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# The Impact of Social Capital on Entrepreneurial Activity in Makerspaces, Hackerspaces and Fab labs

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This thesis marks the end of my academic journey for now. Although I can safely say I've attained a fair share of useful knowledge, I would not say I am a learned man. I have merely acquired the tools to become learned, and now the real journey begins. So long and thanks for all the fish.

Førde, July 2016

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# Abstract

This thesis is concerned with Makerspaces, Hackerspaces and Fab labs (MHFL) in Norway. The study is based on the fact that the Norwegian government recognized that entrepreneurship is good for economic growth and thus is seeking to initiate measures to promote entrepreneurial culture. MHFL's seems to be one such measure because of how they facilitate access to social capital. But even though they have increased rapidly in recent years, literature have yet to study them with respect to entrepreneurial performance. My aim was therefore to find out what impact access to social capital in Norwegian MHFL's have on entrepreneurial activity. The methodological approach used to answer this question was a quantitative survey with emphasis on five point Likert scales. The survey was sent out to all the active MHFL's in Norway. After analyzing the results I found that social capital in Norwegian MHFL have impact on entrepreneurial activity in that it attracts entrepreneurs, but it does not have a significant impact on triggering entrepreneurial activity. Thus, the contributions from this thesis challenges the theoretical notion that social capital can be an accidental entrepreneurial trigger and proposes that it only works as a facilitator in the context of a MHFL.

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# 1 Introduction

In Norway, entrepreneurship is currently perceived as an important development mechanism that must be facilitated with strategies through collaboration across ministries (Spilling, 2006). The government wants to stimulate people with innovation drive and creativity so that Norway will become an attractive country for the development of new ideas and businesses (Regjeringen 2014). A government press release from 2013 is more specific in what it want to facilitate:

*"The entrepreneurs opportunity and abilities to start and grow new ventures is a fundamental part of future value creation in Norway. The Government's entrepreneurial politics have a goal of improving the conditions for starting and growing new businesses. The Government will therefore initiate various measures to promote the entrepreneurship culture, strengthen entrepreneurs social rights and ensure them access to guidance, networks and capital (Prop. 1 S, 2013-2014)."*

This focus is very understandable as entrepreneurship is closely linked to economic growth and boost it by introducing innovative technologies, products, and services (Kritikos, 2014; Ekmekcioglu, 2012; Farzanegan, 2014; van Stel, 2005). Entrepreneurs create new businesses, and new businesses, in turn create jobs, intensify competition, and may even increase productivity through technological change. High measured levels of entrepreneurship will thus translate directly into high levels of economic growth (Acs, Z. 2006).

## 1.1 The importance of social capital for entrepreneurship

However, starting a new venture generally requires the accumulation of a variety of resources with the very limited financial capability (Brush, Green & Hart, 2001). In 1959 Penrose introduced theories that would later be based on what we now know as the Resource-based Theory (RBT), where the main objective was to generate added value for the companies through competitive advantages above corporate competitors (Barney, 2007). This theory has since been applied to entrepreneurship to better understand what type of resources new ventures need in

order to survive. According to studies applying RBT to entrepreneurial firms (e.g. Chandler & Hanks, 1994; Brush & Greene, 1996), in the early stages of new venture development it is the identification and acquisition of resources--rather than deployment or allocation activities--that is crucial for the firm's long-term success (Katz & Gartner, 1988; Stevenson & Gumpert, 1985). Because of this, initial resources can be said to be very important for entrepreneurial success.

Perhaps the most important resources for entrepreneurs is their social capital. Gabbay & Leenders (1999) define social capital as the set of tangible or virtual resources that accrue to actors through the social structure, facilitating the attainment of the actors' goals (Lin, 1999; Portes, 1998). Entrepreneurs require skills, capital, and labor to initiate new companies, but while they may have skills and labor, they often need to access their contacts in order to attain capital (Aldrich & Zimmer, 1986; Aldrich, et al., 1991; Cooper, Folta, & Woo, 1995; Hansen, 1995). Social capital enables entrepreneurs to draw upon, use, recognize and realize opportunities (Jack, Anderson, 2002) and is thus a crucial component for entrepreneurship (Hansen, 2001).

Because entrepreneurial activity seems to be connected with social capital, Davidsson (2003) argues that Governments "might be advised to develop business centers that focus on the facilitation of community and networking activities, thereby increasing each nascent entrepreneurs probability of finding the idiosyncratic inputs s/he needs" (p. 5). This view is also supported by GEM's report from 2011 (Alsos et al., 2012) on how Norway should increase their entrepreneurial activity.

## 1.2 Makerspaces, Hackerspaces and Fab Labs

In response to this need for such community centers, a new interesting phenomenon that facilitates social capital have arisen. This phenomenon goes by the names of Makerspaces, Hackerspaces and Fab Labs (MHFL). "They are three different types of community spaces which developed independently but have appeared to converge towards similar structure and use" (Van Holm, 2014, p. 1). Each can be characterized as a community workshop where

"hackers" share **knowledge**, **expertise** and **access to tools** in order to produce something tangible (Van Holm, 2015).

Lately, there has been a huge increase in these MHFL. In January 2014 there were 186 Fab Labs around the world according to Fablabs.io and as of this writing, June 2016, it has grown to 638. This constitutes an increase of almost 250% in just over two years. But how is MHFL's relevant for entrepreneurship? According to Lindtner (et al., 2014), MHFL's are "crucial sites in this contemporary movement as physical spaces that provide social and technological resources for people to collaborate on the production of new technologies" (p. 3). Van Holm (2014) argues that "the internet opened up incredible new opportunities for entrepreneurs to create and market digital products, but the increase of availability of tools and digital fabrication has introduced the same democratization to physical products" (p. 6). MHFLs may support innovation and product generation by giving individuals without previous access the opportunity and training to use tools (Van Holm, 2014).

Tools and machinery, however, is not the only benefit of MHFL's. Another way to look at them are as the physical manifestation of the hacker culture and ethic (Schlesinger et al., 2010). Thus the physical interactions of hackers in hackerspaces not only give members access to physical resources—3D printers, laser cutters, mining pools, and so on—but most importantly access to "group knowledge" (Robertson, 2010, p. 5). Troxler (2010) argue that "this network of group knowledge means that members of MHFL's can build their expertise around the use of these means, and methods of production in open, face-to-face and virtual communities rather than in closed training settings". "MHFL is a nucleus for communities of practice (Wenger, 1998) that allow all their members to develop mastery, particularly if they share the knowledge and experience they acquire with other members of the community" (Troxler, 2010, p. 1)

Furthermore, "The Maker movement is beginning to change the face of the industry, as entrepreneurial instincts kick in and hobbies become small companies" (Anderson, 2012, p. 19). We have already seen a lot of practical examples of this with flourishing products such as the iPad cover DODOcase, the hardware/software for reading credit cards Square, and the handheld 3D printer 3Doodler which all have links to MHFL's, indicating that their ability to affect the

economy is not contrived (Van Holm, 2014). Lindtner (et al. 2014) confirm this in their fieldwork: Makers “did not just utilize 3D printers and laser cutters in hackerspaces; they started up businesses and collaborated with manufacturers to scale up prototypes and reach mass markets” (p. 2). This goes to show that entrepreneurs have begun exploiting the benefits of the MHFL.

## 1.3 Research question

Given the increase in MHFL’s and their supposed high entrepreneurial activity, my initial aim with this study was to build an understanding of how MHFL help promote entrepreneurship in Norway. After an initial literature review I concluded that there is very little literature on MHFL’s from a resource based view or with respect to entrepreneurial performance. There were also no studies at all conducted on MHFL’s in Norway even though they have been steadily increasing in the last couple of years. This is most likely because MHFL is a relative new phenomenon. Since it is not clear if or how social capital in MHFL contributes to entrepreneurial activity, I propose the following research question:

*"What impact does access to social capital in Norwegian MHFL’s have on the level of entrepreneurial activity?".*

## 1.4 Structure of thesis

The structure of this thesis is divided into seven chapters. In the **Introduction** chapter I present justification for the research question I have chosen. In the next chapter I go into detail about the **Theory** that was used in the study. The purpose of this chapter is to properly define what I mean by social capital, impact on entrepreneurial activity and of course MHFL. In chapter 3, I explain the **Method** that was used to collect and analyze data. This was a quantitative approach that was used with Likert-type question items. Following the data gathering, the **Results** is presented in chapter 4 and further **Analyzed** in chapter 5. By analyzing the respondents from three different groupings I was able to cross reference the data and thus better understand the role of social capital in the context of the MHFL. The next step was to **Discuss** my findings in chapter 6. Here

I bring in theory on social capital and entrepreneurial activity in order to compare my results with established views. In the last chapter I **Conclude** the study and present both practical and theoretical contribution of my thesis. This include filling gaps in MHFL literature and shedding light on how social capital affects entrepreneurial activity in the context of a MHFL. Finally, I end with a recommendation for further research.

# 2 Theory

The theory chapter is meant to highlight the theoretical foundation I have used in my research. First I present the established theory that is written on Makerspaces, Hackerspaces and Fab labs in regards to entrepreneurship. I give a definition of them followed up by a short introduction on the origins of each. Then I talk about what makes them unique and why they are relevant for entrepreneurship. In the next section I define what I mean by entrepreneurship and entrepreneurial activity before I talk about the process in which new ventures are initiated. The following subsection is about how I define impact on entrepreneurial activity. For the last section I go into depth about Social Capital and present the most important elements of it, social networks, trust and reciprocity.

## 2.1 Makerspaces, Hackerspaces and Fab Labs

Even though it is a fairly new phenomenon, academia has already has grappled with it from multiple lens and fields of scholarship. The most relevant definitions for my approach is Lindtner (et al. 2014) which sees the MHFL's as a shared social studios and Robertson (2010) which defines it as a location-based user-led innovation network, building on Von Hippel's (2005) work on innovation. However, a more practical definition is Van Holm (2015) which view them as a community workshop where "hackers" share **knowledge**, **expertise** and **access to tools** in order to produce something tangible (Van Holm, 2015).

"Makerspaces, hackerspaces and fab labs (MHFL) each developed independently but have appeared to converge towards similar structure and use" (Van Holm, 2015, p.1). Hence it is appropriate to address them under the same name, but it is still important to understand how they

each originated. Makerspace did not exist as a term until 2005 when MAKE Magazine was first published by Dale Dougherty and Maker Media. “The term became attached to community workshops where members share tools and was formulated in contrast to hackerspaces, which were considered more focused on computers and electronics. While makerspaces have a very recent genesis, hackerspaces possess a longer history” (Van Holm, 2014, p.3). Hackerspaces arose as computers began to spread beyond academia for use by individuals because there was a desire to work together on projects, learn from each other and join in a community of shared interests (Levy, 2001) Early examples of hackerspaces include the homebrew computer club, a hobbyist group that met from 1975 to 1986 and claimed successful entrepreneurs such as Steve Wozniak, a founder of Apple. As the internet became more accessible, such groups moved online to some degree and formed digital communities, still learning from each other and working to understand and expand the digital universe (Moody, 2002; Raymond, 1998). 3D printers and other equipment have become more available and thus hackerspaces are bringing back the physical space as a place for collaboration (Moilanen, 2012). Steven Levy (2010) describes hackers as believing that “essential lessons can be learned about the systems—about the world—from taking things apart, seeing how they work, and using this knowledge to create new and more interesting things" (p. 28). Therefore, hackerspaces have been historically oriented towards computers and the digital world, but are not limited in the tools they can incorporate.

In contrast to the decentralized development and proliferation of makerspaces and hackerspaces, fab labs originate directly from the Massachusetts Institute of Technology’s Center for Bits and Atoms and the course “How to Make (Almost) Anything”. After the initial development, the University and Niel Gershenfeld with a grant from the National Science Foundation worked to spread these labs everywhere in the world as a blueprint for community workshops (Gershenfeld, 2008). MIT has retained greater control over the term fab labs than Make Media has over makerspace. But regardless of how they are different, they still have many important aspects in common. For starters, they are all built on a structure that facilitates social capital.

One way in which they facilitate social capital is explained by Hoang (2003). He states that “whereas network size and centrality delimit the amount of resources an actor can access, the presence of structural holes in the network challenges the ability of actors to gain access to a

diversity of resources" (p. 2). MHFL is a solution to this as they can gather diverse members in terms of age, goals, and experience in order to unintentionally create a dense network that is productive towards innovation (Van Holm, 2014). Diversity is found to be a critical component for promoting innovation within firms (Østergaard, Timmermans, & Kristinsson, 2011), industries (Feldman & Audretsch, 1999) and cities (Duranton & Puga, 2000; Kelley & Helper, 1999). Furthermore, access to high levels of social capital seems in turn be a major contributor to initiation of entrepreneurial activity in these places.

