastructure • (Co-develop technology/product with potential downstream customer) • IPR protection • R&D with CAS Customers • (IC manufacturer) • (Solar panel components makers) Finances • National research and development subsidies • (Make revenue for providing testing service)
ROAD	Founded in December 2006 Offering • (Develop Digital Video Broadcasting – Handheld circuit) Infrastructure • (Internal R&D)	Offering • 485 communication circuit based automatic electricity meter • DVB-H circuit • (Software development unite) • (Mixed signal integrated circuit) • (GaAs process based RF integrated Circuit) Infrastructure • Fabless manufacturing • Collaboration with university • Internal R&D • (Co-develop products with other companies)

Table 13 The transformation of business (Continued)

Case	Conceptualized idea	Business description in August 2010
ROAD	Customers • (Selling via private network) • (Mobile device manufacturers) Finances • Seed fund from “530 program” • State-backed VC • Self-funding • (Sale from DVB-H circuit)	Customers • Selling via sale agent (commission based) • Selling via private network • (Direct sale to manufacturer) • Mobile device manufacturers Finances • Equity investment from Wuxi industrial group • Sales revenue • (Government backed loan)
ZEBRA	Found in August 2008 Offering • (Wastewater treatment solution) Infrastructure • University based R&D Customers • (Sewage Treatment companies) • (Promoting via government) • (Selling via private network) Finance • Seed fund from “530 program” • Self-funding	Offering • Environmental protection padding • Wastewater treatment solution Infrastructure • Internal R&D based in university • (Building manufacturing device) Customers • (Big Industrial companies) • Selling via private network • (Selling via sales agent) Finances • National research subsidies • (Equity inveseement) • Sales revenue
TRAVEL	Founded in September 2009 Offering • (Industrial Personal Computer based smart driving system)	Offering • (Embedded system based smart driving system) • Industrial Personal Computer based smart driving system

Table 13 The transformation of business (Continued)

Case	Conceptualized idea	Business description in August 2010
TRAVEL	Infrastructure • University based R&D • (Internal R&D) Customers • (Private car market) • (Selling via sales agent) Finances • Self-funding • Seed fund from “530 program”	Infrastructure • Internal R&D based in University Customers • University automobile labs/research institutes • (Public transportation/Taxi company) • Selling via private network • (Changing sales agent) Finances • Self-funding • Sales revenue • (National research fund) • (Industrial VC with market resources)
THUNDER	Founded in July 2008 Offering • (Magnetic Induction Lamp) Infrastructure • Internal R&D • (Self-manufacturing) Customers Finances • Seed fund from “530 program” • Self-funding • (Government subsidies)	Offering • (Magnetic Induction lamp based applications, e.g. water purifying, soiless culture, magnetic powered rice cooker, and applications in telecommunications) Infrastructure • (Self manufacturing by build alliance with the biggest manufacturer of CRT for TV) • Internal R&D • (Applying for product safety certificate) Customers • (Companies in the fields of horticulture and water purification) • Promoting via industrial exhibition/fairs • (Selling via sales agents) Finances • (Applying for national research subsidies) • Self-funding • (Financing from private network)

Table 13 The transformation of business (Continued)

Case	Conceptualized idea	Business description in August 2010
GIANT	Founded in July 2009 Offering • (3G solution for small business) Infrastructure • Internal R&D • (Collaboration with China Unicom) • (Self-manufacturing) Customers • (Small business with a size of 10-100 people) Finances • Seed fund from “530 program” • State-backed VC • Self-funding	Offering • DTU mobile data terminal for vehicle • (Security system for occasional events) • (Mobile office solution) • (Mobile banking sytem) • Software outsourcing service Infrastructure • Internal R&D • (Internal manufacturing) • Collaboration with China Unicom • Collaboration with Shanghai Motor Customers • Selling via private network • Selling via sales agent • (Public transportation company) • (Shanghai Motor) • (China Unicom) Finances • (Equity finance from industrial vcs for market consideration) • Sales revenu from software development • (Government research subsidies)
VENUS	Founded in November 2008 Offering • (Facial recognition solution for TV station and video processing companies)	Offering • (Chip integrates the facial computation technology) • Home security solution • Camera system for public transportation company

Table 13 The transformation of business (Continued)

Case	Conceptualized idea	Business description in August 2010
VENUS	Infrastructure • International R&D Customers • (Selling private network) • (TV station and video processing companies) Finances • Seed fund from “530 program” • Angel investment • Self-financing • (Government support)	Infrastructure • Internal R&D • Internal manufacturing • (Building new joint ventures for home security solution and camera system) Customers • (Building a marketing team) • Selling via private network • Selling via sales agent, e.g.Ccom company • Public transportation company • (Places with need of security system) Finances • Sales revenue from camera system for public transportation companies
WIND	Founded in August 2008 Offering • (Concentrated photovoltaic solution) Infrastructure • Internal R&D • (OEM) Customers • (Energy company) Finances • Self-funding • (State-backed VC) • Seed fund from “530 program”	Offering • (Concentrated photovoltaic solution) • Solar energy batteries components • Solar tracking device Infrastructure • Internal R&D • (Self-manufacturing) • OEM Customers • Promoting via industrial exhibitions • Energy companies Finances • (Equity investment with market resources) • Sales revenue • State-backed VC

Table 13 The transformation of business (Continued)

Case	Conceptualized idea	Business description in August 2010
MARS	Founded in September 2009 Offering • (Internet based platform for software outsourcing) Infrastructure • Internal R&D Customers • (Software outsourcing service providers from mainland China) • (Software outsourcing service buyers from North America) • (Promoting via Internet) Finances • Self-funding • Seed fund from “530 program”	Offering • (Online trading and monitoring platform for animation outsourcing) Infrastructure • Internal R&D Customers • (Selling via sales agent) • (Promoting via Internet) • (Selling via private network) • (SMEs involved in animation outsourcing) Finances • Self-funding • (Industrial VC with market resources)
HOSO	Founded in September 2009 Offering • (HR management system) Infrastructure • Internal R&D Customers • (Inc. 500 sub-unites in China) • (Private network) Finances • Seed fund from “530 program” • Self-funding	Offering • HR management system Infrastructure • Internal R&D Customers • Building marketing team • (Government, large enterprises, Listed companies, Inc. 500 sub-units in China) • (Promoting by organizing industrial forum) Finances • (Both angle investment and institutional investors) • National research fund

Table 13 The transformation of business (Continued)

Case	Conceptualized idea	Business description in August 2010
CAPITAL	Founded in August 2008 Offering • (MID device with industrial applications) Infrastructure • (Collaborating with Intel) • Internal R&D Customers • (Industrial customers) Finances • Self-funding • Funding from state-backed VC • Seed fund from “530 program”	Offering • (Cloud computing service) • (Application for transportation industry) • MID device for end-users Infrastructure • Collaborating with Microsoft, Intel China, and University of California at Berkeley • Internal R&D • Outsourcing manufacturing service Customers • Promoting via fairs and exhibition; with magazine and industrial magazine • (Industrial companies); firms operated in electricity and education sectors Finances • (Equity financing for growth) • Bank loan • Sales revenue from customized MID
HOBBY	Founded in November 2008 Offering • (Unmanned helicopters) Infrastructure • Internal R&D • Purchasing engines Customers • (Industrial firms) Finances • Self-funding • Seed fund from “530 program” • (Government subsidies)	Offering • Customized unmanned helicopter • (Customized solution for firms in the field of agriculture) Infrastructure • Internal R&D • Collaborating with China North Industries Group Corporation • Purchasing engine; design other components Customers • Promoting via industrial exhibition/fairs, demonstrating events • Research institutes; firms in electricity sector • (Industrial firms, e.g. agricultural companies) Finances • (Investment with market resources) • Sales revenue • National research fund

The conceptualized idea depicts the business activities and plans associated with the future activities of a start-up at the time when it was just launched. As the table shows, even if the entrepreneur was convinced of the viability of the conceptualized ideas, it is interesting to see that the conceptualized idea somehow remained “vague” in terms of the running activities and plans associated with the offer, infrastructure, customers, and finances, as the table shows.

For most cases, the conceptualized business canvas is relatively clear on the initial funding activities and conducting R&D activities. A lot of other information regarding the customers (e.g. marketing channels, customer segments) was missing however. This is not rare for the cases where the initial ideas emerge from experiencing and visioning. For example, in the case of THUNDER, after the founder had started the company in July 2008, he still didn’t have any plan regarding the target customers, marketing channels strategy. During the interview he explains, “...as long as your work has been accepted by academic or research institutes, there shouldn’t be a problem, I’m still quite confident of this...” Similarly, HERO, CAPITAL, and HOBBY also share the same remark that they were mostly silent on the plan regarding the customers at the beginning.

Compared to the cases which sense the ideas from experiencing and visioning, the cases where the ideas emerged from observation (GIANT, VENUS, MARS, WIND and HOSO), show more detailed information and planning regarding the 4 clusters of the business model canvas. In the case of VENUS, for example, the founders intended to offer a facial recognition software for TV stations and video editing companies based on internal research and development, and sell it via a private network. To support the running of this company, the founders invested their own money, as well as a seed fund from the “530 program” and angel investment.

Despite the variation of the extent of the details in the conceptualized ideas, the juxtaposition of the conceptualized idea against the business description of the cases at the time when the interviews took place clearly shows that the business of all cases changed dramatically, including those cases that had a relatively detailed conceptualized idea. For example, just as described above, the founder of VENUS had a detailed plan from the beginning. He wanted to develop a facial recognition software for TV stations and video editing companies. But after two years of development, VENUS grew into a company offering and planning to offer a variety of products (e.g. home security solution, a camera system for public transportation, and a chip that integrates the facial computation recognition technology). In addition

to the new market segments, VENUS also extended its marketing channels by teaming up with big companies, sales agents, and by setting up a small marketing department within the company.

The frequent changes of idea components as the entrepreneurship process unfolds are in line with the conceptual ideas in a previous study, that during the implementation process, entrepreneurs adjust their expectations and understanding of what is feasible and valuable and come up with new idea components (Chiesa & Frattini, 2011). Looking into the developmental processes of the cases, the data suggest that the adaptations were taken both in the forms of sensing new idea components and abandoning idea components.

