

# ENTREPRENEURSHIP AND DIGITAL FABRICATION. A NEW INDUSTRIAL REVOLUTION?

Chiara Cantù  
Cattolica University, Milan  
[chiara.cantu@unicatt.it](mailto:chiara.cantu@unicatt.it)

## ABSTRACT

Even if in a traditional perspective the discovery and the exploitation of opportunities are related to entrepreneur capabilities, an external perspective is required to better analyze the phenomenon.

The main aim of this paper is to investigate the new managerial approach that can be adopted in the process of discovery and exploitation of entrepreneurial opportunities. With reference to this process, the paper analyzes the new role of FabLab in digital fabrication development.

The birth of digitalization of manufacturing – or digital fabrication – has started decades ago with the progressive adoption of Computer Numerical Control machines and other computer-controlled manufacturing systems. The innovation trend has significantly accelerated over the past few years, in particular because of the advent of 3D printing technologies.

The paper applied a qualitative method (Dubois and Araujo, 2004) and a case study approach (Barrat et al., 2011) focused on a FabLab located in Lombardy Region.

As depicted in the findings, the entrepreneurial opportunities are discovered and exploited through interconnected relationships that outline the Digital Fabrication Network. The discovery and the exploitation of opportunity are influenced by jointness of actors and their co-evolution.

**Keywords:** Entrepreneurial Opportunity Discovery, Entrepreneurial Opportunity Exploitation, Digital Fabrication Network

**Competitive paper**

## INTRODUCTION

The field of entrepreneurship is considered by Shane and Venkataraman (2000) as the “scholarly examination of how, by whom, and with what effects opportunities that create future goods and services are discovered, evaluated, and exploited” (p. 219). This definition requires to reconsider the traditional interpretation of opportunity related to the entrepreneur.

In an internal perspective, the opportunity discovery and exploitation are founded on the main capabilities of entrepreneur. Strategic management scholars (Christensen, 2011) and economists (Schumpeter, 1934) focus mostly on describing the work and outcomes of innovative entrepreneurs who introduce new technology based products and services that disrupt of the status quo. Some opportunities might arise as a result of the innovative activity of the potential entrepreneur, making the innovator the only one who is in a position to observe the existence of the opportunity. Thus entrepreneurship occurs when an individual acts to take advantage of a profit opportunity that presents itself in the market.

Differently, adopting an external perspective, entrepreneurial opportunities discovery and exploitation are influenced by external forces. Some studies consider factors related to specific situational context such as population, income, R&D employees, educational degrees, university R&D, creativity, foreign population, political structure, and others in a (Armington and Acs, 2002; Audretsch and Lehmann, 2005; Brixey and Grotz, 2007; Kirchhoff et al., 2007; Lee et al., 2004; Wang, 2006).

Moreover depicting the opportunities as the launch of new products or services, the discovery and exploitation process are limited to the interpretation of market opportunities. Some opportunities arise because people see that the market offers an entrepreneurial opportunity, perhaps as simple as buying something cheaply in one location and selling for more elsewhere, or perhaps as complex as buying inputs, combining them in a new manufacturing process, and selling a new product for a profit (Holcombe 2003).

A wider perspective of analysis is required to investigate entrepreneurial opportunities considering that the “entrepreneurship” can be also related to new business (Woodside et al., 2016). Entrepreneurship can be conceptualized as the discovery of opportunities and the subsequent creation of new economic activity, often via the creation of a new organization (Reynolds, 2005). In this context, the opportunities are central to the process through which new economic activities and organizations come into existence (Shane and Venkataraman, 2000).

The interconnected relationships within a wide variety of entrepreneurial actors, including start-ups and new ventures (Jennings et al., 2013), access to information, advice and influence as well as resources held by others (Hoang and Antoncic, 2003). Entrepreneurial opportunities exist when resources are turned from inputs into outputs or because different agents have differing ideas on the relative value of resources (Alvarez and Busenitz, 2001). The opportunity development process can be seen as a part of the entrepreneurial process, where opportunity discovery, or creation, precedes the exploitation of the opportunity (Shane and Venkataraman, 2000) and where interconnected relationships influence the management of resources and thus of entrepreneurial opportunities.

In this context, the importance of geographical proximity should be examined in relation to other dimensions of proximity that may provide alternative solutions to the coordination of relationships (Boschma, 2005). The proximity influences learning, knowledge creation and innovation (Amin and Wilkinson, 1999). In particular, relationships influence the firm to create and capture value (Øiestad and Bugge, 2014).

Differently to traditional interpretation of social network, this paper investigates business relationships adopting the Industrial Network approach. The interface of interactions between actors (Storbacka and Nenonen, 2011) can be conceptualized as “co-evolutionary force in

networks” (Welch and Wilkinson, 2002) promoting collective ideas and thus a collective action related to entrepreneurial opportunities.

Going more in depth, in an industrial perspective, the interconnection of the relationships creates a value network founded on collaboration, with different actors in order to share resources (Håkansson et al., 2009). The latitude of the business in the resource constellation activity pattern and web of actors is important for business development (Snehota, 2011).

The main aim of this paper is to investigate the new managerial approach that can be adopted in the process of discovery and exploitation of entrepreneurial opportunities. With reference to this process, the paper analyzes the new role of FabLab in digital fabrication development.

The paper applied a qualitative method (Dubois and Araujo, 2004) and a case study approach (Barrat et al., 2011). This Italian case, related to a FabLab located in Lombardy Region, belongs to a wider research.

The findings outline how new industrial revolution is founded not only on new technologies but on the collective discovery and exploitation of entrepreneurial opportunities. Even if the FabLab was associated to new technologies such as 3D structures, thus considered as a technical prototyping platform for innovation and invention, nowadays it is a facilitator of business relationships in digital fabrication network. As the findings outline, in the business network the FabLabs are born with the aim to “enable people to define problems, prototype solutions and products and thus give birth to new businesses”. As a new actor in business ecosystem, the FabLab allows the exploration of knowledge, the innovation creation supporting the development of new ventures. The FabLab sustains new ventures to benefit from the potentialities of new digital fabrication in order to create innovative solution.

## **ENTREPRENEURIAL OPPORTUNITY DISCOVERY AND EXPLOITATION: DIFFERENT PERSPECTIVES OF ANALYSIS**

The concept of entrepreneurial opportunity is central for the entrepreneurship studies. Key question that all would-be entrepreneurs face is finding the business opportunity that is right for them.

As defined by Venkataramen (1997) entrepreneurship is “the discovery, evaluation, and exploitation of future goods and services”. As follows, the act of entrepreneurship is based on two fundamental premises: (1) opportunity recognition and (2) the formation of intentions to respond actively to the opportunities discovered (Shane and Venkataraman, 2000).