Lindtner (et al., 2014) argues that "while many makers stressed that a hackerspace shouldn't be reduced to its potential for entrepreneurial practice, they were nevertheless instrumental movers and shapers in local or international start-up scenes. Prominent examples of companies that emerged from such hackerspaces are the Pebble Watch (a programmable watch whose team is the recipient of the largest Kickstarter campaign in history) and MakerBot" (p. 5). Similar to how venture capitalists count on the exceptions to fund further investments (Gompers & Lerner, 2004; Sahlman, 1990), few successful products are required for MHFLs to benefit the nation's economy. This should make it clear that MHFL's also serves as a great environment for accidental entrepreneurship. As Mortara (2014) puts it, "this potential for user-driven innovation (Von Hippel 2005) might, in turn, lead to an increase in the number of individuals attempting to establish new ventures and becoming 'accidental entrepreneurs'" (p. 4). Furthermore Van Holm (2015) explains the process flow in which a maker in a MHFL would commercialize an invention in figure 2.1.

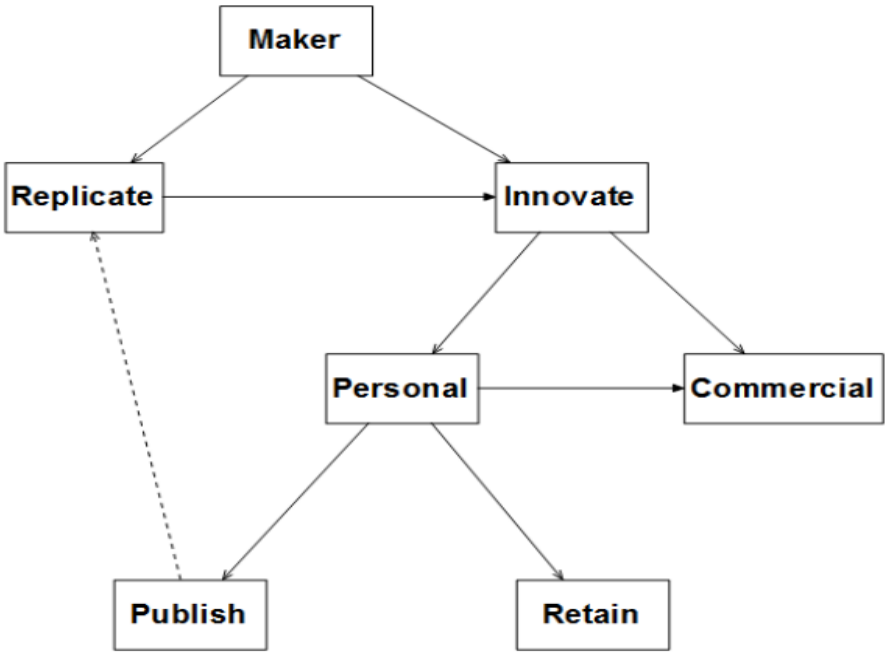


*Figure 2.1. Innovation process flow. Van Holm (2015)*

It is clear from this, that the MHFL's role is mostly to facilitate the early phase of the entrepreneurial process.

Through the literature review, three crucial social capital factors that may help or lead to entrepreneurial activity has been identified in the MHFL. They are access to Tools, Knowledge and Personal Networks.

### 2.1.1 Tools and Equipment

Entrepreneurs can gain access to tools and equipment through the social network structure of the MHFL. MHFL's are seen as potential providers of manufacturing resources (Birtchnell and Urry 2013, Petrick and Simpson 2013), and hence could support individuals interested in producing, commercializing and propagating their innovation. Furthermore, "the maker movement lowers the costs for prototyping, making early sales and acquiring outside funding more realistic" (Van Holm, 2015, p. 1).

### 2.1.2 Knowledge and Expertise

Entrepreneurs can gain access to knowledge and expertise of other MHFL members through trust and reciprocity. As the culture and influence of peers is known to affect entrepreneurs' conduct (Nanda and Sorensen 2010), the sharing culture which typifies fab-spaces (Moilanen 2012) might be expected to have impact on individuals' entrepreneurial behavior.

### 2.1.3 Personal networks

Entrepreneurs can gain access to the personal network of other MHFL members through trust and reciprocity. The entrepreneur's networks (whether personal and relation-based networks or strategic alliances) are crucial for acquiring the requisite complementary resources and capabilities (Bantham et al., 2003; Deeds and Hill, 1996; Johnson and Sohi, 2003; Shan et al., 1994). The contacts that lead to successful outcomes are their social capital and they are a key component of entrepreneurial networks (Burt, 1997).

## 2.2 Entrepreneurs, Entrepreneurial Activity and Entrepreneurship.

In order to talk about impact on entrepreneurship we first need to define what we mean by entrepreneurs, entrepreneurial activity and of course entrepreneurship. When Ahmad & Seymour (2008) set out to define these terms for the Organization for Economic Co-operation and Development (OECD), they came up with the following definitions.

*"Entrepreneurs* are those persons (business owners) who seek to generate value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets." (Ahmad & Seymour, 2008, p. 4).
*"Entrepreneurial activity* (EA) is the enterprising human action in pursuit of the generation of value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets" (Ahmad & Seymour, 2008, p. 4).
*"Entrepreneurship* is the phenomena associated with entrepreneurial activity" (Ahmad & Seymour, 2008, p. 4).

These definitions is very much derived from Schumpeter's (1934) definition of entrepreneurship. He made a clear distinction between innovation based and imitative based ventures. He meant that entrepreneurship only occurred if the result was a new business in one form or another. According to Schumpeter, an entrepreneur is willing and able to convert a new idea or invention into a successful innovation (Schumpeter, JA. 2013).

By using production processes as a starting point, Schumpeter (1934) confined the "new" to revolve around the implementation of the new combinations that disturb the current balance. This is defined as innovation, and can happen in the following ways according to him:

1 - Introduction of new products.
2 - Introduction of new production methods.
3 - Exploiting new type of raw material or semi-finished production.
4 - To enter a new market
5 - New organization within an industry.

Innovation can thus be defined as creating something new through operationalizing ideas, and is referred to as the fundamental phenomenon in economic development. This can happen both in existing and new ventures. Innovation can either be an intentional or accidental activity; it can arise accidentally by discovering either a better process or an improvement upon a project intended as a replication. A person can also start a project intending to create something new, either with an idea for how to modify an existing product, exemplified by user lead innovation (von Hippel, 1986, 2005), or make something entirely new and disruptive (Christensen, 2013).

I think it is also worth to mention Shane and Venkataraman's definitions as they emphasizes discovery and exploitation of opportunities which is highly relevant for MHFL's.

*"The field of entrepreneurship involves the study of sources of opportunities; the processes of discovery, evaluation, and exploitation of opportunities; and the set of individuals who discover, evaluate, and exploit them" (*Shane & Venkataraman, 2000, *p. 1)*

### 2.2.1 The entrepreneurial process

As mentioned previously, the MHFL is mainly concerned with the earlier phase of the entrepreneurial process. But, what exactly are the different phases of entrepreneurship?

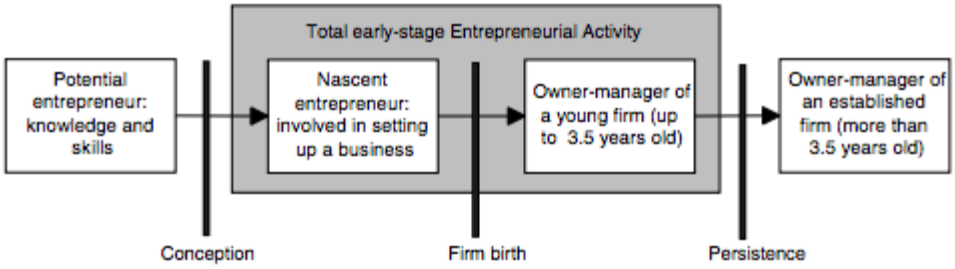


*Figure 2.2. The entrepreneurial process defined by GEM (Reynolds et al. 2005).*

According to Lumpkin and Dess (1996), new venture creation is useful to consider as a process. Reynolds (et al 2005) distinguishes this process in "four phases, with three transition points marking typical entrepreneurial barriers (see figure 2.2). The first phase of the startup process consists of people in the adult population contemplating on setting up a business. Their motives may be fed by opportunity recognition (Rosenbloom et al., 1994), or by lack of job alternatives. Some of these individuals may decide to set-up a business. Once they have initiated some entrepreneurial startup activities, and are doing more than just talking about it, individuals have completed the first transition; moving from conception into the gestation or start-up process" (p. 3). They can be considered nascent entrepreneurs and they are now in the second phase. "The second transition reflects the startup as it develops into an operational business, the firm birth transition" (Reynolds et al., 2005, p. 3). However, at this stage, the firm usually have expanded beyond the MHFL. Thus, the entrepreneurial activity usually found in MHFL's are that of the second phase, the nascent entrepreneur phase.

### 2.2.2 Impact on entrepreneurial activity

Now that entrepreneurship is defined, I needed to define what specifically I mean by 'impact on the level of entrepreneurial activity'. The UK's Research Excellence Framework (REF) defines impact as 'reach' and 'significance' and can encompass the 'effect on, change or benefit to the

economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia'. In this context I have thus looked at how social capital have an effect on, change or benefit the level of entrepreneurial activity in a MHFL. The Global Entrepreneurship Monitor (GEM) is a global study that aims to analyze the level of entrepreneurship occurring in a wide basket of countries. They define "people who are entrepreneurially active as adults in the process of setting up a business they will own, or currently owning and managing an operating young business" (Reynolds et at., 2005, p. 2). Entrepreneurial intentions (EI) is defined as the stage before EA. An individual have EI if they have intentions to start a new company in the next three years. These definitions coincides with those who consider venture creation to be the most appropriate focus of entrepreneurial research (Gartner, 1990). To study entrepreneurial activity (EA), you need simple metrics that can be quantified. GEM measure EA and EI in terms of the entrepreneurial behavior and attitudes of individuals. This essentially just refers to if people are starting new ventures or having intentions to start one.

## 2.3 Social capital

Jack and Anderson (2002) argues "that in order to understand entrepreneurship we need to move away from considering the entrepreneur in isolation and look at the entrepreneurial process. Entrepreneurship is not merely an economic process but draws from the social context which shapes and forms entrepreneurial outcomes. Embedding is the mechanism whereby an entrepreneur becomes part of the local structure. This enables entrepreneurs to draw upon, use, recognize and realize opportunities" (p. 1). "By applying structuration to the study of entrepreneurship, it enables us to recognize how social structures affect and encourage entrepreneurial activity, particularly in terms of resource availability or constraint" (Jack, Anderson, 2002, p. 1). This way, social capital enables access to latent resources and resources otherwise not available to the entrepreneur.

James Coleman (1988) defines "Social capital as anything that facilitates individual or collective action, generated by networks of relationships, reciprocity, trust, and social norms" (p. 2). Social capital helps entrepreneurs to overcome resource constraints and this is especially important in small communities where we often see a lack of market-oriented institutions such as venture

capital firms. (Bauernschuster, 2010). Particularly, the access to social capital can facilitate information diffusion and technology adoption in the process of product creation (Bramoullé & Kranton, 2007).

In terms of measurement, Stone (2001) have done a massive effort in order to summarize the literature on measurement of social capital. He states that "understanding social capital as a resource to action leads immediately to the need for empirical clarity about measures of social capital, and measures of its outcomes. It is necessary to recognize empirically that understanding whether or not a social process is at work is different from understanding the consequences of such a process. As Newton (1997, p. 578) states, social capital "may indeed generate valuable goods and services … but we should not assume that it does, and we should not include such goods and benefits as part of the definition". Similarly, Paxton (1999) draws a distinction between measures of social capital and its outcomes, consistent with the approach taken throughout this paper. This is in distinct contrast, however, to the way social capital has been operationalised in much research to date" (Stone, 2001, p. 4). "Separating the measure of social capital from its outcomes enables social capital to be positioned unambiguously within any research design, and be understood clearly in relation to its predictors and/or outcomes" (Stone, 2001, p. 6). Furthermore, he presents the measurable components of social capital in table 2.1 below. "It identifies networks, trust and reciprocity as the key dimensions" (Stone, 2001, p. 7).

**Table 1. Core dimensions of social capital and their characteristics.**

| Structure of social relations: networks | Quality of social relations: norms |
|---|---|
| **Type:**<br>Informal ↔ formal<br>**Size/capacity:**<br>Limited extensive<br>**Spatial:**<br>Household ↔ global<br>**Structural:**<br>Open ↔ closed<br>Dense ↔ sparse<br>Homogenous ↔ heterogenous<br>**Relational:**<br>Vertical ↔ horizontal | **Norm of trust**<br>• Social trust<br>–familiar/personal<br>–generalised<br>• Civic/Institutional trust<br>**Norm of reciprocity**<br>• In-kind v in lieu<br>• Direct v indirect<br>• Immediate v delayed |

*Table 2.1. Core dimensions of Social Capital (Stone, 2001)*

As the table show, there are two types of social networks, formal and informal. According to Putnam (1998), informal ties include those held between family, kin, friends and neighbors. On the other hand, formal ties include ties to voluntary associations and similar groups. This would mean that MHFL's position themselves somewhere in between a formal and informal network given that some go there to work and others to "hack" with friends. MHFL's also fall between being a closed and open network since it is (usually) only open for members.

Building on Stone's (2001) key dimensions of social capital, I will now go more in detail about why they are important.