5.4.2 Adaptation in the form of sensing new idea components

As the implementation process unfolds, the entrepreneurs in this study sense many new idea components regarding the offer, infrastructure, customers and finances. The new ideas components are in a variety of forms. According to the relationship between the sensed new idea components and the existing business, I grouped the sensed ideas into two categories: 1) elaborating ideas, 2) new ideas.

I label the new idea component as “elaborating idea component” when it reinforces the implementation of the existing idea. For example, a company follows the initial general strategy of developing industrial applications without a concrete industry focus, and later comes up with the idea of making an application for hotel management. Looking into the idea components that elaborate the existing business, the interpretation of the data suggests that the elaborating idea component can be further divided into groups of elaborating on the technology development, and elaborating on the product/service development.

Elaborating on the technology development. All cases involved in this study are required to address both the technology and market creation. In those cases where the ideas emerged from the experiences and visioning, the entrepreneurs are clear about their technical elements, but remain without a detailed plan on the element of product/service and customer. Yet interestingly, the entrepreneur continues elaborating on the technology development instead of addressing market development. If we take the case of CAPITAL as an example, we see that after the founders had settled down in Wuxi, they still didn’t have target customers or a concrete marketing plan. Instead of first figuring these issues out, the two founders continued their R&D work, and sought the possibility of building a collaboration with Intel to get money for the further funding of their R&D activities. The way that

CAPITAL started the entrepreneurial process is typical for cases where the ideas emerge from experiencing. Similar patterns can be observed in the cases of HERO, ROAD, ZEBRA, TRAVEL, THUNDER, and even VENUS, where the idea emerges from observing. Right after the founder had launched VENUS, he abandoned the initial idea of developing a facial recognition software for TV stations and video editing companies due to the perceived small market size. Instead of immediately figuring out another market demand, the funders decided to reinforce the R&D activities.

And elaborating on the product/service development. Unlike the cases where the ideas emerge from experiencing and visioning and where there is no focus on market development, most cases in the group of “sensing via observing” have a strong emphasize on elaborating the product/service right from the beginning. The relevant R&D activities are expected to support the market demand. The strategy for the case of MARS, for example, is clear from the early beginning. All technology development activities and other associated activities are centered on this perceived market demand.

Despite the different focus on only technology development at the beginning also in the cases “sensing ideas from experiencing” and “sensing ideas from visioning”, the entrepreneurs slowly switch their focus to the elaboration of the market as the process unfolds. In the case of TRAVEL, for example, it turned out after years of development that the idea of providing an industrial personal computer based system didn’t work out. They held onto a similar technical capability, and changed their R&D activities to meet the market of private cars however. Yet as I previously presented in section 5.3.5, not all the cases showed similar changes in their developmental processes. The cases of HERO and THUNDER remained focused on the technology development, although they started to realize that they should switch gears at the time that the interviews took place.

New ideas. In addition to sensing new idea components to reinforce the existing business, very often entrepreneurs sense a idea component that only has a loose connection to the existing business. I label this as a “new idea”, instead of an idea component. MARS signed a software-outsourcing contract with Paypal and Bilis, for example. This kind of business has no crucial connection with the B2B software platform they were developing. When I asked the founder why this kind of deal/contract was concluded, he explained:

“...Well, in deed, this kind of contract has nothing to do with my core business...but doing this kind of project can bring cash helping my company

survive...for sure...It won't become part of my business, if I had planned to take this as the core business, I wouldn't have come to Wuxi..."

Similar stories can be found in the developmental processes of TRAVEL, GIANT, and VENUS. Although the data suggest that most entrepreneurs will abandon these new ideas after a certain period of time, these kind of new ideas still matter in the early stage of the entrepreneurial processes, in particular when start-ups face financial constraints and lack of a reputation.

Despite the significant transformations, the data suggest that the changes mostly involved activities that are not part of the core expertise of the ventures. For the cases where the ideas emerge from experiencing, the entrepreneurs rarely adapted the R&D activities. The entrepreneurs stayed with their specific core domain including technological or market expertise. For example, just as the above-mentioned case of VENUS shows, despite the various changes, the technology solution underpinning these product strategies (facial recognition algorithm) remained unchanged.

All in all, the observation regarding the sensing of new idea components is quite close to the patching and thickening process described in the study of organizational changes in the big company (Siggelkow, 2002). For Siggelkow, patching and thickening refers to the emergence of highly interdependent ideas that reinforce the existing core business as well as the creation of a new core element and its reinforcement by new elaborating elements. Different from his observation in established companies, new ventures are in search of a core business element. In this sense, in the technology entrepreneurship setting, the sensing of a new idea component is characterized by experimenting. The entrepreneurs try and test until they achieve a status wherein the start-up focuses on the core business which is reinforced by a set of idea components.

5.4.3 Adaptation in the form of abandoning idea components

Testing and experimenting inevitably involves the abandoning of ideas components. "Abandoning ideas components" refers to actions where the entrepreneur suspends the implementing of certain entrepreneurial ideas, or gives up plans that are yet to be implemented. It doesn't mean that the entrepreneur completely quits the business. It's more like abandoning an idea component embodied in the business model canvas. For example, in the case of THUNDER, in the early beginning of 2010, the founder was planning to acquire equity investment from an industrial venture capital, but it turned out that they preferred the ventures in the growth stage. As a result, the funder

decided to go back to his private network for external financing to bridge the gap between research and market.

Investigating the reasons for abandoning, the interpretation of the data suggests two sources: 1) internal misfit; and 2) external misfit.

Internal misfit describes an internal environment misfit in which actions/plans don't meet the entrepreneur's vision. Mostly they are able to do it, but don't want to do it. In the developmental process of Capital, for example, right after the venture unveiled a product prototype of MID, a company in the education field came over seeking the possibility to co-develop a customized MID for educational purposes and Capital agreed. However, as the collaboration proceeded, it turned out that the final product the customer wanted was low-end and didn't need much powerful computing. This was not in line with the founders' strategy. Just as the informant commented during the interview, "The product they want is just not on the same page with the product we are developing." As a result, instead of developing the whole solutions, the CAPITAL only worked on the software development part of the product.

External misfit. In addition to the internal misfit, entrepreneurs also abandon idea components due to external misfits. The external misfit refers to a situation where the entrepreneurs' actions or ideas conflict with the external environment, i.e., the market strategy doesn't fit the market structure, or there are conflicts with institutions or the idea simply goes beyond the needs of the stakeholders. If you look, for example, at TRAVEL, a start-up that develops intelligent vehicle systems, at the beginning, you see that the founder was planning to develop an industrial personal computer (IPC) based smart driving system. However, after less than one year's operation, he realized that the product based on the industrial control system was becoming too expensive for the private automobile market. The perceived market turned out to be much smaller than expected. He therefore abandoned the idea of selling this product to private automobile owners, and instead switched the idea to a product based on a different platform.

The following table illustrates the abandoning of ideas because of internal and external misfits.

Table 14 Observations of abandoning ideas caused by misfits

Case	Internal misfit	External misfit
HERO		The founder was planning to sell the solution to manufacturer directly. After market research, she decided to get one potential customer involved in the development of the solution.
ROAD		The founder was planning to build its own distribution channels, given his company is doing kind of B2B business. However, later, it turned out the dominant marketing strategy that works in USA is difficult to be applied in Chinese market. As a response, they outsourced to external sales agent.
GIANT	The founder was initially planning to be the provider of terminal devices for telecommunication. After marketing research, the founder believes that working on the system integration would bring more value added profits.	The founders were trying to recruit employees locally with an intention to avoid the high turnover rate, but it turned out that they were not able to find qualified staff. As a compensating strategy, they outsourced some activities
CAPITAL	Right after the company had unveiled a product prototype of MID, a company in education field came over seeking the possibility to co-develop a customized MID for childhood education and CAPITAL agreed on this. However, as the collaboration proceeded, it turned out that the wanted product didn't need much powerful computing. As a result, instead of developing the whole solutions, CAPITAL works only on the software development part of the product.	In the beginning of 2010, when the company was trying to figure out another domain for industrial applications, they were also planning to do the content on their own. But that didn't work out, just as the informants said during the interviews: "it was so complicated for us to do everything. Each industrial application requires incorporation with operators; every industrial application involves at least one operator. It's impossible for us to have it all."

Table 14 Observations of abandoning ideas caused by misfits (Continued)

Case	Internal misfit	External misfit
VENUS	The initial idea for the VENUS was to develop facial recognition to blur faces for digital video. But later, the founders abandoned the ideas because the market is too small in their eyes.	The founders were planning to sell the facial recognition software. However, after the investigation of the market environment, in particular, and of the environment regarding IRP protection, the founders determined that developing a chip that integrates the facial computation technology is safer.
ZEBRA		Instead of trying to replace the existing system directly, ZEBRA switches to the customers who don't have the pollution treatment systems yet.
WIND	The founder turned down an investment proposal from an industrial VC, and keeps looking for the VCs who could bring market access.	
TRAVEL	At the beginning, the marketing was outsourced to a company, but it didn't work well. Given the fact that all the sales are achieved with the research institutes, the founders thought of a new marketing strategy, for example segmenting the market, relying on a private network.	At the beginning, the funder of TRAVEL was planning to develop an industrial personal computer (IPC) based smart driving system. However, after around one year's operation, he realized that the product based on the IPC had become too expensive for the private automobile market. The perceived market turned out to be much smaller than they expected. He therefore abandoned the idea of selling this product to private automobile owner, and switched the idea to a product based on a different platform.

Table 14 Observations of abandoning ideas caused by misfits (Continued)

Case	Internal misfit	External misfit
THUNDER	After years of operation, the founder abandoned the strategy of doing everything on his own, and instead, he planned to collaborate with a sales agency, and hire marketing people.	The founder was planning to acquire equity investment from Lenovo capital for the commercialization of the developed technology, but it turned out that they prefer the ventures on the growth stage. As a result, the funder decided to go back to his private network for external financing to bridge the gap between research and market.
HOBBY		The founders were planning to sell their products to potential customers directly. After two years testing, however, it turned out the market was just emerging. Therefore, they switched their strategy to an indirect one to shape the market by attending exhibitions, fairs, and industrial events frequently
MARS	The founder is fully aware of the importance of using IRP in acquiring government subsidies. After the first round of support from the government, the funder decided not to proceed with the IPR application for his software platform, because it's way to expensive and consumes too much time	
HOSO		They were targeting at subunits of Inc. 500 in China, but after the financial crisis, the budget for the IT system shrank dramatically. As a response, they decided to switch their target customers to the government, and fast-growing Chinese companies.