In a traditional perspective, the discovery of opportunity was related to the entrepreneur: an entrepreneurial opportunity is a situation where entrepreneurs can take action to make a profit. Shand and Venkataraman (2000) introduced the concept of the individual– opportunity nexus. This notion makes the point that micro-level explanations of entrepreneurial action and outcomes should look beyond the individuals involved. Entrepreneurial opportunity emerges at individual aspirations with economic and social conditions perceived as favorable to create a new product or service, either in an existing market or a new one.

In a traditional perspective entrepreneurship is associated with individuals who recognize and act upon a business opportunity. New business formation is founded on one-way process from the opportunity discovery to the opportunity exploitation developed by individual entrepreneurs. A related assumption is that the individual entrepreneur is essential to opportunity discovery and exploitation. Opportunity recognition coincides with, or precedes, the formation of intentions to set up a new business, specifically because opportunity recognition often involves an instantaneous affective response, but intentions may also be formed after a period of deliberate and focused search (Gaglio, 2004).

The centrality of entrepreneur is also related to the creation of opportunity. In the literature on entrepreneurship, there is an ongoing debate on whether opportunities are discovered or created (Venkataraman et al., 2012; Short et al., 2010; Vaghely and Julien, 2010). The Discovery View (Ardichvili et al., 2003; Cornelissen and Clarke, 2010; Wood and McKinley, 2010) and the Creation view (Alvarez and Barney, 2007; Alvarez et al., 2013) define the “opportunity” in a rather external-objectivistic manner as a market imperfection, although it is emphasized that “opportunities” can be socially constructed. Entrepreneurial opportunities are essentially arbitrage opportunities that exist because of the undervaluation of resources in the market. When the market is not in equilibrium, profit opportunities exist, and entrepreneurs discover and act on these profit opportunities to equilibrate the market. Kirzner (1973) depicts entrepreneurial insight as the recognition of a profit opportunity that was previously unnoticed. The pure existence of an entrepreneurial opportunity to obtain profit is thus insufficient. In order to earn entrepreneurial profit, an individual has to recognize that the opportunity exists and is valuable. As noted in Makadok and Coff (2002) firms may well end-up capturing more (or less) value than what they actually created (Pitelis, 2009). The “opportunity” is the successful end point of the entrepreneurial journey (Davidsson, 2015). Entrepreneurs often search for solutions to problems that are imperfectly defined, they explore new technological applications that are not fully developed, and they are often dependent on specialized knowledge from external actor.

The entrepreneurship literature generally recognizes that availability of sufficient resources is important since novel resource combinations are necessary to exploit new opportunities (Larson and Starr, 1993) requiring the possibility to access to external resources. Although opportunity recognition has been conceptualized in different ways and is yet to be explored more fully, interaction with the external environment emerges as a necessary precondition for entrepreneurial processes.

The interaction with the external environment creates the knowledge and experience necessary to perceive the opportunity. The external analysis involves the study of technological evolution, organizational environment, demand characteristics and institutional context (Baumol, 1990). As stated by some scholars (Kang and Uhlenbruck, 2002) the analysis of entrepreneurial opportunity exploration and exploitation could be developed by applying a multiple theoretical perspective of social-information processing, resource-dependence, transaction cost, and strategy theories, in order to better understand and explain the multidimensional phenomena of entrepreneurial activities. Following the entrepreneurial theory of the firm based on dispersed knowledge, the dispersion of knowledge, uncertainty and heterogeneous expectations lead to different opportunities that will be exploited in new or existing firms (Ravasi and Turati, 2005). A relevant role in identifying entrepreneurial opportunities is thus recognized not only to market but to social network also.

Furthermore, one important aspect of entrepreneurship is that the entrepreneur perceives the opportunity to act as temporally constrained and space limited.

## THE ENTREPRENEURIAL OPPORTUNITY IN THE “SPACE” DIMENSION

Because opportunity recognition involves attention to external conditions and events, the entrepreneurial process is dependent on the geographical movements of the entrepreneur.

Specifically, geographical movements and the time spent in different locations determine the content and scope of social networks, which supply resources, and new ideas to be considered and recombined in the formation of new businesses (Aldrich, 1999).

Conceptually, opportunity recognition can be attributed to the size and diversity of existing social networks. It has been found that informal contacts, including businesses, family, and

personal friends, are the main sources of information and help in assembling the elements of a new business (Birley, 1985). It can be expected that most of the people involved tend to reside and work in close geographical proximity to the entrepreneur (Zander, 2004). Entrepreneurs were seen as tied, through their social relationships, to a broader network of actors. As stated by Aldrich and Zimmer (1986) the entrepreneur is embedded in a social network that plays a critical role in the entrepreneurial process. In the broadest terms, social networks are defined by a set of actors (individuals or organizations) and a set of linkages between the actors. Often when the impact of a network interaction is in the social aspect of an organization, the relationship is explained as social networking (Kostova and Roth, 2003). Networks can be defined as a specific set of linkages between a defined set of actors with the characteristic that the linkages as a whole may be used to interpret the social behavior of the actors involved. Different types of relations define different types of networks even if the same units are connected.

Interpersonal and interorganizational relationships are viewed as the media through which actors gain access to a variety of resources held by other actors. With the exception of work on the role of networks to access capital, most research has focused on the entrepreneur's access to intangible resources. Network relations provide emotional support for entrepreneurial risk-taking and this in turn is thought to enhance persistence to remain in business. Several studies document that entrepreneurs consistently use networks to get ideas and gather information to recognize entrepreneurial opportunities (Hoang and Young, 2000; Tamasy, 2006).

On the basis of the phenomenon of "geographical inertia", an entrepreneur stay in the region where the firm was first established, due to the resources it has established and/or utilized there. The phenomenon highlights the importance of geographically localized networks of contacts for entrepreneurial activities and firm creation (Sorenson and Audia, 2000; Tamasy, 2006). As the co-evolutionary theory has demonstrated, an important characteristic that should be considered in understanding regional entrepreneurial activities is that firm birth and death are highly dependent on regional characteristics and entrepreneurial environments including habitat. Entrepreneurial activity and resulting firm creation has been recognized as one of the most important drivers of regional economic growth (Acs and Armington, 2004; Audretsch and Keilbach, 2005).

Geographical proximity refers to the spatial vicinity of the organizations' physical locations but it is neither a sufficient nor a necessary condition for learning and interactive innovation to take place (Boschma, 2005). Some firms interacted with firms outside the cluster, while others did not. Accordingly, Boschma (2005) depicts fivefold classification of geographical, cognitive, social, institutional and organizational proximity (Tamasy, 2006). These kinds of proximity sustain the development of wider network horizon. The space, considered as atmosphere, is not related only to geographical proximity but different kinds of proximity can be considered.