### 2.3.1 Social Networks

In 1986, Aldrich and Zimmer argued that the entrepreneur is embedded in a social network that plays a critical role in the entrepreneurial process. Since then, academics of entrepreneurship have increasingly recognize that entrepreneurs embed their business decisions in social structures (Birch, 1994; Hansen, 1995; Larson & Starr, 1993; Reynolds, 1991; Starr & MacMillan, 1990). Entrepreneurs thus position themselves within a social network to shorten the path to knowledgeable people in order to get what they need (Blau, 1977; Burt, 1992; Granovetter, 1973). Hoang (2003) adds that "differential network positioning has an important impact on resource flows, and hence, on entrepreneurial outcomes" (p. 4).

In the broadest terms, social networks are defined by a set of actors (individuals or organizations) and a set of linkages between the actors (Brass, 1992). Hoang (2003) argues that "these network relations provide emotional support for entrepreneurial risk-taking (Bruderl and Preisendorfer, 1998) and this in turn is thought to enhance persistence to remain in business (Gimeno et al., 1997)" (p. 5). "The entrepreneur is therefore well advised to develop and promote networks of all sorts, particularly inter-firm and intra-firm relations. Given the rapid changes and advances in communication technologies, and the increasing feasibility of entrepreneurs to work remotely, careful attention toward the promotion and development of social, network, and mentoring capabilities would seem prudent." (Davidsson, 2003, p. 4)

Furthermore, according to Stone (2001), "conceptualizing social relations as networks enables us to identify the structure of social relations as well as their content, for example, flows of goods and services between people, as well as norms governing such exchanges (Nadel, 1957). Classical social network analysis in sociology and anthropology is in many ways concerned with those aspects of networks which are necessary to understand social capital, and forms a rich reference for the study of networks in social capital research" (p. 6). Networks may thus be understood as the 'structural' elements of social capital.

### 2.3.2 Trust and Reciprocity

Do members trust the knowledge they have access to through social networks? Do they give help to the same people that they get help from and vice versa? Questions like these are important for whether or not there is high social capital in a community.

"According to the social capital literature, the degree to which networks are open or closed has implications for the quality of the relationships they embody, and their productive output (Coleman 1988). Coleman (1988; 1990) defines the structure of relations which shape social capital. First, he distinguishes between open and closed networks of social relations and describes the consequence of the degree to which a network is open or closed. A closed network is one in which social relations exist between and among all parties" (Stone, 2001, p. 20). This holds true for how MHFL's are structured. "Closure of social structure is important not only for the existence of effective norms but also for another form of social capital: the trustworthiness of social structures that allows the proliferation of obligations and expectations. Closure creates trustworthiness in a social structure" (Coleman 1988: 107-108). When analyzing the quality of social networks, the norm of trust, combined with reciprocity is key components of social capital. Social capital theory clearly states that trust is a crucial component in order for a community to function well because it helps facilitates democracy and public engagement. (Putnam 1993, 1995; Uslaner 1999).

## 2.4 Summary

Makerspaces, Hackerspaces and Fab labs have appeared to converge towards similar structure, and hence I address them under the same name: MHFL. Together they are defined as community workshop where "hackers" share knowledge, expertise and access to tools in order to produce something tangible (Van Holm, 2015). Three crucial social capital factors that may help or lead to entrepreneurial activity has been identified in the MHFL. They are access to Tools, Knowledge and Personal Networks. Social capital is defined as anything that facilitates individual or collective action, generated by networks of relationships, reciprocity, trust, and social norms (Coleman. 1988). Social capital is crucial for entrepreneurs and according to Stone (2001) it comprises of three key dimensions. These are Social Networks, Trust and Reciprocity. Moving on to entrepreneurship, I decided to use Ahmad & Seymour's (2008) definition of entrepreneurial activity. They define it as "the enterprising human action in pursuit of the generation of value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets" (p. 4). Impact in this context is defined as how social capital have an effect on, change or benefit the level of entrepreneurial activity in a MHFL.

With this theoretical foundation I move on to the next chapter to explain my research approach and why I chose it.

# 3 Method

In this chapter I describe my research approach. First I discuss what type of data I needed in order to answer my research question. The second step was to choose the method that is best suited to attain this data and explain why it is so. Further on I explain how I planned to use this method. Next I talk about my process for collecting the data and finally how I analyzed it.

## 3.1 What data do I need?

What type of data do I need to collect in order to answer my research question? To say something about how social capital impact entrepreneurial activity in MHFL, I needed to measure two separate units, namely social capital and entrepreneurial activity. Hence, I wanted data with the following criteria:

1. Data that can easily be compared across different measurements. The data should have low ambiguity in other words.
2. Data that is more or less representative for the whole MHFL. Since I did not have the time and resources to collect data from every MHFL member in Norway, I had to find the best way to represent them.
3. Data that can be quantified so I could do simple analysis like averages and calculate total entrepreneurial activity. For this to be possible I also needed to data that satisfied the next criteria.
4. Data that is at least on the level of ordinal or higher. This means that the respondents should be able to put their answers on some sort of scale, preferably an interval. This allowed me to get more information out of the data by doing various advanced analysis. In general, the more angles I can look at the data from, the better.

I collected this data empirically because MHFL's is a new phenomenon and it does not exist a lot of data I can use from previous research.

### 3.1.1 From who do I gather data?

I need to collect data from people within the MHFL's in Norway in order to understand how they work. Within the MHFL there are three different types of people: Active members that work in the MHFL regularly. Inactive members which are in the MHFL for a one-time project. Promoters that run the MHFL's. They might also be active members. Because in-active members most likely will not be well embedded in the social structure I have not prioritize to collect data from them. Promoters on the other hand have a very good insight into the social community of the MHFL. The problem with them however, is that they might have a social desirability bias

meaning that they want their MHFL to look good and may therefore give responses that are more positive than they really should. Hence, my aim was to mostly gather data from active members that is not promoters.

## 3.2 Choosing a method

Taking into considerations the criteria from above I have now described the method I used to collect the data. The broader issue I needed to address was whether I should do a quantitative or qualitative study. The main differences can be summed up in this table from Minichiello et al. (1990, p. 5).

| | Qualitative | Quantitative |
|---|---|---|
| Conceptual | Concerned with understanding human behaviour from the informant's perspective | Concerned with discovering facts about social phenomena |
| | Assumes a dynamic and negotiated reality | Assumes a fixed and measurable reality |
| Methodological | Data are collected through participant observation and interviews | Data are collected through measuring things |
| | Data are analysed by themes from descriptions by informants | Data are analysed through numerical comparisons and statistical inferences |
| | Data are reported in the language of the informant | Data are reported through statistical analyses |

*Table 3.1 Qualitative vs. quantitative method.*

In McLeod's (2008) words, "Qualitative research gathers information that is not in numerical form. For example, diary accounts, open-ended questionnaires, unstructured interviews and unstructured observations. Qualitative data is typically descriptive data and as such is harder to analyze than quantitative data. It is useful for studies at the individual level, and to find out, in depth, the ways in which people think or feel (e.g. case studies). Analysis of qualitative data is

difficult and requires an accurate description of participant responses, for example, sorting responses to open questions and interviews into broad themes. Quantitative research on the other hand gathers data in numerical form which can be put into categories, or in rank order, or measured in units of measurement. This type of data can be used to construct graphs and tables of raw data to do in depth analysis. Experiments typically yield quantitative data, as they are concerned with measuring things" (p. 1).

Since my aim was to measure the impact of Social Capital on Entrepreneurial activity I needed quantifiable data that can be compared between groups and this suggest a quantitative approach. The level of social capital can according to stone (2001) be captured in many ways, but in this case, with a qualitative approach it would be difficult to compare the results between each MHFL since qualitative data is hard to quantify. It would also be hard to ensure that I get a good representation of the population if I were to do in depth interviews. Within the time constraints of this project I could perhaps manage to do only one from each MHFL. But how would I know if that person is a good representation for the whole MHFL? On the contrary, a quantitative approach where I made a survey would enable me to reach out to much more people per MHFL. This would most likely give a better picture of how the MHFL really is and thus I went with the survey format. But it was not as simple as that. For the level of measurement to be ordinal or higher there was a need for a questionnaire with scaled items. Perhaps the most used method for gathering data on a scale is the Likert scale. The beauty of using scales such as Likert is that it enables you to quantify qualitative data. While it is still a quantitative research method, you can still get valuable results without having many thousand respondents. Thus this seemed like the best option to represent an MHFL without having to talk to all the members.

There are two ways of making Likert questionnaires, with Likert-type items and with Likert-scales. Boone (2012) identified Likert-type items as "single questions that use some aspect of the original Likert response alternatives. While multiple questions may be used in a research instrument, there is no attempt by the researcher to combine the responses from the items into a composite scale. A Likert scale, on the other hand, is composed of a series of four or more Likert-type items that are combined into a single composite score/variable during the data

analysis process. Combined, the items are used to provide a quantitative measure of a character or personality trait" (p. 2).

With Likert items, the level of measurement is ordinal. With ordinal scales, it is the order of the values that is what's important and significant, but the differences between each one is not really known. Because of this, there is some discussion about whether or not it is a good idea to calculate averages from Likert items. Usually, in order to take averages, you have to be sure that the distance between each choice is the same. However, it has been shown that parametric analysis of ordinary averages of Likert scale data is justifiable by the Central Limit Theorem (Bruin, J. 2006). However, once you assume that the distance between ordinal items is the same, you assume that the level of measurement really is interval instead of ordinal. So, in order to be able to use statistics that assume the variable is interval, I assumed that the distances on my scale was equally spaced.

Furthermore, In order to better satisfy my criteria of the data being comparable, I introduced a method called T-tests. "It is a statistical examination of two population means. A two-sample t-test examines whether two samples are different and is commonly used when the variances of two normal distributions are unknown and when an experiment uses a small sample size" (Purwanto, 2013, p. 2). I have used this to check if the differences between MHFL's are significant or if they can easily be reproduced just by chance.

## 3.3 Constructing the Survey

The survey was constructed in four parts. Entrepreneurial activity, Social capital, Impact of social capital on entrepreneurial activity and lastly Perceptions of the MHFL.

### 3.3.1 Entrepreneurial activity

The first part of the survey was to measure the entrepreneurial activity using the same methods as GEM (Reynolds et al 2005). By using the same questions as GEM, it enables me to compare my results directly with the national average data on Norway that they have collected. There are 6 questions concerning EA. The first one is made to identify either EA or entrepreneurial

intentions (EI). If the respondents are currently setting up a business, either for themselves or for an employee, they qualify as an active entrepreneur. The same goes if they are owner of a company that is less than 3.5 years old. If the respondents answer that they either have intentions, or is contemplating to start a new company in the next three years, they have EI. If they answer none above, they are not entrepreneurial. While the survey was not taken by all the members of each MHFL, it does not mean the data is inaccurate. It has been shown that aggregate individual perceptions related to entrepreneurship are positively linked with the observed level of entrepreneurship (e.g. Reynolds et al., 2004; Arenius and Minniti 2005). The next question in this section is only meant to be answered by entrepreneurs. It asks if their company is related to the MHFL in any way and how. The last questions concern common and individual opportunity and is only meant to be answered by non-entrepreneurs. The first ask whether there will be a good opportunity to start a new business in your area in the next 6 months. Following this is a question that asks if the respondents think they have the required skills to start a new business. After this I ask if fear of failure would prevent them from starting a company.

### 3.3.2 Social Capital

In this part of the survey I measured the social capital of the members. But how do we measure social capital? Social capital can be measured qualitatively through interviews (Stewart-Weeks and Richardson 1998) or quantitative through surveys (Onyx & Bullen 1997). Since I decided to make a quantitative survey, this helped me get a more accurate foundation for comparing data. Of all the literature I read on measuring social capital I found the method from Onyx & Bullen (1997) on communities to be most transferable to MHFL. In their study they used a survey with 68 items and used a 4-point Likert-type response scale ranging from 1 to 4 for each item. I have used a regular 5 point Likert scale ranging from Strongly agree to Strongly disagree, but my questions was still be based on the format they utilized.

As the theory on social capital suggest, the three most valuable resources in SC is Trust, Reciprocity and Social Networks (Stone 2001). In the survey I tried to measure these individually in three sections. To measure trust I ask if the respondents trust the competence of their peers in the MHFL and their ability to protect intellectual property. To measure social

network I asked about the importance of access to the most crucial resources in MHFL. Namely tools, knowledge and personal networks. To measure reciprocity I asked if the respondent often help their peers and feel they can speak up if they disagree with something.

### 3.3.3 Perceived impact of Social Capital

The third part measured the perceived impact of social capital on entrepreneurial activity in the MHFL. I have identified Knowledge, Tools and Personal Networks as the most important contributors to social capital in the MHFL. The questions were asked in the following way: How important is having access to tools, knowledge etc. in the MHFL when starting a new company? Does having access to it make it more likely that you will engage in entrepreneurial activity? By measuring entrepreneurial activity and social capital isolated from each other in the two first sections, I can then compare how this correlates with the individual's perception of the impact.

### 3.3.4 General perceptions of the MHFL

The last part simply measured general perceptions of the MHFL. Does the MHFL encourage entrepreneurship? What about social capital? Should they do more to encourage it? Does being a part of the MHFL community make it more likely that you will engage in entrepreneurial activity? These questions was valuable when it comes to assessing the differences in different groups of analysis later on.