Although, the data suggest that the abandoning of ideas is caused by misfits, it is worth noting that not every misfit will lead to the abandoning of ideas. The misfit is a time associated construct. Therefore the original misfit can evolve into the status of a fit, as the entrepreneurial process unfolds. Just as the founders of HOBBY describes, “at the beginning, there was no market for unmanned helicopters at all.

When I was trying to contact potential customers, very often they asked me does the helicopter easily fall off. Now after years of efforts, for example, we do the demonstration, and attend some events like natural disasters exercises, slowly some potential customers show interest in our product.”

To some extent, the creation of a configuration is a process of transforming the external misfit into a “fit” situation. The speech by the founder of CAPITAL in this study well describes this process:

“...No dream, no gain. A real execution is to realize the dream. The CEO needs take the role of executing. Cloud computing is the future. But before getting there, we need to do quite a lot. MID, including iPhones, are intermediates. What shall we do before cloud computing is mature? MID with its powerful computation capability, and storage capacity also allow the device not to convey all the data back to the “cloud”. And further, data could also be stored in the small size servers in the companies. For cloud computing, it’s for people who have a dream. Without dreams, the small size, middle size, and big size servers are not able to support it. Now cloud computing is a buzz word, it is not for nothing, but also needs someone with insights/perceptions to draw it up, and keep it in a sustained way...”

5.5 Summary

To summarize, the main result of this study is a process framework of entrepreneurship which derives from a number of concrete findings: First, three paths towards the initial ideas have been extracted. It adds “sensing via experiencing” and “sensing via visioning” as two complementary paths to the widely accepted path of “sensing via observing”. Experiencing refers to the situation when ideas emerge from engagement in the field but not necessarily driven by an ambition to become an entrepreneur. Visioning is the situation where ideas emerge not because of the specific unmet market demand, nor is the knowledge accumulated from deep engagement in the technical field. The entrepreneurs simply want to pursue their ideas because they believe in their future, or they just find them interesting.

Moreover, the results also show that the initial ideas which trigger the entrepreneurship process, are vague, simple, and incomplete in comparison to a detailed business plan. This is in contrast to the general belief that the first thing every founder must do is create a business plan to describe the size of demand/market, the product/service to be developed, and a strategy that can lead the new venture to success. The cases in this study show that instead of tirelessly sketching a plan until it is perfect, the entrepreneurs accept vague ideas and start engaging in the field.

Second, I then found that the entrepreneur engages in a “conceptualization process” of many iterative interactions with external stakeholders and actively tests and experiments with underpinning technologies where entrepreneurs develop their ideas further. Instead of sketching a perfect plan on their own, entrepreneurs mostly take a “going out” approach, when interacting with external stakeholders, to ask for feedback on their ideas. The feedback on the aspects of the idea, in turn make those ideas more explicit and also acts as a basis for the entrepreneurs’ growing confidence.

The third finding of this research has to do with the implementation process through which entrepreneurs acquire resources from their environment. They convey claims regarding their products and their company and legitimize the new venture in the diverse, and, over time changing interests and values of external stakeholders. This result first reconfirms the propositions in existing literature that new ventures heavily rely on point-to-point communication channel building. As the entrepreneurial process proceeds, the entrepreneurs utilize communication outlets like presenting at professional events and engaging the media. Apart from the three ways of claim conveying, the results also suggest three means that entrepreneurs use to convey social meaning beyond the intrinsic content of the information

disseminated, and to convince resource holders to support the start-ups. They are 1) achieving interim accomplishments in terms of technical interim achievements and product interim achievement; 2) networking with legitimized participants in the form of building multisided alliances, organizational networking, and doing business with big names; and 3) harnessing the third parties' neutrality.

The fourth finding of this research is the identification of adaptations that trigger and sustain the entrepreneurship process. Adaptions occur in the developmental processes of new ventures as "abandoning idea components" and "sensing new idea components". The data also suggest two causes for the abandoning of idea components: internal misfit and external misfit.

In conclusion, these four findings characterize technology entrepreneurship as an iterative process consisting of conceptualizing implementing, and adapting actions, towards the creation of entrepreneurial configuration. This is distinct from an evolutionary economic rationale where learning takes place on the level of the economy through variance, selection and retention (or abandoning) of individual entrepreneurial projects. In place of the Darwinian "survival of the fittest" learning approach, here it is conceptualized as a process of frequently testing ideas, gathering feedback, and revising entrepreneurial ideas until they reach a status of a configuration. This result also stands in contrast to the decades-old formula that an individual writes a business plan, pitches it to investors, registers a company, hires people, develops a product, and starts selling. Technology entrepreneurship is a social design process. The following figure summarizes the findings of this study.

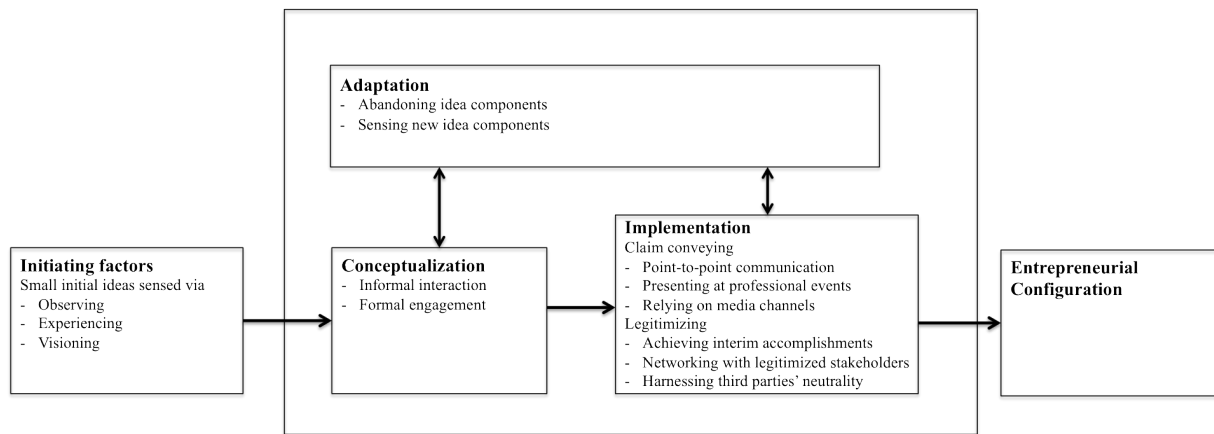


Figure 8 The elaborated social design process of entrepreneurship

Chapter 6 Conclusion: A social design perspective of entrepreneurship

This study is motivated by the aim to elaborate on the concept of the “entrepreneurship process”, to test it in an empirical setting, and to examine to what extent this concept could contribute to the development of an integrated entrepreneurship theory. The cross cases analysis in Chapter 5 resulted in the development of an elaborated social design process framework. In this process, spawned by an initial idea, entrepreneurs first interact with the external environment to test, develop, and evaluate these ideas. The interactions can take place in both, formal and informal forms. As the interactions proceed, the entrepreneurs receive feedback and become convinced of the viability of their ideas. Meanwhile, they conceptualize their initial ideas by actively engaging in experimentation. With these conceptualized ideas, the entrepreneurs start a business and acquire aid and support from resource holders by convincing them also of the viability of the conceptualized idea via the actions of “conveying claims” and “legitimizing”. Moreover, as the social design process unfolds, there are constant adaptations of the ideas in terms of “abandoning idea components” and “sensing new idea components”. The abandoning of idea components arises from both internal and external misfits. These processes of “conceptualization”, “implementation” and “adaptation”, together with the concepts of “general feedback”, “new information”, “misfit”, “idea components”, and “configuration”, form a language that allows for a coherent description of the social design process.

The research results presented here contribute to the development of a social design perspective in three ways. Specifically, I first empirically ground the conceptual insights derived from prior research. Second, I advance theory building by developing a social design process framework. Thirdly, drawing from the empirical observations of this study and based on theoretical debates in existing literature, I further develop seven propositions to be tested in future research.

In this chapter, in order to justify these contributions, I make a reflection on the research findings and connect them with the existing entrepreneurship literature which takes a different theoretical stance. Specifically, I start with revisiting the results from this study and connect them with the social design framework. After that, I bring the findings of this study closer to extant research that builds on the existing theoretical lenses from other domains, to illustrate the supplementary impact of the

social design perspective on these previous research findings. Finally, I conclude this chapter by extending my research results to elucidate the implications for practitioners, and by giving a summary of the limitations of this study.

6.1 A refined social design process of entrepreneurship

6.1.1 Enriched initiating conditions

The empirical results of the initiating conditions of the social design process show that a variety of initial ideas trigger the entrepreneurship process. They take such shapes as these, for example, the aim of developing a solution for a deficiency in an existing working process (HERO), a judgment about a market demand (MARS), or a vision on the future of a certain technology (THUNDER). Compared to the general conception about a business idea which mostly includes information about product and market size, these initial inputs (1) are rather vague, and do not yet have explicit goals; (2) are spontaneous, not necessarily results of planned activities; and (3) have no timelines of implementations.

In addition to the initial forms of inputs for the social design process, three possible paths towards the initial ideas can be pointed out: 1) sensing via experiencing; 2) sensing via observing; and 3) sensing via visioning, thus adding “sensing via experiencing” and “sensing via visioning” as two complementary paths to the widely accepted path of “sensing via observing”, the common belief that scanning will result in the discovery of entrepreneurial ideas.

These observations enrich the initiating conditions of the social design process by answering the questions: what is the input for the social design process? Furthermore, how do these initial ideas emerge? As discussed in Chapter 3, with its strong “social creation” feature, scholars who defend the social design perspective look at processes that are characterized by frequent interactions like the “conceptualization process” and the “implementation process”. This has left the initializing conditions of the social design process insufficiently examined in previous studies.

Regarding the question of what is the input for the social design process, scholars mostly take a simplified approach assuming that the endogenous ideas trigger the social design process (Alvarez, Barney, & Anderson, 2012; Sarasvathy, Dew, Velamuri, & Venkataraman, 2005). Such endogenous ideas include, for example, beliefs (Felin & Zenger, 2009) and judgments (Klein, 2008). Less attention

has been paid to the question: what do these ideas look like and where do they come from?