In contrast to opportunities existing and recognized in market by alert entrepreneurs, collective opportunities are created through interaction and joint acts with others (Alvarez and Barney, 2007; Ardichvili et al., 2003; Kor et al., 2007). Opportunity development is a social and culturally embedded process in which opportunities are created through a continuous dialog that involve different business actors (Singh et al., 1999; Slotte-Kock and Coviello, 2009).

## THE ENTREPRENEURIAL OPPORTUNITY IN THE IMP PERSPECTIVE

Entrepreneurship discovery and exploitation is a nonlinear process of enacting workable interfaces between external resources owned by several actors and creating new combinations from the resources. The core process is the business opportunities discovery and exploitation through interaction.

Ciabuschi et al. (2012) criticize the traditional opportunity recognition and exploitation perspective in entrepreneurship research on the basis of its focus on internal, owned resources, single entrepreneurs as the key actors and the assumption of the linearity of the new business formation process. Differently, the collective opportunity process is characterized by the evolution of interconnected relationships and the building of meaning in networks (Kauppinen and Puhakka, 2010). The creation of collective opportunities for new business is an emergent process requiring extensive interaction to recombine resources owned and controlled by several actors in a relational space perspective.

In the Industrial Marketing and Purchasing (IMP) perspective, opportunity is related to the variety within business landscape. Business relationships are multidimensional. The actors in order to benefit from a relationship have to relate to each other over time and in a number of dimensions. Adaptation made in relation to each other is relevant and it can be carried out to decrease or to increase variety (Håkansson and Ford, 2002; Håkansson et al., 2009). Variety can be natural or “man made” and both forms can be used as business opportunities. IMP emphasizes the importance of interaction and business relationships in benefit from the variety: the way of exploiting variety includes attempts to decrease variety to reach efficiency and to attempts to increase variety to create innovation. Variety is both an important starting point for all interaction and an end result of it.

The emerging opportunities had also emerging network and required activating the passive network or the network with the new relationships (Ciabuschi et al., 2012). That caused the network change as the emerging opportunity had different types of needs and requirements for the network. Relationships in industrial markets are characterized by adaptation (Hallén et al. 1991; Brennan and McGovan, 2006) and commitment. The mutuality is a result of the relationship process where the firms make relationship-specific resource investments and integrate and link their activities to each other.

Ciabuschi et al. (2012) emphasize that new business formation is a process of combining resources in relationships. The new venture reflects how it relates to and interacts with others and the availability of others to act jointly in the venture. A new business always builds a new collection of specific resources that are combined to form a meaningful whole of value to certain actors. Relative resources for new business formation are, thus, relational and emergent. Resources have a meaning only in relation to a specific action that connects and uses resource elements derived from several actors outside the focal venture (Baraldi and Strömsten, 2006; Håkansson and Waluszewski, 2002).

Firm's business development is an outcome of cyclical process of entrepreneur's networking behavior in opportunity development (Juho and Mainela, 2012). Business development happens through four states of opportunity, namely through emerging opportunity, stable opportunity, technological opportunity and business opportunity. The opportunities develop through entrepreneurs acting in networks at two levels. The emerging and stable opportunities are developing at individual level of entrepreneur's perception of opportunity while the technological and business opportunity development are changing the network and happens at network level.

The discovery and exploitation of opportunities is emerging through network crossing borders. The efficiency and the effectiveness in opportunity management can be reached by the entrepreneur with close contacts with the existing network structure and special

knowledge around activities and resources structure. New actors are considered as outcome of previous interactions within existing relationships or within the combining of resources and activities (Hakansson et al., 2009).

The business landscape is characterized by constant motion, in which all activities, resources and actors change over time. Each business actor is involved with others in exploiting the heterogeneity of resources by combining them in new ways at the same time as they are linking their own and other's activities differently to exploit and develop interdependencies. Each business actor is also changing due to the shifts in resources and activities. The actors co-evolve, resources move along particular path and activities become more specialized in one or more direction.

## **RESEARCH APPROACH**

### **METHODOLOGY**

In order to better understand the phenomenon of entrepreneurial opportunities, and the process of their development that remains relatively underdeveloped, the paper applied a qualitative approach (Dubois and Gadde, 2002; Dubois and Araujo, 2004) and a case study approach (Beverland and Lindgreen, 2010; Harrison and Easton, 2004, Barrat, Choi, Li, 2011, Eisenhardt, 1989).

The analysis adopted an abduction process that enables data-driven theory generation (Järvensivu and Törnroos, 2010): choices related to the theoretical framework influenced the empirical investigation. The research involved a systematic combination of the continuous interaction between theory and the empirical world (Dubois and Gadde, 2002 Dubois and Araujo, 2004; Piekkari et al., 2010).

This case belongs to a wider research focused on new actors of entrepreneurship network such as FabLabs, Incubators and Science Parks. 10 interviews were focused on the FabLab. The main interviews were developed with key referents of FabLab and actors involved in the related project

The main semi-structured interviews were realized over a period of six months, lasting from 60 to 120 minutes. Data were collected also by telephone and email. The transcripts synthesized the information gathered from the interviewees, together with supplementary company-related data gathered from information websites, brochures, daily papers, and magazines, used as a basis for the case descriptions and as input to assist the case analysis being performed. The primary data were combined with secondary data gathered from the firm's website, reports, trade press and other company documents.. The secondary data contributed to improving the understanding of different business contexts. The use of multiple data sources produced increased reliability for the data and stronger substantiation of both the constructs and the research propositions. The holistic description of the network generated by multiple sources of evidence (Järvensivu and Törnroos, 2010) has been required to analyze in greater depth the interconnected relationships.

Going more in depth as stated by IMP scholars (Hakansson et al., 2009) the interaction process requires to be investigated considering the time and space perspective. The Actors Resources and Activities (ARA) model involves the outlining of activity patterns, resource constellations and actor webs. In time perspective, the activity patterns are related to specialization, the resources constellations are related to path and the actor webs to co-evolution. In space perspective, the activity patterns concern interdependency, the resource constellation the heterogeneity and the actor webs the jointness. In particular, to develop this research the attention has been focused on the main actors involved in digital fabrication.

This is an emblematic case in which we can observe the emergence of a new managerial approach for entrepreneurial opportunities and an evolution of the role of FabLab in digital fabrication.

## RESEARCH CONTEXT

Digital fabrication is commonly referred to as the third industrial revolution. From the beginning, this revolution has not been limited to large firms but to consumers also.