## 3.4 Collecting the Data

The first step in collecting the data was to locate all the MHFL's in Norway. In Van Holm's (2014) article he mentions that there are three user-maintained directories publicly listing MHFL's: hackerspaces.org, makerspace.com, and FabLab.io. Not all organizations that should be considered as MHFL's are listed on those directories so in addition I used google searches to locate some more. In total I located 13 MHFL's. After I had located them I did an analysis of all MHFL based on their websites (See appendix). It turned out two of the MHFL's, Mesh Makerspace and Bergen Hack had shut down so I removed them from the list. On the ones that

were still active, I looked at what type of tools they offered, what business model they had, and if there were any indications of entrepreneurial activity. After I had gathered this information about all the MHFL, I proceeded to initiate contact with them through email. I did not attach the survey in the initial email. Instead I just asked if they had a mailing list or slack channel where I could get access to all the members. The response was really good as I got a reply from nearly everyone within an hour. They invited me to their Slack channel or gave me a mailing list if the had one. I also learned that Grenland Hackerspace was no longer active. In total, this meant that I had found 3 Fab Labs, 4 Hackerspaces and 3 Makerspaces in Norway that I could send my survey to. With an exception of Oslo, which host 4 of them, the rest were spread quite evenly across the country. After a couple of iterations with my survey, I did a test run with 5 people before giving a final touch to the questions. Then, when I was happy with the survey, I proceeded to send it out to the members of the different MHFL's. I did not get any responses from the Solvik Gard, the Fab lab in northern Norway so that is why it is not included in the results.

## 3.5 Analyzing the data

After collecting all the responses in spreadsheets I could start looking at the data. I made one sheet for every section of my survey to get a good overview. I decided to analyze the data from three different perspectives. First I look at the overall results to find out how the entrepreneurial activity compares with the national average. The second perspective was to compare the MHFL's with each other. Here I found out who were the outliers in EA and if they differed in level of Social capital from the rest. Lastly I looked at the data from an individual level where I group top performers in EA and compare them to the bottom performers. This way I could find out if the groups differs in any other variables like social capital. By doing this three-way analysis I can effectively isolate the relationships between social capital and entrepreneurial activity.

I analyze the responses both as Likert-type and Likert-scale data. Here is the recommended means of analysis for both types of data (Boone, 2012).

| | **Likert-Type Data** | **Likert Scale Data** |
|---|---|---|
| Central Tendency | Median or **mode** | **Mean** |
| Variability | **Frequencies** | Standard deviation |
| Other Statistics | Chi-square | ANOVA, **t-test**, regression |

*Table 3.2. Likert-type data vs. Likert scale data (Boone, 2012)*

I have highlighted the methods of analysis I used. As seen above, a good way of analyzing the central tendency for Likert-type data is to calculate the mode. This is simply just a grouping of all the responses. How many agreed? How many disagreed? How many was neutral? When doing this type of analysis, it is easy to pick up big variances in the data which might disappear when just taking the average. Because of the small i sample size I could get a lot of information out of the data just by using simple analyzing techniques like taking averages and looking at the distribution of responses. For comparing results in different groups I used t-tests to make if the differences were significant or not.

In order to best represent the data, I tested many different means of visualization and concluded that simple bar charts and line graphs were most effective.

## 3.5 Summary

To answer my research question I needed data that is easily comparable, representative for the whole MHFL, can be quantified and that is at least on the quality level of ordinal or higher. After I had decided that I should gather data from the active members of the MHFL I argued that a quantitative approach with a Likert scale questionnaire would be most suitable. Then I constructed a survey with questions based on findings from my literature review on how I should measure social capital and entrepreneurial activity. I used three different internet directories in addition to google searches to find all the active MHFL's in Norway. After this I proceeded to send the survey out to their members. For the analysis I planned to use simple analytical tactics like dividing the respondents into different groups and calculating the mode and average of their

responses to find the outliers in the data. But before I go further into the analysis, I need to present the results.

# 4 Results

The results from the survey was divided into four different sections and are presented as such. These sections was Entrepreneurial activity (EA), Social capital (SC), Perceived impact of SC on EA, and General Perception of the MHFL. From Fellesverkstedet and Fix Makerspace I got respectively 3 and 2 responses. They were counted in the overall results, but not in the MHFL comparison section because of the small sample size. The number of total respondents were **47** and below is how they were distributed:

**Bitraf:** 7
**Creator:** 10
**Fablab NTNU:** 5
**Fellesverkstedet:** 3
**Fix Makerspace:** 2
**Hackeriet:** 7
**Hackerspace NTNU:** 9
**Hackheim:** 4

## 4.1 Entrepreneurial activity

In figure 4.1 is the entrepreneurial activity/intentions for each MHFL respectively and totals. 1 is equal to 100% and 0.5 is 50%.

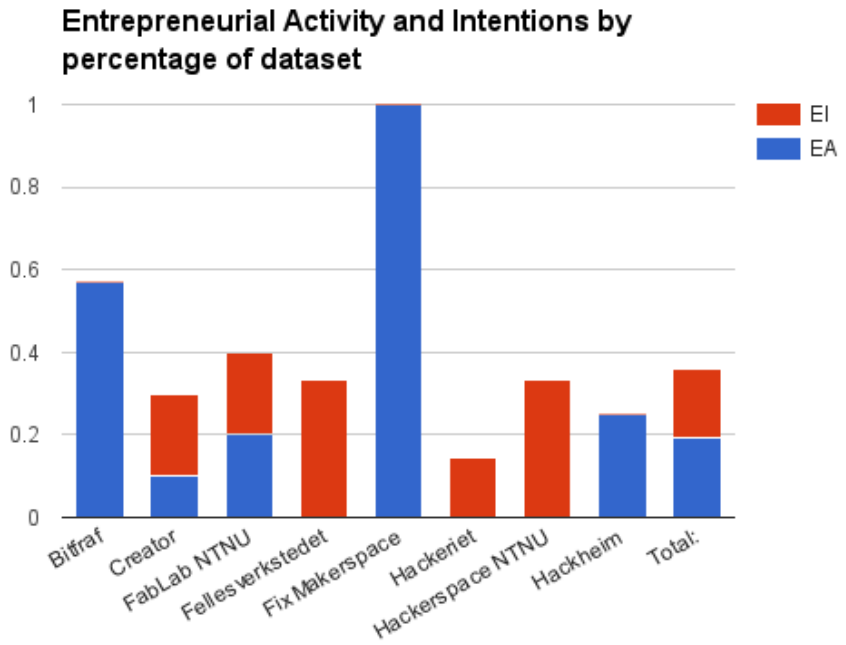


*Figure 4.1*

In my sample, I measured the total entrepreneurial activity to **19.1%** and of the members that were not active entrepreneurs, **17%** answered that they had intentions or contemplated to start a new business within the next three years. As we can see the entrepreneurial activity of Bitraf and Fix Makerspace is far higher than the other MHFL's with over **50%** of the respondents being active entrepreneurs. It is important to note however that the latter only had two responses so it might not be very accurate description of the makerspace in general. **45%** of the overall entrepreneurial activity comes from only one MHFL, namely Bitraf. Without Bitraf the entrepreneurial activity is **12.5%**, but still twice as high as general population. Both Fellesverkstedet and Hackerspace NTNU does not have any EA in my sample, but over **30%** of them had entrepreneurial intentions. Hackeriet is the worst performer with no EA and only **15%** EI. The rest is fairly similar to the combined total EA and EI average of **36%**.

### 4.1.1 Company relationship to MHFL

Out of the ones that identified themselves as active entrepreneurs, 71% said that their business is directly related to the MFHL.

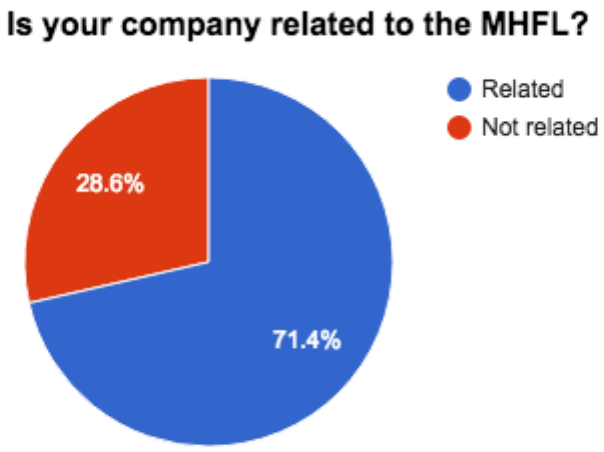


*Figure 4.2*

### 4.1.2 Individual attitudes

In order to find more out about the attitudes of non-entrepreneurial members, I asked asked about individual capabilities and fear of failure. In line with the methods of GEM, the entrepreneurs responses to the following questions were excluded.

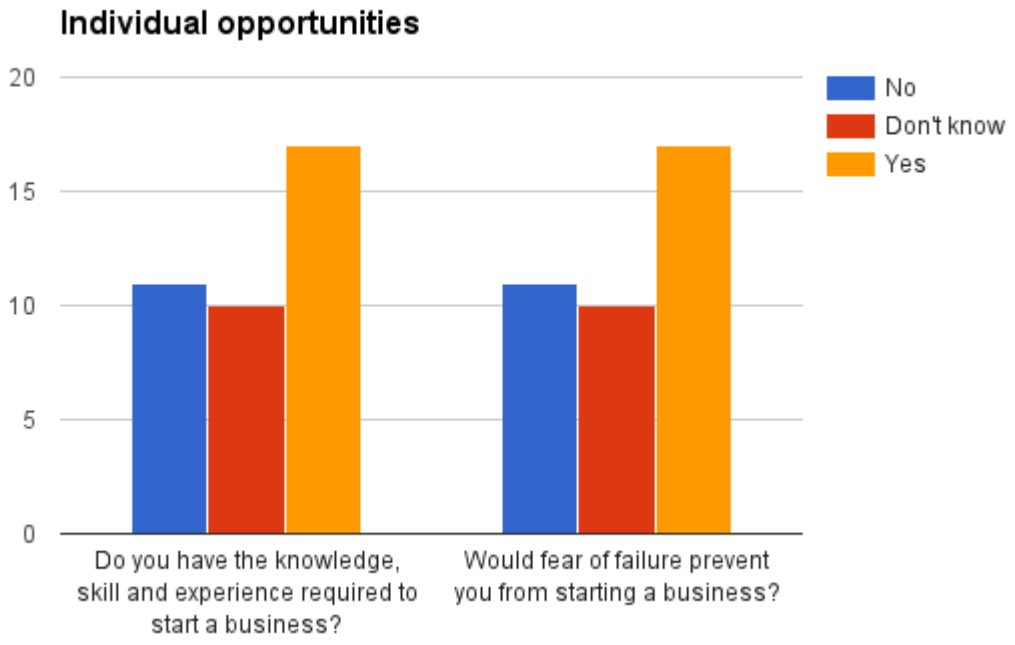


*Figure 4.3*

**44%** of the non-entrepreneurial population perceived their capabilities to start a business as sufficient. **44%** of the non-entrepreneurial population said that fear of failure would prevent them from starting a new business.

## 4.2 Social capital

In the survey there were 10 questions that I used to measure social capital. Three was related to social networks, four to trust, and finally three to reciprocity (See appendix 9.2 for questions). In this section I have first looked at what type of capital is most valued by the MHFL members. Then I have seen how the MHFL's responded to questions about social capital on average. Lastly I have done the same, only with the mode instead of average.

### 4.2.1 Importance of access to capital

Figure 4.4 shows how the members of the MHFL perceive the importance of access to tools, knowledge and personal networks.

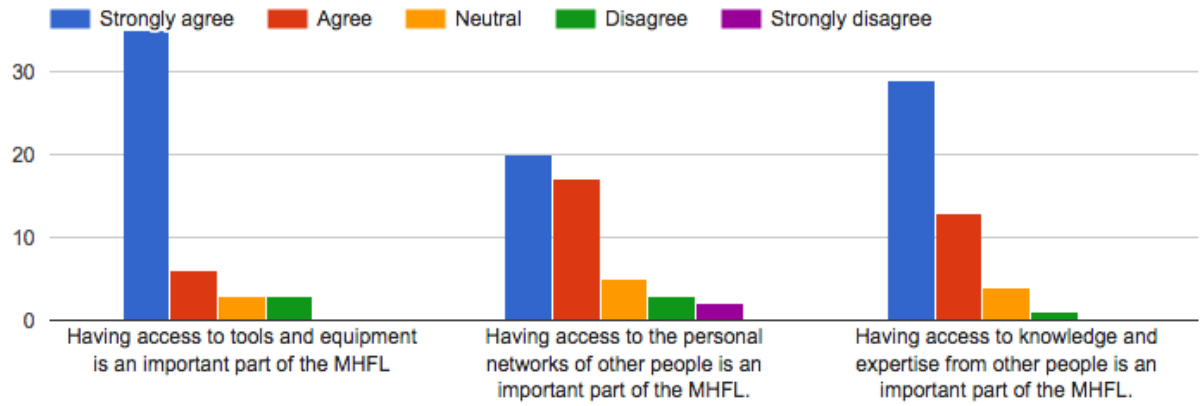


*Figure 4.4*

**Tools and equipment seems to be most valued** while personal network is least valued. However, by looking at the distribution of answers we see that **all capital is generally very valued** by the members.