The findings of this study, therefore, first provide empirical evidence for the conceptual ideas of prior studies. Obviously, the entrepreneurs have some forms of judgments and beliefs that can be observed in the case studies. Such concrete ideas include, for example, the belief that the Magnetic Induction Lighting represents the future of the lighting industry (THUNDER), or the motivation of investing in one's personal hobby of constructing aircraft models (HOBBY).

As for the emergence of the initial ideas, they can arise from knowledge accumulation, or the ambition to become an entrepreneur. The knowledge accumulation manifests itself as market expertise, or as technical expertise. This observation is in line with the studies of the innovative enterprise which indicate that entrepreneurs require special expertise in order to engage in the entrepreneurship process (Lazonick, 2010).

However, knowledge accumulation alone will not result in the emergence of initial ideas. Sometimes entrepreneurs have accumulated experience or knowledge long before they ultimately come up with initial ideas. On the other hand, the simple ambition of becoming entrepreneur, of course, also does not result in having an initial idea, except for the cases wherein entrepreneurs harbor a strong emotional commitment to implementing a certain idea such as in the cases characterized by ideas sensed via visioning. Yet, overall the comparisons of paths suggest that in most cases, both the ambition to become an entrepreneur and the knowledge accumulation efforts (including market expertise and technical expertise) matter concerning the emergence of the initial ideas.

To summarize, I develop the following proposition:

Proposition 1: Combination of knowledge accumulation (market expertise and technical expertise) and the ambition to become an entrepreneur, increase the number of initial ideas.

6.1.2 The elaborated conceptualization process

As figure 8 in chapter 5 shows, conceptualization is a social process. To test and develop the initial idea, entrepreneurs informally interact with friends, colleagues, and potential customers. Also, they formally engage in active testing actions like participating in business idea competitions, applying for innovation subsidies and conducting technical experiments. By doing so, entrepreneurs receive feedback as

well as new information regarding the implementation of their initial ideas. As the positive feedback and information regarding the implementation of the idea accumulate, the entrepreneurs ultimately make the decision to start a new business and explore the conceptualized ideas.

These observations confirm to some extent, the conceptual ideas from previous research that feedback from external stakeholders plays a crucial role in influencing the entrepreneurs' decision, i.e., positive feedback increases entrepreneurs' confidence, and thus increases the likelihood of propelling one to decide to exploit the sensed ideas (de Jong, 2013). The greater the consensus achieved with knowledgeable peers about the viability of the idea, the more likely the entrepreneur will implement the idea (Wood & McKinley, 2010).

Yet, in contrast to previous studies that treat the feedback as a whole, this study develops a nuanced typology for the feedback: new information and general feedback. This development draws the attention away from the impact of conceptualizing actions on individuals, and instead steers it to the idea itself. Further, on the well-discussed role of the overall feedback, the new information received through the conceptualizing actions can serve to make the idea explicit. In the case of VENUS, for example, the interaction with a classmate led the founder to make his product strategy clear and focus on a facial computation solution for video companies and TV stations. In this case, the information that brings the founder of VENUS to come up with a concrete product strategy is as a result of the new information received from his classmate.

This nuanced understanding of "feedback" suggests that the development of an initial idea is a social process, which stands in contrast to the prevailing image of the lonely entrepreneur who maps out a novel idea on his or her own much like the lone cowboy with his lasso (Shane, 2008: 40). Instead, the entrepreneurship process involves a host of give-and-take seesawing with a whole range of people playing small but critical roles in the whole operation. Following this line of thinking, I come to the conclusion that the conceptualization process helps entrepreneurs to figure out the best idea, for, as the information accumulates, the entrepreneur is, in principle, capable of calculating the risks associated with each idea. However, given the uncertainty regarding the technology, product and service, due to the non-existence of information (Alvarez & Barney, 2007), the entrepreneur is not able to calculate the risks associated with each idea, no matter how much effort he/she invests in collecting information. Nevertheless, the feedback helps the entrepreneurs to filter out not all but certain faulty ideas and subsequently terminate them. To summarize these discussions, I develop the following proposition:

Proposition 2: Conceptualizing efforts filter out unviable ideas. Even though it is not possible to identify the best idea, this activity decreases the failure rate of entrepreneurship.

In addition to the impact on the elaboration of the idea, the social features of the conceptualization process observed in this study also contribute to the ongoing discussion about the roles of different stakeholders in the conceptualization process. Previous studies typically look at the relationship between the entrepreneurs and the stakeholders, or the attributes of the stakeholders, in order to examine their impacts on the entrepreneur's decision to start a new business. Gemmell and his colleagues (2012) found, for example, that "trusted partners" drive the productivity of the conceptualization process and facilitate the entrepreneurs' decisions to implement the ideas. Going beyond the relationship between entrepreneur and stakeholders, some other scholars study the stakeholders and speculate that the impact of the feedback, in particular, in terms of overall feedback, is affected by the stakeholder's knowledge base (Wood & McKinley, 2010). A knowledgeable stakeholder plays a more important role in the conceptualization process. To summarize, these studies show that entrepreneurs should interact with close and knowledgeable stakeholders from an existing network to test and develop their ideas.

The data of this study show evidence that entrepreneurs interact with a variety of stakeholders including both those from existing networks, as well as those whom the entrepreneurs might not know personally, but they somehow manage to interact with. These observations confirm, on the one hand, the statement that entrepreneurs interact with close knowledgeable stakeholders from an existing network, but on the other hand suggest that the stakeholders are not always friends, family members, or mentors, but also other associates who are close to the entrepreneurs, for example, venture capitalists or top scientists in the field. Moreover, even some organizations can play a role as a stakeholder in the conceptualization process, such as a business plan competition organization, a regional innovation office, or a patent office.

The observations that entrepreneurs interact with "not-close" stakeholders and a broad range of stakeholders (e.g. potential sponsors, potential customers), have drawn attention to a reconsideration of the intriguing question of, with whom the entrepreneurs should interact, in order to test, develop and evaluate their ideas. Previous research on creativity suggests that creativity is closely correlated with knowledge diversity (Ahuja & Katila, 2001; Fleming, 2001). The more diverse your knowledge is, the higher the chance of being creative. In this sense, interacting with close peers becomes a double-edge sword, as, it can stifle creativity insofar as interacting with close stakeholders frequently and intensely often results in a

reproduction of the entrepreneur's own knowledge base on account of the similar experiences and background of those peers (Gemmell, Boland, & Kolb, 2012). It follows, then, that in a setting where creativity is needed, limiting interactions to close peers only may not be an efficient way to conceptualize ideas.

The fact that creativity is positively correlated with knowledge diversity also supports the observation that entrepreneurs interact with a broad range of peers. Interacting with different stakeholders provides access to their diverse knowledge bases, which in turn increases the diversity of the available knowledge for the entrepreneurs.

In addition to the impact on the access to diverse knowledge, the new and surprising feedback from “not-close” stakeholders and a broad range of stakeholders, impacts the conceptualization process in two ways. First, the relatively “new” information helps shape the existing ideas into a more structured and comprehensive form of input. This runs parallel to the findings of a previous study which reveals that distant social ties are likely to provide unique and less repetitive information (Perry-Smith, 2006). Second, even if distant peers do not give positive feedback on existing ideas, the entrepreneur is likely to rethink his or her original judgment (Zellmer-Bruhn, 2003), which can help the entrepreneurs to revise their faulty perception and to terminate their bad ideas. As the case of VENUS exhibits, right after the founders attained the initial idea, they drafted the business plan, and sent it to a famous venture capitalist in China. They were not sure about its viability in the market. The founder describes:

“...In an effort to test our idea, we sent our business plan to a famous venture capitalist in Beijing. Surprisingly we got a detailed reply. In that letter, he says, he likes my technology and idea, but from a VC's point of view, they are not going to invest money in this project, simply because the market is too small in their eyes. It's a niche market...to some extent. It's bad news on the one hand, but we were enlightened by this reply...”

As a result, the founders abandoned their initial idea, and started looking for a new one. The negative feedback, in this sense, thus helped the entrepreneur to develop the initial idea.

In summary, a broader range of stakeholders and more diverse relationships with the stakeholders result in better access to diverse knowledge, which in turn increases the probability of obtaining new and surprising information and feedback, and in so doing, facilitates the conceptualization process. I use the term of “openness” for describing the interaction with (a) a broad range of stakeholders and (b)

stakeholders to whom the entrepreneurs have diverse relationships, and suggest therefore the following proposition:

Proposition 3: Conceptualization openness accelerates the conceptualization process in a situation of high uncertainty regarding the prospective product and service.

Combining these observations, another fundamental research question in the social design perspective arises that still has to be addressed: – how does an individual become entrepreneur? The conventional entrepreneurship research emphasizes the individual's personal behavioral traits which distinguish an entrepreneur from a non-entrepreneur (Holm, Oppen, & Nee, 2013). The social design perspective assumes that entrepreneurs ex ante are not significantly different from non-entrepreneurs (Alvarez & Barney, 2007). If this is true, then a natural question follows: how does an individual turn into an entrepreneur? Previous research hasn't touched this issue much.

This study provides some evidence which may provide an answer to this question: becoming an entrepreneur is not always a linear process that starts with scanning the environment to identify an unmet demand, which then leads to the development of a product or service to meet the identified gap, as many researchers suggested (Ruef, 2005). In the setting of technology entrepreneurship, it is instead very often an intensely social process riddled with ongoing idea - shaping, abandoning, and reshaping. As many cases in this study show, especially engineers very often encounter the initial idea by chance and are pushed into it via the conceptualization process. To summarize, combining the observation on the emergence of initial ideas, I develop the following proposition:

Proposition 4: In a situation of high uncertainty regarding the prospective product and service, it is the cumulative effect of interactive knowledge accumulation, the ambition to become an entrepreneur, and socially-constructed conceptualizing actions, which serve to create entrepreneurs.

6.1.3 The elaborated implementation process

An unproven idea is difficult to sell. In the midst of the implementation process, the entrepreneurs convey claims to resource holders in an attempt to acquire resources from them, and perform legitimizing actions to add credit to the conveyed claims, as the figure 8 in chapter 5 summarizes. In this process, both groups of actions, the conveying of the claim and the legitimizing, are important in acquiring external resources.