While the move towards digitalisation of manufacturing started decades ago with the progressive adoption of computer-controlled manufacturing systems, the trend has significantly accelerated over the past few years, in particular because of the advent of 3D printing technologies.

Digital fabrication combines 3D printing technologies, additive manufacturing and printed electronics to depict product prototype. 3D printing can be described as a radical innovation, as it will disrupt the current manufacturing industry: new organizations with new products and services. Digital fabrication is a radical innovation in Schumpeterian terms: it forms significant improvement of digital fabrication.

Progressively, over the past 30 years, new digital technologies have enabled to turn an increasing number of physical products into intangible digital content. Yet, while such objects necessarily have to be made in order to be used, digital technologies have taken an increasingly important part in their production. While a lot of work has already been carried out as to what these technologies will bring in terms of product and process innovation, few analysis have been done on their impact on firm's strategies.

As the technology improved, it became possible to use 3D printers not only to prototype, but also to manufacture tools and moulds used for traditional manufacturing. It then became possible to entirely manufacture end-products with 3D printers. Finally, the advent of Personal 3D Printers has made it possible to directly manufacture at home, thereby bypassing the (physical) distribution stage.

In this context the FabLab (Fabrication Laboratories) is a International laboratory network on a reduced scale that offers all necessary tools to implement digital projects fabrication: all those activities involving the data processing in real objects and vice versa, sites contamination of ideas between students, professors and professionals from different disciplines, where the objective is to promote contemporary knowledge, entrepreneurial culture and innovation.

People can use the lab to build any object, the philosophy is: "you must learn to do it yourself, and you have to share the use of the lab with other users". Training in the lab is acquired through projects; it is expected that users contribute to the documentation and education. The idea came to FabLab Central Massachusetts Institute of Technology (MIT). FabLab is the educational outreach component of MIT's Center for Bits and Atoms (CBA), an extension of its research into digital fabrication and computation.

The investigated FabLab is located in Milan, the Italian city that records the presence of the highest number of FabLab and makerspace.

## THE CASE: MILAN FABLAB

Milan FabLab was founded in 2013 thanks to the support provided by the Mike Bongiorno Foundation. Milan FabLab is a laboratory where advanced machinery and technologies are available to give shape to the ideas and the innovative projects.

Milan FabLab is a place of sharing that promotes the cooperation between students and professionals, facilitating the exchange of ideas. 3D printers, cnc milling machines and other machines are only the frame of this place.

The first task of the Milan FabLab is to be a public space, a place for everyone: young students, businesses, professors, etc. In this way, through the training courses, Milan FabLab invites people to know the revolutionary digital fabrication. The key areas of the Milan FabLab are to share, to learn and to make.

The most ambitious goal of the Milan FabLab is to be able to turn ideas into real products. Thanks to shared language and tools in different professions, Milan FabLab becomes a new way to think about the product. At the Milan FabLab, the tools of digital fabrication allow the prototype and test activities. The FabLab sustains a return to humanism and to be able to do: The corporate designers become self-producers.

### FROM TECHNOLOGIES TO SERVICES

At the beginning the main attention of Milan FabLab was focused on new technologies that could allow users to create a design and a prototype. Nowadays people can find vinyl cutter, 3D printer, sewing machines and electronics laboratory.

In addition to this, Milan FabLab has discovered the opportunity of innovative additional services, such as courses for students and management to sustain the diffusion of digital fabrication

Periodically Milan FabLab organizes courses and workshops and mentoring sessions. The organization provides services aimed at students and professionals, small and large businesses.

The educational activity involves projects devoted to primary and secondary schools to get to higher education courses for students and teachers. Other courses are devoted to designers, architects and creative experts; the courses are founded on instruments available to Digital Fabrication (3D printers, Arduino and electronic software, Rhino 3D modeling software).

For more generalist and less technical users, basic level courses characterized by multidisciplinary activities are provided to explore the fields of application of digital fabrication (jewelry and 3D modeling, home and home automation, robotics and drones, fashion and wearable, health and 3D printing).

Milan FabLab provides a co-working space also. The idea is to offer space for experts and to sustain the sharing of their skills. Maker, App developers, video editors, artisans can use of the spaces of the FabLab.

### THE INCUBATION OF NEW VENTURES

Milan FabLab incubates businesses promoting networking between new ventures and other specialized actors of entrepreneurship context (universities, laboratories, specialists, consultants...).

Milan FabLab has been a relevant business partner for Skiddi start up. Thanks to the projects developed by FabLab, in few weeks Skiddi reached the crowdfunding campaign for the official launch of the micro-trolley ski. The device characterized by Made in Italy, with high

technical and ethical values, promised to revolutionize the daily habits of 105 million skiers all over the world. The match campaign on Kickstarter.com reached \$ 10,000 in just over 72 hours.

On the basis of the cooperation with Milan FabLab, the final development of the prototype has taken place a couple of years later, following the purchase of a printer open-source 3D that allowed to define the lines and the distinctive design of the product.

In 2014, the founder of Skiddi has been rewarded in DesignWinMake competition.

## THE DEVELOPMENT OF NEW VENTURE

At the beginning of 2016 the managerial team of Milan FabLab founded ShapeMode start up. As said by the founder of ShapeMode “We develop design and prototyping activities for organizations specialized in the biomedical field and jewelry. Our goal is to facilitate the business as a creative and productive path using innovative tools. Our experience allows us to interact with different professionals: design studios, designers, production managers, engineers, CEO”.

ShapeMode anticipated the technical problems of production and molding, realizing the CAD model ready for 3D printing or for rendering. ShapeMode adopted several different software and rapid prototyping systems.

ShapeMode is organized in heterogeneous teams specialized in different areas:

- In the *biomedical and dental industry*, experts cooperate with the dedicated team made up by biomedical engineers in order to develop the product.
- *Jewellery Designer team* characterized by creativity and expertise in 3D CAD. There are also technicians who study the new product development processes.
- *Model Team* is made up by experts who consider the modeling as an art.
- *Product Design Team* consists of people with different backgrounds, from designers to software developers, from architects to electronic and mechanical engineers. Completing this team, staff figures working in media and legal channels can offer support to the patent registration, the Kickstarter campaign, Crowdfunding and Marketing.
- *Prototyping Service and Mechanical Design Team* is made up by qualified personnel with more than 20 years of experience. Experts cooperate for the development of prototypes and mechanical design in the automotive, machinery for industries with knowledge in different technologies.

## DISCUSSION

In a traditional perspective the discovery of opportunity and its exploitation were related to the entrepreneur and his/her capabilities.

As outlined in the case, in an open perspective the discovery of opportunity and its exploitation to reach value are generated in networking by the combining of internal and external relationships.