### 4.2.2 Average by MHFL

Figure 4.5 below shows the *average* level of social capital for each question (Appendix 9.2) by MHFL:

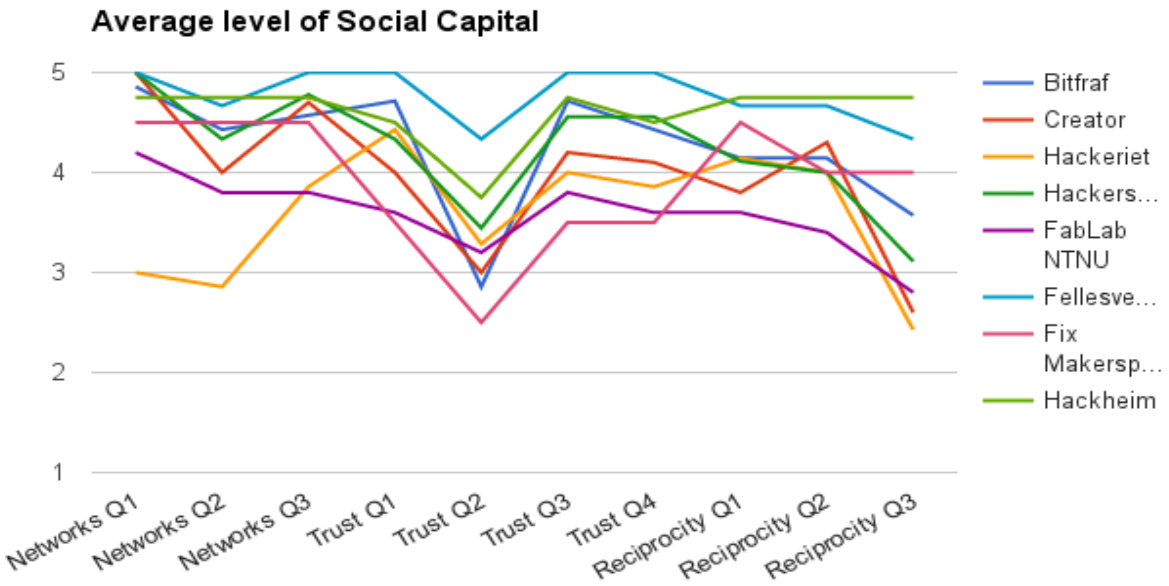


*Figure 4.5*

The closer the lines is to 5, the higher level of social capital is found to be present. If an MHFL answered 'Strongly Agree' on all the questions, the average would show a straight horizontal line at 5. From this graph we see that the average of the three first questions is around 4.5, but Hackeriet is clearly below everyone else. There is a drop in agreement in question 2 about trust of intellectual property. The last question about reciprocity received a very wide range of answers.

### 4.2.3 Mode by MHFL

Figure 4.6 shows the *mode* results for all the MHFL. Number of responses is on the y-axis while the Likert scale is on the x-axis (1 = Strongly disagree):

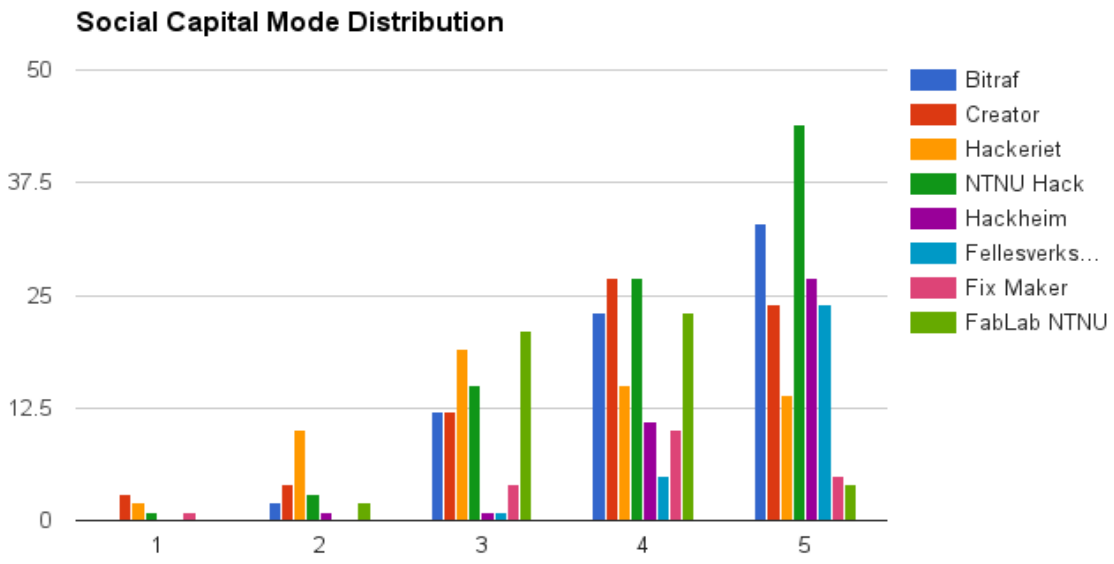


*Figure 4.6*

By looking at the mode of each MHFL we can see that Hackeriet have a mode of 3 or Neutral. Creator, Fab Lab NTNU and Fix Makerspace have 'Agree' as the mode while Bitraf, Hackerspace NTNU, Hackheim and Fellesverkstedet have a mode of 'Strongly Agree'. In total, **41%** of the respondents said they strongly agree with the statements about social capital and **33%** just agreed.

## 4.3 Perceived Impact of SC

I measured social capital by three categories: Social Networks, Trust and Reciprocity. Three elements of the MHFL that falls into these categories is access to knowledge, tools and personal networks. In the next section I measured how the different MHFL's perceived the impact of these element on entrepreneurial activity. First I look at how the MHFL's responded to the questions on average and then by mode.

### 4.3.1 Average by MHFL

Figure 4.7 below shows the average perceived level of impact that the social capital have on entrepreneurial activity.

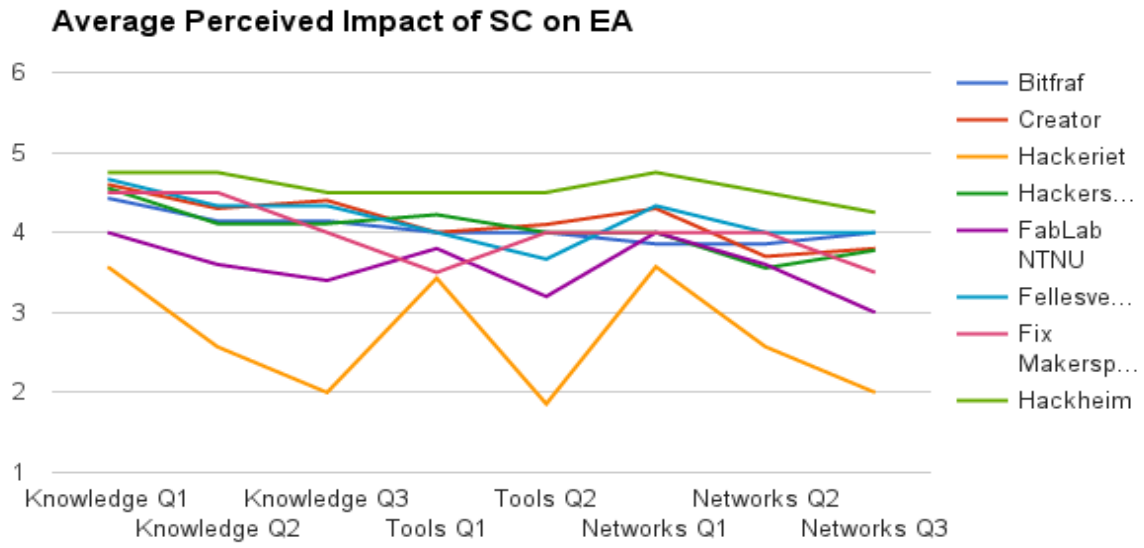


*Figure 4.7*

Hackeriet is yet again the outlier with an average well below the rest. Especially the questions about whether having access to tools, networks and knowledge would make it more likely for them to engage in EA received a very negative response (K3, T2 and N3). On the other end of the spectrum we see Hackheim which averages above 4.5 and scores more positively than all other MHFL on each question. The rest seems to average at around 4.0 without any notable variances.

### 4.3.2 Mode by MHFL

The mode or the distribution of answers (1 = Strongly disagree):

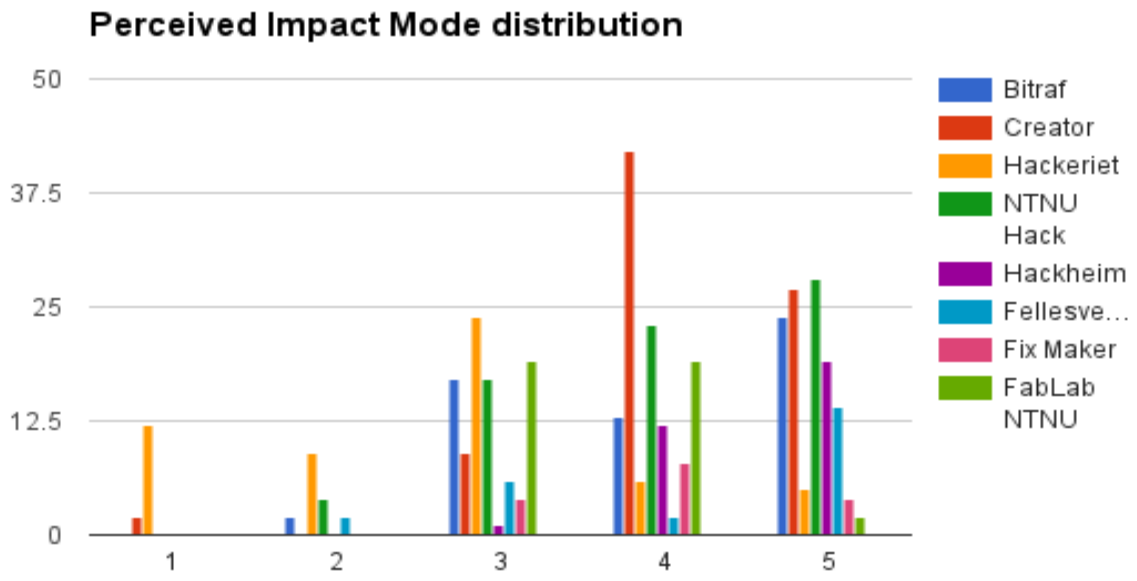


*Figure 4.8*

The mode for Hackeriet and Fablab NTNU is Neutral. Creator and Fellesverkstedet it is 'Agree', while for the rest it is 'Strongly Agree'. This suggest a strong agreement that social capital have an influential impact on entrepreneurial activity in the MHFL

## 4.4 General Perception of the MHFL

The chart below shows how the members perceive the focus of the MHFL and if they are happy with it or not. This is asked in respect to entrepreneurial activity (two first questions) and social capital (question three and four). The last question asks whether they feel that being part of the MHFL community makes it more likely that they will engage in EA.

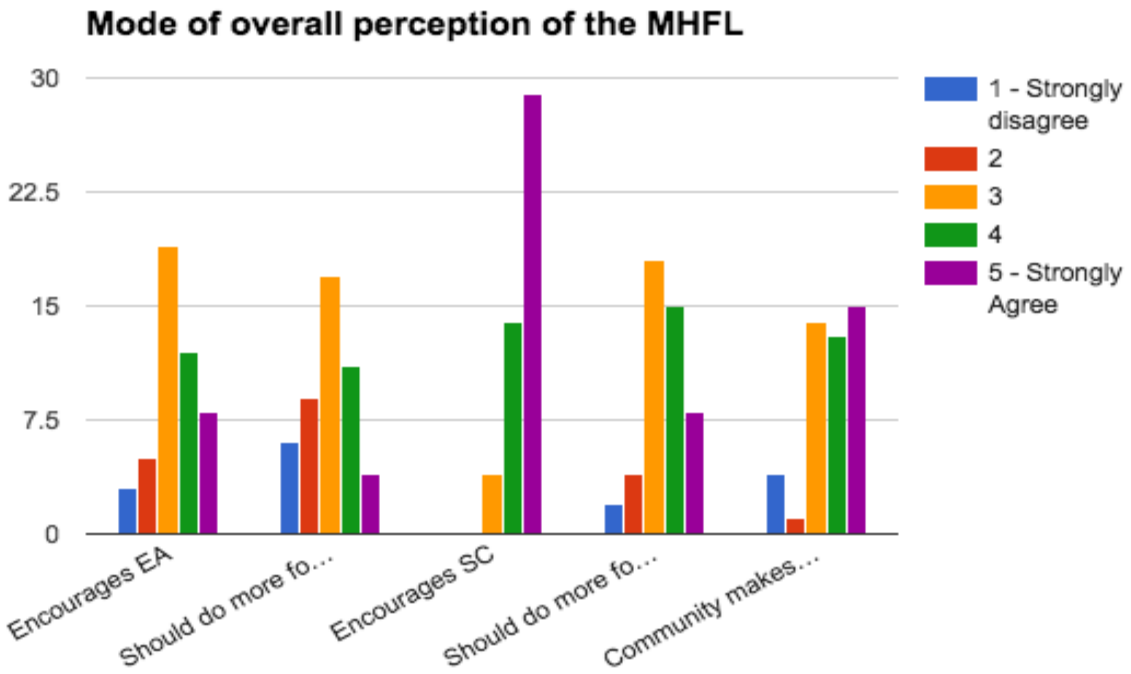


*Figure 4.9*

Of the total sample population, **43%** said that their MHFL encourage entrepreneurship. Following up this, on a question regarding whether the members felt that their MHFL should encourage more entrepreneurship, only **32%** of the respondents felt they should and **36%** were neutral. **60%** of the population felt that being part of the MHFL community makes it more likely that they will engage in entrepreneurial activity in the future.