Three mechanisms of claim-conveying are commonly used by the entrepreneurs. Yet, conveying the claim alone does not suffice to bring about the desired course of action in entrepreneurship. The data also suggests that three types of legitimizing activities are important for resource acquisition. They are: achieving interim accomplishment, networking with legitimized participants, and harnessing third parties' neutrality.

These observations confirm two streams of previous research on consensus building with external stakeholders. First, there is the cognitive perspective. Previous research built on this perspective generally focuses on the cognitive characteristics of entrepreneurs and how entrepreneurs make sense of their ideas (Grégoire, Corbett, & McMullen, 2011). For example, one study looks at how the entrepreneur defines a distinct identity for both the company and the market and conveys it to external stakeholders (Santos & Eisenhardt, 2009). The observations concerning claim-conveying fall to some extent along the lines of the cognitive perspective, as, it also addresses the question of how entrepreneurs convey their claims to external stakeholders as the figure 8 in chapter 5 shows, for example, via point-to-point communication. Moreover, the findings concerning the legitimizing actions are in line with ideas from previous studies that are built on an institutional perspective. Research with this perspective typically examines the construction of the cultural and symbolic meaning of the new ventures (Cornelissen & Clarke, 2010; Martens, Jennings, & Jennings, 2007). The study of symbolic actions (Zott & Huy, 2007), for example, examined the subjective social meaning of entrepreneurial actions, and found that conveying entrepreneurs' credibility, professional organizing, as well as their ability to demonstrate organizational achievements and fruitful stakeholder relationships, all help acquire resources from external stakeholders. Other scholars similarly found that social ties and reputation are crucial factors for convincing stakeholders (Dew, Read, Sarasvathy, & Wiltbank, 2008; Rindova, Williamson, Petkova, & Sever, 2005; Sarasvathy, Dew, Read, & Wiltbank, 2008; Wood & McKinley, 2010).

In addition to the confirmation of previous research, the observation of the implementation process also draws attention to the interactions between the conveying claims and legitimizing actions. The actions of claim conveying impact the building of an alliance with external partners. Previous studies imply that the information asymmetry impacts the consensus building between entrepreneurs and potential partners (Amit, Brander, & Zott, 1998). On the other hand, results from the interim accomplishments in turn also impact the conveying claims. By providing an image of the final product or service, the interim achievement increases the soundness of the claim or message that the entrepreneurs intend to convey (von Hippel, 1994). This observation brings the cognitive perspective and institutional perspective together, which are however mostly addressed separately in previous studies.

Coupled with the interactions which take place between legitimizing actions and claim conveying actions, there are the interactions which take place in the course of the legitimizing actions as well. The three types of actions furthermore reinforce each other. For example, the achieving of interim accomplishments (e.g. technology prototype) helps to build alliances (agreement on co-developing). The alliances in turn facilitate further achievements.

The observations of interactions between legitimizing and claim-conveying, and the interactions in the course of the legitimizing actions are related to a concept that is called “double interact” (Weick, 1979: 110-118). The claim-conveying actions, legitimizing actions and their outcomes form a “virtuous circle” in getting external resources in the case that they positively affect and reinforce each other through a feedback loop.

To summarize these notes, I develop the following proposition:

Proposition 5: The proactive combination of claim conveying and legitimizing efforts, accelerates the acquisition of external resources in a situation of high uncertainty regarding the prospective product and service.

Yet, has the proactive combination of claim conveying and legitimizing efforts also accelerated the creation of entrepreneurial configurations? The data indicate that there is no simple answer.

The creation of a configuration involves multiple stakeholders for both the technology development and the market construction, and requires their support. These stakeholders use different approaches to evaluate the entrepreneurs’ idea, technologies, and product (Garud & Ahlstrom, 1997). This yields important

implications on how new ventures create entrepreneurial configurations. As the developmental processes of the cases exhibit, the creation of the entrepreneurial configuration involves a variety of participants including sponsors like family members, technology supporters, suppliers, investors, and so on. Very often, every participant has a specific view on the aspects in the development of the configuration. For instance, research institutes or organizations directly involved in the co-development of technology may consider the advances in technology to be the most important, while investors are more concerned about the market scenario than the technical features. Even for VCs, various VCs also have different preferences concerning the developmental stages of new ventures. In this sense, addressing technology development with associated participants only will not always lead to the creation of the entrepreneurial configuration.

To address the combination of technology development and market construction, the cases in this study suggest two alternative ways for organizing implementing actions: 1) a linear sequential way; and 2) a concurrent way. The observations suggest that a linear sequential way of organizing first technology development and later market construction might be not the efficient way in terms of creating a configuration. As the cases of HERO and THUNDER reveal, both are successful in terms of acquiring external resources for the development of their technology, yet both companies face financial difficulty when trying to introduce the product to the market. This observation is in line with the finding of a previous study that there is a gap between technology invention and innovation (Auerswald & Branscomb, 2003). The development of technology and the commercialization of it are not seamlessly bridged.

To summarize these discussion notes, I propose the following proposition:

Proposition 6: Concurrent development of the technology and its commercialization, increases the speed of acquiring external resources and creating entrepreneurial configurations.

The discussions so far haven't touched upon another important question of whether the speed of the entrepreneurship process impacts the ultimate entrepreneurship performance. As previous studies on organizational changes reveal, changing an organization in a more gradual way is less disruptive and better manageable (Quinn, 1978). Rapid changes may be detrimental to the organization's performance (Amis, Slack, & Hinings, 2004). At the same time, some other scholars suggest that organizational changes, in particular, radical transformations, can only be achieved by rapid changes (Romanelli & Tushman, 1994). The observations in

this study don't allow an answer to this question. However, this is an interesting direction for further investigation in the future.

6.1.4 Concurrent adaptation, conceptualization, and implementation processes and entrepreneurial configuration

The data from this study provide empirical evidence for the adaptation process that was previously discussed primarily in a conceptual way. The cases reveal that the entrepreneurial processes involve adaptations in terms of abandoning ideas and sensing new idea components, which trigger and sustain the conceptualization and implementation process as the figure 8 in chapter 5 describes. I further discussed two possible causes for the abandoning of idea components: internal misfit and external misfit.

These findings have a close link to the previous discussion on the configuration. As I discussed in the literature review chapter, the concept of configuration is defined as a status that a new business reaches, when core elements of its founding are connected in a way which allows it to achieve viability and bringing acceptable results. It is about the relationship between core elements (e.g., value proposition for the stakeholders, customers, infrastructure activities, and financing). Built on this definition, the observation of the adaptation actions indicates that the creation of a configuration in essence is a process of addressing misfits (including both internal misfits and external misfits). The misfits emerge from the sensing of new ideas (Siggelkow, 2001, 2002), which is described as a result of social interactions (conceptualization and implementation processes) in entrepreneurship (Mosakowski, 1997). To summarize, in the entrepreneurial process, the entrepreneurs constantly test their ideas, gather feedback, and revise their ideas until they achieve “minimum viable products” (Blank, 2013)⁹.

Based on these discussion notes, together with the findings on the conceptualization process and the implementing process, this research makes possible a description of the creation of an entrepreneurial configuration as a social design process and an emergent process. In particular, abandoning ideas and sensing news ideas and their sources, have expanded on the social design process in a more coherent way. Within each process, the entrepreneur takes actions and receives feedback at the same time, which leads to an adjustment in the entrepreneurs'

⁹ Similar discussion can be found in: Ma, X., Zhou, Z., and Gui, L. (2013), Dynamic capabilities development of new technology ventures - a longitudinal study in China, IEEE International Conference of Technology Management 2013, The Hague, June 2013.

expectations and understanding of what is feasible and valuable (Chiesa & Frattini, 2011). The entrepreneurs interact with the environment in an iterative way so that they test their idea, gain support, and enables learning at the same time, which subsequently helps the entrepreneur to lead an initial idea into an entrepreneurial configuration. In this sense, instead of the Darwinian “survival of the fittest” entrepreneurship here is conceptualized as a process of proactive and frequent testing and revising of entrepreneurial ideas towards the creation of entrepreneurial configurations. To summarize, I develop the following proposition:

Proposition 7: The concurrency of conceptualization, implementation, and adaptation actions increases the speed of creating an entrepreneurial configuration in a situation of high uncertainty regarding the prospective product and service.

As for how a start-up can achieve better performance, however, this question cannot be addressed by the present study. The observations of adaptation don’t allow us to conclude that concurrent conceptualization, adaptation, and implementation would lead to a better entrepreneurial performance. The definition of the configuration as discussed implies that it is not necessarily optimal (Simon, 1996). Rather, it simply describes the status of a new business when the core elements are reinforcing each other. In this sense, it does allow the conclusion that concurrent conceptualization, adaptation, and implementation actions result in a higher chance of survival new ventures. This statement is in line with the previous proposition that a start-up in which entrepreneurs follow a strategy of searching for a viable business model by frequent rounds of experimenting and learning, and not necessarily with a business plan, are less likely to fail (Blank, 2013).

6.1.5 Theoretical implications

To summarize, this research contributes to the development of a social design theory. Specifically, the contributions are three-fold.

First, I empirically ground the conceptual insights derived from prior research. Entrepreneurship scholars believe that the social design perspective of entrepreneurship could help to gain a better understanding of the entrepreneurship process. Departing from three rudimentary assumptions, this study has systematically examined the social design process in the setting of technology entrepreneurship. Actions and interactions performed during the entrepreneurship process have been identified. This investigation covers the stages of idea generation, selection, and the early development process that is hard to study with the traditional approach of

searching data bases. This empirical study systematically analyzes a wide variety of social design actions in the creation of new businesses, how these actions are performed, why they are performed, and what effect their use has on acquiring resources.

Second, I advance theory building by developing a process framework. Several open questions and issues related to the development of a coherent process framework have been addressed. Specifically, this study contributes to the fundamental process issues of 1) “what is the input of the process framework” by illustrating how initial ideas emerge; 2) how the transformation takes places by describing the process of becoming an entrepreneur, the adaptations, and the sources of adaptations; and 3) conceptually discussing the definition of the configuration as “what is the output of the process framework”. The process of adaptation, conceptualization and implementation, together with the concepts of misfit, idea component, new information, general feedback and configuration, form a language which allows for a description of the social design process of new business consistently.