At the beginning, the Milan FabLab was an association sustained by Bongiorno Foundation to promote digital fabrication. The attention of the founders was related to innovative technology consisting of:

- laser cutter: the laser machine allows to cut, through the cardboard laser paper, wood, various plastics, plexiglass etc.
- 3D printer: a 3D design allows to build the object drawn by the computer. It is used for the creation of prototypes or for design and architecture applications.

- cutting plotter: it allows to cut vinyl materials, paperboard and cardboards. It is used mainly in the world of graphics.
- screen printing press: it is indicated for printing on fabrics and paper.
- milling machine: users can carve and sculpt wood and other types of material through a computer input.

Thanks to the relevant internal cooperation within experts in heterogeneous area, and thanks to external partnerships with local organizations (such as University, accelerator, incubator, co-working area, SME), the members of the FabLab association decided to transform this latter in a private organization. The opportunity was identified in the possibility to change the nature of the organization to provide not only the use of innovative technology but additional services also, as required by users. The internal specializations of FabLab association were mainly related to product design, prototype and mechanical projects while the external competences concerned research, market study, strategic planning, and specific industry competences.

In addition, the cooperation with users and partners allowed FabLab to involve biomedical specialists and dental specialists as well as jewelry and modeling specialists. The combining of these heterogeneous competences sustained the foundation of ShapeMode, the start up focused on design and fast prototyping with a major in the biomedical field and jewelry. The goal has been to facilitate the business as a creative and productive path using innovative tools. The experience in Milan FabLab allows the founders to interact with different experts: design studios, designers, production managers, engineers, CEO. ShapeMode Academy was founded with the goal of creating an educational area on technological innovation and comes from the desire to share expertise and experience in the field of prototyping, design, 3D printing and, more generally, the digital fabrication. The development of the start up is considered as an opportunity discovered and exploited through internal and external networking.

The services provided by Milan FabLab involve the creation of value through the learning by doing. The users are invited to create the products through new technology as well as they are invited to attend courses in active way. Users learn by designing and creating objects of personal interest. Empowered by the experience of making something themselves, they both learn and mentor each other, gaining deep knowledge about the machines, the materials, the design process, and the engineering that goes into invention and innovation. Milan FabLab is a community characterized by specialized capabilities. As stated by Business Network Paradoxes (Hakansson et al., 2009), in the business relationship each actor explicates the teaching and learning activity.

In particular Milan FabLab supported young business idea. To discover the opportunities of digital technologies of makers and their own creativity, Milan FabLab organized summer school that alternate day laboratory work, group work, use of innovative technologies (3D pen, software for creating 3D models and 3D printer), testing new techniques through games, promoting digital skills, manual skills and social skills.

On the basis of the previous analysis, the following proposition can be outlined:

*P1. The discovery and the exploitation of entrepreneurial opportunity are co-created in an interactive process.*

The changes of Milan FabLab is related to its strategies. Milan FabLab has changed from the provision of a place with new technology to a relational space where users can interact with

others and with the technologies. In addition, the shift has been from the provision of product to the provision of relational services.

In this regards, FabLab activated collaborations with the most influential Italian and academics maker who participated in different projects by providing their know-how for the development of activities commissioned by individuals and businesses. The innovative technologies provided by Milan FabLab include a laser cutter that makes 2D and 3D structures, and a suite of electronic components and programming tools for low-cost, high-speed microcontrollers for on-site rapid circuit prototyping.

Moreover Milan FabLab proposed different services related to education in digital fabrication. Milan FabLab provides training activities to different targets. Periodically Milan FabLab organizes courses and workshops, mentoring sessions and support services that aimed at young and old, students and professionals, small and large businesses. It started with an education devoted to primary and secondary schools to get to higher education courses for students and university faculty members. Dedicated courses for designers, architects and creative professionals include the use of the instruments available in the Digital Fabrication Lab. For less technical users, basic level courses concern multidisciplinary activities such as cooking, games, literature, music etc. Special attention is recognized to vulnerable groups of citizens (the unemployed, the elderly and women in difficulty), for which is provided free participation in training and refresher courses.

The involvement of experts as users and then as teachers has allowed Milan FabLab in developing innovative projects such as Artigianni and Polein.

With reference to Artigianni Project, from manual labor to 3D Printing, Milan FabLab organized workshops for secondary school children, aged 10 to 14 years. Artigianni is a workshop that provides an overview on the craft of the artisan enabling children to work side by side with the maker of Milan FabLab. Participants can build their custom stamp, starting from design and coming to the realization. Artigianni is a workshop for middle school children organized by Milan FabLab in cooperation with *Hands Bovisa* and *La Fucina di Efesto*. *Hands Bovisa* is a project of social TV undertaken by several students of the School of Design of the Milan Polytechnic, who wants to set off the handicraft realities in the neighborhood. The goal is to transmit the value of craftsmanship to new generations. *La Fucina di Efesto* is a centre of craftsmanship, a meeting point for traditional, innovative and creative technology: the conceptual design and realization can take place at premises that are fully equipped with tools, where ideas translate into tailor-made works of art. *La Fucina di Efesto* provided specific competences to sustain the development of the project: craft and flexible skills, use of traditional techniques, innovative machines, state-of-the-art equipment and technologies specific to metal processing and finishing, added to the knowledge of modern and rapid modelling techniques of different welding and assembly techniques. *La Fucina di Efesto* offers its expertise and experience for restoration works, installation of static and dynamic structures in different environments.

With reference to Polein Project, craftsmanship and technology come together in a collection of hybrid vessels. The project has been developed by Milan FabLab in cooperation with ShapeMode Academy. The project proposes a series of advanced training courses in various sectors and craft. At the laboratories of ShapeMode Academy, users can learn arts and crafts of the future considering the history also. ShapeMode Academy is an Authorized Rhino Training Centre (ARTC), a software adopted in industrial and jewelry design.

Milan FabLab is connected to a global community of learners, educators, technologists, researchers, makers and innovators, a knowledge sharing network providing stimulus for local entrepreneurship.

On the basis of the previous analysis, the following proposition can be outlined:

*P2 The role of FabLab has shifted from the provider of technology to the provider of innovative solutions related to digital fabrication*

Milan FabLab has been involved in the process of start up development (Table 1). FabLab created the campaign of Skiddi start up in Kickstarter. Kickstarter platform helps artists, musicians, filmmakers, designers, and other creators find the resources and support they need to make their ideas a reality.

Focusing on the development of Skiddi, we can note that different actors provided specific resources in order to develop activities that allow the birth of the new venture (Table 1).