Lastly I asked which type of resource is most valuable for the members in the MHFL. There were many different responses, but most seemed to identify 3D-Printers, Laser cutters and CNC machines, Electronics lab and last but not least humans as very valuable resources.

## 4.5 Summary

I measured the total entrepreneurial activity to **19.1%** and of the members that were not active entrepreneurs, **17%** answered that they had intentions or contemplated to start a new business within the next three years. **44%** of the non-entrepreneurial population said that fear of failure

would prevent them from starting a new business. Of all the capital in the MHFL, tools and equipment seems to be most valued. When it came to Social capital, it generally seemed to be very strong in all the MHFL's. There is also a strong agreement that social capital have an influential impact on entrepreneurial activity in the MHFL. Only Hackeriet seemed to disagree with this. However, only **32%** of the respondents felt their MHFL should encourage more entrepreneurship and **36%** were neutral. This suggest something about their attitude towards entrepreneurship as **60%** of the population felt that being part of the MHFL community makes it more likely that they will engage in entrepreneurial activity in the future. But what does these facts really tell us? Moving on to the next chapter I have analyzed the data in light of my research question.

# 5 Analysis

In order to answer my research question in the best possible way I need to analyze the data from different perspectives. To give the results from my study more weight I have analyzed the data from three angles. An overall perspective, by MHFL's and lastly from an individual perspective. By looking at the overall picture I hope to be able to point out the general trends and tendencies in the data. Then I have tried to explain these tendencies more in detail by looking at them from the last two perspectives.

## 5.1 Overall

In this section I look at the overall trends. After having measured the entrepreneurial activity and intentions of the respondents, I proceed to compare these results with the national averages calculated by the Global Entrepreneurial Monitor (GEM). Then I see how the individual attitudes of the members towards entrepreneurship compares to the same national data by GEM. Furthermore, I briefly discuss my findings in the measurement of social capital.

### 5.1.1 Entrepreneurial Activity

Is there any significant evidence of entrepreneurial activity in the MHFL's? According to GEM. Norway have a total entrepreneurial activity of 6.4% of the population. In my sample, I measured the total entrepreneurial activity to 19.1%. In addition, 70% of the entrepreneurs said that their business activity is directly related to the MHFL. Of the members that were not active entrepreneurs, 17% answered that they had intentions or contemplated to start a new business within the next three years. In comparison, the national average percentage of entrepreneurial intentions is 5%. In other words, both **EA and EI is three times as high as the national average.**

From a resource based view, there are two possible explanations for why there is such a high entrepreneurial activity in MHFL. Either the access to high SC in MHFL makes members more entrepreneurial or it attracts people from the outside that is already entrepreneurial.

### 5.1.2 Individual attitudes

On the question about whether the non-entrepreneurs felt they had the required skill and knowledge to start a company, 44% agreed that they did. **This is 10% higher than the national average of 34%**. It seems members of MHFL's have higher confidence in their own abilities than the national average. Interestingly, the same members were **9% more likely to be prevented to start a new company due to fear of failure**. The national average here is 35%. This suggest they are more capable, but also more risk averse. So what implications does this have for my research question? It suggests that MHFL's might have a negative impact on risk aversion.

### 5.1.3 Social Capital

The overall results from the survey shows that there is very high social capital in all MHFL, but there is specifically two questions that score lower than the others. They are:

*"If I am working on something secret in the MHFL, I trust the other members not to talk about it in public."*

*"I frequently uses the personal network of other members in the MHFL to get in contact with other people."*

They represent a dip on the overall high average. This may be explained by the fact that these two questions is more business related than the others. In addition, from the responses it seems that **access to tool and knowledge is a more valuable capital** than access to knowledge and personal networks. Most rated each as highly important, but it goes to show that this seems to be the main reason why people seek MHFL's.

## 5.2 By MHFL

In this section I present the results grouped by MHFL's. They show which MHFL have the highest entrepreneurial activity and which have the highest social capital. Because the sample size from some MHFL is relatively small, one could make the argument that it is not a good idea to do an analysis from this perspective. However, the goal is not necessarily to give the best description of each MHFL, but rather to find outliers that might describe tendencies or correlation between SC and EA.

When I compare the overall levels of social capital and EA I get the following graph (Figure 5.1). The top line represents the social capital of each MHFL while the bottom represent entrepreneurial activity and intentions. Note that the EA was originally measured in percentage but is here scaled down to fit the 1-5 scale of SC.

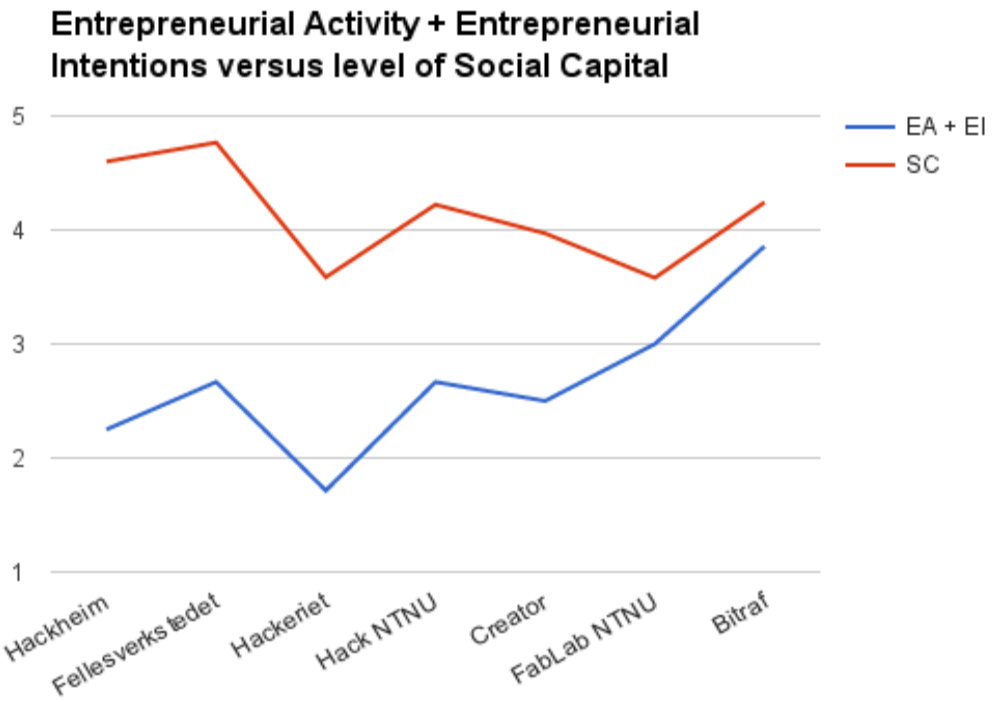


*Figure 5.1*

This might look somewhat like a correlation, but it is deceiving. Hackerspace NTNU and Bitraf have the same SC average, but totally different EA. Similary with FabLab NTNU and Hackeriet. Hackheim have the second highest SC, but the second lowest EA.

To further analyze between different scores I used a T-Test to compare and see if the difference between each MHFL was significant. From these results, it was easy to see that Hackeriet is a big outlier in the data. They scored very low on EA, EI and perceived impact of SC, but while their scores on SC were the lowest overall, they still scored fairly high. To gain a better understanding about the low EA scores, I talked to some of the members and discovered that they had a very negative attitude in regards to entrepreneurship (See appendix, 9.3). Some of them were even disgusted by the idea of using a hackerspace for business purposes. They had more or less an opposite attitude from Bitraf, which in general was very entrepreneurial. This suggests that **high social capital does not make the members more entrepreneurial**. In support of this statement, you could look at an outlier in the other end of the specter. Hackheim

performed best on perceived impact of SC and second best on SC. However, when it comes to EA, only Hackeriet was worse.

An important aspect to note is that 45% of the overall entrepreneurial activity comes from only one MHFL, namely Bitraf. Without Bitraf the entrepreneurial activity is 12.5%, but still twice as high as general population. This corresponds well to the fact that Bitraf is also the MHFL which encourages most entrepreneurship. Similary, Hackeriet is MHFL with lowest encouragement of entrepreneurship and the one lowest actual EA. This could indicate that encouragement from the MHFL promoters will have a strong effect on either attracting entrepreneurs or making existing members more entrepreneurial. But, as results from the survey shows, **only 32% said that their MHFL should encourage more entrepreneurship**. The majority seemed content with the current focus of their MHFL.

## 5.3 Individual

Judging from the analysis above, there seems to be weak evidence that high SC correlates with high EA. To test this hypothesis more rigidly, I divided the individual members of MHFL's into two groups, A and B. Members that are entrepreneurs or have entrepreneurial intentions was placed in group A and the rest was placed in group B. This resulted in 17 people in Group A and 30 people in Group B. By comparing the average data from these two groups I should be able to isolate any differences in SC or perceived impact of SC.

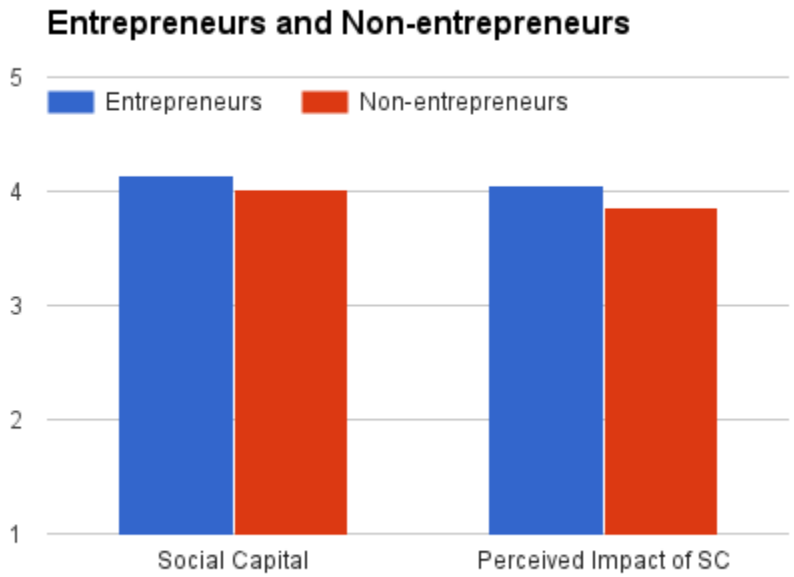


*Figure 5.2*

From figure 5.2 there **does not seem to be any significant differences** and this was also confirmed by my T-Test which showed respectively 0.384 and 0.347 for Social Capital and Perceived impact of SC. For the difference to be significant, the T-Test score has to be lower than .05, which is a long way from my results.

The only significant difference I could find between these two groups is that entrepreneurs seems to feel that their MHFL encourages more entrepreneurship.

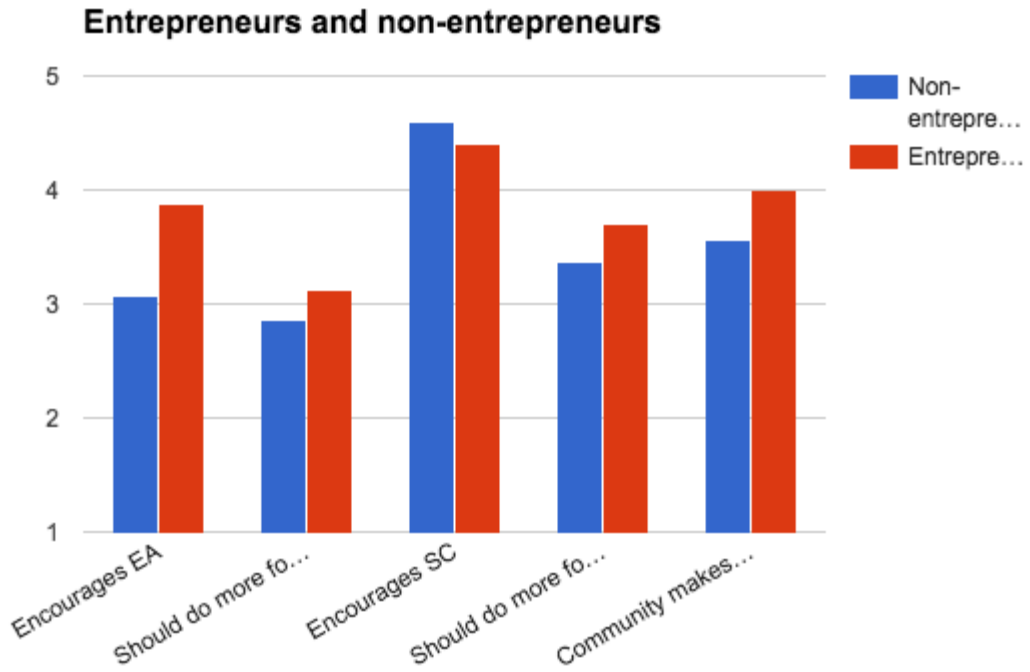


*Figure 5.3*

## 5.4 Summary

In conclusion I found that high SC **does not initiate EA in this context**, but clearly the majority of members believe that social capital is important for both the MHFL and for EA. They also believe it makes it more likely that the will engage in entrepreneurial activities in the future. Furthermore It looks as though the reason there is high entrepreneurial activity in the MHFL is because they are **attractive to entrepreneurs**. Of the capital available to members, tools and equipment seems to be most attractive. To add to this, the MHFL members should be more capable as entrepreneurs than the national average, but they also is more risk averse which suggests that MHFL's might have a **negative impact on risk aversion**.