Thirdly, this study also develops propositions which can be elaborated into more specific hypotheses, and be tested in future research in a quantitative fashion. Drawn from the empirical observations and theoretical conversation in existing literature, seven propositions regarding different phases in the social design process (e.g., the emergence of initial ideas, becoming entrepreneurs) have been developed.

6.2 Connecting the results with associated entrepreneurship research

In the first part of this chapter, I revisited and discussed the findings of this study in terms of contributing to the theorizing of the social design perspective. In this second part, I link these results to the relevant extant entrepreneurship studies which build on alternative existing theories from other domains, and further discuss the supplementing impact that the social design perspective might bring to them.

In the following, I first link the social design perspective with the research of planning in entrepreneurship, given the fact that social design perspective is a framework that allows studying “planning without goal”. Then I switch my focus from planning to the connection between the implementation process in the social design perspective and collaborative innovation. They are chosen because both strongly emphasize the “co-creation” – the proactive involvement of external

stakeholders in the entrepreneurship process. Finally, I discuss the link between research of leadership and the social design framework given the fact that both are concerned with the process of reaching a goal by using subjective social influence.

6.2.1 Conceptualization and planning

In entrepreneurship research, planning is generally regarded as efforts of collecting reliable and precise information associated with the future prospects of the sensed ideas (Brinckmann, Grichnik, & Kapsa, 2010; Castrogiovanni, 1996), or writing associated business plans which typically provide information regarding the unmet market demand, the product or service to be developed, the resources required, and the expected profits (Liao & Gartner, 2006). Described in this way, the concept of “planning” is close to the conceptualization process in the social design framework (figure 8) insofar as entrepreneurs engage in both informal interactions and formal engagement, to evaluate and develop their initial ideas.

6.2.1.1 Planning and entrepreneurship

Business planning is generally considered to be an important issue for entrepreneurship researchers, entrepreneurship education providers, and entrepreneurs. The business planning associated courses mostly play an important role in the entrepreneurship curriculum offered by universities (Honig & Karlsson, 2004; Menzies, 2009). Many business plan competitions which aim to foster entrepreneurial activities have been organized in many countries (Lange, Mollov, Pearlmuter, Singh, & Bygrave, 2007). With growing interests in business planning, the considerable research efforts which are devoted to this theme are predominantly concerned with its impacts on new business performance (Brinckmann et al., 2010).

However, these efforts haven’t brought about a unitary result so far. The debates on whether business planning indeed positively impacts the new business performance remain (Brinckmann et al., 2010; Gruber, 2007). For the studies that view planning as a set of activities, some researches suggest that business planning activities are positively related to the new business performance (e.g. Delmar & Shane 2003; Liao & Gartner, 2006), as, performing business planning activities helps to effectively allocate resources, accelerate product development and decision making, and turn abstract goal into operational steps. A similar argument that business planning positively influences the new business performance has also been found in the studies that view business planning strictly in the form of written documents. Studies adopting legitimization theory, for example, claim that business

plans are helpful in signaling the capability of the entrepreneurs which goes beyond the planning activities themselves (Brinckmann et al., 2010), and also enables better communication with external stakeholders in certain situations, for example, applying for public subsidies. A written plan for such an occasion is mostly a response to the external pressure, rather than an approach which helps obtain better prediction on the aspects of the prospective business (Honig & Karlsson, 2004).

In contrast to these studies which propose that business planning is beneficial for the development of new business, some other studies suggest that business planning does not bring benefits for new business, and can sometimes even be detrimental to its development, as, a detailed plan can stifle the organizational flexibility (Karlsson & Honig, 2009). A recent research study of 623 entrepreneurs with a longitudinal method of examining both the role business planning activities and the symbolic role which written plans play, suggests that business planning doesn't positively impact new business's performance at all (Honig & Samuelsson, 2012).

Given these mixed findings, scholars postulate that there are contingencies at play, and accordingly examine contextual factors with the aim of resolving these discrepancies. Thus far, a number of moderating factors for the causal planning-venture performance relationship have been identified. For example, the development stages of the new ventures (Delmar & Shane, 2003; Gibson & Cassar, 2005), the novelty of the new business (Shepherd, Zacharakis, & Baron, 2003), the cultural setting (Schneider & De Meyer, 1991), the dynamism of the founding environment and the types of planning activities (Gruber, 2007). These studies indeed bring a contextualized understanding to the business planning in the development of new businesses.

Further, to the investigation of the causal relation between planning and venture performance, another relevant research topic is the relationship between planning and rational decision-making. Researchers from this group link the value of planning to the rational decision model. According to them, the main purpose of planning is to pursue the best ideas and terminate the bad ones. To achieve that, the entrepreneurs expect to obtain reliable information concerning the future prospects of the planned venture (e.g., information about customer segments, marketing channels), in order to estimate the consequences of alternative actions. With this information, they are able to figure out the best solutions based on mathematical calculations. In this sense, the value of planning completely depends on the possibility of gathering precise and reliable information associated with every possible result of the decision (Chwolka & Raith, 2012). This kind of precise and reliable information is also

referred to as “diagnostic information” (Arora & Fosfuri, 2005). This line of thinking has a strong linear impact on how entrepreneurs make decisions. They believe that the entrepreneurs first can identify and, second, can choose the better option. Proper planning will allow a look at the full decision context with all possible actions (Casson, 2005).

Different from this line of thinking, a “learning school” of planning has been emerging and advocates that the entrepreneurial planning take a flexible means of making decisions, learning, and changing decisions in response to the rapidly changing environment (Hough & White, 2003; Wiltbank, Dew, Read, & Sarasvathy, 2006). This line of thinking implies that the initially planned strategy can be implicit and abstract and is elaborated on during the entrepreneurship process. They stress the parallel activities of planning, decision-making and learning across the whole entrepreneurship process, in order to capture emerging opportunity (Mosakowski, 1997).

6.2.1.3 Linking the conceptualization process to literature of planning

By bridging these discussions in the literature and the findings of this study, the social design process framework supplements previous research on planning and entrepreneurship, in at least two ways.

First, what is planning? Along with the emerging “learning school” of planning research (Brews & Hunt, 1999; Wiltbank et al., 2006), the social design process framework provides an incremental process perspective on planning in entrepreneurship. Instead of relying on precise predictions and detailed plans, the results of this study suggest that entrepreneurs adopt a planning strategy of a developmental nature. The entrepreneurs should focus on adaptation in response to changing external environments. This perspective of course is not saying that planning is not important, but rather, it presents a new lens for studying the relationship of planning and venture performance other than the formal approach which emphasizes the relationship between the detailed outcome of planning (e.g. written business plan) and the venture performance (Liao & Gartner, 2006).

The overlaps between the learning school of planning and the social design perspective, for example, suggest a new aspect of business planning – the content of planning - for further study on the business planning activities and new business performance. As discussed above, extant research hasn’t considered the content included in the written business plan or the results of business planning activities which critically determine the quality of business planning activities. Moreover, the

business plans also differs in terms of long-term plan vs. short-term plan. Following the idea of “learning school” of planning and the social design perspective, the long-term planning seems less effective in the context of new business for several reasons. First, a new business faces high degree of uncertainty which makes collecting information regarding the long-term future more challenging. Second, planning becomes more effective when learning occurs, and learning is more likely to happen when the entrepreneurs test and experiment with the idea. To summarize these discussion notes, it suggests that business planning is more effective when the content of the plan can be implemented in a shorter time span. In other words, short term planning is more suitable for new business development.

Second, we turn to the relationship between planning and decision-making. This research brings new ideas concerning the value of planning activities by incorporating social elements in the decision-making process. Instead of the pure value attached to the diagnostic information received from planning, the data suggests that both collecting new information and receiving positive feedback from interaction with peers, helps to mitigate the uncertainty and ultimately influence the decision making of entrepreneurs.

6.2.2 Implementation and collaborative innovation in SMEs

The process of implementation observed in this study has a close relationship with extant research on collaborative innovation in SMEs. These two are closely related because both of them highlight the “co-creation” – the proactive involvement of external stakeholders in the entrepreneurship process.

6.2.2.1 collaborative innovation in SMEs

The argument that acquiring resources and competencies over and beyond organizational boundaries is crucial for profiting from innovation (Teece, 1986), has long been held by scholars. It holds particularly true for new technology-based business. Scholars believe that collaborative innovation is an efficient mechanism for new ventures to address their entrepreneurial challenges resulting from their newness and small size (Baum, Locke, & Smith, 2001). Most of the new ventures are constrained by financial resources (Carpenter & Petersen, 2002), and by the need for complementary resources to capture the value of the innovative technologies they develop (Gans & Stern, 2003; Teece, 1986). Collaborative innovation therefore could help to address these challenges because it allows for accessing resources and competencies well beyond those possessed by these partners.

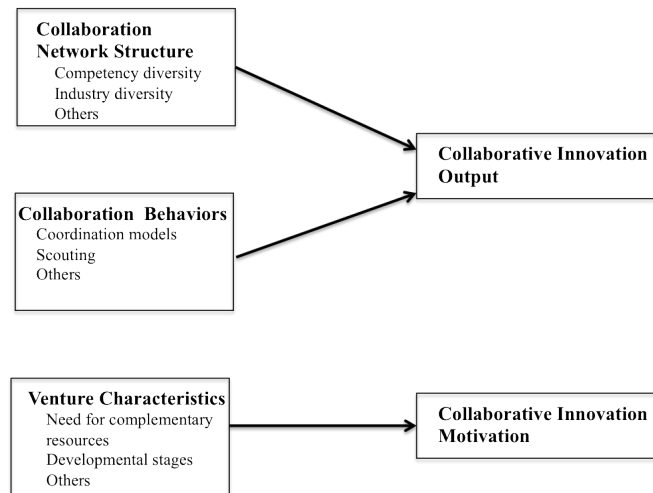


Figure 9 Three research themes in the inquiry into collaborative innovation in SMEs

Looking into the existing literature, three research themes have slowly emerged from the inquiries into collaborative innovation in SMEs, as the above figure exhibits. Specifically, they are 1) the relationship between the collaboration network structure and innovation performance; 2) networking behavior and innovation performance; 3) the antecedents that lead to the motivation for collaborative innovation.