Table 1 – Actors, resources and activities in Skiddi development

<b>Actors</b>	<b>Resources</b>	<b>Activities</b>
Milan FabLab	Innovative technologies Team competences Networking competences Potential relationships	Crowdfunding campaign  Web site  Incubation
The founder of Skiddi	Business idea	Business plan
Kickstarter	Platform	Exposure
D-namic	Consultancy services	Acceleration
Cooperative Association	Human resources	Assembly

The development of Skiddi becomes a reality thanks to capabilities of the founders (resources), combined with the resources shared with the FabLab. This latter involved the own start up, ShapeMode and the own business partner (actors): D-namic accelerator. D-namic is a center of expertise able to contribute its know-how, through specialized services, to create value and economic and social well-being, starting with the development of ideas and creative thinking. The main activities involve incubation, open innovation, consultancy services, crowdfunding, seed capital investments, technology transfer and training. D-namic has activated a special programme that allows creatives, inventors and entrepreneurs to accelerate the development and the market uptake of their ideas and startup business in an effective and faster way, using crowdfunding as a triggering channel. The device to adapt Skiddi to freeride skiing was prototyped with a printer and a 3Drag Delta WASP 2040 using PLA and ABS at Milan the FabLab.

Skiddi is also considered as an ethical project, a social good, as Milan FabLab realized it involving local cooperative association (actor) improving local economy. From prototyping of some accessories made in an open FabLab Milan, the production taking charge by guests of the social cooperative (Brescia city), which is daily engaged in reintegration social and labor of people with physical and mental discomfort.

On the basis of the previous analysis, the following proposition can be outlined:

*P3 The new services of co-working and incubation recognized a role of new venture promoter to FabLab*

Milan FabLab improved the technological local events to sustain the development of business idea.

In 2016 B-Hack (Business App Hackaton) organized by Milan FabLab allowed the experimentation of new ideas and innovative solutions. Participants could choose to develop a new application or to improve and extend an open-source code already existed. The solutions had to be referred to new trends such as Internet of Things, proximity marketing, wearable devices.

In addition, Milan ProtoHack was dedicated to no-technicians who wanted to develop a business idea. The Code-Free Hackathon was designed to empower the non-technical community to explore the own business ideas in technology. Thanks to a mentor, the team of no-technicians was able to create a prototype (mockup). At ProtoHack Milano, participants come together to build teams, collaborate with one another on a business idea, learn from design, pitch, and product mentors, prepare a deck, and present to a panel of judges that include VCs, angels, and notable founders.

On the basis of the previous analysis, the following proposition can be outlined:

### *P3.1 The FabLab is considered as a facilitator in the discovery of entrepreneurial opportunities*

At Milan FabLab there is the sharing of innovative tools that is combined with the sharing of idea, knowledge and competences. The proximity to research centers and schools of Architecture and Industrial Design, and Information Engineering outlines the strategic location to intercept and engage students and teachers in the activities of the Milan FabLab. The FabLab is located in a modern structure built in 2010 adjacent to the two campuses of the Politecnico, Milano Bovisa. The space intended for laboratory occupies an area of about 200 square meters. The proximity to research centers and schools of Architecture and Design, Industrial and Information Engineering hosted inside the campus can intercept and engage students and university teachers in the activities of the FabLab. The FabLab may also be used as an exhibition space and can contribute to the regeneration of the Bovisa area.

In addition to this, the activities of FabLab are developed with actors located in different places but sharing the same valued: FabLab becomes a community to learn and to work in a new way. The innovative incubation services provided by FabLab can be used by organizations belonging to different geographical area. Even if at the beginning the attention of Milan FabLab was related to local actors, nowadays FabLab cooperates with organizations belonging to different geographical area but characterized by the commitment in the same values. In 2016 Milan FabLab cooperated with the digital makers of Parma FabLab.

Other business partners of Milan FabLab have been: Intel, Bayer, Bemyapp, and Ambrosetti, the European House. These actors belong to different geographical area but they are involved in the same relational space.

Knowledge and best practices are disseminated throughout the FabLab network, making it a cutting edge laboratory for R&D. A FabLab is about democratizing access to the tools for personal expression and invention. The services provided by FabLab sustain the growing of the makers community. A maker can be defined as the technological hobbyist of the 21st century. Makers have a strong passion for technology, design, art and sustainability.

FabLabs have to share common tools and processes. The idea is that all the labs can share knowledge, designs, and collaborate across international borders. The similar processes, codes and capabilities are relevant. As stated in the The Fab Charter, FabLabs are a global network of local labs, enabling invention by providing access to tools for digital fabrication. In this way, through real training courses, FabLab approaches the greatest number of people

to the universe revolutionary digital fabrication: “It is about learning together a new alphabet, a different way of designing and communicating, what will help us to then give life to our relationships and our projects”.

On the basis of the previous analysis, the following propositions can be outlined:

*P4 The discovery and the exploitation of opportunity are developed in a relational space characterized by interconnected business relationships*

*P5 The discovery and the exploitation of opportunity are influenced by the borders of business Network, by the jointness of actors and their co-evolution*

## **IMPLICATIONS FOR FUTURE RESEARCH AND PRACTICE**

In a traditional entrepreneurship research, opportunities are created and exploited by entrepreneur. In a different perspective, as depicted in the case study, opportunities are developed through interaction and co-action. Entrepreneurial opportunities are collectively enacted, discovered and exploited.

As depicted in this research the opportunity of a FabLab to transform the association into organization has been related to internal and external networking. Thanks to internal and external network the FabLab shifted its strategic orientation: from the provision of technology to the provision of innovative solutions. The machinery available to a FabLab is varied and generally includes 3D printers, milling machines, laser cutter, and microprocessors materials. Moreover the FabLab sustained the diffusion of innovation through courses, seminars, events, together with co-working services and incubation activities. Nowadays the FabLab provides value added solutions related to digital fabrication. The FabLab was able to discovery the opportunity to change its strategy.

In addition, the FabLab assumed the role of facilitator in discovery opportunities. The discovery of the opportunity and its management depends on internal forces such as the competences and capabilities of the entrepreneurial team but mainly on the association to the entrepreneurial ecosystem that can be sustained by FabLab. The FabLab allows the sharing of ideas between students, researchers, specialists...through the co-working area but more and more through the additional value services that sustain the learning by doing value creation. In addition to this, the FabLab activates incubation services for new ventures supporting the start ups in their development. The FabLab can be considered as a relational space provider and a facilitator of knowledge relationships that allow the discovery of entrepreneurial opportunities.

Differently from personal network perspective that considers how connections affect opportunity recognition as they provide feedback to entrepreneurs on early business plans, the interconnections between business relationships outline the Digital Fabrication Network.