These are my main findings but how do they stand up against established theory? I have explored this in discussion chapter.

# 6 Discussion

In the discussion I have highlighted my findings and talk about them in relation to established theory. I have discussed the most prominent findings from my analysis. The first one being that MHFL's does not trigger entrepreneurial activity and the second being that MHFL members are risk averse. Building on this, I further argue that entrepreneurs are attracted to MHFL's and that is why they have such high entrepreneurial activity.

## 6.1 MHFL does not trigger entrepreneurial activity

Hoang (2003) mentions that the presence of structural holes in the network challenges the ability of actors to gain access to a diversity of resources. He claims that the MHFL is a solution to this as they can gather diverse members in terms of age, goals, and experience in order to unintentionally create a dense network that is productive towards innovation. The MHFL's in Norway may fill structural holes in the social networks of members, but the diversity that Hoang stresses does not have a very clear presence. In terms of experience and expertise maybe, but not in much else. In my sample, less than 5% were female and only 19% were either younger than 20 or older than 40 years old. The impact of diversity on EA and the value of unintentional innovation might therefore be overstated.

I found strong evidence that social capital is perceived as very important for entrepreneurial activity. This is not very controversial as the notion that social capital is important for entrepreneurship is widely recognized. Access to social capital helps entrepreneurs to overcome resource constraints (Bauernschuster 2010) and facilitate information diffusion and technology adoption in the process of product creation (Bramoullé & Kranton 2007). However, the word facilitate turns out to be important in my analysis. MHFL's are said to be a place for user-driven innovation (Von Hippel 2005). Furthermore, Shah and Tripsas (2012) talks about how this potential for user-driven innovation might, in turn, lead to an increase in the number of individuals attempting to establish new ventures and becoming "accidental entrepreneurs". The way people engages with each other in the MHFL would suggest that accidental entrepreneurship could indeed happen, but then again it's all up to the entrepreneurial attitude of

the individuals. Even with a good business idea, someone without the right attitude will still fail to seize the opportunity. I asked all the entrepreneurs about their business and I did not come across any accidental entrepreneurs in my study. Thus I would think that the impact SC have on accidental entrepreneurs is fairly small. As the culture and influence of peers is known to affect entrepreneurs' conduct (Nanda and Sorensen 2010), Moilanen (2012) claims that the sharing culture which typifies fab-spaces might be expected to impact on individuals' entrepreneurial behaviour. In addition, Newton (1997) states that social capital 'may indeed generate valuable goods and service through entrepreneurship, but In my research I did not see any evidence of this. There was no clear connection between SC and EA in the MHFL. Entrepreneurs benefitted greatly from being in the MHFL, but non-entrepreneurs did not seem to become more entrepreneurial. This all underscores my finding that Norwegian MHFL's facilitates entrepreneurship, they do not trigger it.

## 6.2 MHFL members are risk averse

In the analysis I found that fear of failure was particularly strong within non-entrepreneurial members of MHFL which suggests that MHFL's increase risk aversion. This is somewhat contradicting with Bruderl & Preisendorfer's findings that network relations provide emotional support for entrepreneurial risk-taking and this in turn is thought to enhance persistence to remain in business (Gimeno et al., 1997). Individuals with a low degree of risk aversion are more likely to become entrepreneurs as opposed to wage employment (Cantillon 1979; Say 1971; Knight 2012). Fox (2014) also claims that risk aversion is a much lower barrier to entrepreneurship within this maker movement. In particular, barriers to accessing entrepreneurial resources (RBT) are lowered. It might be true that network relations make it easier for entrepreneurs to stay in business, but in my case it did not make non-entrepreneurs any less risk averse. Does this mean social capital is bad for risk aversion or is there some other explanation? Since "it is common knowledge that the rewards of entrepreneurship are more variable and less certain than the wages of employment" (Cramer et al., 2002, p. 1), possibly the most logical explanation is that members of MHFL generally have higher education and income than the national average. This is reasonable to assume since hacker activities usually requires university-level skillsets. According to Hartog (et al 2002), there is substantial empirical support for the

claim that risk aversion is higher for people with high income, wealth and education. Thus, social capital might not to impact risk aversion negatively.

## 6.3 Entrepreneurs are attracted to MHFL's

In the analysis I proposed two possible explanations for why there is such a high entrepreneurial activity in MHFL. Either the access to high SC in MHFL makes members entrepreneurial or it attracts people from the outside that is already entrepreneurial. I found no evidence for the former case and theory supports this. In his article, Morrison (2000) suggest that "the key to initiating the process of entrepreneurship lies within the individual members of society. He argued that there is a significant relationship between entrepreneurship and cultural specificity" (p. 1). This means that individuals attitude towards entrepreneurship plays a far more important role in triggering entrepreneurial activity than external factors like environment and social network. It seems very obvious to me that increase in social capital in a Hackerspace like Hackeriet would not make it more entrepreneurial because of the individual attitudes.

Thus, I would suggest that the high level of EA in MHFL's is due to the fact that these places are good at attracting people with the entrepreneurial mindset, and theory supports this. Many entrepreneurs identify with "hackers" and research have shown that entrepreneurs are attracted to like-minded people (Malecki, 1997). In addition, MHFL's are seen as potential providers of manufacturing resources (Birtchnell and Urry 2013, Petrick and Simpson 2013), and hence could support individuals interested in producing, commercializing and propagating their innovation. Surely, this look like an environment entrepreneurs want to be in.

In her article, Lindtner (2014) discovered that while "many makers stressed that a hackerspace shouldn't be reduced to its potential for entrepreneurial practice, they were nevertheless instrumental movers and shapers in local or international start-up scenes" (p. 5). Her research was based in the US, but I have evidence supporting this to be true in Norway as well. While there are not that many MHFL's in Norway yet, the ones that exists seems to offer valuable resources for entrepreneurs that they can't get other places. Social embeddedness enabled access to latent resources and resources otherwise not available to the entrepreneur states Jack &

Anderson (2002). The high SC in MHFL shows that they are socially embedded in my analysis. Thus, according to Jack & Anderson they should also act as a gateway to latent resources and this seems to be true in my sample. Entrepreneurial members identified 3D-Printers, Laser cutters and CNC machines, Electronics lab and last but not least humans as very valuable resources.

Brush (et al 2001) identifies that gathering an initial set of resources can be a big challenge for new businesses. One way of meeting these challenges include seeking advice from a network of contacts (Brush et al. 2001). In my survey I asked the members whether having access to personal networks of other people was important to them. While not as important as access to tools and knowledge, it still seemed to be an important part of most communities. As such, it makes sense for entrepreneurs to seek out such environments in the initial phase of their business. There seems to be little doubt that entrepreneurs are attracted by MHFL's and thus it should come as no surprise that entrepreneurial activity is high in these places.

## 6.4 Summary

Theory suggest that the MHFL should be great places for accidental entrepreneurship, but I did not find any evidence for this. However, as theory had predicted, entrepreneurs benefitted greatly from being in the MHFL. Also in line with established research is my finding that entrepreneurs are attracted to MHFL's because of high social capital. Furthermore, being a part of the MHFL did not make the members less risk averse contrary to what established theory would expect. In fact, I saw the opposite effect. It could be explained by the fact that members of MHFL generally have higher education and income than the national average.

# 7 Conclusion

To conclude this thesis, I have first discussed some limitations with my research followed by a complete summary of my findings. Here I discuss how my research contributes back to theory and what the practical implications of my findings are. Finally, I give my recommendation for further research on this topic.

## 7.1 Limitations

First of all I recognize that my sample size might be a bit small. I have tried to compensate for this by using T-Test throughout my analysis to make sure that my results likely would have yielded the same result on a large dataset. By using the T-Test I control for variance in the data, but only relative to my sample. So it may not represent all the MHFL in a best possible way. In the study I got results from 47 people across MHFL's in Norway and I tried to find out how big percentage of total population this was, but that turned out to be quite difficult. There are plenty of problems with counting the total amount of members since many members are not active and some also define "members" in different ways. That said, I know that Hackheim have 20 paying members and Hackerspace NTNU have about the same for working members. Given my samples, this corresponds to 20% and 45% of total population. The rest of the samples is probably a bit lower than that. I estimate around 10-15%. Preferably it should have been higher, but it was hard to get more people to respond because of the time constraints of my thesis.

If I had better time with this project, I might also have considered to do a longitudinal study instead. By following the MHFL's in Norway for three or so years I could have tracked all the entrepreneurial activity and how it evolved.

Another limitation with the survey is that Likert scales "may be subject to distortion from several causes. Respondents may avoid using extreme response categories (central tendency bias); agree with statements as presented (acquiescence bias); or try to portray themselves or their organization in a more favorable light (social desirability bias)" (Statistics Cafe, 2011, p. 1). However, since I was aware of all this while collecting and analyzing I am confident in the validity of the data and that they are not corrupted. An alternative solution to Likert-type questions could have been to use open ended survey questions, but this would make analyzing and comparing data much harder. The tradeoff would simply not be worth it.

## 7.2 Summary

To summarize my findings, there is not a clear correlation between high social capital and high entrepreneurial activity in Norwegian MHFL's. However, members recognize that social capital is a very important factor for entrepreneurship and that its presence makes it more likely that they will engage in entrepreneurial activities in the future.

To answer my research question: *"What impact does access to social capital in Norwegian MHFL's have on the level of entrepreneurial activity?"*. In conclusion, social capital in Norwegian MHFL have impact on entrepreneurial activity in that it attracts entrepreneurs, but it does not have a significant impact on triggering entrepreneurial activity. Entrepreneurs are attracted to MHFL because of the high social capital. High social capital however, is not a trigger for entrepreneurship, it is merely a facilitator.

This finding challenges the theoretical notion that social capital can be an accidental entrepreneurial trigger and proposes that it only works as a facilitator in the setting of a MHFL. In addition, social networks may not make you less risk averse if your network comprises of people with high income and wealth.

The practical implications for my study is that policymakers may be advised to promote entrepreneurship in MHFL's in order to attract entrepreneurs. It was clear in my research that MHFL's that encouraged entrepreneurship was also the ones with the highest EA. However, before changing policies it is important to take into consideration what attitudes the existing members have towards entrepreneurship. If they oppose it, new policies promoting entrepreneurship might not be very welcome.

## 7.3 Further research

As this study only looked at MHFL's from a resource based view, for further research I would recommend a study focusing on attitudes and behavior of the members. In my research I found that the attitudes of the MHFL members towards entrepreneurship differ enormously, and

established theory touches upon this as well. It is apparent that people with two different mindset and goals are drawn towards the same type of community. The question is then why some people have prejudices against entrepreneurship and how MHFL's can overcome them. If social capital cannot trigger entrepreneurial activity, can policies aimed at changing attitudes do it? Within the scope of my study I was not able to get to the bottom of this issue.

An alternative recommendation for further studies would be to do a longitudinal study where one could track the entrepreneurial activity of MHFL's over multiple years to see how they perform. This way, one could much more effectively isolate cause and effect regarding new venture creation. While I found out what type of resources in the MHFL the member thought was the most important in regards to entrepreneurship, a longitudinal study could confirm whether these findings hold up in reality.

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# 9 Appendix:

## 9.1 Initial mapping and analysis of the MHFL's

### 9.1.1 From Fablab.io

**Name:** Fellesverkstedet

**Type:** Fab Lab

**Focus:** It's about the infrastructure everyone needs to get their ideas out into the physical world. Production facilities, and assistance under the same roof, where you can make anything you want, at a price that everyone can afford.

**Perceived entrepreneurial focus:** 2/3

**Offerings:** Big workshop with lots of machines. They also have their own github repository for open source programming.

**Machines**: Laser cutter/engraver, 3D CNC milling machine, Sliding table panel saw/ Sirkelsag, Thicknesser/ Tykkelseshøvel, Jointer/ Avretterhøvel, Bandsaw/ Båndsag, Press, Exposure unit, Inkjet printer, Compound miter saw, Building saw.