First, we turn to the relationship between the collaboration network structure and innovation performance. Scholars in this area typically develop constructs to measure the collaboration network structure in a quantitative way, and to link them to the innovation performance. Specific constructs developed include competency diversity, e.g., capabilities (Goerzen & Beamish, 2005), functions and value chain stages (Jiang, Tao, & Santoro, 2010; Miotti & Sachwald, 2003), as well as the type of knowledge, and network structure diversity, e.g., industry diversity (Jiang et al., 2010), collaboration with non-profit organizations (Lasagni, 2012), and the geographical location of partners (Piscitello, 2011).

Second, some other scholars examine the various forms of collaborative behavior of SMEs and their impact on innovation performance. Scholars attempt, for example, to link these actions to the innovation performance by examining the coordination modes attached to collaboration innovation projects (Gardet & Fraiba, 2012), internal R&D efforts, and open innovation behaviors such as scouting or sourcing (Parida, Westerberg, & Frishammar, 2012), and subsequently develop

constructs measuring the networking behaviors like innovation breadth (Gardet and Fraiba, 2012).

Third, going beyond the impact of collaborative efforts on performance, many scholars also focus on the question of what the antecedents are that lead to the motivation for collaborative innovation. Scholars from this stream extend the research scope of collaborative innovation by shedding light on the pre-collaboration stage, to understand the factors that determine the emergence of collaborations. They mainly look at venture characteristics, for example, the need for complementary resources, and the developmental stage of the venture (Rivkin, 2000). Katila and his colleagues (2008) illustrate this with their investigation of the “Sharks dilemma” of new ventures, i.e., a situation where new ventures need resources (e.g. manufacturing and marketing) and at the same time they need to protect their own core resources (e.g. technical expertise) by implementing some protection mechanisms (e.g. patenting). On the one hand, new ventures are very often pushed to form collaborative relationships with external partners for needed resources (Zaheer, McEvily, & Perrone, 1998). On the other hand, they tend to stay away from collaborative relationships because of possible misappropriation of key core resources by their partners (Gulati, 1998; Ahuja, 2000; Katila & Mang, 2003). In such a situation, the decision in favor of collaborative innovation depends on a set of factors including the degree of need for resources, access to legal defense mechanisms and the availability of alternative partners (Katila, Rosenberger, & Eisenhardt, 2008).

All in all, despite these research efforts on the understanding of SME collaboration, few studies have been found dedicated to the process perspective on how these collaborative innovation efforts emerge and how they evolve. Inquiry into the positive impacts associated with performing collaborative innovation has dominated previous studies (Das & Teng, 2002; Ring & Ven, 1994). Indeed, collaborative innovation does bring a variety of benefits to small businesses. It is also a challenge for emerging entrepreneurial organizations, however, because they lack resources and proven competencies (Zott & Huy, 2007). This challenge is exacerbated by the information asymmetry between entrepreneurs and potential partners. In particular, in a setting characterized by a high level of uncertainty, the potential partners are usually reluctant to make commitments in terms of an investment of their precious resources to new ventures, as the findings of this study that are associated with the implementation process demonstrate.

6.2.2.2 Tie creation process framework and collaborative innovation in SMEs

There are at least two causes for the limited advance in understanding of the process perspective on collaborative innovation in prior research. First, the dominant variance theorizing approach excludes a time effect in the collaborative innovation research. Most of the extant research examines the causal relationships in the phenomenon of collaborative innovation. This has left the transformation of networks largely unexamined.

Second, the previous studies on collaborative innovation are dominated by the “resource dependence theory” for examining why technology ventures need to engage in innovation collaboratively (Pfeffer & Salancik, 1978; Teece, 1986). This does not constitute a process framework however. According to this perspective, a small firm could not require so many different types of resources to control all the steps and aspects of innovation process (Dhanaraj & Parkhe, 2006). This perspective has a strong emphasis on the formation of relationships in order to meet the venture’s need for resources. Although a few studies recently have been increasingly incorporating the ideas from social capital theory (Gulati & Gargiulo, 1999), still, this research leaves other roles, such as the environment in the entrepreneurship process, insufficiently examined.

The social design perspective could potentially contribute to the research of collaborative innovation in SMEs in two ways. First, the social design perspective with its process nature is a suitable theoretical lens for the question of how networks emerge and how they evolve. The observations of the implementation process in this study have provided some preliminary evidence to this effect. Secondly, the close links between the implementation process and collaborative innovation point to one of the central elements of the social design perspective – co-creation. The previously dominant resource dependency view emphasizes that collaborative innovation enlarges the start-ups’ competence endowment (Teece, 1986; Gans & Stern, 2003). The social design perspective extends the role of external peers from a resource provider to a co-creator. The participants collaborating with the entrepreneur can, for example, help to convince other potential participants of the viability of the ideas. In addition to the resources, collaborative innovation can help to gain legitimization from external participants.

6.2.3 The social design process and entrepreneurial leadership

The findings from this study also raise questions about the role of leadership in the social design process. I observe that entrepreneurs engage in a variety of actions to influence external participants and get them also convinced of the entrepreneur's claim, and to co-create the entrepreneurial configuration. It is very clear, given the high uncertainty and lack of resources that the entrepreneurial configuration cannot be achieved without the aid or support from external stakeholders like employees, investors and suppliers. In this sense, the entrepreneurs indeed exhibit leadership in the developmental processes.

Viewing leadership as part of the social design process also raises the question of exactly what role leadership plays in the creation of the entrepreneurial configurations. Unlike previous researchers who have emphasized the leaders' role in influencing other participants to create and trigger change (Yukl & Falbe, 1990) and examine different leadership styles, for example, visionary leadership (Westley & Mintzberg, 1989), or relational leadership (Brower, Schoorman, & Tan, 2000), I observe that in the social design process, the leaders' interpretation of the changes during the adaptation process was important. Especially concerning the actions of revising and abandoning ideas, the entrepreneur showed leadership. In this way, the entrepreneur served as an "interpreter", giving meaning to the changes that were unfolding rather than creating and directing the changes alone.

However, can the creation of the entrepreneurial configuration be attributed to leadership alone? If it this were the case, the creation of entrepreneurial configuration is achieved as soon as the entrepreneurs decide to implement sensed ideas. Yet, this was not the case, as, many companies in this study demonstrate that it takes many years before the entrepreneur successfully turns the initial ideas into entrepreneurial configurations. As I discussed in the beginning of this chapter, entrepreneurial configurations emerge from the interaction between an initial idea which surfaces from the ambition to become an entrepreneur, and the external environment, together with entrepreneurs who are convinced of and passionate about the objectified ideas. It is a result of constant adaptations. In this process, the entrepreneurs influence the external environment, but at the same time they are influenced by the external environment. For example, as the case of TRAVEL shows, the founder was intending to introduce a smart driving system to the private car market. As the entrepreneurship process unfolds, the entrepreneur's perception has been influenced by the environment, and accordingly he changed the product development strategy.

One compelling research issue related to leadership emerges when we think about entrepreneurship as a social design process. Previous research has examined the impacts of entrepreneurial leadership behavior on new business performance mostly done in a variance fashion (Ensley, Pearce, & Hmieleski, 2006; Hmieleski, Cole, & Baron, 2012). Ensley and his colleagues (2006) found, for example, that the dynamic environment has a moderating effect on the causal relationship between entrepreneurial leadership behavior and new business performance. Despite these contributions, this line of research inherently assumes that leadership is due to certain stable traits of the individual. Researchers don't view leadership as a process concept. Those key bits of feedback from outsiders to the entrepreneur may play the decisive role in allowing him/her the courage to take on the leadership role, for example, whilst continual positive feedback and also warranted criticism may be required in order to sustain the proper balance of healthy leadership for taking on entrepreneurial pursuits. In the conventional understanding of entrepreneurial leadership, however, the interactions between the environment and leadership are ignored and fall far short of explaining what goes on in this process. , Entrepreneurship studies appear to be a promising area for research on leadership, in particular, for examining the development of leadership, because, as the social design perspective implies, the entrepreneurs proactively engage in the construction of external environment on the one hand, and are simultaneously influenced by these engagements on the other.

6.3 Implications

Practitioners such as prospective entrepreneurs, entrepreneurs, policy makers, and entrepreneurship educators can benefit from this research. For prospective entrepreneurs, firstly, I offer encouragement: entrepreneurship is not only for geniuses. A viable idea is not achieved by planning; instead it is the result of a long learning process. Thus, starting early is a good way to come up with the viable idea. Secondly, original ideas can stem from hobbies, visions, or unsolved challenges, and can ultimately turn into entrepreneurial configurations if they are refined in the entrepreneurial process.

For entrepreneurs, firstly, I add a process perspective to the action checklists established in the literature by addressing the questions of “when”, “to whom”, and “why”. Secondly, the entrepreneurship process is design, not only planning. Specific skills in analytical and logical thinking, business planning and entrepreneurial marketing, are valuable in entrepreneurship. Yet entrepreneurs are strongly advised

to adapt the “social constructivism” perspective to combine planning skills and creativity, in particular, in the early stage of technology entrepreneurship when the information that is required for a rational decision doesn’t exist yet. Thirdly, our research points to the importance of interacting with the network. Building and sustaining networks is important even if the entrepreneurs fail to acquire resources from them. By forming ties with established organizations, entrepreneurs can learn and shape a compelling image that complements liability of newness of new ventures.

The key thesis of this research for policy makers is that, the economic means of supply-oriented public support is not enough. The research result points to a policy design that aims to foster entrepreneurship activities and facilitates the growth of start-ups in three ways. First, by providing cheap resources to facilitation--this research suggests that instead of providing cheap resources in the form of subsidies to start-ups, for example, governmental technology entrepreneurship programs and initiatives should focus on facilitating the interactions between entrepreneurs and their environment to accelerate the entrepreneurship process. This could be done with such measures as facilitating networking initiatives, clusters, living lab initiatives in Europe. Secondly, from business planning to learning capabilities: technology entrepreneurship addresses both technology development and market creation. It is highly uncertain regarding the performance. In practice, to identify fast-growing ventures, policy makers so far only rely on the screening of well documented reports, such as business plans. This study suggests that, instead of screening ventures based on numbers and detailed reports, the policy makers would be well advised to pay more attention to the entrepreneurial process to track the adaptation behaviors of the founding. Thirdly, from a supply oriented approach to an ecosystem perspective: policy makers are very keen to weave a net between entrepreneurs and investors. This is by far insufficient. The nurturing of start-ups also requires information, advice and the simple introduction to the right people. Therefore policy makers should not neglect the importance of other crucial stakeholders like professional service providers, engineering and technical talents. In this sense, the policy makers are advised to build a wider interactive talent web including brokers and functional professionals like engineers.