Furthermore, the FabLab promoted business relationships among local actors in order to sustain the local entrepreneurship. In addition, the FabLab improved relationships with actors belonging to different places. The digital factory considered at the beginning as a place of gathering and sharing knowledge is now characterized by wider borders. The FabLab cooperates also with other FabLab located in different places. In addition in order to develop innovative solutions the FabLab involve new international business partners.

Although the case study approach allowed the researcher to gain detailed information about the Fablab and its relationships, this effort does not measure the performance outcomes of the relationships and actions that were taken to improve the competitiveness of the FabLab. Future studies would benefit from a large-scale questionnaire given to the members of the

Fablab and to the actors of its network, so to analyze all of its performance implications for the Fablab and the digital fabrication network as a whole.

Future research could also investigate the international managerial approach adopted by FabLab located in different countries.

Other researches could deepen the role of FabLab in the process of new ventures development and disruptive innovation. Since its foundation, disruption was considered suitable for new entrant firms, which tend to be more successful than incumbents with the introduction and emergence of disruptive technologies. For the development of disruptive technologies, newer firms appear to be advantageous as they are generally more flexible in resource allocation.

## References

- Acs, Z. J., and A. Varga (2004). "Entrepreneurship, Agglomeration and Technological Change", *GEMs research conference* in Berlin, Germany.
- Aldrich, H. 1999. *Organizations evolving*. Thousand Oaks, CA: Sage.
- Aldrich, H., and Zimmer, C. (1986). "Entrepreneurship through social networks". In D. Sexton and R. Smiler (eds.), *The Art and Science of Entrepreneurship*: 3-23. New York: Ballinger.
- Alvarez, S.A., Barney, J.B., Anderson, P., (2013). "Forming and exploiting opportunities: the implications of discovery and creation processes for entrepreneurial and organizational research". *Organ. Sci.* 24, 301–317.
- Alvarez, S. A., and Barney, J. B. (2007). "Discovery and creation: Alternative theories of entrepreneurial action". *Strategic Entrepreneurship Journal*, 1(1–2): 11–26.
- Alvarez, S.A. and Busenitz, L.W. (2001). "The entrepreneurship of resource-based theory". *Journal of Management*, 27, 755-775.
- Amin, A. and F. Wilkinson (eds.)(1999) "Learning, proximity and industrial performance," *Cambridge Journal of Economics*, vol. 23, 2, Special issue
- Ardichvili, A., Cardozo, R., Ray, S., (2003). "A theory of entrepreneurial opportunity identification and development". *J. Bus. Ventur.* 18 (1), 105–123.
- Armington C. and Acs, ZJ (2002). "The determinants of regional variation in new firm formation", *Regional Studies* 36 (1): 33-45
- Audretsch, D. and Keilbach, M. (2005). "Entrepreneurship Capital – Determinants and Impact" London: CEPR.
- Baraldi, E. and Strömsten, T. (2006). "Embedding and utilizing low weight: value creation and resource configurations in the networks around IKEA's Lack table and Holmen's newsprint". *IMP Journal*, 1(1), 39-70.
- Barratt, M., Choi, T.Y., and Li, M. (2011)."Qualitative case studies in operations management: Trends, research outcomes, and future research implications". *Journal of Operations Management*, 29(4), 329-342
- Baumol W. (1990). "Entrepreneurship: Productive, Unproductive, and Destructive", *Journal of Political Economy*, 98, 5, pp. 893-921
- Beverland, M., and Lindgreen, A. (2010). "What makes a good case study? A positivist review of qualitative case research published in *Industrial Marketing Management*, 1971–2006." *Industrial Marketing Management*, 39(1), 56–63
- Boschma R. (2005). "Proximity and Innovation: A Critical Assessment", *Regional Studies*, 39, 1: 61 — 74
- Brennan MC and McGovan P (2006). "Academic entrepreneurship: An exploratory case study". *International Journal of Entrepreneurial Behaviour and Research*, 12(3), 144–164
- Brixy, U., Grotz, R. (2007). "Regional patterns and determinants of the success of new firms in Western Germany". *Entrepreneurship and Regional Development* 19 (4), 293-312.
- Christensen, J.F., Olesen, M.H., Kjaer, J.S. (2005). "The industrial dynamics of open innovation—evidence from the transformation of consumer electronics". *Research Policy* 34, 1533–1549
- Ciabuschi, F., Perna, A. and Snehota, I. (2012). "Assembling resources when forming a new business". *Journal of Business Research*, 65 (2), 220-229.
- Cornelissen, J.P., Clarke, J.S., (2010). "Imagining and rationalizing opportunities: inductive reasoning and the creation and justification of new ventures". *Acad. Manag. Rev.* 35, 539–557.

- Davidsson P. (2015), "Entrepreneurial opportunities and the entrepreneurship nexus: A reconceptualization". *Journal of Business Venturing* 30 (2015) 674–695
- Dubois, A. and Araujo, L. (2004). "Research Methods in Industrial Marketing Studies" in *Rethinking Marketing: Developing a New Understanding of Markets*, Håkan Håkansson, Debbie Harrison and Alexandra Waluszewski, (eds), Wiley, Chichester: 207-227.
- Dubois, A. and Gadde, L. 2002, "Systematic combining: an abductive approach to case research", *Journal of business research*, 55, 7, pp. 553-560.
- Eisenhardt, K.M. and Graebner, M.E. (2007). "Theory building from cases: opportunities and challenges", *Academy of management journal*, 50, 1, pp. 25-32.
- Eisenhardt, K.M. (1989), "Building theories from case study research", *Academy of management review*, vol. 14, no. 4, pp. 532-550.
- Gaglio, C. M. (2004). "So what is an entrepreneurial opportunity?" In J. E. Butler (Ed.) *Opportunity identification and entrepreneurial behavior*: 115–134. Greenwich, CT: Information Age Publishing.
- Håkansson, H. and Ford, D. (2002). "How should companies interact in business networks?", *Journal of business research*, vol. 55, no. 2, pp. 133-139.
- Håkansson, H. (1982), *International marketing and purchasing of industrial goods: An interaction approach*, Wiley Chichester.
- Håkansson, H., Ford, D., Gadde, L., Snehota, I. and Waluszewski, A. (2009). *Business in networks*, John Wiley & Sons,.
- Harrison D. and Easton G. (2004). "Temporally embedded case comparison in industrial marketing research" In: *Critical Realist Applications in Organisation and Management Studies*: p.194-210, Routledge London and New York.
- Hoang H. and Antoncic B. (2003). "Network-based research in entrepreneurship A critical review". *Journal of Business Venturing* 18, 165–187
- Hoang, H., and Young, N. (2000) "Social embeddedness and entrepreneurial opportunity recognition: (more) evidence of embeddedness" *Frontiers of Entrepreneurship Research, Babson College, Wellesley, MA*.
- Holcombe R. (2003) "The Origins of Entrepreneurial Opportunities". *The Review of Austrian Economics*, 16:1, 25–43.
- Järvensivu T. and Törnroos J-Å (2010). "Case study research with moderate constructionism: Conceptualization and practical illustration", *Industrial Marketing Management*, 39, 1: 100-108.
- Jennings JE, Edwards T., Jennings D., Delbridge R. (2014). "Emotional arousal and entrepreneurial outcomes: Combining qualitative methods to elaborate theory". *Journal of Business Venturing*
- Juho A. and Mainela T. (2012) "Entrepreneurial Networking In Inv's Opportunity Development". *IMP Conference, Rome*
- Kang, E. and K. Uhlenbruck (2002). "A process framework of entrepreneurship: From exploration, to exploitation, to exit". *Academy of Management Conference*: Denver.
- Kauppinen A. and Puhakka, V. (2010). "Entrepreneurial Archetypes In Making Sense Of The Structural Holes" *Frontiers of Entrepreneurship Research* 30 (5)
- Kirzner, I. (1973) *Competition and Entrepreneurship*. Chicago: University of Chicago Press
- Kor, Y.Y., Mahoney, J.T., Michael, S.C., (2007). "Resources, capabilities and entrepreneurial perceptions". *J. Manag. Stud.* 44 (7), 1187–1212.
- Kostova, T and Roth, K. (2003). "Social capital in multinational corporations and a micro-macro model of its formation". *Academy of Management Review*. 28: 306- 324