**Business model:** Offer daily rates and extra for machines. In addition, they offer training at a hourly price.

**Location:** Oslo (Urban)

**Website:** http://www.fellesverkstedet.no/

**Contact:** Jens Dyvik, info@fellesverkstedet.no, 22381898

**Owned by:** Private

**Name:** Fab Lab NTNU

**Type:** Fab Lab

**Focus:** To stimulate learning through the innovative life cycle utilizing new digital fabrication tools. Low focus on entrepreneurship based on website. Mostly 3d-printing just for fun.

**Perceived entrepreneurial focus:** 1/3

**Offerings:** Offer people (only students?) the possibility to turn university projects or your own ideas into reality. Can also offer assistance with equipment / software provided in the FabLab for educational purposes. You need to provide your own materials. FabLab ++ is the possibility that user of the FabLab have to access machines from other labs located at the same building, such as plastic lab, mechatronics lab, industrial lab. Such machines are usually larger and require extensive training to achieve quality and safety.
**Machines**: 3D printer FDM, Desktop Mill, 3D Printer SLA, Vinyl Cutter, Laser Cutter, Arduino Compatible kits, Plotter. Plus, one can book the machines from the other labs, at the FabLab ++.
**Business model:** No information on website.
**Location:** Ålesund (Semi-Rural with 50k people living there)
**Website:** https://www.ntnu.edu/fablab
**Contact:** Henrique M. Gaspar / Associate Professor AMO - henrique.gaspar@ntnu.no
**Owned by:** Public

**Name:** Solvik Gard
**Type:** Fab Lab
**Focus:** Accommodation and internationalization. Offer experts a remote way of doing research, development and commercialization. Decent focus on entrepreneurship based on website.
**Perceived entrepreneurial focus:** 2/3
**Offerings:** Offer people related to the Fab Foundation free stay as long as they are open to share expertise with locals when it is relevant. They have ongoing technology projects with researchers in charge. You can fill in a form and apply to work there if you have an commercial idea. In this way they are supporting entrepreneurship. They also take school classes.
**Machines**: Laser cutter for wood, Computers with SketchUp software.
**Business model:** Sell food and accommodation. Sell products made from laser cutter.
**Location:** Lyngen (Rural)
**Website:** http://www.fablab.no/
**Contact:** Haakon Karlsen - haakon@fablab.no, 91852232
**Owned by:** Private

### 9.1.2 From Hackerspaces.org

**Name:** Hackerspace NTNU

**Type:** Hackerspace

**Focus:** Software. The goal of the space is to promote interest in regards to new technology. They are aiming to be a low threshold offer for students. Further on their website they also state that their vision is to be an creative arena where students can get help to realize their ideas and make the solutions of tomorrow. This is certainly somewhat focused on entrepreneurship, but is contradicting the goal of the hackerspace. May just be buzz words.

**Perceived entrepreneurial focus:** 1/3

**Offerings:** They have regular courses in technologies like Arduino and 3D printing.

**Machines**: Drones, 3D printers, leap motion, robot-kit, kinect, soldering iron, a  and oculus rift.

**Business model:** None as I can see from website.

**Location:** Trondheim (Urban)

**Website:** https://hackerspace-ntnu.no/

**Contact:** Erik Bjørgen, Tor Erik Lassen, hackerspace@idi.ntnu.no

**Owned by:** Public

**Short interview:** The hackerspace is two years old and is used mainly by students from Computer Science and Computer Engineering. The lab is run by students. Currently only 1 of 7 project have potential to be a commercial project. The rest is only hobby projects for fun and learning purposes. I was told that there is a informal attitude that commercialization is fine, but very little focus is given to promote it. Their main focus is to build a maker culture. As of this moment some people lack the attitude to go through with projects when they get hard. Tor Erik believe the maker culture is important to help people finish their project. He stated that he would never have come as far on his current project had it not been for the helping culture already established at the hackerspace. However, they still strive to make it better.

**Name:** Grenland Hackerspace

**Type:** Hackerspace

**Focus:** Seems like a very hobby focused hackerspace.

**Perceived entrepreneurial focus:** 1/3

**Offerings:** Judging from the websites, they look pretty dead.

**Machines**: Soldering Iron

**Business model:** N/A

**Location:** Porsgrunn (Semi Rural)

**Website:** http://tinkartank.org/doku.php

**Contact:** Thomas Sigurdsen, thomas.sigurdsen@gmail.com

**Owned by:** Private

**Quote: "**For mange er hackerspaces mest en sosial arena hvor man kan møte andre likesinnede, for andre er det et sted hvor man har kunnskap og fysiske ressurser (f.eks. elektriske komponenter, datamaskiner, gryter, jord og frø osv.); men jeg antar de fleste plasserer seg et sted i mellom disse."

**Name:** Hackeriet

**Type:** Hackerspace

**Focus:** This a physical space where people can go to make things, meet others and share knowledge and technology. This is not just about computer programming; Any hackers, from ham radio people and electronics geeks to artists and metalworkers are welcome to join up. Our strength is in diversity. If you have your own project, Hackeriet can offer you support. Seem to have few indication of commercial focus.

**Perceived entrepreneurial focus:** 1/3

**Offerings:** Hackeriet is a members-owned non-profit association. Members have a hand in the running of the organisation as well as 24/7 access to the space.

**Machines**: From their webpage: We do wearables, mechanics, electronics, fabrication, automatisation, creative recycling, socioeconomix, telecomix, 2600 style chipmonk, filtering, bass waves, heavy metal works, language wars, high voltage, biohacking, cypherpunk, cryptoparties, hsync and vsync, radio, code zen, free software, permaculture, social engineering, quantum fiziks, particle bendage and data love.

**Business model:** Membership is paid monthly by standing order. We ask that you pay what you think the space is worth to you.

**Location:** Oslo (Urban)

**Website:** http://hackeriet.no/

**Contact:** styret@hackeriet.no

**Owned by:** Private

**Name:** Bitraf

**Type:** Hackerspace

**Focus:** From what I can tell from their website, they seems to have a very broad focus, but a lot of their members are entrepreneurs and freelancers so they should be very aligned for a commercial focus.

**Perceived entrepreneurial focus:** 3/3

**Offerings:** You can work with your own project in a social environment, join workshops, hackathons or LAN parties. Bitraf is completely driven by members so you decide activities will take place. In daytime, there are typically entrepreneurs and freelancers working here.

**Machines**: Seems to be mainly focused on software

**Business model:** Have to pay a monthly subscription to be a member. They also get money from sponsors.

**Location:** Oslo (Urban)

**Website:** https://bitraf.no/

**Contact:** post@bitraf.no

**Owned by:** Private

### 9.1.3 From Themakermap.com

**Name:** Hackheim

**Type:** Makerspace

**Focus:** They want to be a hub for all people interested in technology. Seems very hoby focused.

**Perceived entrepreneurial focus:** 1/3

**Offerings:** Open for everyone.

**Machines**: Electronic workshop, 3d-printing, brewery, woodworking shop and computer shop.

**Business model:** Monthly subscription to be member.

**Location:** Trondheim (Urban)

**Website:** http://hackheim.no/

**Contact:** Nikolai Ovesen – 977 30 654

**Owned by:** Private

**Name:** Creator

**Type:** Makerspace

**Focus:** 1) Spark interest for making and create makers. 2) help makers turn their ideas into reality and become entrepreneurs. 3) Connect local makers with local businesses for joint opportunities

**Perceived entrepreneurial focus:** 3/3

**Offerings:** They have extra office space for businesses.

**Machines**: laser cutter, multiple CNC Mills for soft metal, plastics and wood, multiple 3D printers, large plotter, CNC vinyl and paper cutters, electronics equipment, various power- & hand tools.

**Business model:** Monthly subscription to be a member.

**Location:** Stavanger (Urban)

**Website:** https://www.creator.no/

**Contact:** Sjur Usken, +47 969 99 902

**Owned by:** Private

**Name:** Fix Trondheim

**Type:** Makerspace

**Focus:** A place where the tools and resources enable your creative projects to come to life. We are striving to provide a collaborative space for creatives, freelancers, independents, nomadic workers alike and curious minds, all of whom are woven together by sharing a core set of values.

**Perceived entrepreneurial focus:** 2/3

**Offerings:** Very little information on website.

**Machines**: CNC-machining, 3D-printing and programming.

**Business model:** Offer both personal and company membership for a monthly subscription.

**Location:** Trondheim (Urban)

**Website:** http://fixmakerspace.no/

**Contact:** N/A

**Owned by:** Private

## 9.2 Questions from survey

### Entrepreneurial Activity

1. **Which of the following descriptions fits you the best?**

❏ You are, alone or with others, currently trying to start a new business, including any self-employment or selling any goods or services to others.

❏ You are, alone or with others, currently trying to start a new business, including any self-employment or selling any goods or services to others.

❏ You are, alone or with others, currently owner of a company/startup that is less than 3,5 years old and you have worked with it in the last 12 month.

❏ You are, alone or with others, expecting to start a new business, including any type of self-employment, within the next three years.

❏ You are, alone or with others, contemplating to start a new business, including any type of self-employment, within the next three years.

❏ None of the above.

2. **If you have, or were planning to start a new company. Is it related to the MHFL in any way? If yes, how?**

3. **Common opportunity**

*Answer yes, no or don't know to the following items:*

- Do you know someone personally who started a business in the past 2 years?
- In the next six months, will there be good opportunities for starting a business in the area where you live?

4. **Individual opportunity**

*Answer yes, no or don't know to the following items:*

- Do you have the knowledge, skill and experience required to start a business?
- Would fear of failure prevent you from starting a business?

## Social Capital

*On the scale: Strongly agree, Agree, Neutral, Disagree, Strongly disagree. How do you rate the following items?*

1. **Trust in the MHFL**

- I have trust in the competence of other people in the MHFL.
- If I am working on something secret in the MHFL, I trust the other members not to talk about it in public.
- When I am stuck on a problem, or just need some advice, I am quick to ask other people in the MHFL for help.
- I usually get the help I need when I ask for it in the MHFL.

2. **Social Networks in the MHFL**

- Having access to tools and equipment is an important part of the MHFL
- Having access to the personal networks of other people is an important part of the MHFL.
- Having access to knowledge and expertise from other people is an important part of the MHFL.

3. **Reciprocity in the MHFL**

- I often help someone else with their project in the MHFL
- If I disagree with what everyone else agreed on, I feel free to speak out against it in the MHFL.
- I frequently uses the personal network of other members in the MHFL to get in contact with other people.

## Impact of SC on EA

*On the scale: Strongly agree, Agree, Neutral, Disagree, Strongly disagree. How do you rate the following items?*

1. **Knowledge and expertise**

- Having access to knowledge and expertise from other people is important when starting a new company
- If I decided to start a new company, I would get access to knowledge and expertise from other people in the MHFL.
- Having access to people with knowledge and expertise in the MHFL, makes it more likely that I will engage in entrepreneurial activities such as starting a new company.

2. **Tools and equipment**

- Having access to tools and equipment is important when starting a new company
- Having access to tools and equipments from the MHFL, makes it more likely that I will engage in entrepreneurial activities such as starting a new company.

3. **Personal networks**

- Having access to the personal network of other people is important when starting a new company
- If I decided to start a new company, I would get access to the personal network of other people in the MHFL.
- Having access to the other MHFL members personal network make it more likely that I will engage in entrepreneurial activities such as starting a new company.

## Individual perceptions of the MHFL

1. **Individual perceptions**

*On the scale: Strongly agree, Agree, Neutral, Disagree, Strongly disagree. How do you rate the following items?*

- My MHFL encourages members to engage in entrepreneurial activities such as starting a new company.
- My MHFL encourages members to engage in entrepreneurial activities such as starting a new company.
- My MHFL encourages members to be social and help each other.
- My MHFL should do more to encourage social relations.
- Being a part of the MHFL community make it more likely that I will engage in entrepreneurial activities such as starting a new company.

2. **Any additional remarks about this topic?**

## 9.3 Additional remarks

At the end of the survey I asked if it were something members wanted to add. Below is some of the most informative responses.

*"Having people with business relationships in a hackerspace ruins completely the genuinity of the whole effort. A hackerspace is not a place to work, that's a coworking space or a startup lab. A hackerspace is a place to experiment and socialize, and possibly do something for the good of your own community (the hackers), it's more of a family than an enterprise. To have people relating to each other as colleagues or employees/employer creates a toxic social environment. No one mentally healthy would like to spend free time in that context."*

*"Entrepreneurial activity is a byproduct of a successful MHFL. The focus of these spaces and initiatives should first and foremost always be on creating opportunities (generally), encouraging creativity, and developing communities. From experience, a too strong focus on business development often leads to the destruction of a space and is counterproductive."*

*"I simply want to be a part of a community that fosters creativity, and try to help others with both technical and business issues, based on my experience. At some point in time I'll likely found/co-found a company, but for now it's enough for me to just have fun at Creator :)"*

*"I'm using the makerspace to realize a project for my employer that is one-off thing that is outside of our normal line of business. I'm also looking to pursue personal projects, but not starting any new companies."*