6.4 Limitations

I recognize at least two limitations to this study, although I firmly believe that a process study with multiple cases study method to studying entrepreneurship is suitable for developing an emerging theory. First, this study is based upon a small sample of 12 cases in a kind of laboratory setting (e.g. similar background, getting initial seed fund from local government, operating in high-tech industries). All of the participants in the study have achieved some measure of entrepreneurial configuration. Some of their behavior and methodologies may nevertheless not represent best practices. I advise carefully generalizing the results to other contexts.

The second limitation regards the data collection. The principle informant in this study is the founders of the new ventures, and it is possible that the informant's personal issues, such as experiences, memory, thoughts, and opinions could have influenced the narrative of the entrepreneurship process. I relied on multiple data sources (e.g. newspaper articles, internal organizational documents) to triangulate the self-reported data from the interviews. Yet all in all, as in any qualitative research, the concern on the objectivity of the data remains.

6.5 Future research directions

The developed social design process model opens, at least, two areas for future research. First, we examine the exploration of entrepreneurial configurations. As defined in this thesis, configuration is a status that a new business reaches, when core elements of a new business are connected in a way which allows for the achievement of viability. However, this study didn't contribute much to the operational aspects of this concept. To advance the understanding of this concept, I suggest that future research explore this concept and take a two-step approach: identification of core elements of new business and of the ideal types of entrepreneurial configurations. The identification of core elements calls for research efforts to figure out a set of related variables that are weaved together and play an important role in the new business development. Parallel to the identification of core elements, developing ideal types of entrepreneurial configuration via both theoretical and empirical analysis is also important for the operationalization of this concept.

Second, explicating the boundaries of the social design perspective by addressing the setting in which entrepreneurs are more likely to take a social design logic would be necessary. It involves the generality of theory. The interesting

observation of this study is that all selected cases show a social design logic, in particular at the early stage. Such a finding is also connected to the limitation of case studies. A more broadly designed study is necessary to generalize these research results. Two possible factors for making the boundary clear are the settings where the entrepreneurs operate, and the uncertainty of the ideas.

Future research could tackle the question by grounding empirical examination in different fields. One possible field could be sustainable innovation. The triple bottom line of sustainable innovation involving economic, ecological and social issues, makes an excellent territory for the further development of the social design perspective. It provides direct applications to this field, as, this promising framework acknowledges both subjective and objective attributes of entrepreneurial actions.

Appendix

Interview Protocol

Part 1 The emergence of initial idea and becoming entrepreneurs

1. Could please give me a brief description of your founding team's
 - a. Education experience
 - b. Working experience
 - c. Entrepreneurial experience
 - d. If there is a founding team, then how was this team is formed
2. Tell me about your initial idea that triggered you to launch this start-up
 - a. What was the idea?
 - b. How and when did the idea occur to you?
 - c. What were you thinking about and how did you feel?
3. How did you become passionate about and convinced of the idea?
 - a. Who was involved?
 - b. How did you interact with them? Does it help?
 - c. How did you know it was a good idea?
 - d. Have you tested your idea?
4. The funding of start-up
 - a. When was this company is launched?
 - b. Initial funding structure?
 - c. What were the initial challenges when you launched the company?

Part 2 The implementation

1. Could you please describe the status quo of the company
 - a. Product development
 - b. First sale
 - c. Marketing strategy
 - d. What are the challenges regarding marketing?
 - e. Who are the firm's main (planned/potential) customers?
 - f. Did the number of customers change?
 - g. How did you get or how do you plan to get access to these customers?
 - h. What are the challenges at the moment and do how you plan to manage that?

2. Did you receive external financing or do you plan to get external financing?
 - a. How many times did you receive external financing? And when?
 - b. What are the financing sources?
 - c. Why they invest?
 - d. How did these external financing occur?
3. How do you know you hired good people?
 - a. What are the most important requirements for new employees
 - b. What is the main source for new employees
 - c. How do you keep your employees (staff turnover)
 - d. What are/were the key challenges of the HRM and how do/did you manage that?
4. Could you please provide an brief introduction on the business environment
 - a. Who are the firm's main (potential) competitor?
 - b. How do/did you learn about the competitors' behaviors?
 - c. How did/do you respond to their behaviors? And when was that?
5. How do you see the relationship with external partners? The business relationships are formal and information relationships that are or have been, important to the company. This may be a business partner, or an individual or organization important for the company to acquire resources, knowledge, and information.
 - a. Who are the partners?
 - b. The motivation?
 - c. How these cooperation take place?
6. Were there any big changes since the firm started its operation?
 - a. Product/ customer?
 - b. Financing?
 - c. Infrastructure/ technology?
 - d. When were the changes?
 - e. What are the sources for these changes?
 - f. What does entrepreneur learn from these changes?

Part 3 Technology environment, legal and administrative environment

1. Were there any significant changes in technology or knowledge base since the firm started its operations? Give examples
 - a. Was the firm involved in these changes?
 - b. How does the firm learn about these changes?
2. How do you see the local entrepreneurial environment?

- a. Are the national/local regulatory requirements clear to you?
- b. Are there any preferential policies that your firm also benefits from?
- c. Do changes in national/local requirements/policies occur often?
- d. How do you keep following the policies and requirements?
- e. Are there any policies that inhibit the development of your firm? Give example
- f. What do you have in you mind to improve the local entrepreneurial environment?

Coding book

Code	Description	Example
Initiating factors		
Initial idea	The initial trigger of the entrepreneurship process	To develop a technical solution for a deficiency in the existing chemical treatment approach in manufacturing Integrated Circuits (IC). (HERO)
Sensing initiating factors		
Sensing via experiencing	Knowledge accumulated bears a close connection to the initial idea, and the knowledge accumulation efforts occurred before the ambition was formed	“...The founder has been working for the R&D department in an industrial company and at the university full time for almost 15 years. This allows him cutting edge knowledge regarding mapping, sensor and image processing technologies...he thought about a smart driving solution out of the knowledge accumulated...”(TRAVEL)
Sensing via observing	Knowledge accumulation has a close connection to the initial idea, but the knowledge accumulation is instead driven by the ambition of becoming an entrepreneur;	“...My business partners and I had been working in the USA for quite some time. We had long been thinking of doing something together. Actually before setting up this business, I had one start-up in the field of wireless communication since 2004 in Beijing, but the business there has nothing to do with this one I’m running...this idea emerged from my scanning of the market and network. I identified the surging solar panel market in China, and I see the connections between this market demand and the expertise from my network...” (WIND)
Sensing via envisioning	The link between knowledge accumulation efforts and the initial idea was not obvious. The entrepreneur is mainly driven by the ambition of becoming an entrepreneur and other endogenous factors such as one’s hobby, for example.	“...It’s our hobby. I think almost every boy is fascinated by aircraft models just like when we were young boys. But my family couldn’t afford it at that time. Now we have time and some money that could be invested in our hobby...” (HOBBY)

Coding book (Continued)

Code	Description	Example
Conceptualization		
Informal interactions	Short conversation or verbal exchange.	Talking to friends and family members
Formal engagements	Formal ways of testing and developing initial ideas	Participating in business plan competition
Implementation		
Conveying claims	Point-to-point contacting	"...In the year of 2009, right after we developed our facial recognition computation solution, I was planning to build a pilot market. The biggest challenge for me is that the concept of facial recognition has been used like a buzzword that has been overused by some opportunists. People knew it, but also held heavy doubts about the solutions that are connected to this buzzword. To relieve their concern, what I did was to visit potential customers one by one, explain my solution to them again and again. If you don't do it, they ignore you..." (VENUS)
	Presenting at professional events	"...The main channel for accessing the potential customer is solar panel exhibitions and relevant industrial fairs. We usually attend twice every year. One trip to a domestic one within China, and make another one to an international one..." (WIND)
	Leaning on media channels	"...In 2009, we got two contracts with two large industrial customers...as to the question of how they got these two contracts, I would say we were well known in China in this field in terms of technology development. The reputation is partly due to media articles. We are good at disseminating by articles. Just as an example, before we reached the stage of prototype, Chinese Forbes Magazine spent two and half pages introducing our company. Quite a number of companies (potential customers) found us through this article. In addition, we also have a good relationship with large portal websites in China, for example Sina, Tecom..." (CAPITAL)

Coding book (Continued)		
Code	Description	Example
Legitimizing	Achieving interim accomplishments	“...Indeed, IPR does help an organization to protect their knowledge to some extent. However, it doesn’t mean that much for new ventures in China...it takes time and money to for the filing, and you never know if it will work out or not...you might ask then why I still apply for IPR? The answer is quite simple, it helps you to get external resources...just for example, if you want to apply for government support, patent matters a lot...” (VENUS)
	Networking with legitimized partners	“...Disseminating information on the frequent networking activities like participating in the industrial exhibition, organizing academic seminars, help in attracting more attention from a broad ranges of participants, for example, the venture capitalist, and potential customers...” (THUNDER)
	Harness the third parties “neutrality”	“...To deliver a speech at the top 10 potential innovative start-ups in China, does not really make sense, in my eyes. It’s just a title. There are quite a few ‘awards organizing’ organizations, they charge the attending organizations and make money out of that...people believe that title matters...in my case, of course, I’m not going to pay for it. It’s an award ceremony organized by one of the most influential magazines, <The Founders>. It might be a good opportunity to espouse my company in the flashlights...” (WIND)
Adaptations		
Sensing new idea components	A new plan that reinforces the implementation of the existing idea.	Regarding the potential applications, the founder thought the product could be applied in the field of soilless agriculture. (THUNDER)
Abandoning idea components	Suspending the implementation of actions, or giving up plans that are yet to be implemented.	The initial idea for the VENUS was to develop facial recognition to blur faces for digital video. But later, the founders abandoned the ideas because the market is too small in their eyes. (VENUS)

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