- Larson, A., and Starr, J. A. (1993). "A network model of organization formation." *Entrepreneurship: Theory and Practice*, 17(2): 5-15
- Lee, S.Y., Florida, R. and Acs, Z.J. (2004). "Creativity and entrepreneurship: a regional analysis of new firm formation", *Regional Studies*, 38, 8, pp.879- 891.
- Makadok, R. and Coff, R. (2002). "The theory of value and the value of theory: breaking new ground versus reinventing the wheel". *Academy of Management Review*, 27: 10-13.
- Øiestad, S., Bugge, M.M., 2014. "Digitisation of publishing: exploration based on existing business models". *Technol. Forecast. Soc. Chang.* 83, 54–65.
- Piekkari, R., Plakoyiannaki, E. and Welch, C. (2010). "'Good' case research in industrial marketing: Insights from research practice". *Industrial Marketing Management*. 39 (1): 109-117.
- Pitelis, C., and Teece, D. J. (2009). "The (new) nature and essence of the firm". *European Management Review*, 6(1): 5-15.
- Ravasi, D., and C. Turati. (2005). "Exploring entrepreneurial learning: A comparative study of technology development projects". *Journal of Business Venturing* 20:137–64
- Reynolds, P.D. (2005). "Understanding business creation: Serendipity and scope in two decades of business creation studies". *Small Business Economics*, 24, 359-364.
- Sarasvathy, Saras D., Nicholas Dew, S. Ramakrishna Velamuri and Sankaran Venkataraman, 2003, "Three Views of Entrepreneurial Opportunity," in Zoltan J. Acs and David B. Audretsch (eds.), *Handbook of Entrepreneurship Research*, New York: Kluwer, pp. 141-160.
- Schumpeter, J.A., (1934), *The Theory of Economic Development*, Cambridge, Mass.: Harvard University Press
- Shane, S.A. and Venkataraman, S. (2000). "The promise of *entrepreneurship* as a field of research". *Academy of Management Review*, 25, 217-226.
- Short, J.C., Ketchen, D.J., Shook, C.L., Ireland, R.D., (2010). "The concept of "opportunity" in entrepreneurship research: past accomplishments and future challenges". *J. Manag.* 36 (1), 40–65.
- Singh, R.P., Hills, G.E., Hybels, R.C., and Lumpkin, G.T. (1999) "Opportunity recognition through social network characteristics of entrepreneurs". *Frontiers of Entrepreneurship Research, Babson College, Wellesley, MA.*
- Slotte-Kock, S., and Coviello, N. (2009). "Entrepreneurship research on network processes: a review and ways forward". *Entrepreneurship Theory and Practice*, 34(1): 31-57.
- Snehota, I. (2011), "New business formation in business networks", *IMP Journal*, 5, 1, pp. 1-9.
- Sorenson, Olav and Pino G. Audia, (2000), "The social structure of entrepreneurial activity: Geographic concentration of footwear production in the United States, 1940–1989". *American Journal of Sociology*, 106: 424–462.
- Storbacka, K. and Nenonen S., (2011). "Scripting markets: from value propositions to market propositions". *Industrial Marketing Management*, 40(2), pp. 255-266.
- Tamásy C (2006) "Determinants of regional entrepreneurship dynamics in contemporary Germany: a conceptual and empirical analysis". *Reg Stud* 40(4): 364–384
- Vaghely, I.P. and Julien, P.-A. (2010). "Are Opportunities Recognized or Constructed? An Information Perspective on Entrepreneurial Opportunity Identification". *Journal of Business Venturing*, 25, 73-86.
- Venkataraman, S., Sarasvathy, S.D., Dew, N., Forster, W.R., (2012). "Reflections on the 2010 AMR decade award: whither the promise? Moving forward with entrepreneurship as a science of the artificial". *Acad. Manag. Rev.* 37 (1), 21–33.

- Venkataraman, S. (1997). "The distinctive domain of entrepreneurship research: An editor's perspective". In J. Katz and R. Brockhaus (Eds.), *Advances in entrepreneurship, firm emergence, and growth*, 3:119-138.
- Wang, C. L. (2008). "Entrepreneurial orientation, learning orientation, and firm performance". *Entrepreneurship Theory and Practice*, 32(4), pp.635-656.
- Welch, C., and Wilkinson, I. F. (2002). "Idea logics and network theory in business marketing". *Journal of Business-to-Business Marketing*, 8(3), 27-48
- Wood, M.S., McKinley, W., (2010). "The production of entrepreneurial opportunity: a constructivist perspective". *Strateg. Entrep. J.* 4 (1), 66-84.
- Woodside AG, Bernal PM, Coduras A. (2016). "The general theory of culture, entrepreneurship, innovation, and quality-of-life: Comparing nurturing versus thwarting enterprise start-ups in BRIC, Denmark, Germany, and the United States". *Industrial Marketing Management* 53 (2016) 136-159
- Zander I., (2004). "The microfoundations of cluster stickiness—Walking in the shoes of the entrepreneur", *Journal of International Management*, 10 (2): 151-175